DAGGETT COUNTY COMMISSION AND RDA MEETING AGENDA
Tuesday, August 26 2025 AT 9:00 A.M.
Daggett County Courthouse (95 North 1st West; Manila, UT 84046)
Public Access Is Available Through Electronic Means At
meet.google.com/ewi-tjqt-axg

9:00 A.M. STANDING BUSINESS FOR DAGGETT COUNTY COMMISSION & RDA

A. Welcome And Introduction Of Those Attending Electronically By Name
B. Invocation And Pledge of Allegiance
C. Motion To Go In And Out of Redevelopment Agency Meeting
D. Review of Minutes
E. Issues Updates – Discussion Only
   a. Redevelopment Agency (RDA)
   b. Municipal Building Authority
   c. Affordable/Workforce Housing
   d. EMS/EMT Sheriff's Office Updates
   e. Airports
   f. Clinic Updates
   g. Roads
   h. Code Enforcement Issues
   i. Legislation
   j. Tourism
   k. Citizen Comments - 5 minutes
F. Cash Summary Report & Accounts Receivable Report
G. Open Invoice Register & Reimbursement Register
H. Disbursement Listing
I. Purchase Requests
J. Correspondence
K. Commission Calendar Review

DAGGETT COUNTY COMMISSION POLICY AND LEGISLATION

1. 9:15 AM Recess For MBA Meeting
2. Discussion And Consideration Of EM Mitigation Of Regional Plan Adoption
3. 10:00 AM Discussion And Consideration Of UDOT Long-Range Plan
4. Discussion And Consideration Of Manila ALP Update Reimbursement Request #1
5. Discussion And Consideration Of Mid America Mediation Granting Settlement Authority To Discuss Numbers & Selecting A Point Person From The County To Contact During Mediation
6. Discussion And Consideration Of 2025 Certified Tax Rate Approval Of Resolutions 25-13, 25-14 & 25-15
7. Discussion And Consideration Of Policy Manual Section 24 Proposed Changes
8. Discussion And Consideration Of Letter Of Recommendation From Planning & Zoning To County Commission Regarding Richard Thomason Plat Amendment
9. Discussion And Consideration Of Sewer Easement Documentation Process Of The Proposed Sewer Alinement Going Near The Airport & The Property Adjacent To Ruble Lane

Closed Session For Discussion Of Items Permitted By §52-4-205 Of State Code**

REDEVELOPMENT AGENCY (RDA) POLICY & LEGISLATION

a) Discussion And Consideration Of Disbursement Request #10-08-15-2025 Closing Of Escrow Account
b) Closed Session For Discussion Of Items Permitted By § 52-4-205 of State Code**

COMMITTEE/MAINTENANCE REPORTS

1) Mechelle Miller – Dept. Of Public Safety – Emergency Management
2) Justice Court Updates.
3) Board And Committee Updates
4) U.S. Forest Service Updates

Notes: In compliance with the Americans with Disabilities Act, individuals needing special accommodations during this meeting should notify Larinda Isaacson at 95 North 1st West, Manila, Utah 84046, Telephone: 435-784-3154.

**Pursuant To § 52-4-205 of State Code Closed Session Is For The Purpose Of Discussing The Character, Professional Competence, Or Physical Or Mental Health Of An Individual; Collective Bargaining; Litigation, Purchase, Exchange, Or Lease Of Real Property.

Minutes of the Meeting of the Daggett County Commission and the Daggett County Redevelopment Agency held on **Tuesday, August 19, 2025** in the Commission Chambers in the Daggett County Courthouse at 95 North 1st West in Manila, Utah and through electronic means. Commissioner Matt Tippets, Commissioner Randy Asay and Commissioner Jack Lytle attended in person. Attorney Kent Snider attended virtually. Sheriff Bailey and Clerk Larinda Isaacson attended in person. The meeting was called to order at 9:01 am by Commissioner Tippets. The invocation was given by Commissioner Lytle. Commissioner Tippets then led those in attendance in the Pledge of Allegiance.

Present In Person: Peggy White, Jordynn Hewitt, Cordell McCracken, Mayor Butch Johns, Ken Campbell, Allen Parker

Present Online or by Phone: Bart Jensen, Bryan Meier, Adam Perschon

Motion to Go In and Out of Redevelopment Agency (RDA): Commissioner Asay motioned to go in and out of the Redevelopment Agency (RDA) Meeting Agenda. Commissioner Lytle seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioners Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Approve Minutes: Minutes from the August 12, 2025 Commission and RDA Meeting were available for review. Commissioner Lytle motioned to accept the minutes from the August 12, 2025 Commission and RDA Meeting. Commissioner Asay seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Recess for MBA Meeting at 9:20 am. Returned from recess at 9:31 am.

Issue Updates

RDA and MBA: There were no new updates.

Affordable Workforce Housing: Things are moving forward.

EMS/EMT Sheriff's Office Updates: Time was given to Sheriff Eric Bailey. He stated that we have talked about having a light put on the gates at the rodeo grounds. It would be a good thing for safety and also convenience. They are using flashlights now. It would be nice to have this done before the PRCA rodeo. There was some discussion. The Sheriff's Office was thanked for all the work they do.

Airports: There was nothing at this time.

Clinic: Things are moving forward.

Code Enforcement Issues: Kent Snider stated that things are moving forward.

Tourism: Time was given to Jordynn Hewitt, the Charlie Jenkins concert is this Friday. It is Free. The PRCA Rodeo is coming up and Daggett Daze. There has been advertising done for these events.

Citizen Comment: There were no citizen comments.

Cash Summary and Accounts Receivable: The Cash Summary and Accounts Receivable was provided by the Treasurer's Office and reviewed by the Commissioners. Commissioner Asay motioned to accept the Cash Summary and Accounts Receivable Report for the County and RDA dated August 15, 2025. Commissioner Lytle seconded motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Open Invoice Register: The Open Invoice Register was provided by the Auditor's Office and reviewed by the Commissioners. Commissioner Asay motioned to approve the Open Invoice Register dated August 14, 2025 in the amount of $34,705.87 for the County & the RDA. Commissioner Tippets seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Reimbursement Register: There was no reimbursement summary.

Brief Recess for technical issues at 9:40 AM. Back from recess at 9:44 AM

Disbursement Listing: The Disbursement Listing was provided by the Auditor's Office and reviewed by the Commissioners. Commissioner Lytle motioned to accept the Disbursement Listing as being reviewed from August 10, 2025 to August 14, 2025 for Daggett County Zion's Checking in the amount of $64,154.70 with no void amount. Commissioner Tippets seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Purchase Request: There were no purchase requests at this time.

Correspondence / Calendar: There was a meeting with the food pantry last week and it was requested that we have a food drive to help with stocking the pantry with holiday foods.

UAC is coming to Daggett County next week. They want to observe our Commission meeting and an Elected Officials meeting. They would also like to tour the jail.

Brian Wilson, District Forest Ranger is moving out of the area. He and his family will be missed.

POLICY AND LEGISLATION

Discussion And Consideration Of Utah Rural County Grant Contract #26063270 From The State Of Utah, Governor's Office Of Economic Opportunity To Daggett County Government: There was some discussion. Commissioner Asay motioned to approve the Utah Rural County Grant Contract #26063270 From The State Of Utah, Governor's Office Of Economic Opportunity To Daggett County Government. Commissioner Lytle seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Discussion And Consideration Of Victim Advocate Request For A County Cell Phone: There was some discussion. Having a work phone for Victim Advocate is a good idea. Commissioner Lytle motioned to approve the Victim Advocate request for a county cell phone. Commissioner Asay seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Discussion And Consideration Of Esri's Parcel Fabric With Jones & DeMille Engineering For GIS: Time was given to Cordell McCrackin. There was some discussion. Commissioner Lytle motioned to approve the Esri's Parcel Fabric with Jones & DeMille Engineering for GIS. Commissioner Asay seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Discussion And Consideration of Resolution # 25-12: A Resolution Authorizing The Filing Of Cross-Appeals For 2025 Centrally Assessed Properties: Commissioner Lytle motioned to approve Resolution # 25-12: A Resolution Authorizing The Filing Of Cross-Appeals For 2025 Centrally Assessed Properties. Commissioner Asay seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Discussion and Consideration of Airport Insurance Application: Commissioner Tippets stated that this is a ratification as he signed the application last week due to time restraints. It was discussed that it was best to cover our bases. Commissioner Lytle motioned to ratify the signing of the Airport Insurance Application. Commissioner Asay seconded the motion. The Commissioners voted as follows on the motion:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Discussion and Consideration of Dutch John Airport Development: Dutch John Mayor, Butch Johns wanted to be here for this. He is enroute. It was decided to go into closed session until Mayor Johns could be present.

Commissioner Lytle motioned to go into closed session for the purpose of Purchase, Exchange, or Lease of Real Property. Commissioner Asay seconded the motion. The commissioners voted as follows:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Went into closed session at 10:19 AM. Back in to open session at 11:30 AM

Commissioner Lytle motioned to go back into open session. Commissioner Asay seconded the motion. The commissioners voted as follows:

	Yes	No	Abstained	Absent
Commissioner Tippets:	X			
Commissioner Lytle:	X			
Commissioner Asay:	X			

The motion carried.

Discussion and Consideration of Dutch John Airport Development Cont': Ken Campbell, who runs the Vernal Airport and Allen Parker joined the meeting with Mayor Butch Johns. Time was given to Butch Johns. The Mayor stated that he had not seen the master plan of the Dutch John Airport. Commissioner Tippets had supplied the plan to him. The Mayor did like the master plan. He would like to have an Airport Board that would be over the Dutch John Airport. He would like to assist the airport to reach the master plan level. There was some discussion. Kent Bond was called and joined the meeting. There was more discussion. It was decided to have a work meeting to move forward with plans. A date for the work meeting was not decided upon.

With nothing further to discuss, Commissioner Tippets adjourned the meeting by acclamation at 12:37 PM.

County of Daggett
Cash Summary
All Bank Accounts as of 08/22/2025

Description	Amount
Zions Checking	$4,694,711.58
PTIF 2259 General Accounts	$421,155.42
PTIF 2552 General Fund	$26,331.60
PTIF 2772 Farm & Ranch Protection	$20,218.21
PTIF 2834 General Fund	$188.93
PTIF 3465 General Fund	$23,126.89
PTIF 3932 General Fund	$12,157.16
PTIF 5583 Daggett County RDA Fund	$1,367,492.64
PTIF 5610 Daggett County Redevelopment #1	$845,683.21
PTIF 8676 Water Revenue Bond	$58,499.26
PTIF 8699 WT Bond Reserve Account	$18,442.92
PTIF 8700 WT 2015 Replacement Account	$84,914.26
Zions Tax Collection 026134668	$243,717.12
PTIF 3200 Motor Vehicle	$90,405.81
UNDEPOSITED PAYMENTS	$17,215.35
General Ledger Cash Total:	**$7,924,260.36**

County of Daggett
Cash Summary
All Bank Accounts as of 08/22/2025

Bank Account	Account No.	Account Name	Amount
Zions Checking	10.1122	Zions Checking - General	($9,743.40)
Zions Checking	11.1122	Cash - checking - Zions Fd 11	$1,170,842.17
Zions Checking	12.1122	Cash - checking - Zions Fd 12	$186,154.59
Zions Checking	13.1122	Cash - checking - Zions Fd 13	$306,301.03
Zions Checking	15.1122	Zions Checking - General	$6,302.46
Zions Checking	17.1122	Cash - Checking - Zions Fd 17	$15,925.26
Zions Checking	18.1122	Cash - Checking - Zions Fd 18	$30,849.22
Zions Checking	19.1122	Zions Checking - General	$267,332.10
Zions Checking	20.1122	Cash-Checks-Zions fd 20	$3,667.26
Zions Checking	22.1122	Cash - checking Zions Fd 22	$409,441.11
Zions Checking	23.1122	Cash - checking - Zions Fd 23	$586,053.44
Zions Checking	24.1122	Cash - checking - Zions Fd 24	$3,996.50
Zions Checking	25.1122	Cash - checking - Zions Fd 25	$812,519.39
Zions Checking	27.1122	Cash - checking - Zions Fd 27	$3,745.51
Zions Checking	28.1122	Cash - checking - Zions Fd 28	$558,303.88
Zions Checking	30.1122	Cash - Checking - Zions Fd 30	$19,823.95
Zions Checking	32.1122	Cash - checking Zions FD 32	$10,496.52
Zions Checking	33.1122	Cash - checking - Zions Fd	($219,755.05)
Zions Checking	34.1122	Cash-Checking-Zions Fd 34	$680,289.27
Zions Checking	35.1122	Zions Checking	($49,497.44)
Zions Checking	37.1122	Zions Checking - Combined	$24,787.35
Zions Checking	40.1122	Cash - checking - Zions Fd 40	$191,836.48
Zions Checking	45.1122	Cash - Checking - Zions Fd 45	($636,117.65)
Zions Checking	49.1122	Checking - Zions Fd 49	$58,472.72
Zions Checking	50.1122	Cash-Checking-Zions Fd 50	$66,859.35
Zions Checking	72.1122	Cash - checking - Zions Fd 72	$12,909.80
Zions Checking	74.1122	Cash - checking - Zions Fd 74	$23,756.11
Zions Checking	75.1122	Cash - checking - Zions Fd 75	$52,847.72
Zions Checking	76.1122	Cash - checking - Zions Fd 76	$32,927.49
Zions Checking	77.1122	Cash - checking - Zions Fd 77	$4,312.97
Zions Checking	78.1122	Cash - checking - Zions Fd 78	$10,643.39
Zions Checking	80.1122	Cash - checking - Zions Fd 80	$58,428.08
			$4,694,711.58
PTIF 2259 General Accounts	10.1151	PTIF 2259 General	$11,781.47
PTIF 2259 General Accounts	11.1151	PTIF 2259 General	$255,562.97
PTIF 2259 General Accounts	12.1151	PTIF 2259 General	$47,991.00
PTIF 2259 General Accounts	13.1151	PTIF 2259	$103,949.81
PTIF 2259 General Accounts	33.1123	PTIF 2259 General	$1,700.17
PTIF 2259 General Accounts	50.1151	PTIF 2259 General	$170.00
			$421,155.42
PTIF 2552 General Fund	10.1161	PTIF 2552 General Fund	$5,265.54
PTIF 2552 General Fund	28.1161	PTIF 2552 Home Sales	$21,066.06
			$26,331.60
PTIF 2772 Farm & Ranch Protection	10.1162	PTIF 2772 General Fund	$20,218.21
PTIF 2834 General Fund	10.1153	PTIF 2834 General Fund	$188.93
PTIF 3465 General Fund	10.1163	PTIF 3465 General Fund	$23,126.89
PTIF 3932 General Fund	10.1154	PTIF 3932 General Fund	$12,157.16
PTIF 5583 Daggett County RDA Fund	25.1151	PTIF 5583 Daggett County RDA	$1,367,492.64
PTIF 5610 Daggett County Redevelopment #1	25.1158	PTIF 5610 Daggett County RDA	$845,683.21
PTIF 8676 Water Revenue Bond	28.1168	PTIF 8676 Water Revenue Bond	$58,499.26
PTIF 8699 WT Bond Reserve Account	28.1169	PTIF 8699 WT Bond Reserve Account	$18,442.92
PTIF 8700 WT 2015 Replacement Account	28.1170	PTIF 8700 WT 2015 Replacement Account	$84,914.26
Zions Tax Collection 026134668	81.1130	Zions Checking - Tax Collection	$243,717.12
PTIF 3200 Motor Vehicle	81.1131	PTIF 3200 Motor Vehicle	$90,405.81
UNDEPOSITED PAYMENTS	10.1175	Cash clearing	$36.48
UNDEPOSITED PAYMENTS	12.1175	Cash clearing	$0.02
UNDEPOSITED PAYMENTS	25.1175	Cash Clearing	$856.33
UNDEPOSITED PAYMENTS	28.1175	Cash clearing	($892.83)
UNDEPOSITED PAYMENTS	33.1175	Cash clearing	($1,913.61)
UNDEPOSITED PAYMENTS	40.1175	Cash Clearing	$0.01
UNDEPOSITED PAYMENTS	72.1175	Cash clearing	($0.02)

County of Daggett
Cash Summary
All Bank Accounts as of 08/22/2025

Bank Account	Account No.	Account Name	Amount
UNDEPOSITED PAYMENTS	74.1175	Cash clearing	$0.03
UNDEPOSITED PAYMENTS	81.1175	Cash clearing	$19,128.94
			$17,215.35
General Ledger Cash Total:			**$7,924,260.36**

Accounts Receivable Report for Commission

Who:	Fund:	What:	How Much:	Received:	Notes:
State of Utah	10	EMPG 2024-2025	$14,357.71		Submitted 01/17/2025
State of Utah	33	Multi-County Assessing & Collecting	$150,000.00		Turned in GIS Data 07/10/2025
UDOT	50	Advertising Invoice for SR-43 Trail	$1,320.00		Submitted 08/06/2025
State of Utah	45	Written Request No. 2	$324,433.84		Will Submit 08/26/2025

County of Daggett
Reimbursement Register
Payroll Period: 08/03/2025 to 08/16/2025

Employee No.	Employee	Payroll Date	Amount	Reimbursement	Ledger Account/Project	Activity
T32	Tate, Matthew R.	08/16/2025	114.10	Inspections Mileage	104180.232 - P&Z building inspector mileage	
			$114.10			

Daggett County

Open Invoice Register - 8/21/2025

Invoice No.	Vendor	General Ledger Date	Due Date	Amount	Account No.	Account Name.	Description
19QX-WC41-NPYD	Amazon Capital Services	8/15/2025	8/15/2025	$ 709.96			
				$ 709.96	104131.61	HR misc supplies	Suitcases,Paddle Board
1DTW-6KTK-6VGK	Amazon Capital Services	8/20/2025	8/20/2025	$ 187.00			
				$ 187.00	104131.61	HR misc supplies	Watch
1GWG-F6H4-VVM1	Amazon Capital Services	8/19/2025	8/19/2025	$ 2,338.73			
				$ 2,338.73	104131.61	HR misc supplies	WAtches, Binoculars, Dewalt, Soundbar, Coolers, Milwaukees
1L6J-W7JY-DJKV	Amazon Capital Services	8/6/2025	8/6/2025	$ 19.95			
				$ 19.95	114415.251	Equipment Repair	AC Dye Leak Detector
1RPM-FLKV-J716	Amazon Capital Services	8/18/2025	8/18/2025	$ 824.96			
				$ 824.96	104131.61	HR misc supplies	Tablet, Mini Fridge, Tools
1VVC-VWQV-71X6	Amazon Capital Services	8/11/2025	8/11/2025	$ 53.72			
				$ 53.72	114415.251	Equipment Repair	Front air suspension Leveling Rods
	Vendor Total:			**$ 4,134.32**			
08.20.2025V	Ameritas Life Insurance Corp.	8/20/2025	8/20/2025	$ 359.76			
				$ 359.76	101461	Health insurance clearing	September 2025 premium
August2025D	Ameritas Life Insurance Corp.	8/20/2025	8/20/2025	$ 1,892.39			
				$ 1,892.39	101461	Health insurance clearing	September 2025 premium
	Vendor Total:			**$ 2,252.15**			
01-105999	Big B Equipment	8/13/2025	8/13/2025	**$ 164.65**			
				$ 164.65	114415.255	B Road Fleet Vehicle Maintenance	Clevis, Set Screw, Pin, Freight
169	Fisher, Matt	8/15/2025	8/15/2025	**$ 71,500.00**			

Daggett County

Open Invoice Register - 8/21/2025

Invoice No.	Vendor	General Ledger Date	Due Date	Amount	Account No.	Account Name.	Description
				$ 71,500.00	354611.74	Shooting Range Capital Outlay	Biuld for Pavillion Labor & Materials - Shooting Range
8.20.2025	Lincoln Financial Group	8/20/2025	8/20/2025	**$ 1,783.94**			
				$ 1,783.94	101461	Health insurance clearing	September 2025 Premium
590470	Public Employees Health Program	8/15/2025	8/15/2025	**$ 34,132.58**			
				$ 34,132.58	101461	Health insurance clearing	September 2025 premium
53033	Smuin, Rich and Marsing	7/31/2025	7/31/2025	**$ 3,216.00**			
				$ 1,608.00	104141.31	Auditor Professional Services	Consulting
				$ 1,608.00	334144.31	A & C - Rec/Trs professional services	Consulting
8.14.2025	Wyoming State SHRM	8/14/2025	8/14/2025	**$ 375.00**			
				$ 375.00	104131.23	HR travel/training	
	Total			**$ 117,558.64**			

		GL Account Summary
$ 38,168.67	101461	Health insurance clearing
$ 375.00	104131.23	HR travel/training
$ 4,060.65	104131.61	HR misc supplies
$ 1,608.00	104141.31	Auditor Professional Services
$ 73.67	114415.251	Equipment Repair
$ 164.65	114415.255	B Road Fleet Vehicle Maintenance
$ 1,608.00	334144.31	A & C - Rec/Trs professional services
$ 71,500.00	354611.74	Shooting Range Capital Outlay
$ 117,558.64		**Total**

County of Daggett
Disbursement Listing
Zions Checking - 08/14/2025 to 08/21/2025

Payee Name	Reference Number	Payment Date	Payment Amount	Void Date	Void Amount	Source
	0821251200	08/21/2025	$50,154.19			Paycheck
AJoules, Inc.	100497	08/19/2025	$2,250.00			Purchasing
Amazon Capital Services	100498	08/19/2025	$1,582.61			Purchasing
AT&T Mobility	100499	08/19/2025	$43.23			Purchasing
AT&T Mobility LLC (FirstNet)	100500	08/19/2025	$377.91			Purchasing
Big Pee Industries INC.	100501	08/19/2025	$400.00			Purchasing
Centurylink	100502	08/19/2025	$33.20			Purchasing
Daggett County	100503	08/19/2025	$244.00			Purchasing
DDI, Inc.	100504	08/19/2025	$1,955.00			Purchasing
F.B. McFadden Wholesale Co	100505	08/19/2025	$108.85			Purchasing
G & H Garbage Service	100506	08/19/2025	$586.96			Purchasing
GCS Billings	100507	08/19/2025	$123.79			Purchasing
RDO Equipment Co.	100508	08/19/2025	$225.65			Purchasing
Slaugh's Sinclair	100509	08/19/2025	$102.90			Purchasing
TecServ Inc.	100510	08/19/2025	$54.00			Purchasing
Town of Dutch John	100511	08/19/2025	$60.00			Purchasing
Uintah County	100512	08/19/2025	$6,352.85			Purchasing
Verizon Wireless	100513	08/19/2025	$80.02			Purchasing
Town of Dutch John	100514	08/19/2025	$60.00			Purchasing
Frontier Recovery	100515	08/21/2025	$150.00			Payroll
FP Finance Program	ACH	08/19/2025	$85.00			Purchasing
HealthEquity	ACH	08/19/2025	$39.90			Purchasing
Jones & DeMille Engineering, Inc.	ACH	08/19/2025	$20,000.00			Purchasing
EFTPS	ACH	08/21/2025	$14,243.98			Payroll
HealthEquity	ACH	08/21/2025	$1,569.54			Payroll
Utah Retirement Systems	ACH	08/21/2025		08/21/2025	$10,272.62	Payroll
Utah State Tax Commission	ACH	08/21/2025		08/21/2025	$2,442.34	Payroll
			$100,883.58		**$12,714.96**	

From: **Stephen Sorweid** <ssorweid@utah.gov>
Date: Thu, Aug 21, 2025 at 11:10 AM
Subject: Centrally Assessed 2025 Daggett County Presentation
To: <jplatt@daggettcounty.org>, <larindai@daggettcounty.org>, <kpallesen@daggettcounty.org>, <bcarter@daggettcounty.org>
CC: Rachael McIntire <rmcintire@utah.gov>

Hello!

I hope this message finds you all well! My name is Steve Sorweid, and I am reaching out from the centrally assessed team at the State Tax Commission. It's the time of year that we are compiling a presentation focused on centrally assessed industries including mining, oil and gas, and utilities within Daggett County again. I wanted to reach out and see if there are any concerns or specific questions you may have that we can keep in mind to address in the presentation as we put it together.

If you would like this information presented in person or virtually, please respond back with possible dates that work for your county officials. Regardless of whether a formal review with our team is requested, we will send you the slide deck so you have the information.

Please feel free to reach out to me with any questions or suggestions you may have. We are more than happy to accommodate if there is anything you wish to discuss.

Look forward to hearing from you.

Warm regards,

-

Steve Sorweid
Oil and Gas Valuation Analyst
Utah State Tax Commission
(385) 499-0546
Mission: Promote Tax and Motor Vehicle Law Compliance

This email is intended for the individual to whom it is addressed and may contain information that is privileged, confidential, or otherwise exempt from disclosure under applicable law. If the reader of this email is not the intended recipient or the employee or agent responsible for delivering the message to the intended recipient, you are hereby notified that any dissemination, distribution, or copying of this communication is strictly prohibited. If you have received this communication in error, please immediately notify us by telephone and return the original message to us at the listed email address.

To Whom It May Concern,

I want to sincerely thank you for awarding me the CEOAB Grant. This generous support will help me grow my camper rental business, Birch Creek RV Rentals, and create opportunities to better serve visitors and families in our county.

I'm grateful for this opportunity and excited to see the ways it will not only strengthen my business but also contribute to our local community.

With appreciation,

Carol Slaugh

Birch Creek RV Rentals

COBBLESTONE
software
100 Overlook Center, Floor 2 • Princeton, NJ 08540

Wednesday, July 30, 2025

Jack Lytle
County Commissioner
Daggett County
PO Box 219
Manila Utah 84046

Managing Contracts Just Got Easier®!

It was great meeting you at **NACo's Annual Conference & Exposition**. I would like to continue our conversation regarding your current contract administration process. I'd also like to reintroduce you to CobbleStone's industry-leading contract management software.

CobbleStone Contract Insight® helps legal professionals better manage the contract lifecycle with powerful contract management features, including:

- ✓ Contract drafting & contract authoring
- ✓ Dynamic templates & clauses
- ✓ Online negotiations & compliance monitoring
- ✓ Auto extract & intelligent workflows
- ✓ Document version tracking
- ✓ Electronic approvals & eSignatures
- ✓ VISDOM® contract artificial intelligence

We pride ourselves on providing a robust and user-friendly contract management software platform that can scale with your organization's contracting needs. CobbleStone® can make contracting processes less stressful while increasing efficiency, centralization, and revenue while decreasing risk and missed opportunities.

If your team is looking to manage contracts better, please contact us for a free, personalized demo based on your team's specific contract management needs at JPedrick@CobbleStoneSoftware.com or call 866-330-0056 today.

Scan the QR code below for a free 30-day trial system of our Enterprise Edition.

All the best,

James Pedrick
CobbleStone Software – Leaders with Contract Management Software
866-330-0056 x 1503 | JPedrick@CobbleStoneSoftware.com | CobbleStoneSoftware.com

Gmail

Larinda Isaacson <larindai@daggettcounty.org>

Revitalization Grant Information and deadlines

1 message

Karly Worthen <karlyworthen@utah.gov> Tue, Aug 19, 2025 at 11:24 AM
Bcc: braymond@daggettcounty.org

Hello Airport Managers,

I am writing to inform you of updates to the application process for the Revitalization Grant program. As a reminder, this grant is available to all public use airports within the state and is intended to support projects that enhance the visual appeal of airport facilities.

Each year, a total of $200,00 is allocated for distribution through the Revitalization Grant.

Important deadlines:
Applications for Fiscal Year 2026 are due by Friday, August 22, 2025. We apologize for the short notice.

If you submitted a project within the past year and have not received a response, please reach out to me by email to confirm your submission has been received. With the recent transition to Blackcat, I want to make sure no project is overlooked for the review process this year.

New ongoing application process:
Going forward, applications may be submitted year round. All applications received before July 1 of each year will be reviewed, ranked, and considered for funding for the upcoming fiscal year.

When submitting a proposal, please include the applicable fiscal year in the title. For example: Revitalization Grant FY2027.

Applicants whose proposals are selected for funding will be notified in writing no later than September 1st.

Please feel free to reach out if you have any questions about this process or a general question about the grant.

Warm regards,

Karly Worthen | Aircraft Registration Program Specialist

UDOT Division of Aeronautics

135 N 2400 W | Salt Lake City, UT 84116

Cell: (435) 660-9470

UDOT
AERONAUTICS

Gmail

Larinda Isaacson <larindai@daggettcounty.org>

Clarification on Grant Application Process

1 message

Karly Worthen <karlyworthen@utah.gov> Tue, Aug 19, 2025 at 3:01 PM
Bcc: braymond@daggettcounty.org

Hello Airport Managers,

Apologies for not clarifying this in my previous email.

To apply for the grant, submissions must be made through Blackcat. Additional information about the grant, and application guidelines, can be found at the following website:

Revitalization Grant Website

Please let me know if you have any questions.

Best regards,

Karly Worthen | **Aircraft Registration Program Specialist**

UDOT Division of Aeronautics

135 N 2400 W | Salt Lake City, UT 84116

Cell: (435) 660-9470

Gmail Nicole White <nwhite@daggettcounty.org>

Disbursement Request #10 -08-15-2025 -Closing of Escrow Account

1 message

Jack Lucas <jacknlucas@msn.com> Mon, Aug 18, 2025 at 12:29 PM
To: "Braymond@daggettcounty.org" <braymond@daggettcounty.org>, Matt Tippets <mtippets@daggettcounty.org>, "bjohns@dutchjohn.org" <bjohns@dutchjohn.org>
Cc: Carl Mathis <carl.mathis@zionsbancorp.com>, "Matt Lucas (wrfguides@gmail.com)" <wrfguides@gmail.com>

Mayor Johnson and Commissioner Tippets,

Included is "Disbursement Request #10". This Request is for disbursement and closure of the Escrow Account created for the Redtail 2 Subdivision -Dutch John, UT. This Distribution Request will release all remaining funds in Escrow Account held by Zions Bank created to guarantee of completion of all utilities and construction associated with the Redtail 2 Subdivision project.

It is important to note that the escrow balance consists of funds Cicada Cove, LLC has caused to remain in the account to comply with Dutch John Zoning requirements. This is to cover a two-year guarantee period for the utilities related to the Redtail 2 Subdivision. Additionally, Cicada Cove, LLC has covered $4,000 of fees associated with maintaining this Escrow account.

We sincerely appreciate the support from Daggett County and City of Dutch John to bring this project to fruition. Together we

have been able to create a wonderful addition to the Dutch John community. Please don't hesitate to call or email if you have any questions or need clarification.

Thank you and best regards,

Jack Lucas

Matt Lucas

Manager -Redtail Development/Cicada Cove, LLC

Cell: 801-910-5005

35 Airport Rd., Dutch John, UT 84023

From: Jack Lucas
Sent: Thursday, November 2, 2023 12:00 PM
To: skunkel@dutchjohn.org; Braymond@daggettcounty.org; Matt Tippets <mtippets@daggettcounty.org>
Cc: Carl Mathis <carl.mathis@zionsbancorp.com>; Matt Lucas (wrfguides@gmail.com) <wrfguides@gmail.com>; Kade Harmon <kade@lhcgr.com>; Brittany Ketchum <brittany@lhcgr.com>
Subject: Disbursement Request #9-Revised -11-01-2023 - Longhorn Construction

To:

Carl Mathis, Mayor Kunkle & Commissioner Matt Tippets,

Please find attached **Disbursement Request Form #_9-Revised__**. This request is for the work completed thus far by Longhorn

Construction-General Contractor on the Redtail 2 Subdivision and specifically associated with the Escrow Agreement with Zions Bank.

Explanation to Revised Request. To minimize confusion, we have revised the amount of this Disbursement and eliminated the **"Amendment to the Escrow Agreement-Addendum 1"** . The amount of this Request reflects the amount remaining in the Escrow Account specifically for construction costs. The remaining balance to be left in the Escrow Account after payment of this Request will address the "Improvement Assurance Guarantee" of $73,000.00, which is required to be left in the account for two years from date of completion.

Remaining balance for Construction Costs will be paid to Longhorn Construction **directly from Cicada Cove, LLC..**

Your help in processing this request is greatly appreciated.

Please don't hesitate to contact me if you have any questions.

Best regards,

Jack N. Lucas

Co-Owner Western Rivers Fly Fishers Guides

Dutch John, Utah

Cell: 801-910-5005

www.wrfguides.com

Disbursement Request Form -No 10 Cicada Cove LLC.pdf
155K

EXHIBIT B-1

("Specific Instructions")

DISBURSEMENT REQUEST # 10

Zions Bank
Attn: Corporate Trust Dept.
One South Main Street, 12th Floor
Salt Lake City, Utah 84133

Re: Escrow Account Number: 1473056

In accordance with the Escrow Agreement dated as of June 8, 2023 by and among Cicada Cove, LLC, Daggett County Redevelopment Agency, and Zions Bancorporation, National Association, as Escrow Agent, you are hereby authorized and directed to disburse the following amount to the payee listed below:

Amount: $ 88,487.37

Payee: Cicada Cove, LLC

Address: PO Box 204

Dutch John, UT 84023

Daggett County Redevelopment Agency

By: _____

Name: Matt Tippetts

Title: Daggett County RDA Chairma

Date: _____

Town of Dutch John

By: _____

Name: Butch Johnson

Title: Mayor-City of Dutch Jol

Date: _____

------ Forwarded message ---------
From: **Thomas W. Peters** <twp@psplawyers.com>
Date: Tue, Aug 19, 2025 at 12:58 PM
Subject: Mid America Mediation (Attorney/Client Privileged Communication)
To: Commission <Commission@daggettcounty.org>, Brianne Carter <bcarter@daggettcounty.org>, Jesse Platt <jplatt@daggettcounty.org>, Kent Snider <ksnider@daggettcounty.org>, Keri Pallesen <kpallesen@daggettcounty.org>

Daggett County,

Below is an email that I have sent to the other counties on the Mid America matter. In the past since Daggett has about a 1% value we haven't had much discussions on the settlement proposals because the other counties haven't been in agreement with any of the proposals. We discussed a year or so back that I would reach out when I had something, but that hasn't really happened. However, we do have a mediation scheduled for next week and in the hopes of possibly setting the matters I thought I would reach out to obtain settlement authority consistent with my request to the other counties. If you could designate someone that I can call that would be great, I would probably only call when Grand, San Juan and Uintah agreed to something since they make up 98% of the value. Or I could just reach out after. Even a settlement at Mid America's numbers produces a refund of about $65,000.00 or less from Daggett County.

A mediation for the Mid America matters (2018-2025) has been scheduled for August 27, 2025.

Attached is a spreadsheet showing the latest settlement numbers by Mid America and the Division. The section titled 2025 Methodology Calculation" is something I requested the Division perform when the 2025 assessment was issued. The reason I requested this is because the 2025 assessment incorporates the methodology changes to the 2016/2017 assessment as ordered by the District Court Tax Court's Decision for 2016/2017 as well as the Tax Commission's summary judgment ruling for 2018-2023. I asked the Division to "reverse engineer" the prior years' assessments based upon the 2025 methodology and apply it to 2018-2023.

The results from that request show that the Counties will be subject to an overall reduction of 14.33% from the original assessment for all years. This would be a best case scenario for the Counties based upon the Tax Court Decision and the Tax Commission's Summary Judgment Decision.

The fact that the Division has provided the "Minimum Acceptable Settlement Values" numbers to Mid America has complicated things. Mid America has rejected that proposal by the Division.

I am requesting settlement authority between the 14.33% overall reduction numbers titled "2025 Methodology Calculation" and the Division's "Minimum Acceptable Settlement Values." This would be the range that I would focus our negotiations on during the mediation. Anything above (in value) and below (in percentage reduction) the Division's Minimum Acceptable Settlement Values" would be considered a "win." This is because the Division's numbers could always be agreed to by Mid America and the Division and then the Counties would be subject to an Order to Show Cause. I would like to start our discussions with Mid America and the Division at the 14.33% overall reduction numbers.

If these matters are unable to be resolved at the mediation and instead go to a hearing, Mid America will likely be requesting a 35-45% reduction in overall value for all of the assessments. Mid America is also not in agreement with the Division's 2025 methodology, so that section is not set in stone, and I expect the Division to offer some sort of reduction to the 2024 and 2025 assessment for settlement reasons. That means the Division will likely offer an additional 20% reduction for 2024 and possibly 2025 to settle the cases.

In approximate refund numbers, since each county has a different tax rate, Mid America is essentially looking at an approximate $7mm+ refund plus interest from the Counties, the Division is offering an approximate $5.5mm refund, and the Counties would be in the range of starting at a $3.5mm+ refund. For any settlement I will push to have the numbers be a flat number and not subject to interest if paid by December 31, 2025.

It is going to be hard to get Mid America off of their 28.53% reduction since they do have some valid arguments for requesting considerably more in reduced value. This is because they have applied the Tax Court decision and Tax

ne one issue they did not prevail on from the Tax Commission's Summary Judgment Decision. The point they lost on, was because the Tax Commission said they would need to hear the evidence related to growth for each year and could not decide it based upon the facts before them. The Tax Commission could agree with Mid America on the growth issue in any subsequent hearing and the refund would then be north of 30% reduction in value.

n preparation for the mediation next week, I am asking for the following:

1. Settlement authority to discuss numbers with Mid America and the Division between the 2025 Methodology Calculation and the Division's Minimum Acceptable Settlement Values.
2. A point person from the County that I can call, with 15-30 minutes notice to discuss any nuances and issues that may arise during the mediation.

Please let me know if you have any questions. I am available most of this week and Monday and Tuesday of next week to discuss these matters in further detail prior to the mediation.

Best regards,

Tom

Thomas W. Peters
PETERS | SCOFIELD
A *Professional Corporation*
7430 Creek Road, Suite 303
Sandy, Utah 84093-6160

Telephone: (801) 322-2002 Ext. 105
Direct Dial: (801) 858-3405
Facsimile: (801) 912-0320
Email: twp@psplawyers.com

Mid-America Pipeline Original Assessment		Mid-America Pipeline's 2/26/2025 Settlement Offer (2025 added 5/15/2025)			Division's 3/4/2025 Minimum Acceptable Settlement Values			2025 Methodology Calculation For Settlement Discussion Purposes Only (As requested by Counties on 5/15/2025)			
Year	Valuation	Proposed Settled Value	Difference in Value from Original	Percent Decrease	Proposed Settled Value	Difference in Value from Original	Percent Decrease	Original Assessment Valuation	2025 Methodology Calculation	Difference in Value from Original	Percent Decreace
2018	$372,049,310	$248,518,141	$123,531,169	33.20%	$270,000,000	$102,049,310	27.43%	$372,049,310	$285,237,800	$86,811,510	23.33%
2019	$340,301,560	$244,542,978	$95,758,582	28.14%	$248,000,000	$92,301,560	27.12%	$340,301,560	$275,644,270	$64,657,290	19.00%
2020	$319,601,340	$248,353,002	$71,248,338	22.29%	$259,000,000	$60,601,340	18.96%	$319,601,340	$287,054,480	$32,546,860	10.18%
2021	$328,765,300	$234,838,941	$93,926,359	28.57%	$249,000,000	$79,765,300	24.26%	$328,765,300	$270,259,040	$58,506,260	17.80%
2022	$322,089,420	$200,872,265	$121,217,155	37.63%	$219,000,000	$103,089,420	32.01%	$322,089,420	$272,034,990	$50,054,430	15.54%
2023	$207,182,010	$142,745,664	$64,436,346	31.10%	$160,000,000	$47,182,010	22.77%	$207,182,010	$181,418,440	$25,763,570	12.44%
Total Through 2023	**$1,889,988,940**	**$1,319,870,991**	**$570,117,949**	**30.17%**	**$1,405,000,000**	**$484,988,940**	**25.66%**	**$1,889,988,940**	**$1,571,649,020**	**$318,339,920**	**16.84%**
2024	$177,458,860	$138,639,986	$38,818,874	21.87%				$177,458,860	$172,145,730	$5,313,130	2.99%
Total Through 2024	**$2,067,447,800**	**$1,458,510,977**	**$608,936,823**	**29.45%**				**$2,067,447,800**	**$1,743,794,750**	**$323,653,050**	**15.65%**
2025	$190,543,700	$155,309,094	$35,234,606	18.49%				$190,543,700	$190,543,700	$0	0.00%
Total Through 2025	**$2,257,991,500**	**$1,613,820,071**	**$644,171,429**	**28.53%**				**$2,257,991,500**	**$1,934,338,450**	**$323,653,050**	**14.33%**

Utah State Tax Commission - Property Tax Division **Resolution Adopting Final Tax Rates and Budgets**	**Form PT-800** Rev. 02/15

County: DAGGETT **Tax Year: 2025**

It is hereby resolved that the governing body of:

MULTICOUNTY ASSESSING & COLLECTING LEVY

approves the following property tax rate(s) and revenue(s) for the year: **2025**

1. Fund/Budget Type	2. Revenue	3. Tax Rate
950 Multicounty Assessing & Collecting	7,311	0.000014
	$7,311	**0.000014**

This resolution is adopted after proper notice and hearing in accordance with UCA 59-2-919 and shall be forwarded to the County Auditor and the Tax Commission in accordance with UCA 59-2-913 and 29-2-920.

Signature of Governing Chair

Signature: _____ Date:_____

Title:_____

Utah State Tax Commission - Property Tax Division **Resolution Adopting Final Tax Rates and Budgets**	**Form PT-800** Rev. 02/15

County: DAGGETT **Tax Year: 2025**

It is hereby resolved that the governing body of:

COUNTY ASSESSING & COLLECTING LEVY

approves the following property tax rate(s) and revenue(s) for the year: **2025**

1. Fund/Budget Type	2. Revenue	3. Tax Rate
955 County Assessing & Collecting	238,123	0.000456
	$238,123	**0.000456**

This resolution is adopted after proper notice and hearing in accordance with UCA 59-2-919 and shall be forwarded to the County Auditor and the Tax Commission in accordance with UCA 59-2-913 and 29-2-920.

Signature of Governing Chair

Signature: _____ Date:_____

Title:_____

Utah State Tax Commission - Property Tax Division **Resolution Adopting Final Tax Rates and Budgets**	**Form PT-800** Rev. 02/15

County: DAGGETT **Tax Year: 2025**

It is hereby resolved that the governing body of:

DAGGETT

approves the following property tax rate(s) and revenue(s) for the year: **2025**

1. Fund/Budget Type	2. Revenue	3. Tax Rate
10 General Operations	1,116,464	0.002138
20 Interest and Sinking Fund/Bond	136,075	0.000261
190 Discharge of Judgement		
	$1,252,539	**0.002399**

This resolution is adopted after proper notice and hearing in accordance with UCA 59-2-919 and shall be forwarded to the County Auditor and the Tax Commission in accordance with UCA 59-2-913 and 29-2-920.

Signature of Governing Chair

Signature: _____ Date:_____

Title:_____

SECTION 24

DAGGETT COUNTY COMMISSION AGENDA APPOINTMENTS

24.1 The agenda for each Daggett County Commission meeting is prepared by the County Clerk's office.

24.2 The Daggett County Commission agenda closes at 12:00 noon, fiveour (54) days prior to the county commission meeting. All appointments, business items and informational items for the county commission agenda are made with the County Clerk's office prior to the 12:00 noon deadline. Submissions for new business items and information items must be submitted to the County Clerk's office by the same 12:00 noon deadline. Ex: If the Daggett County Commission meets on Tuesday, appointments must be made and new business and informational items submitted by 12:00 noon the preceding FridayThursday. The Daggett County Commission requests that digital documentation for an agenda item to be submitted at that time. Please provide any original that will need to be signed and returned. Requests for appointments and items submitted after this time will be carried over for the next agenda. If a mandatory deadline is missed in submitting information for the county commission agenda and in order to conduct county business a special meeting can be called with at least twenty-four (24) hours noticehours' notice, subject to commissioner's schedules and approval.

24.3 County departments shall submit all materials in digital format to the County Clerk's office.

24.4 When submitting an item for the agenda, the requesting department, organization or individual shall submit all materials to the County Clerk's office at that time.

24.5 The agenda will be available at 5:00 p.m., four (4) days preceding the county commission meeting. Ex: If the Daggett County Commission meets on Tuesday, the agenda will be available Friday, by 5:00 p.m.

24.6 The agenda is available in the office of the County Clerk and on the county website at www.daggettcounty.govorg. Links to specific agenda items will be available when practical.

24.7 If you require visual equipment (Smart Board, Internet, Projector, etc.) for your appointment with the Daggett County Commission, please notify the IT Department's staff when scheduling your appointment.

24.8 At all times, the Daggett County Commission reserves the right to rearrange agenda items because of time constraints and to accommodate the commission schedule or the public.

24.9 Employees of the county cannot be considered members of the public if they are discussing items reasonably associated with any part of their employment.

95 North 1st West, Manila Utah 84046

August 20, 2025

Letter of Recommendation to the Daggett County Commissioners
Plat Amendment for Richard A. Thomason in Flaming Gorge Pines Subdivision

Mr. Richard Thomason has applied for a plat amendment in Flaming Gorge Pines. His application is proposing to combine lots 2B and 3A and Lots 6 and 7 in Plat C and vacate the remainder of Deer Run Lane in the Flaming Gorge Pines Subdivision. It was determined that Deer Run Lane is in the jurisdiction of the HOA of the subdivision. Mr. Wayne Simper signed off on the plat amendment approving the lot combination and the vacating of Deer Run Lane. Notification was given to contiguous property owners 10 days before the Planning and Zoning meeting held on August 19, 2025. No responses were received.
After Discussion and Consideration Heidi Steele made a motion to approve the plat amendment. Mr. Allan Wood seconded the motion. All in favor, motion carried.

Daggett County Planning & Zoning Board

Chad Reed, Chair
Allan Wood, Vice Chair
Heidi Steele
Tamara Twitchell
Carrie Poulsen, alternate

Commissioners
Matt Tippets, Chairman
mtippets@daggettcounty.org
Randy Asay
rasay@daggettcounty.org
Jack Lytle
jlytle@daggettcounty.org
435-784-3218

Assessor
Jesse Platt
jplatt@daggettcounty.org
435-784-3222 X 120

Deputy Assessor/DMV
Tamara Twitchell
ttwitchell@daggettcounty.org
435-784-3222 X121

Planning and Zoning
Carrie Poulsen
cpoulsen@daggettcounty.org
435-784-3222 X230

Fax Number: 435-784-3335

Daggett County Planning and Zoning
95 North 1st West
Manila, Utah 84046
435-784-3218

APPLICATION TO AMEND AN EXISTING SUBDIVISION PLAT

Office Use Only

Application # DAG Thomason
Fee: $ 350
Date Received 7/14/25
Paid: 8-4-25
Name of Subdivision to be Amended Flaming Gorge (Pines)
Planning and Zoning Commission Date: _____ Approved _____ Denied _____

Vacate/Amend/Alter Street ✓ No ___ Yes(County Commission Approval Required) - HOA owned does not need
County Commission Date _____ Approved _____ Denied _____
Public Hearing Date(s) Planning Commission n/A County Commission _____

Property information and Location

Property Address 1320 Deer Run Ln
City/St Dutch John, Utah Zip 84023
Parcel# Plat C Amedment 3 Serial# Lots 2B, 3A, 6, 7, Deer Run
Section 19 & 30 Township 2 North Range 22 East
Zone _____ Is Zone Change Needed ___ Yes ___ No ___ Requested Zone _____

You must include a parcel map obtained from the Daggett County Recorder's office with this application

Property Owner(s) Information

Name(s) Richard A Thomason
Mailing Address 6605 Weber Drive
City/St Mountain Green, Utah Zip 84050
Phone# 801-430-1279 Email rich@timberworksinc.net

Agent for the Property Owner

Name(s)_____

Mailing Address_____

City/St_____ Zip_____

Phone#_____ Email_____

An agent authorization form properly signed and notarized MUST be included with this application

Engineer/Surveyor

Name(s) Arneldon T Davis

Company Name Rocky Mountain Surveyors, Inc.

Address 960 North 2500 West

City/St Vernal, Utah Zip 84078

Phone# 435-789-6152 Email neddavis90@gmail.com

Professional License Number 161259

Reason for Amendment Combine lots to construct a detached garage adjacent to an existing home

Each development shall be actively pursued to completion. Any application that exceeds the time limits stated in the Subdivision Ordinance will be deemed null and void and the sub divider for that development waives all vested rights. Any extension must be requested prior to the expiration of the original approval. Should a prior application become void, the applicant must reapply. There shall be no presumption of approval of any aspect of the process. Each application for a subdivision amendment shall have all required submittals before it is accepted as a complete application. I (We) hereby submit this as a legal and complete application on: Signature of owner(s) or agent(s):

Signature Richard A Thomason Date 7/14/2025

Printed name Richard A Thomason

Signature Gina P Thomason Date 7/14/25

Printed name Gina P Thomason

ArcGIS Web Map



7/14/2025, 4:40:33 PM

Parcels_07_07_21

Roads - Dagget County

AddressesService

1:2,257

0 0.01 0.03 0.05 mi

0 0.02 0.04 0.09 km

Maxar, Microsoft, Esri, HERE, Garmin, iPC

ArcGIS Web AppBuilder

Maxar, Microsoft | Utah BLM, Utah Automated Geographic Reference Center (AGRC),Utah Counties, School and Institutional Trust Lands Administrations (SITLA), Premier Data Services | Esri, HERE, Garmin, iPC |

Flaming Gorge Fire & EMS District

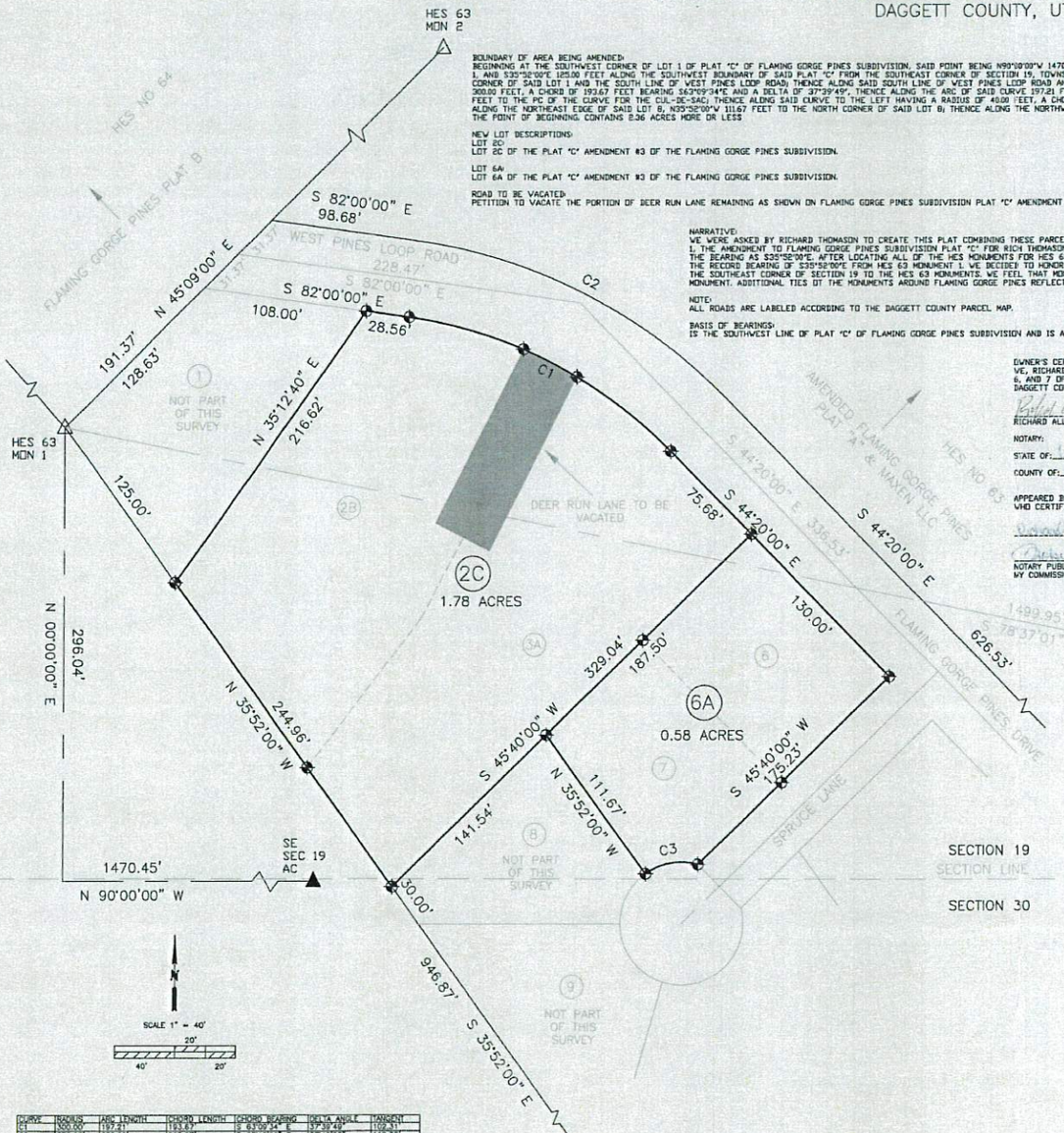
71 West 1st North
PO Box 247
Manila, Utah 84046
(435) 343-9043

August 1, 2025

To the Daggett County Planning & Zoning and any other participating parties, I have observed the site plan and actual location of Richard Thomason in the Pines subdivision as well as discussed the plan specs with Thomason. Per our discussion, the lots owned by him should be adequate for emergency vehicle access and follow the fire code in regards to planned driveway width and turnaround space on project completion.

Jeff Gosar
Fire Chief

FLAMING GORGE SUBDIVISION PLAT "C" AMENDMENT 3
AMENDING LOTS 2B, 3A, 6, AND 7
AND A PETITION TO VACATE THE REMAINDER OF DEER RUN LANE
LOCATED IN SECTIONS 19 AND 30
TOWNSHIP 2 NORTH, RANGE 22 EAST, SALT LAKE BASE AND MERIDIAN
DAGGETT COUNTY, UTAH



CURVE	RADIUS	ARC LENGTH	CHORD LENGTH	CHORD BEARING	DELTA ANGLE	TANGENT
C1	300.00'	197.21'	193.67'	S 63°09'34" E	37°39'48"	102.31'
C2	350.00'	230.09'	225.97'	S 63°10'00" E	37°40'00"	119.38'
C3	40.00'	36.86'	34.76'	S 79°53'10" W	51°30'19"	19.30'

BOUNDARY OF AREA BEING AMENDED:
BEGINNING AT THE SOUTHWEST CORNER OF LOT 1 OF PLAT "C" OF FLAMING GORGE PINES SUBDIVISION, SAID POINT BEING N99°08'09"W 1470.45 FEET (RECORD WEST 1469.37'), AND N00°00'00"E 296.84 FEET (RECORD NORTH 295.83 FEET) TO THE NORTHWEST CORNER OF SAID PLAT "C" ALSO BEING KNOWN AS HES 63 MONUMENT 1, AND S35°52'00"E 125.00 FEET ALONG THE SOUTHWEST BOUNDARY OF SAID PLAT "C" FROM THE SOUTHEAST CORNER OF SECTION 19, TOWNSHIP 2 NORTH, RANGE 22 EAST, SALT LAKE BASE AND MERIDIAN. THENCE RUNNING N35°12'40"E 216.62 FEET ALONG THE SOUTHEAST LINE OF SAID LOT 1 OF PLAT "C" TO THE NORTHEAST CORNER OF SAID LOT 1 AND THE SOUTH LINE OF WEST PINES LOOP ROAD); THENCE ALONG SAID SOUTH LINE OF WEST PINES LOOP ROAD AND THE SOUTHWEST LINE OF FLAMING GORGE PINES DRIVE THE FOLLOWING 3 CALLS: S82°00'00"E 28.56 FEET TO THE PC OF A CURVE TO THE RIGHT, SAID CURVE HAVING A RADIUS OF 300.00 FEET, A CHORD OF 193.67 FEET BEARING S63°09'34"E AND A DELTA OF 37°39'49", THENCE ALONG THE ARC OF SAID CURVE 197.21 FEET TO THE PT OF SAID CURVE; THENCE S44°20'00"E 205.68 FEET TO THE NORTHWEST LINE OF SPRUCE LANE; THENCE ALONG THE NORTHWEST LINE OF SPRUCE LANE S45°40'00"W 175.23 FEET TO THE PC OF THE CURVE FOR THE CUL-DE-SAC; THENCE ALONG SAID CURVE TO THE LEFT HAVING A RADIUS OF 40.00 FEET, A CHORD OF 34.76 FEET BEARING S79°53'10"W, AND A DELTA OF 51°30'19", A DISTANCE ALONG THE ARC OF 35.98 FEET TO THE SOUTHEAST CORNER OF LOT 8 OF SAID PLAT "C"; THENCE ALONG THE NORTHEAST EDGE OF SAID LOT 8; N35°52'00"W 111.67 FEET TO THE NORTH CORNER OF SAID LOT 8; THENCE ALONG THE NORTHWEST LINE OF SAID LOT 8, S45°40'00"W 141.54 FEET TO THE SOUTHWEST LINE OF SAID PLAT "C"; THENCE ALONG THE SOUTHWEST LINE OF SAID PLAT "C" N35°52'00"W 244.96 FEET TO THE POINT OF BEGINNING. CONTAINS 8.26 ACRES MORE OR LESS

NEW LOT DESCRIPTIONS:
LOT 2C:
LOT 2C OF THE PLAT "C" AMENDMENT #3 OF THE FLAMING GORGE PINES SUBDIVISION.

LOT 6A:
LOT 6A OF THE PLAT "C" AMENDMENT #3 OF THE FLAMING GORGE PINES SUBDIVISION.

ROAD TO BE VACATED:
PETITION TO VACATE THE PORTION OF DEER RUN LANE REMAINING AS SHOWN ON FLAMING GORGE PINES SUBDIVISION PLAT "C" AMENDMENT 1, ENTRY 630639, BOOK 100, PAGE 481 RECORDED WITH THE DAGGETT COUNTY RECORDERS OFFICE.

NARRATIVE:
WE WERE ASKED BY RICHARD THOMASON TO CREATE THIS PLAT COMBINING THESE PARCELS AND PROPOSING THE VACATION OF DEER RUN LANE. WE USED THE G.L.O. PLAT, FLAMING GORGE PINES SUBDIVISION PLAT "C", FLAMING GORGE PINES SUBDIVISION PLAT "C" AMENDMENT 1, THE AMENDMENT TO FLAMING GORGE PINES SUBDIVISION PLAT "C" FOR RICH THOMASON, AND THE FOUND MONUMENTS FOR HES 63. IN DOING THIS SURVEY WE FOUND A DISCREPANCY WITH THE WEST LINE OF HES 63 BETWEEN MONUMENT 1 AND 4. THE ORIGINAL PLAT SHOWS THE BEARING AS S35°52'00"E. AFTER LOCATING ALL OF THE HES MONUMENTS FOR HES 63 WE DETERMINED THAT THE BEARING BETWEEN THE FOUND MONUMENTS 1 AND 4 BEARS S35°55'06"E. WE ALSO FOUND MONUMENT 2 FOR HES 130. THE MONUMENT FOR HES 130 FALLS AT THE RECORD BEARING OF S35°52'00"E FROM HES 63 MONUMENT 1. WE DECIDED TO HONOR THE BEARINGS SHOWN ON THE ORIGINAL FLAMING GORGE PINES PLAT "C" FOR THIS SURVEY. WE ALSO USED THE HES 63 MONUMENTS AS CONTROL FOR THIS SURVEY. WE HAVE RETIED THE SOUTHEAST CORNER OF SECTION 19 TO THE HES 63 MONUMENTS. WE FEEL THAT MONUMENT 4 OF HES 63 HAS BEEN MOVED FROM ITS ORIGINAL LOCATION, POSSIBLY DUE TO UTILITY INSTALLATION AND BASED ON PERSONAL KNOWLEDGE OF THE ORIGINAL LOCATION OF SAID MONUMENT. ADDITIONAL TIES OF THE MONUMENTS AROUND FLAMING GORGE PINES REFLECT A MOVEMENT OF THIS MONUMENT.

NOTE:
ALL ROADS ARE LABELED ACCORDING TO THE DAGGETT COUNTY PARCEL MAP.

BASIS OF BEARINGS:
IS THE SOUTHWEST LINE OF PLAT "C" OF FLAMING GORGE PINES SUBDIVISION AND IS ASSUMED TO BEAR S35°52'00"E AS SHOWN ON THE ORIGINAL SUBDIVISION PLAT, ENTRY 963, BOOK 13, PAGE 25, RECORDED WITH THE DAGGETT COUNTY RECORDER'S OFFICE.

OWNER'S CERTIFICATION:
WE, RICHARD ALLEN THOMASON, AND GINA POSSELLI THOMASON, AS CO-TRUSTEES OF THE THOMASON FAMILY TRUST DATED 04/18/2023, SAID TRUST BEING THE OWNERS OF THE ORIGINAL LOTS 2B, 3A, 6, AND 7 OF THE FLAMING GORGE PINES SUBDIVISION PLAT C AMENDMENT 1, DO HEREBY CERTIFY THAT WE HAVE THE AUTHORITY AND DO HEREBY PETITION THE DAGGETT COUNTY COMMISSION AND THE DAGGETT COUNTY PLANNING COMMISSION TO APPROVE THIS AMENDMENT AND GRANT THE ROAD VACATION AS SHOWN HEREIN.

RICHARD ALLEN THOMASON (TRUSTEE) _____ GINA POSSELLI THOMASON (TRUSTEE) _____

NOTARY:
STATE OF: Utah
COUNTY OF: Morgan

APPEARED BEFORE ME THIS _____ DAY OF _____, 202__
WHO CERTIFIED TO ME THAT THEY HAVE THE LEGAL RIGHT TO REPRESENT THE THOMASON FAMILY TRUST DATED 04/18/2023 AND THAT THEY HAVE EXECUTED THIS DOCUMENT.

_____ AND _____ AS CO-TRUSTEES OF THE THOMASON FAMILY TRUST DATED 04/18/2023.

NOTARY PUBLIC _____
MY COMMISSION EXPIRES _____

STATE OF UTAH NOTARY PUBLIC ROBIN BROWN COMMISSION #734891 MY COMMISSION EXPIRES 01/04/2026

H.O.A. CERTIFICATION:
WE, AS REPRESENTATIVES OF THE FLAMING GORGE PINES HOMEOWNERS ASSOCIATION, DO HEREBY CERTIFY THAT WE HAVE THE AUTHORITY AND DO HEREBY PETITION THE DAGGETT COUNTY COMMISSION AND THE DAGGETT COUNTY PLANNING COMMISSION TO APPROVE THIS AMENDMENT AND GRANT THE ROAD VACATION AS SHOWN HEREIN.

REPRESENTATIVE _____ REPRESENTATIVE _____

NOTARY:
STATE OF: Utah
COUNTY OF: Uintah

APPEARED BEFORE ME THIS 11th DAY OF June, 2025
WHO CERTIFIED TO ME THAT THEY HAVE THE LEGAL RIGHT TO REPRESENT THE FLAMING GORGE PINES HOMEOWNERS ASSOCIATION AND THAT THEY HAVE EXECUTED THIS DOCUMENT.

_____ AND _____ AS REPRESENTATIVES OF THE FLAMING GORGE PINES HOMEOWNERS ASSOCIATION.

NOTARY PUBLIC _____
MY COMMISSION EXPIRES _____

SHIRLEY C. SLAUGH NOTARY PUBLIC-STATE OF UTAH My Commission Expires February 6, 2027 COMMISSION NUMBER 734891

DAGGETT COUNTY PLANNING COMMISSION:
APPROVED THIS _____ DAY OF _____, 202____ BY THE DAGGETT COUNTY PLANNING COMMISSION.

_____
CHAIRMAN

DAGGETT COUNTY COMMISSION:
APPROVED THIS _____ DAY OF _____, 202____ BY THE DAGGETT COUNTY COMMISSION.

_____
CHAIRMAN
ATTEST: _____
CLERK

COUNTY SURVEYOR:
APPROVED THIS _____ DAY OF _____, 202____ BY THE DAGGETT COUNTY SURVEYOR.

_____
ACTING COUNTY SURVEYOR

COUNTY RECORDER:
APPROVED FOR FILING THIS _____ DAY OF _____, 202___ BY THE DAGGETT COUNTY RECORDER.

_____
COUNTY RECORDER

FOR COUNTY RECORDER USE

LEGEND:
- AREA OF SUBDIVISION AMENDMENT
- HES & PLAT "C" BOUNDARIES
- SECTION LINE
- SUBDIVISION PLAT
- TIES TO SECTION CORNER
- TIES TO SECTION CORNER
- PROPOSED ROAD VACATION
- SECTION CORNER USED
- HES CORNER MONUMENT FOUND REBAR

SURVEYOR'S STATEMENT:
I, CERTIFY THAT I AM A PROFESSIONAL LAND SURVEYOR IN THE STATE OF UTAH AND HOLD LICENSE NO. 161209 AS PRESCRIBED BY LAWS OF THE STATE OF UTAH. I FURTHER CERTIFY THAT BY AUTHORITY OF THE OWNERS I HAVE MADE A SURVEY OF THE TRACT OF LAND SHOWN ON THIS PLAT AND DESCRIBED IN THE SURVEYOR'S CERTIFICATE HEREON IN ACCORDANCE TO TITLE 17-23-17 PROFESSIONAL ENGINEERS AND PROFESSIONAL LAND SURVEYORS ACT AND HAVE VERIFIED ALL MEASUREMENTS, AND HAVE PLACED MONUMENTS AS REFERENCED ON THE PLAT.

KENDLON L. DAVIS
UTAH PLS 161209

Rocky Mountain Surveyors Inc.
MAILING: 980 NORTH 2500 WEST
OFFICE: 1615 S. 1500 E. SUITE 17
VERNAL, UTAH 84078
435-789-8152

CLIENT: RICHARD THOMASON
SCALE: 1" = 40'
CREW: ED, KD
DRAWN: ED
DATE: 5/29/2025
DRAWING #: 250229

2024

Uintah Basin Region

Multi-Jurisdictional All Hazard Mitigation Plan

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ANNEX A: DAGGETT COUNTY

ANNEX B: DUCHESNE COUNTY

ANNEX C: UINTAH COUNTY

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PART I: PLANNING PROCESS

CHAPTER 1 INTRODUCTION

INTRODUCTION

The Uintah Basin Region (Region) is located in the northeastern corner of Utah and consists of Daggett County, Duchesne County, and Uintah County within this tri-county area. The Region is very rural, with a total population of 58,261 persons within an approximate 8,480 square mile area (U.S. Census QuickFacts, 2022).

The Uintah Basin Region and the incorporated communities that lie within these boundaries are vulnerable to natural hazards that have the possibility of causing serious threats to the health, welfare, and security of its residents. The cost of response to and recovery from potential disasters, in terms of potential loss of life or property, can be lessened when attention is turned to mitigating their impacts and effects before they occur or reoccur.

The joint representative body for the counties, reservation, and municipalities within the Uintah Basin is the Uintah Basin Region 5 (UBR5) Regional Response Planning Committee (RRPC), which is made up of the emergency managers from each of the three counties.

Recognizing the importance of reducing community vulnerability to natural hazards, the UBR5 RRPC is actively addressing hazard mitigation through updating this Multi-Jurisdictional All Hazard Mitigation Plan. While overall maintenance of the plan is the responsibility of the UBR5 RRPC, implementation of the plan is the responsibility of the counties, tribe, and participating towns and cities within the Uintah Basin Region. Some of the benefits to be realized from this effort include protection of public health and safety, preservation of essential services, prevention of property damage, and protection of the local economic base.

This Multi-Jurisdictional All Hazard Mitigation Plan seeks to identify the county's and individual communities' hazards and understand their impact on vulnerable populations and infrastructure. With that understanding, the plan sets forth solutions that, if implemented, have the potential to significantly reduce threat to life and property. The plan is based on the premise that hazard mitigation works. With increased attention to managing natural, technological, and manmade hazards, communities can reduce the threats to citizens and through proper land use and emergency planning can avoid creating new problems in the future. Many solutions can be implemented at minimal cost and social impact.

This is not an emergency response or management plan. While the plan can be used to identify weaknesses and refocus emergency response planning, the focus is to support better decision making directed toward avoidance of future risk and the implementation of actions that will eliminate or reduce the risk for those that may already have exposure to a hazard threat.

The Uintah Basin Regional Multi-Jurisdictional All Hazard Mitigation Plan was created with the goal of substantially and permanently reducing the county's vulnerability to hazards through sound public policy. By increasing public awareness of potential harm, documenting resources for risk reduction and loss prevention, and identifying activities to guide the development of less vulnerable and more sustainable communities, this plan aims to protect citizens, critical facilities, infrastructure, private property, and the natural environment.

PLAN ORGANIZATION

The UBR5 Hazard Mitigation Plan was developed and organized within the rules and regulations established by 44 CRF 201.6. The plan contains a discussion of the methodology used to develop the plan, the hazard risk assessment, and the mitigation strategy. Separate annexes for each of the counties and the reservation are included to address area-specific risk and mitigation. There are also several appendices that include planning documentation and hazard related technical information.

Part I of the plan provides a general overview of the plan and its planning process and identifies who was involved in revisions of the plan and the process used to develop this particular revision.

Part II contains a community profile of the Region.

Part III provides a brief definition for each natural hazard. All hazards identified as affecting the Region are analyzed at the county and incorporated city levels and then summarized in a hazard profile.

Part IV outlines the Mitigation Strategy and identifies the goals, objectives, and mitigation projects.

Part V details the plan maintenance process and provides a tentative timeline for updating the plan in the future.

The **Appendix** contains contact information for the planning team, meeting minutes, meeting invites, worksheets, agendas, public participation social media advertisements, website screenshots, disadvantaged community tables, plan adoption and endorsement forms, and references.

Purpose

This plan exists to identify natural hazard threats to the community, prepare mitigation management strategies to address those threats, develop short-term and long-term goals and objectives for mitigation planning, and to fulfill federal, state, and local hazard mitigation planning obligations. The intention of this plan is to enhance awareness of and provide mitigation strategies for elected officials, agencies, and the public and develop actions which will minimize negative outcomes to the Uintah Basin Region's citizens, the economy, and the environment due to potential natural hazard threats. The well-being of the county and local communities rests on reducing risks to life and property in the event of a hazard event or emergency/disaster.

The core mission of the plan is to:

- Coordinate with each participating local government to develop a regional planning process that meets each component of FEMA's Local Mitigation Plan guidance and any additional state planning expectations, both regionally and specifically.
- Gather local input on natural hazard mitigation planning.
- Reduce risk from natural hazards in the Uintah Basin Region through the implementation and updating of a regional plan.

Hazard Mitigation & Hazards

Hazard mitigation is defined as cost-effective actions that have the effect of reducing, limiting, or preventing the vulnerability of people, culture, property, and the environment to potentially damaging, harmful, or costly hazards. Hazard mitigation measures, which can be used to eliminate or minimize the risk to life, culture, and property, fall into three categories:

1. Those that keep the hazard away from people, property, and structures;

2. Those that keep people, property, or structures away from the hazard; and
3. Those that reduce the impact of the hazard on victims (e.g., insurance).

Hazard mitigation measures must be practical, cost effective, and culturally, environmentally, and politically acceptable. Actions taken to limit the vulnerability of society to hazards must not, in themselves, be costlier than the anticipated damages.

Hazard mitigation planning must be based on vulnerabilities and its primary focus must be on the point where capital investment and land use decisions are made. The placement of capital investments, whether for homes, roads, public utilities, pipelines, power plants, or public works, determine to a large extent the nature and degree of a community's hazard vulnerability. Once a capital facility is in place, there is little opportunity to reduce hazard vulnerability through correction of errors in location or construction. It is for this reason that often the most effective mitigation tools are zoning and other ordinances that manage development in high vulnerability areas and building codes that ensure that new buildings are constructed to withstand the damaging forces of anticipated hazards.

Because disaster events are generally infrequent, the nature and magnitude of the threat is often ignored or poorly understood. Thus, the priority to implement mitigation measures is low and implementation is slowed. Mitigation success can be achieved, however, if accurate information is portrayed through complete hazard identification and impact studies, followed by effective mitigation management.

The hazards analyzed in this plan include the following:

Natural Hazards

- Severe Summer Weather
    - Extreme Heat
    - Lightning
    - Hail
    - Tornado
    - Straight-line Wind
- Severe Winter Weather
    - Extreme Cold
    - Winter Storm
    - Avalanche
- Wildfire
- Flood
    - River or Stream Flood
    - Flash Flood
    - Dam Failure
- Drought

Geological Hazards

- Earthquake
- Landslide
- Problem Soils
    - Expansive Soils
    - Land Subsidence

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact the Uintah Basin Region due to geographic location:

- Hurricane
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Eruption

Scope

The plan provides comprehensive natural hazard identification, risk assessment, vulnerability and impact analyses, mitigation actions, and an implementation schedule.

Plan Goals & Objectives

The goals of the Uintah Basin Regional Multi-Jurisdictional All Hazard Mitigation Plan include coordinating with local governments to develop plans and processes that meet the planning components identified in the FEMA Region VIII Crosswalk document, as well as Utah DEM planning expectations and public input from the local community. The overall objective is risk reduction from natural hazards in the state of Utah through implementing and updating county, regional, and the state of Utah mitigation plans.

Authorities

Federal

Public Law 93-288, as amended, established the basis for federal hazard mitigation activity in 1974. A section of this Act requires—as prerequisite for state receipt of future disaster assistance outlays—the identification, evaluation, and mitigation of hazards. Since 1974, many additional programs, regulations, and laws have expanded on the original legislation to establish hazard mitigation as a priority at all levels of government.

Several additional provisions were also included when PL 93-288 was amended by the Stafford Act that provide for the availability of significant mitigation measures in the aftermath of a presidentially declared disaster. Civil Preparedness Guide 1–3, Chapter 6—Hazard Mitigation Assistance Programs places emphasis on hazard mitigation planning directed toward hazards with a high impact and threat potential.

The Disaster Mitigation Act of 2000 (DMA 2000) was signed into Law on October 30, 2000 by President Bill Clinton. Section 322 defines mitigation planning requirements for state, local, and tribal governments. Under Section 322, if states submit a mitigation plan (a summary of local/regional mitigation plans) identifying natural hazards, risks, vulnerabilities, and proposed actions to reduce those risks and vulnerabilities, the state is eligible for an increase in the federal share of hazard mitigation.

State

The Governor's Emergency Operation Directive, the Robert T. Stafford Disaster Relief and Emergency Assistance Act, amendments to Public Law 93-288, as amended, Title 44, CFR, Federal Emergency Management Agency Regulations, as amended, State Emergency Management Act of 1981, Utah Code

53-2, 63-5, Disaster Response Recovery Act, 63-5A, Executive Order of the Governor, Executive Order 11, Emergency Interim Succession Act, 63-5B.

Local

Effective natural hazard mitigation is dependent upon local governments assuming a vital role. As such, each local government will review all present or potential damages, losses, and related impacts associated with natural hazards to determine what is required for mitigation action and planning. For Daggett County, Duchesne County, Uintah County, and the cities and towns within, the local executives responsible for implementing plans and policies are the county commissioners and city or town mayors. It is critical that local governments be prepared to participate in the post-disaster Hazard Mitigation Team process, as well as the pre-mitigation planning outlined in the Multi-Jurisdictional All Hazard Mitigation Plan.

Chapter 2 Planning Process

Planning Process

The 2024 Uintah Basin Region Multi-Jurisdictional All Hazard Mitigation Plan was completed through the collaborative efforts of the Utah Department of Public Safety Division of Emergency Management, County Emergency Managers, Fire Departments, Sheriff's Offices, Public Works Departments, Planning and Zoning Commissions, Assessor's Offices, City, County, and State GIS Departments, Elected Officials, Public Employees, Utah Division of Forestry, Fire and State Lands, and citizens of the cities and town within the Region. Feedback was solicited through the Uintah Basin Region Local Hazard Mitigation Planning Team. During the plan development, the draft plan was posted on the social media sites for each of the participating counties. All comments, questions, and discussions resulting from these activities were given thoughtful consideration as the plan was developed.

Additionally, many of the hazards described in this mitigation plan also affect counties adjacent to Daggett County, Duchesne County, and Uintah County. The draft of this plan was sent to each of these neighboring counties, and their input was considered and implemented. The 10 adjacent counties are listed below:

- Sweetwater County, WY
- Moffat County, CO
- Rio Blanco County, CO
- Garfield County, CO
- Summit County, UT
- Carbon County, UT
- Utah County, UT
- Wasatch County, UT
- Grand County, UT
- Emery County, UT

Participating Jurisdictions

This plan covers Daggett County, Duchesne County, Uintah County, the cities of Duchesne, Myton, Roosevelt, Ballard, Naples, and Vernal, and the towns of Dutch John, Manila, Altamont, and Tabiona. Each of these jurisdictions participated in the update of the plan.

Jurisdiction	Attended at least one meeting	Represented at Mitigation Workshop	Met with Core Planning Team	Submitted at least one new mitigation action	Reviewed past mitigation actions
Daggett County	X	X	X	X	X
Duchesne County	X	X	X	X	X
Uintah County	X	X	X	X	X
City of Duchesne	X	X	X	X	X
City of Myton	X	X	X	X	X
City of Roosevelt	X	X	X	X	X
City of Ballard	X	X	X	X	X
City of Naples	X	X	X	X	X
City of Vernal	X	X	X	X	X
Town of Dutch John	X	X	X	X	X
Town of Manila	X	X	X	X	X

Jurisdiction	Attended at least one meeting	Represented at Mitigation Workshop	Met with Core Planning Team	Submitted at least one new mitigation action	Reviewed past mitigation actions
Town of Altamont	X	X	X	X	X
Town of Tabiona	X	X	X	X	X

Uintah Basin Region 5 Regional Response Planning Committee Planning Team

The Uintah Basin Region local hazard mitigation planning team is comprised of representatives from the Daggett County Local Emergency Planning Committee (LEPC), Duchesne County Local Emergency Planning Committee (LEPC), Uintah County Local Emergency Planning Committee (LEPC), county emergency managers, county department heads, participating city and town representatives, support technicians, and select other county department representatives, as well as planning consultants and representatives from the Utah Division of Emergency Management (DEM). The table below lists each member of the LEPC. Descriptions of the planning meetings follow in the next section below as well as with the meeting minutes in Appendix B.

Agency	Representative	Position
Uintah County OEM	Heidi Lundburg	Emergency Manager
Duchesne County	Mike Lefler	Emergency Manager
Daggett County	Leonard Isaacson	Emergency Manager
Myton City	Allen Allred	Director Public Works
Roosevelt City	Joshua Bake	City Manager
Town of Dutch John	Sandy Kunkel	Mayor
Vernal City	Gabby Blackburn	Planning Director
Uintah Fire District	Jeremy Raymond	Director
UBMC	Tawnie Reynolds	ED Manager
UBAOG	Julie Slocum	Director Community Service
Integrated Solutions Consulting	Jacob Halley	Consultant
Integrated Solutions Consulting	Daiko Abe	Consultant

Local Hazard Mitigation Planning Meetings & Mitigation Workshops

Uintah Basin Region Hazard Mitigation Plan Update Kickoff Meeting—May 17, 2023

The Core Planning Team held the Virtual Hazard Mitigation Plan Update kickoff meeting on May 17, 2023. This meeting served to provide an overview of the 2024 update process, provide roles and expectations, discuss public and stakeholder involvement, review project timelines, and discuss needed data requests. See Appendix B for the meeting's agenda.

The attendance roster for the meeting is as follows:

Agency	Representative	Position
Straten Networks	Mark Robertson	Safety
Duchesne County	Tracy Killian	
Roosevelt City	Joshua Bake	City Manager
Uintah Fire Dist	Terri Terril	Admin Assistant
Vernal PD	Keith Campbell	Assist Chief
UBAOG	Kim Deter	Community Service
UBAOG	Julie Slocum	Director Community Service
Uintah County OEM	Heidi Lundburg	Emergency Manager
THCD	Rob Grove	MRC Coordinator
UBMC	Greg Gardiner	Chief Nursing Officer
Myton City	Allen Allred	Director Public Works
Uintah Fire District	Jeremy Raymond	Director
Vernal City	Gabby Blackburn	Planning Director
UHP	Brett Gehring	Lieutenant
UBMC	Tawnie Reynolds	ED Manager
Town of Dutch John	Sandy Kunkel	Mayor
Duchesne County	Mike Lefler	Emergency Manager
Duchesne Sheriff's Office	Monty Nay	Chief Deputy
UBAOG	Carl Conrad	Transit Director
UBAOG	Joey Reyes	Transit Manager
Uintah County	John Laursen	Commissioner
Uintah County	Jordan Merrell	GIS
Naples PD	Nathan Simper	Chief
Daggett County	Peyton Ashely	Road Dept OP
Daggett County	Sean Hughes	Road Dept OP Supervisor
Daggett County	Leonard Isaacson	Emergency Manager
Daggett County	Katie Anderson	Assistant EM
Uintah County Sheriff's Office	Brian Fletcher	Chief Deputy
Duchesne County	Shelly Felter	EM Coordinator
Uintah County	Deanna Nyburg	Planner
Integrated Solutions Consulting	Jacob Halley	Consultant
Integrated Solutions Consulting	Daiko Abe	Consultant

Hazard Mitigation Planning Workshop—September 13, 2023

Planning workshop to review and rank hazards. Review existing mitigation actions and develop new actions.

The attendance roster for the meeting is as follows:

Agency	Representative	Position
Straten Networks	Mark Robertson	Safety
Duchesne County	Tracy Killian	
Roosevelt City	Joshua Bake	City Manager
Uintah Fire Dist	Terri Terril	Admin Assistant
Vernal PD	Keith Campbell	Assist Chief
UBAOG	Kim Deter	Community Service
UBAOG	Julie Slocum	Director Community Service
Uintah County OEM	Heidi Lundburg	Emergency Manager

Agency	Representative	Position
THCD	Rob Grove	MRC Coordinator
UBMC	Greg Gardiner	Chief Nursing Officer
Myton City	Allen Allred	Director Public Works
Uintah Fire District	Jeremy Raymond	Director
Vernal City	Gabby Blackburn	Planning Director
UHP	Brett Gehring	Lieutenant
UBMC	Tawnie Reynolds	ED Manager
Town of Dutch John	Sandy Kunkel	Mayor
Duchesne County	Mike Lefler	Emergency Manager
Duchesne Sheriff's Office	Monty Nay	Chief Deputy
UBAOG	Carl Conrad	Transit Director
UBAOG	Joey Reyes	Transit Manager
Uintah County	John Laursen	Commissioner
Uintah County	Jordan Merrell	GIS
Naples PD	Nathan Simper	Chief
Daggett County	Peyton Ashely	Road Dept OP
Daggett County	Sean Hughes	Road Dept OP Supervisor
Daggett County	Leonard Isaacson	Emergency Manager
Daggett County	Katie Anderson	Assistant EM
Uintah County Sheriff's Office	Brian Fletcher	Chief Deputy
Duchesne County	Shelly Felter	EM Coordinator
Uintah County	Deanna Nyburg	Planner
Integrated Solutions Consulting	Jacob Halley	Consultant
Integrated Solutions Consulting	Daiko Abe	Consultant

Public & Stakeholder Involvement

This section documents the involvement of federal, state, regional, and local stakeholders in the development of this Uintah Basin Region 5 (UBR5) Hazard Mitigation Plan. The UBR5 Plan affects numerous organizations, including county departments, municipalities, utility companies, and federal and state agencies. The general public must be given an opportunity to be involved in the planning process. As such, a number of public outreach activities were organized to ensure public participation and input was obtained. Additionally, a draft of the 2024 Uintah Basin Region Multi-Jurisdictional All Hazard Mitigation Plan was made available to the public and linked on the website on the Office of Emergency Management page beginning on August 2, 2024. The link was updated with the completed version of the plan in September 2024 and is still available for review. This allowed the public the opportunity to comment or provide feedback on the updated plan before completion. A screenshot of the link is provided in Appendix E.

Public Survey

An emergency preparedness study and survey was distributed to the public through coordination with the local newspaper, Facebook, and the website beginning in August 1-September 1 2023. The purpose of the survey was to allow Uintah Basin Region residents and businesses to help the county update its emergency preparedness plans by providing feedback on how they respond to emergencies in the region and how the region can better serve them during an emergency. The post about the survey was made on

the Uintah, Duchesne AND Daggett County Utah Emergency Management Facebook pages. The post can be found in Appendix E. The survey remained easily accessible and available to the public on the website on the Emergency Management page until September 1 2023. and received 69 responses in total. A screenshot of this page can be seen in Appendix E.

Stakeholder Participation

Additional state and regional stakeholders participated in the 2024 update of the Uintah Basin Region Multi-Jurisdictional All Hazard Mitigation Plan:

- Utah Division of Emergency Management
- Utah Department of Transportation
- Utah State Police
- U.S. Bureau of Land Management

Equity Considerations for Underserved Communities and Socially Vulnerable Populations

Some disasters occur on larger scales and are more impacted by built environments and most likely to continually impact those most at risk because of existing health conditions, lack of resources, being underserved by past mitigation planning work, facing historical disinvestment in their communities, or other factors. In this case, people in widely different locations can be the most harmed by repeating disaster cycles, so mitigation strategies should also work to break cycles of loss caused by social and economic disparities. Hazard mitigation strategies can reduce existing risk by, for example, relocating a building out of an area that frequently floods. In each case, an attempt has been made to lessen the harm of a future flood before the event happens. Strategies may also seek to make future development less vulnerable to hazards at the time it is built. Examples would be requiring new structures to be elevated above predicted flood levels or by building structures to better withstand future hazards. Hazard mitigation plans are designed to involve the input of stakeholders from different perspectives to ensure plans use the best available data, are aligned with the needs of the entire community, and are in alignment with other plans, such as comprehensive plans, capital improvement plans, and climate action plans.

This Hazard Mitigation Plan continues to recognize that all members of the community are not impacted in the same way by natural disasters. Some community members are at more risk, for a number of possible reasons. A mitigation strategy that uses a “one size fits all” approach and does not recognize different levels of risk will not adequately or efficiently support historically underserved populations and can actually make inequalities worse after a disaster.

Equitable mitigation success should be measured by assessing who was most impacted in loss of life or financial harm by past and future disasters, quantifiable reductions of vulnerability to those most at risk, and increasing engagement with historically underserved populations and community organizations to better understand how plans and processes and natural hazard events are affecting different communities.

The county and participating jurisdictions have a responsibility to ensure equitable outcomes in the implementation of this plan and to ensure that action is taken to reduce vulnerabilities to disasters experienced disproportionately by marginalized populations.

The Climate & Economic Screening Tool provided by the U.S. Council on Environmental Quality analyzes the 2010 census tracts in Daggett County, Duchesne County, and Uintah County for

disadvantaged communities. The burdens experienced in each census tract are identified and described in Appendix F.

Each county also invited and coordinated with stakeholders representing a number of local organizations serving disadvantaged populations, such as the [Name of Local Homeless Coalition]. Additionally, the public survey specifically included questions to determine how the county could better support functional and access needs populations and underserved groups in the county. Questions include, but are not limited to: During times of emergency, information is provided in a format I can understand; I can easily obtain emergency information in times of crisis; Please indicate how Grand County can better assist you in preparing for emergencies and disasters; What might prevent you from leaving your place of residence if there was an evacuation order?

PART II: COMMUNITY PROFILE

Chapter 3 Uintah Basin Region Profile

Location

The Uinta Basin Region is located in the northeastern corner of Utah, with its northern border adjoining the southern border of Wyoming and its eastern border adjoining the western border of Colorado. The Uinta Mountains make up the southwestern area of the Region as well as the southern border.. It is bordered on the north by Sweetwater County, WY; on the east by Moffat County, CO; on the south by Grand and Carbon Counties; on the west by Utah and Wasatch Counties; and on the northwest by Summit County. Total area of the region is 8,478 square miles, of which 61 square miles is water (U.S. Census QuickFacts, 2022).

Topography & Vegetation

The Uinta Basin Region is in the semi-arid region of northeastern Utah. The region is positioned on the south side of the Uinta Mountains. The region's terrain slopes to the south and the east on the southern side of the Uintas, which run east to west along the northern border of the county. The highest point in the range is King's Peak at 13,528 feet, which is also the highest point in the state of Utah. Duchesne has an elevation of 5,518 feet, Myton has an elevation of 5,085 feet, and Roosevelt has an elevation of 5,095 feet. Of the two towns, Altamont has an elevation of 6,388 feet, and Tabiona has an elevation of 6,516 feet. The elevation range within the county is from 13,528 feet in the Uinta Mountains to 4,619 feet in Nine Mile Canyon in the southeastern part of the county near the shared borders with Uintah County and Carbon County (Duchesne County Topographic Map, 2023).

The Uinta Mountains are the highest mountain range in the contiguous United States with no modern glaciers. Lush mountain forests, as part of Ashley National Forest, cover the lower parts of the range while rock and permafrost dominate the upper elevations. The most common species of tree in the lowest elevations of the forested land in the county is pinyon pine and juniper. Douglas-fir, white fir, ponderosa pine, limber pine, and lodgepole pine can be found at mid-elevations. The highest elevation species are primarily Englemann spruce and Subalpine fir. Quaking aspen can be found at all elevations, and blue spruce is often found in the lower riparian areas. Many species of grasses, shrubs, and forbs can also be found throughout the county (Duchesne County General Plan, 2022).

The Duchesne River flows southward from the Uinta Mountains in the northwestern corner of the county and then eastward through the central part of the county. Salt cedar (Tamarisk), Russian olive tree, cottonwood, and willow are common species found in the riparian areas of the county (Duchesne County General Plan, 2022).

Nine Mile Canyon in the southeastern corner of the county is approximately 40 miles long and extends through both Duchesne and Carbon Counties. Nine Mile Canyon Road weaves through the canyon and was once the primary transportation corridor for the region during the late 1800s. Nine Mile Creek is the small stream that originally formed the canyon and is a minor tributary of the Green River. The stream empties into Desolation Canyon in the east. Several smaller canyons branch off the larger Nine Mile Canyon, and a few have roads traveling through them, as well (Flickr, 2010).

Natural Resources

The Uinta Basin Region depends heavily on the mining of energy and minerals. Coal, iron, phosphate, oil, and natural gas are significant natural resources present in the region. The individual county annexes provide details on the prevalent natural resources by county within the region.

CLIMATE

The climate in Region is primarily semi-arid, with occasional severe cold in the winter. The climate in the upper elevations of the Uinta Mountains is often colder with increased snowfall. Average annual precipitation is approximately 9.12 inches based on the averages of the three counties included in the region. Specific information by county and participating jurisdictions are provided within the county annexes.

PART III: RISK ASSESSMENT

Chapter 4 Hazard Risk Summary

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy, and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the DMA (44 CFR, Section 201.6(c)(2)).

Identified Hazards

There are countless hazards that pose a threat to human life, health, and well-being, and no attempt is made here to compile an exhaustive list. Those that are addressed in disaster planning are generally categorized as “natural” or “technological” (sometimes “manmade”). The FEMA website contains a thorough discussion and list of hazards in the section entitled “National Risk Index for Natural Hazards” (FEMA, 2022). Some hazards are a threat to all geographic areas while others (e.g., flooding) are more limited in their extent. Studies were conducted to determine which hazards are of concern in Daggett County, Duchesne County, and Uintah County.

Uintah Basin Region hazards were identified and their frequency of occurrence evaluated using a number of resources, including:

- 2019 Uintah Basin Region 5 Hazard Mitigation Plan
- 2008 Daggett County General Plan
- 2017 Daggett County General Plan Resource Management Plan Appendix
- 2022 Duchesne County General Plan & Resource Management Plan
- 2017 Duchesne County Transportation Master Plan
- 2005 Uintah County General Plan, amended 2012
- 2017 Uintah County Resource Management Plan
- 2010 Land Use Plan, amended 2011
- Hazard planning documents developed by state, federal, and private agencies
- NOAA weather data from the past 74 years
- Data from the United States Geological Survey (USGS) and the Utah State Geological Survey (UGS)

Hazards that have been identified as significant in this county and that will be considered in this plan are listed below.

Natural Hazards

- Severe Summer Weather
    - Extreme Heat
    - Lightning

    - Hail
    - Tornado
    - Straight-line Wind
- Severe Winter Weather
    - Extreme Cold
    - Winter Storm
    - Avalanche
- Wildfire
- Flood
    - River or Stream Flood
    - Flash Flood
    - Dam Failure
- Drought

Geological Hazards

- Earthquake
- Landslide
- Problem Soils
    - Expansive Soils
    - Land Subsidence

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact the Uintah Basin Region due to geographic location:

- Hurricane
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Eruption

Hazard Profile

The risk assessments in each individual county plan describe the risks associated with each identified hazard of concern. The following sections were used to describe each hazard and communicate each respective level of risk:

- **Hazard Description**—Each hazard profile contains a description of the general definition and causes of the hazard. It may also include background information for understanding the context of the hazard within each county.
- **Location**—The location or region in each county where each hazard may occur is described.
- **Extent**—The strength or magnitude of each hazard is defined, usually through a form of measurement, such as a formula, scale, chart, or graph.
- **Historical Frequency & Probability of Future Occurrence**—This section identifies past hazard events of note that have occurred in each county. It also includes the likelihood of each hazard occurring again if available.
- **Impacts & Loss Estimates**—The potential impacts of each hazard on each county are discussed. This section also outlines the potential economic/monetary loss from a hazard event, in addition

to loss of property, structures, facilities, systems, livestock, and life. An assessment of affected vulnerable populations and changes in development is included.
- **Climate Change Implications**—The effects of climate change on the probability of future events and severity of impacts for each hazard are assessed.
- **FEMA NRI Score**—The hazard-specific FEMA National Risk Index scores for each natural hazard is included.
- **Related Hazards**—The hazard profiles that fall under a greater hazard category can be found within this section.

Risk Assessment Methodology

Each hazard included in this plan was assessed and ranked based on a pre-defined hazard risk methodology consistent with FEMA's mitigation plan requirements. Information from the hazard profiles and input from subject matter experts were used to inform the hazard risk assessment process. The following is a description of the key factors.

Probability/Likelihood of Occurrence

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- **High**—Significant hazard event is likely to occur annually (Probability Factor = 3)
- **Medium**—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)
- **Low**—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)
- **Unlikely**—There is little to no probability of significant occurrence, or the recurrence interval is greater than every 100 years (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area.

Extent

Extent was assessed in two categories: extent/intensity and catastrophic potential of the hazard. Numerical impact factors were assigned as follows:

Extent/Intensity—Extent is defined as the range of anticipated intensities of the identified hazards. Extent is most commonly expressed using various scientific scales, such as the Enhanced Fujita scale.

- **High**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a high-intensity incident (Extent Factor = 3)
- **Medium**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a medium-intensity incident (Extent Factor = 2)
- **Low**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a low-intensity incident (Extent Factor = 1)
- **Unlikely**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of little to no intensity (Extent Factor = 0)

Catastrophic—The potential that an occurrence of this hazard could be catastrophic.

- **High**—High potential that this hazard could be catastrophic (Extent Factor = 3)
- **Medium**—Medium potential that this hazard could be catastrophic (Extent Factor = 2)
- **Low**—Low potential that this hazard could be catastrophic (Extent Factor = 1)

- **Unlikely**—Virtually no potential that this hazard could be catastrophic (Extent Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Extent/Intensity* and its potential to be *Catastrophic*.

Vulnerability

Vulnerabilities were assessed in three categories: population exposure, property exposure, and exposure based on changes in development. Numerical impact factors were assigned as follows:

People—Values were assigned based on the percentage of the total population exposed to the hazard event.

- **High**—30% or more of the population is exposed to this hazard (Vulnerability Factor = 3)
- **Medium**—15% to 29% of the population is exposed to this hazard (Vulnerability Factor = 2)
- **Low**—14% or less of the population is exposed to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the population is exposed to this hazard (Vulnerability Factor = 0)

Property Exposed—Values were assigned based on the percentage of the total property value exposed to the hazard event.

- **High**—25% or more of the total assessed property value is exposed to the hazard (Vulnerability Factor = 3)
- **Medium**—10% to 24% of the total assessed property value is exposed to the hazard (Vulnerability Factor = 2)
- **Low**—9% or less of the total assessed property value is exposed to the hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the total assessed property value is exposed to the hazard (Vulnerability Factor = 0)

Changes in Development—Changes in development since the previous plan was approved have increased or decreased the community's vulnerability/exposure to this hazard.

- **High**—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)
- **Medium**—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)
- **Low**—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *People*, and a weighting factor of 1 was assigned for *Property Exposed* and *Changes in Development*.

Impact

Hazard impacts were assessed in eight categories: population and life/safety, underserved/equity, property damages, economic, environmental, essential operations, future development, and climate change. Numerical impact factors were assigned as follows:

Population and Life/Safety: Values were assigned based on (1) best available historical and probabilistic data for individuals who are vulnerable to the hazard event and (2) the likelihood to experience adverse impacts in the event of its occurrence.

- **High**: Populations exposed to this hazard are likely to experience significant adverse impacts (Impact Factor = 3)
- **Medium**: Populations exposed to this hazard are likely to experience some adverse impacts (Impact Factor = 2)
- **Low**: Populations exposed to this hazard are likely to experience minimal adverse impacts (Impact Factor = 1)
- **No impact**: Populations exposed to this hazard are not likely to experience significant adverse impacts (Impact Factor = 0)

Underserved/Equity—Values were (1) assigned based on best available data for underserved populations vulnerable to the hazard event and (2) are likely to experience adverse/disproportionate impacts from the hazard incident resulting in greater disparity in equity.

- **High**—Underserved populations exposed to this hazard are likely to experience significant adverse/disproportionate impacts (Impact Factor = 3)
- **Medium**—Underserved populations exposed to this hazard are likely to experience some adverse/disproportionate impacts (Impact Factor = 2)
- **Low**—Underserved populations exposed to this hazard are likely to experience minimal adverse/disproportionate impacts (Impact Factor = 1)
- **No impact**—Underserved populations exposed to this hazard are not likely to experience significant adverse/disproportionate impacts (Impact Factor = 0)

Property Damages—Values were assigned based on the expected total property damages incurred from a hazard incident. It is important to note that values represent estimates of the loss from a major incident based on historical data or probabilistic models/studies.

- **High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
- **Medium**—More than $500,000 but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
- **Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
- **No impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Economic—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, crops, worker wages, and local tax revenues or on the impact on the local gross domestic product (GDP).

- **High**—Total economic impact is likely to be greater than $10,000,000 (Impact Factor = 3)

- **Medium**—Total economic impact is likely to be greater than $100,000 but less than or equal to $10,000,000 (Impact Factor = 2)
- **Low**—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
- **No Impact**—Virtually no significant economic impact (Impact Factor = 0)

Environmental Factor: Environmental impact from a major hazard event requiring outside resources and support; and/or repair, clean-up, restoration, and/or preservation work.

- **High**: Environmental impact from a single major hazard event is likely to be significant, requiring extensive outside resources and support; and/or repair, clean-up, restoration, and/or preservation work (Impact Factor = 3)
- **Medium**: Environmental impact from a single major hazard event is likely to be localized, requiring some outside resources and support; and/or repair, clean-up, restoration, or preservation work (Impact Factor = 2)
- **Low**: Environmental impact from a single major hazard event is likely to be minimal, requiring little to no outside resources and support, and/or minimal repair, clean-up, restoration, or preservation work (Impact Factor = 1)
- **No impact**: No environmental impacts from a single major hazard event is likely (Impact Factor = 0)

Essential Operations Factor: Impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event.

- **High**: Significant impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 3)
- **Medium**: Some impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 2)
- **Low**: Minimal impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 1)
- **No Impact**: No impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 0)

Future Development—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard.

- **High**—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)
- **Medium**—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)
- **Low**—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)
- **No Impact**—Future development trends will not increase the impact/consequence of this hazard and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)

Climate Change—The potential that climate change will increase the risk of this hazard (e.g., type, location, and range of anticipated intensities of the identified hazard and impacts).

- **High**—Climate change trends will significantly increase the risk of this hazard and its impacts (Impact Factor = 3)
- **Medium**—Climate change trends will increase the risk of this hazard and its impacts, but not significantly (Impact Factor = 2)
- **Low**—Climate change trends will minimally increase the risk of this hazard and its impacts (Impact Factor = 1)
- **No Impact**—Climate change trends will not increase the risk of this hazard and its impacts (Impact Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Population and Life Safety* and *Underserved/Equity*, and a weighting factor of 2 was assigned for *Property Damages*. In addition, a weighting factor of 1 was assigned for *Economic*, *Environmental*, *Essential Operations*, *Future Development*, and *Climate Change*.

FEMA NRI Risk Scores

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: Avalanche, Coastal Flooding, Cold Wave, Drought, Earthquake, Hail, Heat Wave, Hurricane, Ice Storm, Landslide, Lightning, Riverine Flooding, Strong Wind, Tornado, Tsunami, Volcanic Activity, Wildfire, and Winter Weather. Because not all hazards are applicable to Grand County, only those hazards with a defined risk to the county are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, Social Vulnerability, and Community Resilience to develop a baseline relative risk measurement for each United States county and census tract (National Risk Index, 2024). These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Community Resilience

Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Expected Annual Loss

The table below shows the overall expected annual loss score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *Impacts & Loss Estimates*.

Overall NRI Score

The table below shows the overall FEMA National Risk Index Score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *FEMA NRI Score*.

Overall Risk Scores

The following tables represent the new overall risk scores for Daggett County, Duchesne County, and Uintah County based on the described methodology. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores.

Daggett County

	Probability	Consequence				Total Risk	
Hazard Event	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Facto	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)	
Flash Flood	2	6	8	25	39	41	M
Wildfire	3	6	9	24	39	57	H
Winter Storm	3	6	11	22	39	57	H
River or Stream Flood	1	6	6	13	25	15	L
Drought	3	6	6	19	31	47	M
Extreme Heat	2	6	12	23	41	42	M
Staright-line Wind	2	6	6	11	23	26	L
Extreme Cold	3	12	11	26	49	70	H
Lightning	1	18	12	31	61	33	L
Hail	1	6	9	19	34	20	L
Landslide	1	6	8	13	27	16	L
Expansive Soil	1	3	6	13	22	14	L
Land Subsidence	1	12	9	24	45	25	L
Avalance	2	12	14	28	54	54	L
Earthquake	1	6	6	10	22	14	L
Dam Failure	1	9	12	24	45	25	L
Tornado	1	3	6	13	22	14	L

Duchesne County

	Probability	Consequence				Total Risk	
Hazard Event	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Facto	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)	
Flash Flood	2	6	8	25	39	41	M
Wildfire	3	6	9	24	39	57	H
Winter Storm	3	6	11	22	39	57	H
River or Stream Flood	1	6	6	13	25	15	L
Drought	3	6	7	25	38	56	H
Extreme Heat	2	6	12	23	41	42	M
Staright-line Wind	2	6	6	11	23	26	L
Extreme Cold	3	12	11	26	49	70	H
Lightning	1	18	12	31	61	33	L
Hail	1	6	9	19	34	20	L
Landslide	1	6	6	13	25	15	L
Exansive Soild	1	6	6	13	25	15	L
Land Subsidence	1	12	9	24	45	25	L
Avalance	2	12	14	18	44	45	M
Earthquake	1	6	6	10	22	14	L
Dam Failure	1	9	12	24	45	25	L
Tornado	1	9	7	15	31	19	L

Uintah County

	Probability	Consequence				Total Risk	
Hazard Event	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Facto	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)	
Flash Flood	2	6	8	25	39	41	M
Wildfire	3	6	9	24	39	57	H
Winter Storm	3	6	11	22	39	57	H
River or Stream Flood	1	6	6	13	25	15	L
Drought	3	6	7	25	38	56	H
Extreme Heat	2	6	12	23	41	42	M
Staright-line Wind	2	6	6	11	23	26	L
Extreme Cold	3	12	11	26	49	70	H
Lightning	1	18	12	31	61	33	L
Hail	1	6	9	19	34	20	L
Landslide	1	6	6	13	25	15	L
Exansive Soild	1	6	6	13	25	15	L
Land Subsidence	1	12	9	24	45	25	L
Avalance	2	12	14	28	54	54	H
Earthquake	1	6	6	10	22	14	L
Dam Failure	1	9	12	24	45	25	L
Tornado	1	9	9	23	41	23	L

Previous Hazard Occurrences

Each of the identified hazards throughout the region are profiled within the individual county annexes. The hazard profiles provide details related to the previous occurrences, location, extent and future probabilities of the hazard.

Hazard Significance

The planning team reviewed the list of hazards for the region and ranked the hazards through a quantitative and qualitative approach. The individual county annexes provide a detailed assessment of each identified hazard along with potential impacts and identified vulnerabilities.

Hazard Assessment

A hazard evaluation for each of the medium risk hazards identified in Section 2.3 was performed on a county basis in order to identify risks on the community level. The hazards were assessed using the methods described below for each hazard type. The results of the assessments are discussed by hazard in the individual county annexes.

PART IV: MITIGATION STRATEGY

Chapter 5Mitigation Goals & Changes in Priority

Mitigation Goals

These goals describe the broad direction that the counties within the Uintah Basin Region will take to select mitigation projects, which are designed specifically to address risks posed by natural and manmade hazards. The goals are steppingstones between the mission statement and the specific objectives developed for the individual mitigation projects. The mitigation projects refer to these goals by their number given below.

1. Reduce the potential of loss of life and injury.
    a. Identify natural and manmade hazards that threaten life in the Uintah Basin Region.
2. To preserve and enhance the quality of life throughout the Uintah Basin Region by identifying potential property damage risks and recommending appropriate mitigation strategies to minimize potential property damage and economic losses.
    a. Implement programs and projects that assist in protecting lives by making homes, businesses, essential facilities, critical infrastructure, and other property more resistant to losses from all hazards.
    b. Improve hazard assessment information to make recommendations for discouraging new development and encouraging preventive measures for existing development in areas vulnerable to natural hazards.
    c. Protect life and property by implementing state-of-the-art standards, codes, and construction procedures.
3. Improved collaboration and cooperation throughout the Uintah Basin Region and the cities of Duchesne, Myton, Roosevelt, Ballard, Naples, and Vernal, and the towns of Dutch John, Manila, Altamont, and Tabiona.
    a. Continue developing and strengthening inter-jurisdictional coordination in the area of emergency services.
    b. Continue providing county and city emergency services with training and equipment to address all identified hazards.
4. Incorporate and integrate hazard mitigation strategies into all appropriate plans and policies.
5. Enhanced communication, public information, and education of risks and threats in the Uintah Basin Region to empower personal preparedness and responsibility.
    a. Increase public awareness of existing threats and the means to reduce these threats by conducting educational and outreach programs to all the various community groups in the county.
    b. Provide informational items, partnership opportunities, and funding resource information to assist in implementing mitigation activities.
6. Continuity of government services and business operations.

Changes in Priority

Mitigation priorities have not significantly changed for any of the counties or cities and towns within since the update of the last plan. For the 2024 plan update, mitigation goals for each county were significantly updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations. The plan also underwent a complete rewrite to better align with new local mitigation plan requirements.

Also, for past mitigation projects identified in previous iterations of the plan, a *2024 Status Update and Changes in Priority* section was included for each past action. A description of the update and changes in priority were included, if appropriate and applicable.

CHAPTER 6 MITIGATION STRATEGIES

MITIGATION ACTION PLAN

The action plan helps to prioritize mitigation initiatives according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The action plan also provides the framework for how the proposed projects and initiatives will be implemented and administered over the next five years.

Mitigation Strategy/Action Timeline Parameters

While the preference is to provide definitive project completion dates, this is not possible for every mitigation strategy/action. Therefore, the parameters for the timeline (Projected Completion Date) are as follows:

- **Short-term**—To be completed in 1 to 5 years
- **Long-term**—To be completed in greater than 5 years
- **Ongoing**—Currently being implemented under existing programs but without a definite completion date

Mitigation Strategy/Action Benefit Parameters

Benefit ratings are defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.
- **Medium**—Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low**—Long-term benefits of the project are difficult to quantify in the short term.

Mitigation Strategy/Action Estimated Cost Parameters

While the preference is to provide definitive costs (dollar figures) for each mitigation strategy/action, this is not possible for every mitigation strategy/action. Therefore, the estimated costs for the mitigation initiatives identified in this plan are identified as high, medium, or low, using the following ranges:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (e.g., bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.

- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Mitigation Strategy/Action Prioritization Process

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was conducted. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

The priorities are defined as follows:

- **High**—A project that addressed numerous goals or hazards, has benefits that exceed cost, has funding secured or is an ongoing project, and meets eligibility requirements for the HMGP or BRIC grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium**—A project that addressed multiple goals and hazards, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, BRIC, or other grant programs. The project can be completed in the short term once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low**—A project that will address few or no goals, mitigate the risk of one or few hazards, has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or BRIC grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or HMA programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define "benefits" according to parameters that meet the goals and objectives of this plan.

Mitigation Projects

Listed below are the goals and objectives developed by the mitigation plan and the priority projects that were developed to address the risks posed. Included in the list are a rough estimate of cost and an anticipated period for further investigation, project development, and implementation.

Participating jurisdictions agreed upon the mitigation actions that apply to the counties and all or some participating jurisdictions (see 17.2.1 New Mitigation Projects and 17.2.2 Ongoing Mitigation Projects). These shared actions, some of which address all hazards, help to meet the following FEMA requirement: “Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? Does the plan include one or more action(s) per jurisdiction for each hazard identified within the risk assessment?” In addition to the mitigation measures that apply to the region and all participating jurisdictions, most communities identified additional mitigation actions unique to their jurisdiction. The individual county annexes provide a detailed table of all identified mitigation actions.

PART V: PLAN MAINTENANCE

Chapter 7 Plan Maintenance

The Uintah Basin Region AHMP maintenance process includes a schedule for annual monitoring and evaluation of the programmatic outcomes established in the plan and for producing a formal plan revision every five years.

Formal Review Process

The plan may be reviewed on an annual basis by the Emergency Manager and reviewed and revised every five years by the Uintah Basin Region County Local Emergency Planning Committee (LEPC), including members from the jurisdictions of Duchesne, Myton, Roosevelt, Ballard, Naples, Vernal, Dutch John, Manila, Altamont, and Tabiona, to determine the effectiveness of programs and to reflect changes that may affect mitigation priorities. The Emergency Manager or designee will be responsible for contacting the Committee members and organizing the review. Committee members will be responsible for monitoring and evaluating the progress of the mitigation strategies in the plan. The Committee will review the goals and action items to determine their relevance to changing situations in the county as well as changes in federal policy, and to ensure they are addressing current and expected conditions. The Committee will also review the risk assessment portion of the plan to determine if this information should be updated or modified, given any new available data. The organizations responsible for the various action items will report on the status of the projects, the success of various implementation processes, difficulties encountered, success of coordination efforts, and which strategies should be revised or removed.

The Emergency Manager or designee will be responsible for ensuring the updating of the plan, with the participation of the jurisdictions of Duchesne, Myton, Roosevelt, Ballard, Naples, Vernal, Dutch John, Manila, Altamont, and Tabiona. The Emergency Manager will also notify all holders of the plan and affected stakeholders when changes have been made. Every five years the updated plan will be submitted to the Utah Division of Emergency Management and to the Federal Emergency Management Agency for review and approval.

Continued Public Involvement

Emergency Management is dedicated to involving the public directly in the review and updates of the plan. The Emergency Manager for each participating county is responsible for the review and update of the plan. The public will also have the opportunity to provide input into plan revisions and updates, as well as adjacent counties. Copies of the plan will be kept by appropriate county departments and outside agencies.

Public meetings will be held when deemed necessary by the Emergency Manager. The meetings will provide a forum where the public can express concerns, opinions, or new alternatives that can then be included in the plan. The Board of County Commissioners will be responsible for using county resources to publicize the public meetings and maintain public involvement throughout the county, including in the jurisdictions of Duchesne, Myton, Roosevelt, Ballard, Naples, Vernal, Dutch John, Manila, Altamont, and Tabiona.

To further facilitate continued public involvement in the planning process, the Uintah Basin Region will ensure that:

- Each county Emergency Management will keep a copy of the plan on hand at their office for review and comment by the public.
- A public meeting will be held annually to provide the public with a forum for discussing concerns, opinions, and ideas with the Local Emergency Planning Committee.

Monitoring, Evaluating, & Updating the Plan

To ensure the Uintah Basin Region Multi-Jurisdictional All Hazard Mitigation Plan continues to provide an appropriate path for risk reduction throughout the county, it is necessary to regularly evaluate and update it. Uintah Basin Region Emergency Management will be responsible for monitoring the status of the plan and gathering appropriate parties to report the status of mitigation actions. The Local Emergency Planning Committee (LEPC) will convene on an annual basis to determine the progress of the identified mitigation actions. The Committee will also be an active participant in the next plan update. As the County All Hazard Mitigation Plan matures, new stakeholders will be identified and encouraged to join the existing Committee.

Emergency Management is responsible for contacting Committee members and organizing the annual meeting. The Committee's responsibilities include:

- Annually review each goal and objective to determine its relevance and appropriateness.
- Monitor and evaluate the mitigation strategies in this plan to ensure the document reflects current hazard analyses, development trends, code changes, and risk analyses and perceptions.
- Ensure the appropriate implementation of annual status reports and regular maintenance of the plan. The Committee will hear progress reports from the parties responsible for the various implementation actions to monitor progress.
- Create future action plans and mitigation strategies. These should be carefully assessed and prioritized using the benefit-cost analysis (BCA) methodology that FEMA has developed.
- Ensure the public is invited to comment and be involved in mitigation plan updates.
- Ensure the county complies with all applicable federal statutes and regulations during the periods for which it receives grant funding, in compliance with 44 CFR.
- Reassess the plan in light of any major hazard event. The Committee will convene within 45 days of any major event to review all applicable data and to consider the risk assessment, plan goals, objectives, and action items given the impact of the hazard event.
- Review the hazard mitigation plan in connection to other plans, projects, developments, and other significant initiatives.
- Coordinate with appropriate municipalities and authorities to incorporate regional initiatives that transcend the boundaries of the county.
- Update the plan every five years and submit for FEMA approval.
- Amend the plan whenever necessary to reflect changes in state or federal laws and statutes required in 44 CFR.

The Five-Year Action Plan

This section outlines the implementation agenda that the Committee should follow five years following adoption of this plan and then every five years thereafter. The Local Emergency Planning Committee (LEPC), led by Emergency Management and including the jurisdictions of Duchesne, Myton, Roosevelt, Ballard, Naples, Vernal, Dutch John, Manila, Altamont, and Tabiona, is responsible to ensure the All Hazard Mitigation Plan is updated every five years.

The Committee will consider the following an action plan for the first 5-year planning cycle. It should be noted that the schedule below can be modified as necessary and does not include any meetings and/or activities that would be necessary following a disaster event (which would include reconvening the Committee within 45 days of a disaster or emergency to determine what mitigation projects should be prioritized during the community recovery). If an emergency meeting of the Committee occurs, this proposed schedule may be altered to fit any new needs.

Year 0

- 2024: Update All Hazard Mitigation Plan, including a series of Committee meetings and public meetings. Submit 2024 Multi-Jurisdictional All Hazard Mitigation Plan for FEMA approval.
- March 2024 – October 2024: Work on county mitigation actions. Each jurisdiction within the region, also work on individual mitigation actions. Daggett, Duchesne and Uintah County Emergency Management to stay in contact with lead departments to keep tabs on project status.
- January 2025: Reconvene Committee for first annual LEPC meeting. Introduce the concept of mitigation plan integration with other planning documents. Host first annual public meeting. Each jurisdiction within the region will advertise public meetings.

Year 1

- January 2025 – March 2025: Work on each county mitigation actions. Each jurisdiction will also work on individual mitigation actions. Daggett, Duchesne and Uintah County Emergency Management to stay in contact with lead departments to keep tabs on project status. Encourage plan integration efforts.
- March 2025: Reconvene Committee for annual LEPC meeting. Discuss opportunities for mitigation plan integration with other planning documents. Discuss recent hazards. Update status of projects. Host public meeting. Each jurisdiction will advertise public meetings as well as the county.

Year 2

- April 2025 – March 2026: Work on county mitigation actions. Each jurisdiction will also work on individual mitigation actions. Daggett, Duchesne and Uintah County Emergency Management to stay in contact with lead departments to keep tabs on project status. Encourage plan integration efforts.
- March 2026: Reconvene Committee for annual LEPC meeting. Discuss opportunities for mitigation plan integration with other planning documents. Discuss recent hazards. Update status of projects. Host public meeting. Each jurisdiction will advertise public meetings as well as the county.

Year 3

- April 2026 – March 2027: Work on county mitigation actions. Each jurisdiction will also work on individual mitigation actions. San Juan County Emergency Management to stay in contact with lead departments to keep tabs on project status. Encourage plan integration efforts.
- March 2027: Reconvene Committee for annual LEPC meeting. Discuss opportunities for mitigation plan integration with other planning documents. Discuss recent hazards. Update status of projects. Host public meeting. Each jurisdiction will advertise public meetings as well as the county.

- Fall 2027: Apply for Building Resilient Infrastructure and Communities or Hazard Mitigation Grant Program funds to update next iteration of mitigation plan.

Year 4

- April 2027 – March 2028: Work on county mitigation actions. Each jurisdiction also work on individual mitigation actions. Daggett, Duchesne and Uintah County Emergency Management to stay in contact with lead departments to keep tabs on project status. Encourage plan integration efforts. Update 2024 Uintah Basin Regional Multi-Jurisdictional All Hazard Mitigation Plan, including a series of LEPC meetings and public meetings. Each jurisdiction will advertise public meetings as well as the county.
- March 2028: Reconvene Committee for annual LEPC meeting. Discuss opportunities for mitigation plan integration with other planning documents. Discuss recent hazards. Update status of projects.

Year 5

- March 2029: Submit 2029 Uintah Basin Region Multi-Jurisdictional All Hazard Mitigation Plan for FEMA approval. Repeat.

Annual Local Emergency Planning Committee Meetings

During each annual Local Emergency Planning Committee (LEPC) meeting, the Committee will be responsible for a brief evaluation of the 2024 All Hazard Mitigation Plan and to review the progress on mitigation actions.

Plan Evaluation

To evaluate the plan, the Committee should answer the following questions:

- Are the goals and objectives still relevant?
- Is the risk assessment still appropriate, or has the nature of the hazard and/or vulnerability changed over time?
- Are current resources appropriate for implementing this plan?
- Have lead agencies participated as originally proposed?
- Has the public been adequately involved in the process? Are their comments being heard?
- Have departments been integrating mitigation into their planning documents?

If the answer to each of the above questions is “yes,” the plan evaluation is complete. If any questions are answered with a “no,” the identified gap must be addressed.

Review of Mitigation Actions

Once the plan evaluation is complete, the Committee must review the status of the mitigation actions. To do so, the Committee should answer the following questions:

- Have the mitigation actions been implemented as planned?
- Have outcomes been adequate?
- What problems have occurred in the implementation process?

Meeting Documentation

Each annual LEPC meeting must be documented, including the plan evaluation and review of mitigation actions. Mitigation actions have been formatted to facilitate the annual review process.

Implementation through Existing Programs

Hazard mitigation practices must be incorporated within existing plans, projects, and programs. Therefore, the involvement of all departments, private non-profits, private industry, and appropriate jurisdictions is necessary in order to find mitigation opportunities within existing or planned projects and programs. To execute this, Emergency Management will assist and coordinate resources for the mitigation actions and provide strategic outreach to implement mitigation actions that meet the goals and objectives identified in this plan.

Refer to the Capability Assessment for a breakdown of each participating agency within the county and their respective programs, plans, policies, regulations, funding, and practices that will be reviewed regularly along with this hazard mitigation plan. When each document listed in the aforementioned tables is updated, the mitigation plan will also be updated. The reverse is also true. The Capability Assessment tables also display how the mitigation plan has already been integrated into each jurisdiction's plans, projects, and programs. Daggett County, Duchesne County, and Uintah County each have Planning Commissions that meet regularly one to two times a month to discuss plan integration and potential updates.

APPENDIX

Appendix A: LEPC, Planning Team, & Participating Members Contact List

Agency	Representative	Position
Straten Networks	Mark Robertson	Safety
Duchesne County	Tracy Killian	
Roosevelt City	Joshua Bake	City Manager
Uintah Fire Dist	Terri Terril	Admin Assistant
Vernal PD	Keith Campbell	Assist Chief
UBAOG	Kim Deter	Community Service
UBAOG	Julie Slocum	Director Community Service
Uintah County OEM	Heidi Lundburg	Emergency Manager
THCD	Rob Grove	MRC Coordinator
UBMC	Greg Gardiner	Chief Nursing Officer
Myton City	Allen Allred	Director Public Works
Uintah Fire District	Jeremy Raymond	Director
Vernal City	Gabby Blackburn	Planning Director
UHP	Brett Gehring	Lieutenant
UBMC	Tawnie Reynolds	ED Manager
Town of Dutch John	Sandy Kunkel	Mayor
Duchesne County	Mike Lefler	Emergency Manager
Duchesne Sheriff's Office	Monty Nay	Chief Deputy
UBAOG	Carl Conrad	Transit Director
UBAOG	Joey Reyes	Transit Manager
Uintah County	John Laursen	Commissioner
Uintah County	Jordan Merrell	GIS
Naples PD	Nathan Simper	Chief
Daggett County	Peyton Ashely	Road Dept OP
Daggett County	Sean Hughes	Road Dept OP Supervisor
Daggett County	Leonard Isaacson	Emergency Manager
Daggett County	Katie Anderson	Assistant EM
Uintah County Sheriff's Office	Brian Fletcher	Chief Deputy
Duchesne County	Shelly Felter	EM Coordinator
Uintah County	Deanna Nyburg	Planner
Integrated Solutions Consulting	Jacob Halley	Consultant
Integrated Solutions Consulting	Daiko Abe	Consultant

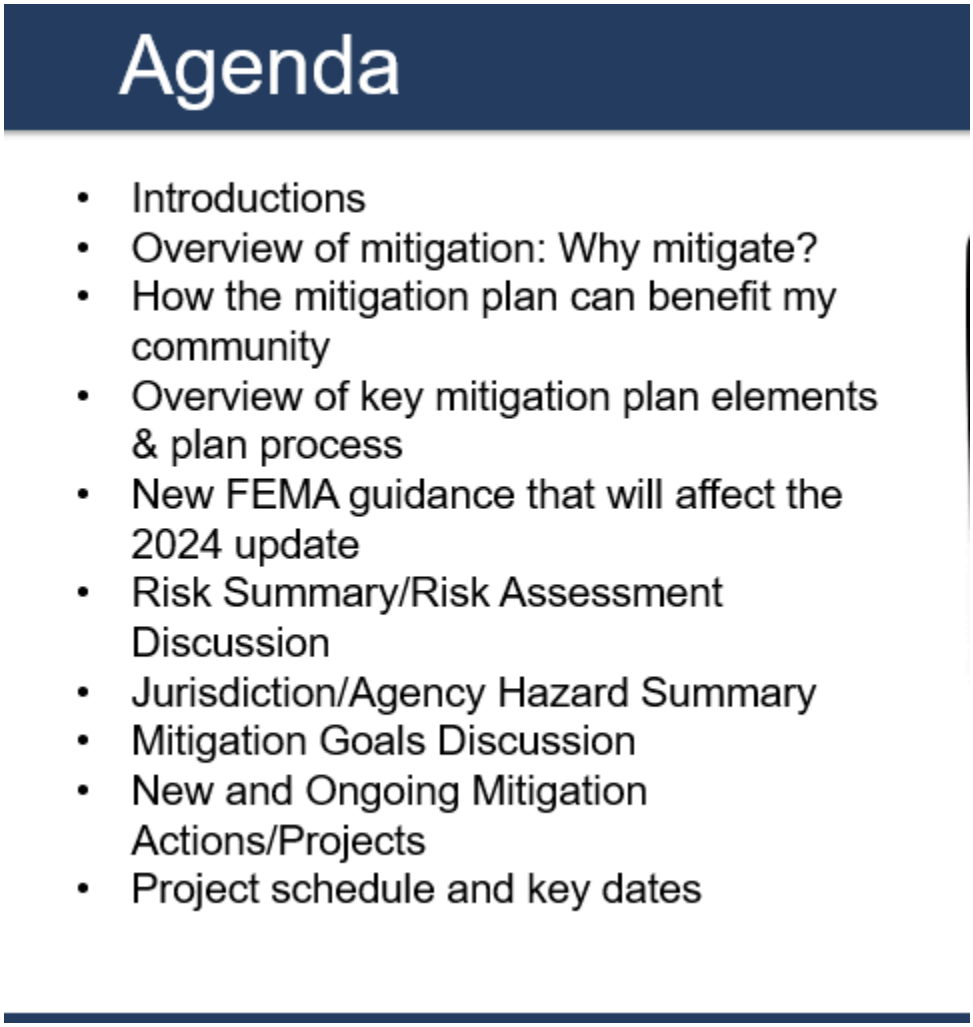
APPENDIX B: MEETING AGENDAS

Kickoff Meeting May 17 2023

Meeting Agenda

- Meeting Roster/Sign-in Sheet
- Hazard Mitigation Planning
- 2024 Plan Update Process
- Roles and Expectations
- Public & Stakeholder Involvement
- Project Timeline
- Data Requests
- Next Steps

Jurisdictional Workshop September 13 2023



APPENDIX C: MEETING WORKSHEETS, AGENDAS, & SIGN-IN SHEETS

- *SIGN-IN SHEET:* **Hazard Mitigation Plan Update** -

Hazard Mitigation Plan: Workshop (09/13/2023)

Uintah Basin, Utah

Hazard Mitigation Planning Meeting - Workshop

Name	Community/Organization	Title	Phone	E-mail
Mark Robertson	Strata Networks	Safety	435 622 6441	mrobertson@stratanetworks.com
Tracy Killian	Duchesne County		435 823 5311	TKillian@duchesne.utah.gov
Joshua Bake	Roosevelt City	City Manager	435-219-2219	Jbake@roosevelt.com
Terri Terrill	Uintah Fire Dist.	Adm. Asst.	435-781-6755	tterrill@stratanet.com
Keith Campbell	Vernal P.D.	Assl. Chief	435-219-1255	KCampbell@vernalcity.org
Kim Deter	UBAOG	Community Service	435-722-4518	Kimd@ubaog.org
Julie Sloan	UBAOG	Director Community Secv. Specialist		Juliet@ubaog.org
Heidi Lundberg	Uintah County EM	Emergency Manager	435-781-5466	HLundberg@uintah.utah.gov
Rob Grove	TCHD	EPR/HCC	435-650-7330	rgrove@tricountyhealth.com
Greg Gardiner	UBMC	CNO	435-421-9723	greg.gardiner@UBH.org
ALAN ALLRED	MYTON CITY	PUBLIC WORKS/ASST FIRE	435-823-2796	AMALLRED@ME.com
Jeremy Raymond	Fire District	Director	435-781-6755	uintahfire@ubtanet.com
Gabriel Hackbart	Vernal City	Planning Director	435-790-7220	gjhackbart@vernalcity.org
Brett Gehring	UHP	Lieutenant	435-503-5980	
Tawnie Reynolds	UBMC	ED Manager	435 621 3114	tawnie_reynolds@ubh.org

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- *SIGN-IN SHEET:* Hazard Mitigation Plan Update -

Hazard Mitigation Planning Meeting – Workshop

Name	Community/Organization	Title	Phone	E-mail
Sandy Kunkel	Mayor Dutch John	Mayor	435-219-1367	Skunkel@dutchjohn.org
Marty Hewes	MUES	Safety Coord.		
Mike Lefler	Duchesne County	Fire & EM		

2

Hazard Mitigation Plan: Workshop (09/13/2023)

Uintah Basin, Utah

Hazard Mitigation Planning Meeting - Workshop

Name	Community/Organization	Title	Phone	E-mail
Monty L. May	Duchesne S.O.	Chief Deputy	435-733-0503	mmay@duchesne.utah.gov
Carl Cowens	UBAOG	Transit Director	435-722-4518	carlc@ubaog.org
Joey Reyes	UBAOG	Transit Manager	435-722-7037	JoeyReyes@ubtransit.com
John Laursen	Uintah Co	Commissioner	435-781-5338	johnlaursen@uintah.utah.gov
Jordan Merrell	" "	GIS Uintah	435-790-6429	Jordmerrell@uintah.ut.us
Nathan Simper	Naples PD	Chief	435-789-9449	nsimper@naples.utah.gov

1

- *SIGN-IN SHEET:* **Hazard Mitigation Plan Update** -

Hazard Mitigation Plan: Workshop (09/13/2023)

Uintah Basin, Utah

Hazard Mitigation Planning Meeting – Workshop

Name	Community/Organization	Title	Phone	E-mail
Peyton Ashley	Daggett County	DP. Road Dept	435-784-3208	
Sean Hughes	Daggett county	Road Dept Supt	435 784 3208	Shughes@daggettcounty.org
LEONARD ISAACSON	DAGGETT COUNTY	EM	435-621-6099	lisaacson@daggettcounty.org
Katie Anderson	Daggett County	EM	435-784-3255	kanderson@daggettcounty.org
BRIAN FLETCHER	UCSO	CHIEF DEPUTY	435 789 2511	bfletcher@uintah.utah.gov
SHELLY FELTER	DUCHESNE CO. EM	EM COORDINATOR	435-738-1220	sfelter@duchesne.utah.gov
Deanna Nyberg	Uintah County	Planner	435-781-5336	dnyberg@uintah.utah.gov

Handout: New Mitigation Actions (Uintah Basin)

Name:

Organization/Department:

E-mail:

Phone:

New Mitigation Action (Please Describe):

Year Initiated	**2024 (New Mitigation Action)**
Applicable Jurisdiction	
Lead Agency/Organization	
Supporting Agencies/Organizations	
Potential Funding Source	
Estimated Cost	
Benefits (loss avoided)	
Projected Completion Date	
PRIORITY (High, Medium, Low)	

Please indicate if the mitigation goals and objectives below are applicable to the new mitigation action/project). Check All That Apply.

X	Place an "X" by the applicable goals, if applicable
	1. Protection of life before, during, and after the occurrence of a disaster and reducing the impact of damage where problems cannot be eliminated.
	2. Protection of emergency response capabilities (critical infrastructure)
	3. Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social and economic needs.
	4. Protection of natural resources and the environment, when considering mitigation measures.
	5. Promoting public awareness through education of community hazards and mitigation measures.
	6. Preserving and/or restoring natural features that provide mitigation such as floodplains.
	7. Provide a basis for funding of projects outlined as hazard mitigation strategies.
	8. Establish a framework and database for the jurisdictions to use to apply for aid.

Handout: New Mitigation Actions (Uintah Basin)

This mitigation action:

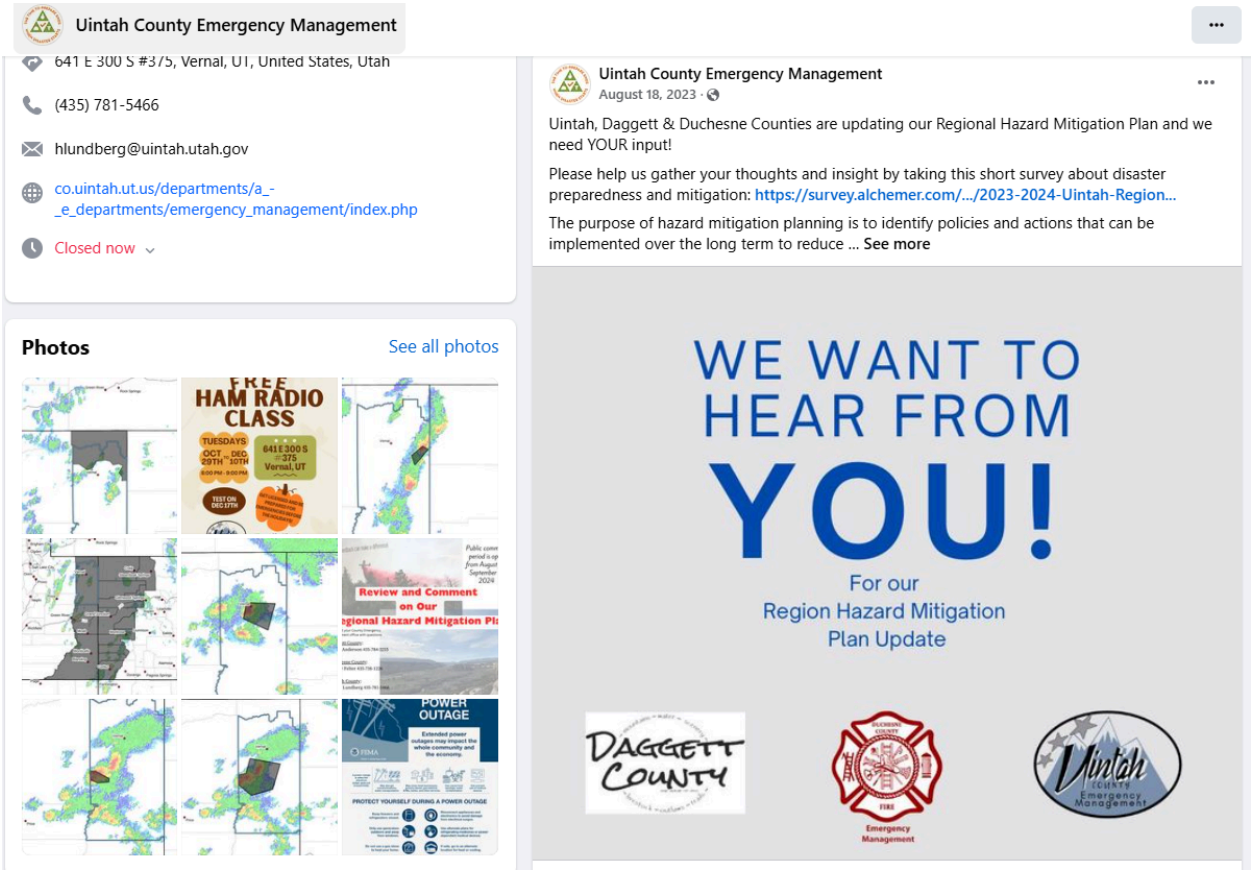
Instructions: Circle the best option

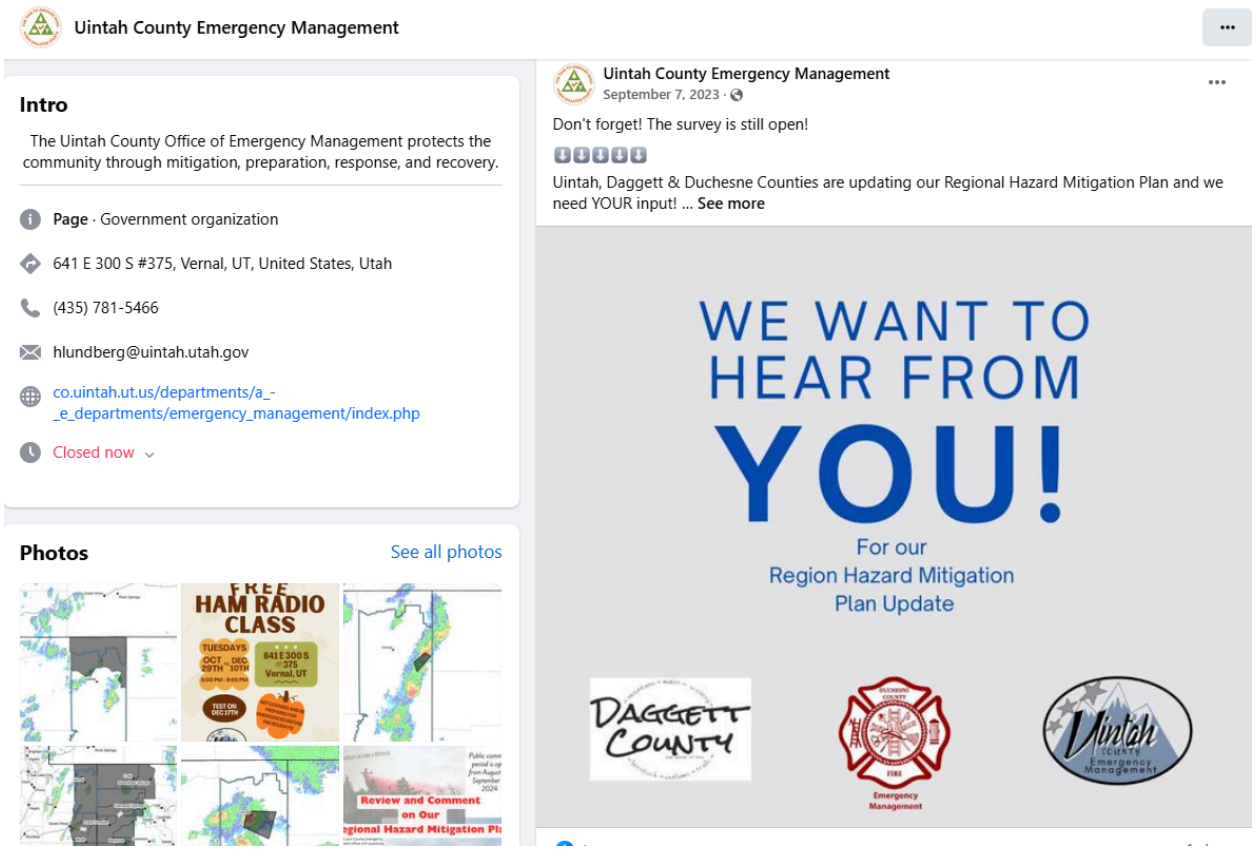
	Strongly Disagree (1)	Disagree (2)	Neither Agree or Disagree (3)	Agree (4)	Strongly Agree (5)
Social: Do you agree or disagree that the mitigation action is more likely to: be acceptable to the community; does not adversely affect a particular segment of the population; does not cause relocation of lower income people and is compatible with the community's social and cultural values.	1	2	3	4	5
Technical: Do you agree or disagree that the mitigation action is technically effective in providing a long-term reduction of losses and has minimal secondary adverse impacts.	1	2	3	4	5
Administrative: Do you agree or disagree that your jurisdiction/organization has the necessary staffing and funding to carry-out this mitigation action.	1	2	3	4	5
Political: Do you agree or disagree that the mitigation action has the support of the public and stakeholders who have been offered an opportunity to participate in the planning process.	1	2	3	4	5
Legal: Do you agree or disagree that the jurisdiction or implementing agency has the legal authority to implement and enforce the mitigation action.	1	2	3	4	5
Economic: Budget constraints can significantly deter the implementation of mitigation actions. Do you agree or disagree that the mitigation action is cost-effective, as determined by a cost benefit review, and is possible to fund?	1	2	3	4	5
Environmental: Do you agree or disagree that the mitigation action is sustainable and does not have an adverse effect on the environment, complies with federal, state, and local environmental regulations, and is consistent with the community's environmental goals.	1	2	3	4	5
Equity: Do you agree or disagree that the mitigation action Does not create an opportunity for unequal distribution of resources. Is the action consistent and systematically fair?	1	2	3	4	5

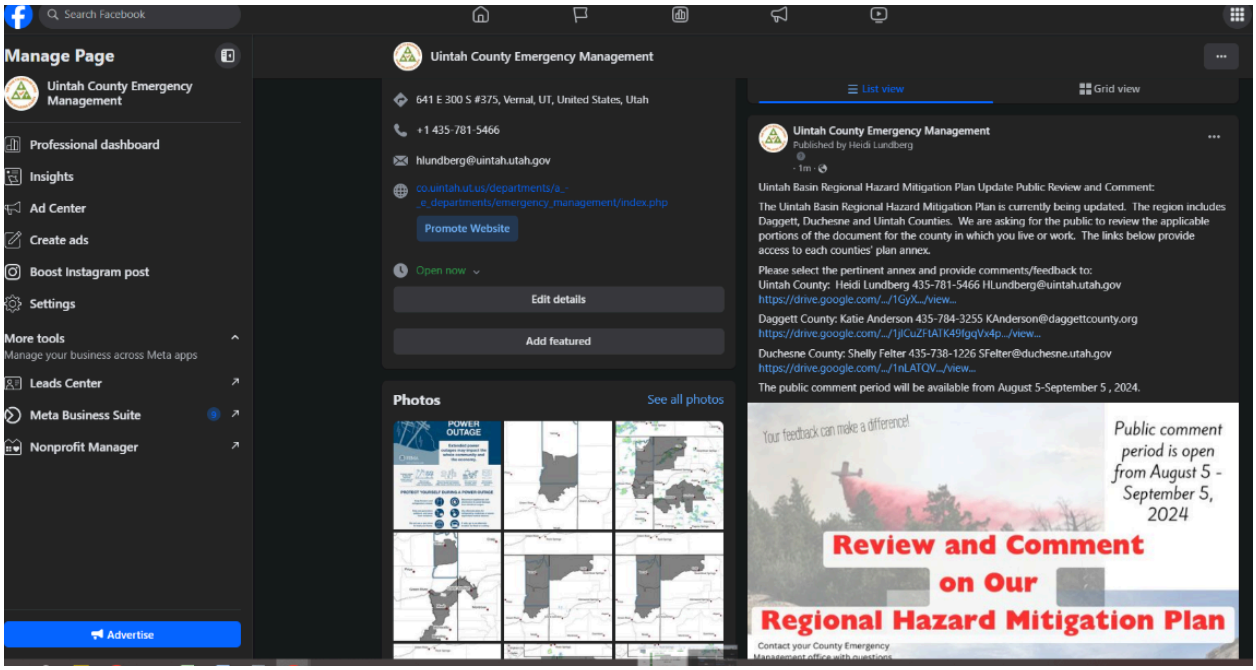
Place an "X" by the hazard(s) this action/project will mitigate:

Mitigated Hazards			
X	Place an "X" by the applicable hazard		
	All Hazards		Severe Wind
	Avalanche		Severe Winter Weather
	Dam Failure		Subsidence
	Drought		Tornado
	Earthquake		Wildfire
	Expansive Soils		
	Flood		
	Hail		
	Landslide		
	Lightning		

Appendix D: Social Media & Newspaper Advertisement for Public Involment




Uintah County Emergency Management
Intro
The Uintah County Office of Emergency Management protects the community through mitigation, preparation, response, and recovery.
Page · Government organization
641 E 300 S #375, Vernal, UT, United States, Utah
(435) 781-5466
hlundberg@uintah.utah.gov
co.uintah.ut.us/departments/a_-_e_departments/emergency_management/index.php
Closed now
Photos
See all photos
Uintah County Emergency Management
September 7, 2023 ·
Don't forget! The survey is still open!
Uintah, Daggett & Duchesne Counties are updating our Regional Hazard Mitigation Plan and we need YOUR input! ... See more
WE WANT TO HEAR FROM YOU!
For our Region Hazard Mitigation Plan Update
DAGGETT COUNTY
Uintah County Emergency Management


Search Facebook
Manage Page
Uintah County Emergency Management
Professional dashboard
Insights
Ad Center
Create ads
Boost Instagram post
Settings
More tools
Manage your business across Meta apps
Leads Center
Meta Business Suite
Nonprofit Manager
Advertise
Uintah County Emergency Management
641 E 300 S #375, Vernal, UT, United States, Utah
+1 435-781-5466
hlundberg@uintah.utah.gov
co.uintah.ut.us/departments/a_-_e_departments/emergency_management/index.php
Promote Website
Open now
Edit details
Add featured
Photos
See all photos
List view
Grid view
Uintah County Emergency Management
Published by Heidi Lundberg
Uintah Basin Regional Hazard Mitigation Plan Update Public Review and Comment:
The Uintah Basin Regional Hazard Mitigation Plan is currently being updated. The region includes Daggett, Duchesne and Uintah Counties. We are asking for the public to review the applicable portions of the document for the county in which you live or work. The links below provide access to each counties' plan annex.
Please select the pertinent annex and provide comments/feedback to:
Uintah County: Heidi Lundberg 435-781-5466 HLundberg@uintah.utah.gov
Daggett County: Katie Anderson 435-784-3255 KAnderson@daggettcounty.org
Duchesne County: Shelly Felter 435-738-1226 SFelter@duchesne.utah.gov
The public comment period will be available from August 5-September 5 , 2024.
Your feedback can make a difference!
Public comment period is open from August 5 - September 5, 2024
Review and Comment on Our Regional Hazard Mitigation Plan

APPENDIX E: PLAN ADOPTION & ENDORSEMENT FORMS

ANNEX A

Daggett County, Utah Annex

2024 Uintah Basin Region

Multi-Jurisdictional All Hazard Mitigation Plan

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PART I: COMMUNITY PROFILE

• DAGGETT COUNTY PROFILE

o LOCATION

Daggett County is located in the northeastern corner of Utah, with its northern border adjoining the southern border of Wyoming and its eastern border adjoining the western border of Colorado. The Uinta Mountains make up the southwestern area of the county as well as the southern border. The Green River also weaves through the east-central part of the county. It is bordered on the north by Sweetwater County, WY; on the east by Moffat County, CO; on the south by Uintah County; on the southwest by Duchesne County; and on the west by Summit County. Total area of the county is 721 square miles, of which 24 square miles is water (U.S. Census QuickFacts, 2022). It is the 26th largest county by area in Utah out of 29 counties.

o TOPOGRAPHY & VEGETATION

Daggett County is in the semi-arid region of northeastern Utah. The county is positioned on the north side of the Uinta Mountains. The county's terrain slopes to the north and the east on the northern side of the Uintas, which run east to west along the southern border of the county. The highest crest in the range is around 12,276 feet. Manila has an elevation of 6,348 feet, and Dutch John has an elevation of 6,430 feet. The elevation range within the county is from nearly 12,300 feet in the Uinta Mountains to 5,370 feet along the Green River in the eastern part of the county near the Utah-Colorado border (Daggett County Topographic Map, 2024).

The Uinta Mountains are the highest mountain range in the contiguous United States with no modern glaciers. Lush mountain forests, as part of Ashley National Forest, cover the lower parts of the range while rock and permafrost dominate the upper elevations. The most common species of tree in the lowest elevations of the forested land in the county is pinyon pine and juniper. Douglas-fir, white fir, ponderosa pine, limber pine, and lodgepole pine can be found at mid-elevations. The highest elevation species are primarily Englemann spruce and Subalpine fir. Quaking aspen can be found at all elevations, and blue spruce is often found in the lower riparian areas. Many species of grasses, shrubs, and forbs can also be found throughout the county (Daggett County General Plan Appendix, 2017).

Daggett County has many lakes, reservoirs, and springs, especially in the basins between the summits and ridgelines of the Uintas. The Green River flows southeastward through the central region of the county and passes through the eastern border of Utah into Colorado where it later turns southwest and dips back into Utah through Uintah County (Daggett County Topographic Plan, 2023). Fremont cottonwood, willow, narrowleaf cottonwood, alder, birch, and dogwood are common species found in the riparian areas of the county (Daggett County General Plan Appendix, 2017).

Flaming Gorge National Recreation Area is made up of 207,363 acres and is located in northeastern Utah and extends into Wyoming. It includes deep, red canyons carved by the Green River and the Flaming Gorge Reservoir, which is 91 miles long (Travel Wyoming, 2023).

o NATURAL RESOURCES

Coal, iron, phosphate, oil, and natural gas are significant natural resources present in Daggett County. Daggett County is the eighth largest producer of natural gas in the state of Utah as of January 2024 with a lifetime production of 193,703,035 MCF. The county produced 748,794 MCF of natural gas in 2023

(Utah DNR, 2024). Approximately 30,273 acres in Daggett County has been set aside by the BLM for phosphate mining and related development. Smaller resources in the region that have been mined in the past include kerogen, bituminous sandstone, wurlitzite, bituminous limestones, ozokerite, nigrite, and tabbyite (Daggett County General Plan Appendix, 2017).

The Green River is an important water resource in Daggett County. A number of streams also flow down the north slope of the Uinta Mountains toward the Green River. This water is often used for irrigation and other municipal and industrial uses. Groundwater is used as culinary and agricultural water. An abundance of fish present in these water resources has historically been a lifeline for Native Americans and settlers in the area but is now primarily used for sport fishing (Daggett County General Plan Appendix, 2017).

o CLIMATE

The climate in Daggett County is primarily semi-arid, with occasional severe cold in the winter. The climate in the upper elevations of the Uinta Mountains is often colder with increased snowfall (Daggett County General Plan Appendix, 2017).

In the summer, the average daily temperature in Manila is 65.7°F, with the warmest month of each year typically being July (NOWData, 2024). In the winter, the average daily temperature is 24.4°F in Manila, and the coldest month is typically December (NOWData, 2024).

Average annual precipitation is approximately 9.63 inches in Manila (NOWData, 2024). Temperature in Flaming Gorge is similar to the temperature in Manila, but Flaming Gorge averages more rainfall with 10.65 inches each year. The wettest month in Manila is May, and the driest month is November. The table below outlines monthly average maximum and minimum temperatures and average precipitation and snowfall at Manila.

Table 1-1. Manila Monthly Climate Summary

Manila, UT												
Average Maximum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
34.7	38.4	48.7	55.4	64.0	76.9	83.3	80.9	72.7	58.8	46.6	34.1	56.6
Average Minimum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
12.2	15.3	24.5	29.8	38.2	47.1	54.5	52.0	43.9	31.9	21.8	12.4	30.7
Average Total Precipitation (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
0.34	0.4	0.66	0.8	1.46	0.95	0.86	1.06	0.92	0.71	0.32	0.49	9.63
Average Total Snowfall (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
5.0	5.6	7.8	5.3	1.9	0.0	0.0	0.0	0.4	3.0	4.7	4.2	37.9
Source: NOWData, 2024; Western Regional Climate Center, 2016												

o LAND OWNERSHIP, LAND USE, & FUTURE DEVELOPMENT

Daggett County has 461,201 total acres of land. Nearly 90% of the land in Daggett County is owned by the federal and state government. Roughly 11% of the land is privately owned, with 44,000 acres of this land designated for agricultural use. Grazing of livestock is allowed on parts of the federal and state land. Approximately 235,299 acres or 54.7% of the county land is owned by Ashley National Forest and is divided between the Flaming Gorge Recreation Area, Flaming Gorge Ranger District, and Vernal Ranger District. All this land is managed by the Forest Service. 98% of the total land in the county is considered open land (Headwaters, 2024; Daggett County General Plan, 2008).

The figure below shows the land ownership statistics for Daggett County, as taken from the Headwaters Economic Profile System:

Land Ownership

	Daggett County, UT
Total Acres	461,201
Private Lands	49,391
Conservation Easement	0
Federal Lands	371,296
Forest Service	258,024
BLM	113,272
National Park Service	0
Military	0
Other Federal	0
State Lands	40,514
State Trust Lands*	29,432
Other State	11,082
Tribal Lands	0
City, County, Other	0
Percent of Total	
Private Lands	10.7%
Conservation Easement	0.0%
Federal Lands	80.5%
Forest Service	55.9%
BLM	24.6%
National Park Service	0.0%
Military	0.0%
Other Federal	0.0%
State Lands	8.8%
State Trust Lands*	6.4%
Other State	2.4%
Tribal Lands	0.0%
City, County, Other	0.0%

Figure 1-1. Land Ownership in Daggett County

Agriculture is a huge part of the county. Much of the land is used for crop production, raising livestock, and grazing. Pastures and rangeland are vital for livestock grazing, and large portions of livestock are grazed on public lands (Daggett County General Plan Appendix, 2017). According to the USDA Census of Agriculture, Daggett County had 52 farms covering 17,671 acres in 2017 (USDA, 2022). 5,409 acres of this land is harvested cropland, and 7,168 acres is irrigated land. The Natural Resources Conservation Service holds the most influence over these private farms. Daggett County and its municipalities also have control over land use and zoning, which affects agriculture in the county (Daggett County General Plan Appendix, 2017).

Only 10.7% of the lands within Daggett County are privately owned, and 90% of which is set aside for agricultural purposes. Private lands are typically used for new development, which means that future

residential, commercial, and industrial land use needs in the county must be met through the limited supply of privately owned land (Daggett County General Plan Appendix, 2017).

There is currently enough undeveloped private land to meet the demand of future population growth in Daggett County. According to the Governors Office and Envision Utah, Utah develops at a rate of about 3.2 people per acre or 14%. Daggett County, however, has a much slower overall growth rate of 2.8% and even declines in population some years. No land shortages are currently expected in Daggett County in the coming decades.

o HISTORY

Scattered archeological remains throughout present-day Daggett County indicate the presence of the Fremont peoples (AD 1–1301) hundreds of years ago. Although the Fremont peoples were more common on the southern side of the Uinta Mountains, a few lived on the northern side at lower elevations along the Green River and its tributaries (Daggett County General Plan Appendix, 2017).

In the 1700s, the Utes and Shoshone tribes occupied the land, and Spanish explorers later came through the area (Daggett County, 2024). Settlers from Europe and the eastern U.S. developed homesteads in the region in the 1800s (Daggett County General Plan Appendix, 2017). Daggett County was officially designated a county in 1918, and the boundaries were adjusted once in 1919.

o POPULATION & DEMOGRAPHICS

In 2022, Daggett County had a population of 1,014 (U.S. Census QuickFacts, 2022). This is an increase of 8.3% from the population taken during the 2020 Census, which was 935. Since 1918 when Daggett County was designated as a county, the population has fluctuated drastically from decennial census to decennial census. The most dramatic changes occurred in 1960 with a 219.8% population increase and 1970 with a -42.8% decline (U.S. Census, 1960, 1970).

The population trends for Daggett County and the two largest towns in the county are shown in the table below.

Table 1-2. Daggett County Population Trends

County Location	2010	2020	Percent Change 2010–2020
Entire County	1,059	935	-11.7%
Manila	310	308	-0.6%
Dutch John	145	141	-2.8%
Source: U.S. Census Bureau, 2010, 2020			

Between 2010 and 2020, the county as a whole decreased in population by -11.7%, although there were periods of growth within that time. The two towns in the county, Manila and Dutch John, both declined in population, as well, with -0.6% and -2.8% declines respectively.

Of the total population in the county, 44.2% are female (U.S. Census QuickFacts, 2022). 21.9% of the total population are under 18 years of age, and 25.8% are 65 years and older. The median age in 2020 was 38.9 years. 0% of residents were foreign born. The population is mainly homogenous with 95.1% of county residents listed as white alone. The county's racial and ethnic distribution is listed in the table

below. Only the six most common ethnicities in the county are included, and some members of the population may identify as more than one race.

Table 1-3. Daggett County Racial and Ethnic Distribution

Race	Percent of Population
White	95.1%
Black or African American	0.3%
American Indian and Alaska Native	1.1%
Asian	0.6%
Native Hawaiian and Other Pacific Islander	0.1%
Hispanic or Latino	6.5%
Source: U.S. Census Bureau, 2020; American Community Survey, 2022	

o HOUSING

In 2018–2022, there were 235 households in Daggett County. The average household size was 2.44 people. 84.9% of residents who are one year or older are living in the same house now that they were a year ago (U.S. Census QuickFacts, 2022).

In July 2022, Daggett County had a total of 1,176 housing units, 65.6% of which were vacant (U.S. Census QuickFacts, 2022). An estimated 25.9% of occupied housing units were built since the year 2000. Of the total occupied housing units, 63.8% were single-unit structures, 0% were multi-unit structures, and 36.2% were mobile homes or another type of unit (American Community Survey, 2022). The median value of owner-occupied housing units in the county from 2018 to 2022 was $252,400. Daggett County has a homeownership rate of 78.2%, which is higher than the national average of 64.6% (Data USA, 2024). Median gross rent was $420 from 2017 to 2021 (U.S. Census QuickFacts, 2022). All households were estimated to have telephone service, and 4.7% had no vehicles available (American Community Survey, 2022).

o ECONOMY

An estimated 52.4% of the population 16 years or older in Daggett County is in the civilian labor force (258 people). An estimated 54.2% of the people employed in 2022 were private wage and salary workers; 26.9% were federal, state, or local government; and 18.9% were self-employed (U.S. Census QuickFacts, 2022). The Accommodation & Food Services (59 people); Retail Trade (36 people); and Arts, Entertainment, & Recreation (21 people) industries currently hold the highest number of employees of any other industry in the county (Data USA, 2024). The most common job groups, regardless of industry, are Management (35 people); Building & Grounds Cleaning & Maintenance (27 people); and Sales (27 people).

The adjusted unemployment rate is 4.0% for Daggett County as of January 2024 compared to the state of Utah unemployment rate of 2.8% and the United States unemployment rate of 3.9% for the same period (Utah Department of Workforce Services, 2024).

The median household income in 2022 in Daggett County was $61,250. An estimated 75.7% of households received earnings, and 35.7% received retirement income. 35.7% of households received Social Security (American Community Survey, 2022). These income sources are not mutually exclusive;

that is, some households received income from more than one source. The poverty rate in the county is 7.3% (U.S. Census QuickFacts, 2022).

o EDUCATION

The total school enrollment from kindergarten to 12th grade in Daggett County was 142 students in 2022 (American Community Survey, 2022). Nursery school and preschool enrollment was 0. Daggett School District is the only public school district in the county, with three in-person schools: Flaming Gorge Elementary School, Manila Elementary School, and Manila Jr./Sr. High School (Daggett School District, 2023). There are no charter or private schools in Daggett County.

College or graduate school enrollment in the county was 24 in 2022 (American Community Survey, 2022). Daggett County has no physical college facilities in the county. However, Utah State University serves the Daggett County area through their Extension Office in Uintah County. The office in Vernal offers research-based community education, resources, and programs in several topics (e.g., agriculture, business, food, health, home, finance, and 4-H and youth) to the communities in Daggett and Uintah Counties (USU Extension, 2024).

o BRIDGES

The following table provides a list of the 13 Daggett County bridge locations, lengths, years constructed, and daily traffic counts, taken from the National Bridge Inventory.

Table 1-4. Daggett County Bridges

Location	Length (ft)	Year Built	Average Daily Traffic Count
Clay Basin	45.7	1987	112
Brown's Park	91.9	1984	25
SR-191 over Cart Creek	171.9	1962	2,178
Flaming Gorge Dam	188.5	1964	1,152
5.9 mi. S of Manila	7	1966	671
.1 mi. W Jct. U-44	19.5	1965	180
1.1 mi. W Jct. U-44	16.5	1976	10
4.7 mi. W Jct. U-44	26.8	1968	10
7.6 mi. W Jct. 10218	9.1	1987	20
8.5 mi. W Jct. 10218	10.1	1980	60
2.5 mi. S Jct. 10221	9.1	1944	8
2.7 mi. S Jct. 10221	8.5	1975	30
No Data Entered	8.5	2019	50
Source: National Bridge Inventory, 2024			

o COUNTY FACILITIES/CRITICAL INFRASTRUCTURE

The following table lists important facilities in Daggett County:

Table 1-5. Daggett County Critical Facilities/Infrastructure

Classification	Total
Hospitals/Medical Clinics	1
Schools	3
Law Enforcement Facilities[1]	1
Fire Stations	2
Critical County and City Facilities[2]	5
Essential Utilities[3]	9
Major Roadways[4]	3

Notes:
[1] Sherriff's office
[2] County Courthouse, Manila Town Hall, Dutch John Town Hall, Road Department, Maintenance Shed
[3] Manila water & sewer, Dutch John water & sewer, Bridger Valley Electric, Moon Lake Electric, WPA Electric Union Wireless (telecom), Clay Basin (Dominion natural gas), Greendale Water Plant
[4] SR-191, SR-530, SR-44

o CULTURAL & HISTORICAL SITES

Sites in Daggett County listed on the National Register of Historic Places can be found in the table below.

Table 1-6. Historic Places in Daggett County

Site	Address	Nearest City/Location
Dr. John Parson Cabin Complex	SW of Bridgeport	Bridgeport
John Jarvie Historic Ranch District	Green River and Indian Crossing Bridge SW of Jarvis, Brown's Park Rd.	Brown's Park
Swett Ranch	NE of Dutch John	Dutch John
Manila Petroglyphs	Address Restricted	Manila
Ute Mountain Fire Tower	SW of Manila	Manila
Source: National Register of Historic Places, 2024		

PART II: RISK ASSESSMENT

● HAZARD RISK SUMMARY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy, and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the DMA (44 CFR, Section 201.6(c)(2)).

o IDENTIFIED HAZARDS

There are countless hazards that pose a threat to human life, health, and well-being, and no attempt is made here to compile an exhaustive list. Those that are addressed in disaster planning are generally categorized as “natural” or “technological” (sometimes “manmade”). The FEMA website contains a thorough discussion and list of hazards in the section entitled “National Risk Index for Natural Hazards” (FEMA, 2022). Some hazards are a threat to all geographic areas while others (e.g., flooding) are more limited in their extent. Studies were conducted to determine which hazards are of concern in Daggett County.

Daggett County hazards were identified and their frequency of occurrence evaluated using a number of resources, including:

- 2019 Uintah Basin Region 5 Hazard Mitigation Plan
- 2008 Daggett County General Plan
- 2017 Daggett County General Plan Resource Management Plan Appendix
- Hazard planning documents developed by state, federal, and private agencies
- NOAA weather data from the past 74 years
- Data from the United States Geological Survey (USGS) and the Utah State Geological Survey (UGS)

Hazards that have been identified as significant in this county and that will be considered in this plan are listed below:

Natural Hazards

- Severe Summer Weather
    - Extreme Heat
    - Lightning
    - Hail
    - Tornado
    - Straight-line Wind
- Severe Winter Weather
    - Extreme Cold

  - Winter Storm
  - Avalanche
- Wildfire
- Flood
  - River or Stream Flood
  - Flash Flood
  - Dam Failure
- Drought

Geological Hazards

- Earthquake
- Landslide
- Problem Soils
  - Expansive Soils
  - Land Subsidence

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact Daggett County or the towns of Dutch John and Manila due to geographic location:

- Hurricane
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Eruption

HAZARD PROFILE

The risk assessments in the following chapters describe the risks associated with each identified hazard of concern. The following sections were used to describe each hazard and communicate each respective level of risk:

- **Hazard Description**—Each hazard profile contains a description of the general definition and causes of the hazard. It may also include background information for understanding the context of the hazard within Daggett County.
- **Location**—The location or region in Daggett County where each hazard may occur is described.
- **Extent**—The strength or magnitude of each hazard is defined, usually through a form of measurement, such as a formula, scale, chart, or graph.
- **Historical Frequency & Probability of Future Occurrence**—This section identifies past hazard events of note that have occurred in Daggett County. It also includes the likelihood of each hazard occurring again if available.
- **Impacts & Loss Estimates**—The potential impacts of each hazard on the county are discussed. This section also outlines the potential economic/monetary loss from a hazard event, in addition to loss of property, structures, facilities, systems, livestock, and life. An assessment of affected vulnerable populations and changes in development is included.
- **Climate Change Implications**—The effects of climate change on the probability of future events and severity of impacts for each hazard are assessed.
- **FEMA NRI Score**—The hazard-specific FEMA National Risk Index scores for each natural hazard are included.

- **Related Hazards**—The hazard profiles that fall under a greater hazard category can be found within this section.

RISK ASSESSMENT METHODOLOGY

Each hazard included in this plan was assessed and ranked based on a pre-defined hazard risk methodology consistent with FEMA's mitigation plan requirements. Information from the hazard profiles and input from subject matter experts were used to inform the hazard risk assessment process. The following is a description of the key factors.

Probability/Likelihood of Occurrence

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- **High**—Significant hazard event is likely to occur annually (Probability Factor = 3)
- **Medium**—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)
- **Low**—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)
- **Unlikely**—There is little to no probability of significant occurrence, or the recurrence interval is greater than every 100 years (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area.

Extent

Extent was assessed in two categories: extent/intensity and catastrophic potential of the hazard. Numerical impact factors were assigned as follows:

Extent/Intensity—Extent is defined as the range of anticipated intensities of the identified hazards. Extent is most commonly expressed using various scientific scales, such as the Enhanced Fujita scale.

- **High**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a high-intensity incident (Extent Factor = 3)
- **Medium**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a medium-intensity incident (Extent Factor = 2)
- **Low**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a low-intensity incident (Extent Factor = 1)
- **Unlikely**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of little to no intensity (Extent Factor = 0)

Catastrophic—The potential that an occurrence of this hazard could be catastrophic.

- **High**—High potential that this hazard could be catastrophic (Extent Factor = 3)
- **Medium**—Medium potential that this hazard could be catastrophic (Extent Factor = 2)
- **Low**—Low potential that this hazard could be catastrophic (Extent Factor = 1)
- **Unlikely**—Virtually no potential that this hazard could be catastrophic (Extent Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Extent/Intensity* and its potential to be *Catastrophic*.

▪ Vulnerability

Vulnerabilities were assessed in three categories: population exposure, property exposure, and exposure based on changes in development. Numerical impact factors were assigned as follows:

People—Values were assigned based on the percentage of the total population exposed to the hazard event.

- **High**—30% or more of the population is exposed to this hazard (Vulnerability Factor = 3)
- **Medium**—15% to 29% of the population is exposed to this hazard (Vulnerability Factor = 2)
- **Low**—14% or less of the population is exposed to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the population is exposed to this hazard (Vulnerability Factor = 0)

Property Exposed—Values were assigned based on the percentage of the total property value exposed to the hazard event.

- **High**—25% or more of the total assessed property value is exposed to the hazard (Vulnerability Factor = 3)
- **Medium**—10% to 24% of the total assessed property value is exposed to the hazard (Vulnerability Factor = 2)
- **Low**—9% or less of the total assessed property value is exposed to the hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the total assessed property value is exposed to the hazard (Vulnerability Factor = 0)

Changes in Development—Changes in development since the previous plan was approved have increased or decreased the community's vulnerability/exposure to this hazard.

- **High**—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)
- **Medium**—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)
- **Low**—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *People*, and a weighting factor of 1 was assigned for *Property Exposed* and *Changes in Development*.

▪ Impact

Hazard impacts were assessed in eight categories: population and life/safety, underserved/equity, property damages, economic, environmental, essential operations, future development, and climate change. Numerical impact factors were assigned as follows:

Population and Life/Safety—Values were assigned based on (1) best available historical and probabilistic data for individuals who are vulnerable to the hazard event and (2) the likelihood to experience adverse impacts in the event of its occurrence.

- **High—**Populations exposed to this hazard are likely to experience significant adverse impacts (Impact Factor = 3)
- **Medium**—Populations exposed to this hazard are likely to experience some adverse impacts (Impact Factor = 2)
- **Low**—Populations exposed to this hazard are likely to experience minimal adverse impacts (Impact Factor = 1)
- **No Impact**—Populations exposed to this hazard are not likely to experience significant adverse impacts (Impact Factor = 0)

Underserved/Equity—Values were (1) assigned based on best available data for underserved populations vulnerable to the hazard event and (2) are likely to experience adverse/disproportionate impacts from the hazard incident resulting in greater disparity in equity.

- **High**—Underserved populations exposed to this hazard are likely to experience significant adverse/disproportionate impacts (Impact Factor = 3)
- **Medium**—Underserved populations exposed to this hazard are likely to experience some adverse/disproportionate impacts (Impact Factor = 2)
- **Low**—Underserved populations exposed to this hazard are likely to experience minimal adverse/disproportionate impacts (Impact Factor = 1)
- **No Impact**—Underserved populations exposed to this hazard are not likely to experience significant adverse/disproportionate impacts (Impact Factor = 0)

Property Damages—Values were assigned based on the expected total property damages incurred from a hazard incident. It is important to note that values represent estimates of the loss from a major incident based on historical data or probabilistic models/studies.

- **High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
- **Medium**—More than $500,000 but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
- **Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
- **No Impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Economic—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, crops, worker wages, and local tax revenues or on the impact on the local gross domestic product (GDP).

- **High**—Total economic impact is likely to be greater than $10,000,000 (Impact Factor = 3)
- **Medium**—Total economic impact is likely to be greater than $100,000 but less than or equal to $10,000,000 (Impact Factor = 2)
- **Low**—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
- **No Impact**—Virtually no significant economic impact (Impact Factor = 0)

Environmental Factor—Environmental impact from a major hazard event requiring outside resources and support; and/or repair, clean-up, restoration, and/or preservation work.

- **High**—Environmental impact from a single major hazard event is likely to be significant, requiring extensive outside resources and support; and/or repair, clean-up, restoration, and/or preservation work (Impact Factor = 3)
- **Medium**—Environmental impact from a single major hazard event is likely to be localized, requiring some outside resources and support; and/or repair, clean-up, restoration, or preservation work (Impact Factor = 2)
- **Low**—Environmental impact from a single major hazard event is likely to be minimal, requiring little to no outside resources and support, and/or minimal repair, clean-up, restoration, or preservation work (Impact Factor = 1)
- **No Impact**—No environmental impacts from a single major hazard event is likely (Impact Factor = 0)

Essential Operations Factor—Impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event.

- **High**—Significant impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 3)
- **Medium**—Some impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 2)
- **Low**—Minimal impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 1)
- **No Impact**—No impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 0)

Future Development—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard.

- **High**—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)
- **Medium**—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)
- **Low**—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)
- **No Impact**—Future development trends will not increase the impact/consequence of this hazard and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)

Climate Change—The potential that climate change will increase the risk of this hazard (e.g., type, location, and range of anticipated intensities of the identified hazard and impacts).

- **High**—Climate change trends will significantly increase the risk of this hazard and its impacts (Impact Factor = 3)
- **Medium**—Climate change trends will increase the risk of this hazard and its impacts, but not significantly (Impact Factor = 2)
- **Low**—Climate change trends will minimally increase the risk of this hazard and its impacts (Impact Factor = 1)

- **No Impact**—Climate change trends will not increase the risk of this hazard and its impacts (Impact Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Population and Life Safety* and *Underserved/Equity*, and a weighting factor of 2 was assigned for *Property Damages*. In addition, a weighting factor of 1 was assigned for *Economic*, *Environmental*, *Essential Operations*, *Future Development*, and *Climate Change*.

o FEMA NRI RISK SCORES

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: avalanche, coastal flooding, cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, tsunami, volcanic activity, wildfire, and winter weather. Because not all hazards are applicable to Daggett County, only those hazards with a defined risk to the county are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, and Social Vulnerability and Community Resilience to develop a baseline relative risk measurement for each United States county and census tract (National Risk Index, 2024d). These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

▪ Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Table 2-1. Social Vulnerability for Daggett County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Social Vulnerability Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	6.6	Very Low
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2024e; 2023f			

▪ Community Resilience

Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table 2-2. Community Resilience for Daggett County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Community Resilience Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	79.34	Relatively High

Census Tract	Communities in Census Tract	Community Resilience Score	Rating
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2024b; 2024e			

▪ Expected Annual Loss

The table below shows the overall Expected Annual Loss score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *Impacts & Loss Estimates*.

Table 2-3. Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Expected Annual Loss Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	26.4	Relatively Low
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2024d; 2024e			

▪ Overall NRI Score

The table below shows the overall FEMA National Risk Index Score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *FEMA NRI Score*.

Table 2-4. Overall National Risk Index Score for Daggett County, UT

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
960100	Town of Dutch John, Town of Manila, and Unincorporated Daggett County	15.39	Very Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024c; 2024e			

o OVERALL RISK SCORES

The following table represents the new overall risk scores for Daggett County based on the described methodology. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores.

▪ Daggett County

Table 2-5. 2024 Hazard Risk Scores for Daggett County

	Probability	Consequence				Total Risk	
Hazard Event	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Facto	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)	
Flash Flood	2	6	8	25	39	41	M
Wildfire	3	6	9	24	39	57	H
Winter Storm	3	6	11	22	39	57	H
River or Stream Flood	1	6	6	13	25	15	L
Drought	3	6	6	19	31	47	M
Extreme Heat	2	6	12	23	41	42	M
Staright-line Wind	2	6	6	11	23	26	L
Extreme Cold	3	12	11	26	49	70	H
Lightning	1	18	12	31	61	33	L
Hail	1	6	9	19	34	20	L
Landslide	1	6	8	13	27	16	L
Expansive Soil	1	3	6	13	22	14	L
Land Subsidence	1	12	9	24	45	25	L
Avalance	2	12	14	28	54	54	L
Earthquake	1	6	6	10	22	14	L
Dam Failure	1	9	12	24	45	25	L
Tornado	1	3	6	13	22	14	L

Table 2-6. Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score			
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–49	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	50–100	High (H)

The **Legend—specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

● SEVERE SUMMER WEATHER

o HAZARD DESCRIPTION

Severe summer weather includes those hazards that are typically found during the spring, summer, and early fall season of the year in Daggett County. Severe summer weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. Included in this category are extreme heat, lightning, hail, tornado, and straight-line wind. Each hazard is examined independently; however, it is recognized that these hazards typically occur together.

o RELATED HAZARDS

▪ Extreme Heat

● *Hazard Description*

Potential Probability		Medium
Potential Consequence		Medium
Location	Countywide, including Dutch John and Manila	
Seasonal Pattern or Conditions	Late spring, summer, and early fall	
Duration	Events may last hours to days	
Analysis Used	NOAA, NWS, Western Regional Climate Center, NCEI, Neighborhoods at Risk, National Risk Index, Headwaters Economics, U.S. Census, Climate and Economic Justice Screening Tool, Resilience Analysis and Planning Tool, HHS, UCAR	

The term “extreme heat,” sometimes called “heat wave,” is to some extent a relative one describing a period when weather conditions include temperatures and humidity significantly higher than those usual for a particular geographic area.

● *Location*

Due to the dry, semi-arid climate of Daggett County in desert Utah, the entire county may be affected by extreme heat, including the jurisdictions of Dutch John and Manila.

● *Extent*

The National Weather Service (NWS) issues alerts to the public based on its Heat Index (HI), which takes both temperature and humidity into account. The NWS will initiate alert procedures when the HI is expected to exceed 105°–110°F (depending on local climate) for at least two consecutive days (NWS, 2024).

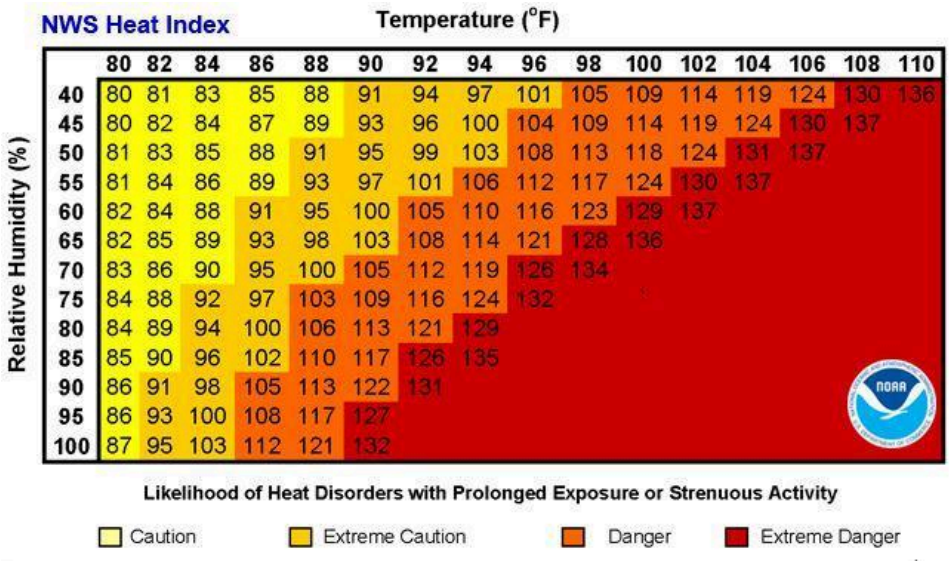


Figure 3-1. NOAA National Weather Service Heat Index (NWS, 2024)

- ***Historical Frequency & Probability of Future Occurrence***

According to NWS available data, the record high temperature in the town of Manila, Utah is 102°F in July 1943 (NOWData, 2024). The record high temperature in the town of Dutch John at Flaming Gorge is also 102°F in July 2002. July is historically the hottest month of the year in Daggett County, with an average temperature of 68.5°F in Manila and 68.7°F in Dutch John (NOWData, 2024). The average high in Manila in July is 84.3°F and 86.6°F in Dutch John. Both Manila and Dutch John have had zero instances of extreme heat of 105°F or higher since 1900.

According to Neighborhoods at Risk, Daggett County is expected to experience four more days that reach above 95°F by 2049. As annual temperatures continue to increase, more extreme heat events are likely to occur. In fact, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by extreme heat, as presented in the table below.

Table 3-1. Impacts of Extreme Heat by Jurisdiction

Jurisdiction	Impacted by Heat Events (95–104°F) Within Last 25 Years	Impacted by Extreme Heat Events (105+°F) Within Last 25 Years	Potential Impacts of Extreme Heat
Daggett County	Yes	Yes	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

Jurisdiction	Impacted by Heat Events (95–104°F) Within Last 25 Years	Impacted by Extreme Heat Events (105+°F) Within Last 25 Years	Potential Impacts of Extreme Heat
Town of Dutch John	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Manila	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

The primary impact of extreme heat is on human health, with disorders such as sunstroke, heat exhaustion, and heat cramps. There are also undoubtedly indirect and chronic health effects from extreme heat, the magnitude of which are difficult or impossible to estimate. Environmental effects can include loss of wildlife and vegetation and increased probability of wildfires.

Power outages may occur during times of extreme heat. Large electrical panels and motors used in water production may also be negatively affected by extreme heat. Economic impacts result from such factors as increased energy prices and loss of business as people avoid leaving their homes to escape the heat. Agricultural losses can also occur. The magnitude of these and other, more indirect impacts is, again, difficult to assess, but for severe heat waves, the economic impact has been estimated to be significant.

Table 3-2. Heat Wave: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0 events per year	0.0	$0	$0	$0	$0	0.0	No Expected Annual Losses

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People particularly susceptible to extreme heat are the elderly, small children, and persons with chronic illnesses.

Table 3-3. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Extreme heat places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-4. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme temperatures. Places prone to high heat are expected to become even drier and hotter over the following century (UCAR, 2024). Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors. According to Neighborhoods at Risk, extremely hot days are the leading cause of weather-related fatalities in the U.S. and contribute to economic stress as the need for and cost of air conditioning rises.

Effects of Climate Change on Probability of Future Events

Table 3-5. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-6. Heat Wave: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
0.0	No Rating	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

Lightning

- ***Hazard Description***

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Dutch John and Manila	
Seasonal Pattern or Conditions	Late spring, summer, and early fall	
Duration	Storms that produce lightning may last hours to days	
Analysis Used	NOAA, NWS, Vaisala, NCEI, NFPA, NIFC, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

Lightning is defined by the NWS as "a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground, or between the ground and a cloud." A lightning discharge may be over five miles in length, generate temperatures upwards of 50,000°F, and carry 50,000 volts of electrical potential. Lightning is most often associated with thunderstorm clouds, but lightning can strike as far as five to 10 miles from a storm. Thunder is caused by the rapid expansion of air heated by a lightning strike. Cloud-to-ground lightning strikes occur with much less frequency in the northwestern U.S. than in other parts of the country.

- ***Location***

This hazard can affect the entire county and the state of Utah, but the risk to the county is relatively low. The jurisdictions of Dutch John and Manila may experience lightning, as well.

- ***Extent***

A lightning flash is created by a transfer of significant charge between two charged objects. Lightning discharges can occur inter-cloud, cloud-to-cloud, cloud-to-air, and cloud-to-ground. Cloud-to-ground (CG) lightning has the greatest risk to society. A CG stroke can kill, destroy equipment, start fires, and disturb power delivery systems.

Lightning is commonly measured using the Lightning Activity Level (LAL), which is a scale that describes the frequency of lightning strikes in a specific area (NWS, 2024).

Lightning Activity Level (LAL)	
Is a scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater then 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Figure 3-2. NWS Lightning Activity Level

- ***Historical Frequency & Probability of Future Occurrence***

Lightning is common in Utah, with an average of 1,040,446 lightning strikes per year in the state from 2015 to 2019 (Vaisala, 2020). However, this average is much less compared to other states, such as those in the Midwest and Southeast. For example, Florida received an average of 13,989,300 strikes per year within the same time period.

The Storm Events Database records 10 significant lightning events in Daggett County since 2000, as seen in the table below.

Table 3-7. Significant Lightning Events in Daggett County, UT

Location Within County	Date	Fatalities/ Injuries	Property Damage	Description
Manila	06/20/2004	0	$2,000	Lightning damaged equipment at water treatment plant
Dutch John	05/06/2005	0	$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Dutch John	05/17/2005	0	$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Dutch John	05/30/2005	0	$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Dutch John	06/23/2005	0	$500	Lightning struck Ross Springs Water Treatment Plant and destroyed pressure transducer
Manila	06/06/2007	0	$500	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Manila	07/21/2007	0	$500	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Dutch John	06/03/2008	0	$1,000	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Manila	05/30/2009	0	$500	Lightning struck Red Canyon Water Treatment Plant and destroyed pressure transducer
Lucerne Valley	07/22/2016	1/1	$0	Lightning struck and killed a 14-year-old girl on a jet ski at Flaming Gorge Reservoir. A 49-year-old female on the jet ski was injured.
Source: Storm Events Database, 2024				

Significant lightning strikes causing significant damage and/or injuries or fatalities are likely to occur again within the next 10 years and could occur anywhere in the county or in the towns of Dutch John or

Manila. Damage-causing lightning is more likely in Dutch John than in other parts of the county due to Dutch John's higher population. Both Dutch John and Manila are surrounded by forestland and susceptible to wildfire from lightning strikes. In fact, 80% of lightning strikes in the Manila area cause fires. Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in Daggett County. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

● *Impacts & Loss Estimates*

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by lightning, as presented in the table below.

Table 3-8. Impacts of Lightning by Jurisdiction

Jurisdiction	Impacted by Lightning	Experienced Significant Lightning Strike with $1,000+ in Damage Since 2000	Fatalities Due to Lightning	Potential Impacts of Lightning
Daggett County	Yes	Yes	1	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
Town of Dutch John	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
Town of Manila	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities

Lightning is the second most deadly weather phenomenon in the U.S., being second only to floods. On average, 20 to 50 deaths per year are attributed to lightning nationally, and in Utah the average is less than one per year. The last death in Utah due to lightning was in 2016, with six total deaths in Utah since 2008 (NWS, 2024). There has been one death in Daggett County due to lightning. A 14-year-old girl was struck and killed in 2016 while on a jet ski at Flaming Gorge Reservoir. Despite the enormous energy carried by lightning, only about 10% of strikes are fatal (NWS, 2024). Injuries include central nervous system damage, burns, cardiac effects, hearing loss, and trauma. The effects of central nervous system injuries tend to be long-lasting and severe, leading to such disorders as depression, alcoholism, chronic fatigue, and in some cases suicide. Lightning also strikes structures, causing fires and damaging electrical equipment. Wildland fires are often initiated by lightning strikes as are petroleum storage tank fires. About one third of all power outages are lightning-related.

The magnitude of economic losses is difficult to estimate. Between 2007 to 2011, $451 million in property damage was reported due to fires caused by lightning strikes in the U.S. (NFPA, 2013). The state of Utah experienced 408 fires caused by lightning strikes in 2023 alone (NIFC, 2023).

Table 3-9. Lightning: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
16.5 events per year	0.0	$2,657	$884	N/A	$3,541	38.0	Relatively Low
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. Any community, whether vulnerable or not, may experience lightning. However, those with inadequate living conditions or shelter may be more vulnerable to a strike.

Table 3-10. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Lightning strikes may lead to power outages depending on the location of the strike and amount of damage inflicted. The following table lists types of critical facilities that could be negatively affected by power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment. Any damage to any of these locations due to lightning could delay critical resources to those in need.

Table 3-11. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). An uptick in lightning strikes could lead to more frequent and severe lightning damage.

Effects of Climate Change on Probability of Future Events

Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in Daggett County, although precipitation may increase slightly. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

Table 3-12. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Lightning Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of lightning may increase.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 3-13. Lightning: Overall National Risk Index Score for Daggett County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
29.3	Relatively Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Hail

• *Hazard Description*

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Dutch John and Manila	
Seasonal Pattern or Conditions	Late spring, summer, and early fall	
Duration	Hailstorms may last hours to days	
Analysis Used	NOAA, NWS, Weather on the Web, III, TORRO, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

The NWS definition of hail is “showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud. Its size can vary from the defined minimum, a little over a quarter of an inch, up to 4.5 inches or larger.” Severe hail is defined as being 0.75 inches or more in diameter. The largest hailstones are formed in supercell thunderstorms because of their sustained updrafts and long duration.

• *Location*

Daggett County can experience hailstorms countywide, including the jurisdictions of Dutch John and Manila.

• *Extent*

The TORRO Hailstorm Intensity Scale was developed by Jonathan Webb to measure and categorize hailstorms (TORRO, 2024). It extends from H0 (hard hail, no damage) to H10 (super hailstorm, extensive structural damage, risk of severe/fatal injuries) with its increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind. The scale could be modified depending on factors such as building materials and types (e.g., whether roofing tiles are predominantly slate, shingle, or concrete). See the scale in the figure below (TORRO, 2024).

Scale	Intensity category	Typical hail diameter (mm)*	Probable kinetic energy J m^{-2}	Typical damage impacts
H0	Hard hail	5	0-20	No damage
H1	Potentially damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Figure 3-3. TORRO Hailstorm Intensity Scale

Hail is considered severe when reaching a size of 0.75 inches in diameter or greater. The following figure shows different hail sizes with a description for comparison (TORRO, 2024).

Size code	Maximum diameter (mm)	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > soft ball
9	91-100	Grapefruit
10	>100	Melon

Figure 3-4. TORRO Hail Size and Diameter

As demonstrated below, the National Weather Service also defines the local threat of severe hail for specified areas based on the likelihood that severe hail will occur combined with the anticipated size or diameter of the largest hailstones (NWS, 2024).

Severe Hail Threat Level	Threat Level Descriptions
Extreme	**"An Extreme Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a moderate likelihood or greater (16% probability or greater) of severe hail, with storms capable of baseball to softball sized stones. *See diameter description below.* AND/OR...a high likelihood or greater (26% probability or greater) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.* AND/OR...a very high likelihood (36% or greater) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
High	**"A High Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a low likelihood (6% to 15% probability) of severe hail with storms capable of baseball to softball sized stones. *See diameter description below.* AND/OR...a moderate likelihood (16% to 25% probability) of very large hail (golf ball to baseball sized hail stones). *See diameter description below.* AND/OR...a high likelihood (26% to 35% probability) of large hail (nickel to golf ball sized hail stones). *See diameter description below.*
Moderate	**"A Moderate Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of baseball to softball sized stones. *See description below.* AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See description below.* AND/OR...a moderate likelihood (16% to 25% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
Low	**"A Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.* AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
Very Low	**" A Very Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.* AND/OR...a low likelihood or greater (6% or greater) of small hail (less than 3/4 inch). *See diameter description below.*
Non-Threatening	**" No Discernable Threat to Life and Property from Severe Hail."** Within 12 miles of a location, environmental conditions do not support the occurrence of severe hail.

Note: To be considered severe, hail stones must be at least 3/4 inch in diameter.

Figure 3-5. Severe Hail Threat Level

- ***Historical Frequency & Probability of Future Occurrence***

In the 10-year period from 1986 to 1995, the NWS recorded severe hail in Utah on 101 occasions, while in the same time period, severe hail was recorded in Colorado nearly 1,400 times (Weather on the Web, 2024).

Hail has been recorded throughout the county and in the towns of Dutch John and Manila. The Storm Events Database has recorded 10 instances of severe hail in Daggett County since 2000. The hailstones from these events range in size from 0.75 inches to 1.75 inches. Six of these hail events occurred in Manila and four in Dutch John (Storm Events Database, 2024).

Hail is likely to occur again in the future in any part of the county, including Dutch John and Manila. Although many parts of the United States are experiencing increased precipitation, Utah has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades.

• *Impacts & Loss Estimates*

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by hail, as presented in the table below.

Table 3-14. Impacts of Hail by Jurisdiction

Jurisdiction	Impacted by Hail	Experienced Significant Hail Damage ($1,000+) Since 2000	Fatalities Due to Hail	Potential Impacts of Hail
Daggett County	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
Town of Dutch John	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
Town of Manila	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation

Deaths and injuries due to hail have occurred but are rare. Most impacts are economic, but hailstorms can also cause utility failure through damage to critical infrastructure. Hailstorms may also lead to car accidents and road closures.

Economic loss can be extensive, especially to agriculturally based economies. Hail is very damaging to crops. Severe hail may also cause extensive property damage, including damage to vehicle paint and bodywork, glass, shingles and roofs, plastic surfaces, etc. Through the Storm Events Database, Daggett County has reported three severe hail events that resulted in $130,000 worth of property damage total, as seen in the table below. Hail-related insured losses averaged between $8 billion to $14 billion each year in the years 2000–2019 in the U.S. (III, 2024).

Table 3-15. Property Damage in Daggett County

Location Within County	Date	Property Damage ($)	Description
Manila	07/15/2004	$30,000	1.25-inch hail dented many trailers and vehicles in mobile home park and broke a car windshield
Dutch John	08/06/2009	$80,000	1.75-inch hail dented vehicles and broke

Location Within County	Date	Property Damage ($)	Description
			windshields and headlights along Hwy 191 in eastern Uintas
Manila	08/06/2009	$20,000	1.25-inch hail broke windows, dented vehicles, and damaged siding on residences
Source: Storm Events Database, 2024			

Table 3-16. Hail: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0.1 events per year	0.0	$74	$1,134	$31	$1,239	46.1	Relatively Low
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to hailstorms.

Table 3-17. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Severe hailstorms may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from hailstorms or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-18. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). Although many parts of the United States are experiencing increased precipitation, Utah as a whole has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades, and a slight increase in precipitation is expected in Daggett County within 25 years.

Table 3-19. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Hail Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of hail may increase.
Source: Neighborhoods at Risk, 2024	

• FEMA NRI Score

Table 3-20. Hail: Overall National Risk Index Score for Daggett County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
39.9	Very Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Tornado

• Hazard Description

Potential Probability		Low
Potential Consequence		Medium
Location	Countywide, including Dutch John and Manila	
Seasonal Pattern or Conditions	Spring, summer, and early fall	
Duration	Tornadoes may last seconds to hours	
Analysis Used	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

The NWS describes a tornado as "a violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena" (NWS, 2024). Like hail, most tornadoes are spawned by supercell thunderstorms. They usually last only a few minutes, although some have lasted more than an hour and traveled several miles.

• Location

Although the risk is low, a tornado event is possible anywhere in the county, including in the jurisdictions of Dutch John and Manila.

• Extent

Wind speeds within tornadoes are estimated based on the damage caused and expressed using the Enhanced Fujita (EF) Scale.

Table 3-21. Enhanced Fujita (EF) Scale for Estimation of Tornado Wind Speeds

EF Scale	Class	Windspeed (mph)	Windspeed (km/h)	Description
EF0	Weak	65–85	105–137	Gale

EF Scale	Class	Windspeed (mph)	Windspeed (km/h)	Description
EF1	Weak	86–110	138–177	Weak
EF2	Strong	111–135	178–217	Strong
EF3	Strong	136–165	218–266	Severe
EF4	Violent	166–200	267–322	Devastating
EF5	Violent	> 200	> 322	Incredible
Source: NOAA, 2024				

• *Historical Frequency & Probability of Future Occurrence*

Tornado occurrence in Daggett County is very low. The Storm Events Database records two tornadoes in the county since 1950, as seen in the table below. The town of Dutch John has experienced two tornadoes, but the town of Manila has not experienced any tornadoes.

Table 3-22. Tornado Events in Daggett County, UT

Location Within County	Date	EF Scale	Property Damage	Description
Dutch John	05/05/1999	EF0	$0	Tornado touched down over rangeland, about 8 mi. NW of Browns Park National Wildlife Refuge, throwing debris 300 feet into the air
Dutch John	08/21/2001	EF0	$0	A narrow and long, rope-like tornado touched down in Flaming Gorge National Recreation Area, traveling for 2 miles and picking up brush, branches, and tree limbs
Source: Storm Events Database, 2024				

Future tornadoes are possible and likely, but significant damage is improbable. However, according to Neighborhoods at Risk, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049, which could prompt the formation of additional tornadoes in the fall and winter with the increased warm air (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

• *Impacts & Loss Estimates*

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by tornadoes, as presented in the table below.

Table 3-23. Impacts of Tornado by Jurisdiction

Jurisdiction	May Be Impacted by Tornado	Experienced Significant Tornado Damage ($1,000+) Since 2000	Fatalities Due to Tornadoes	Potential Impacts of Tornadoes
Daggett County	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
Town of Dutch John	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
Town of Manila	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services

Loss of utilities (primarily due to fallen trees and wind damage) is common following tornadoes, and depending on circumstances, communities might be deprived of almost any kind of goods and services including food, water, and medical care. Agriculturally, crop and livestock loss are also possible.

The Storm Events Database records $0 in total property damage from tornadoes in Daggett County since 1950. See the table under *Historical Frequency & Probability of Future Occurrence* for specific events and descriptions.

Table 3-24. Tornado: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0 events per year	0.0	$1,261	$2,032	$11	$3,304	9.6	Very Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to tornadoes.

Table 3-25. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

A tornado may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from a tornado or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-26. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe tornadoes (USGS, 2023).

Effects of Climate Change on Probability of Future Events

Table 3-27. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Tornado Projections	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent tornadoes in the fall and winter due to the increased warm air.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-28. Tornado: Overall National Risk Index for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
5.5	Very Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

Straight-line Wind

- ***Hazard Description***

Potential Probability	Medium
Potential Consequence	Medium
Location	Countywide, including Dutch John and Manila
Seasonal Pattern or Conditions	All seasons
Duration	Events may last hours to days
Analysis Used	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS

The term “straight-line wind” is used to describe any wind not associated with rotation, particularly tornadoes. Of concern is high wind, defined by the NWS as “sustained wind speeds of 40 mph or greater, lasting for one hour or longer, or winds of 58 mph or greater for any duration.” Like tornadoes, strong, straight-line winds are generated by thunderstorms, and they can cause similar damage. Straight-line wind

speeds can approach 150 mph, equivalent to those in an EF3 tornado. Additionally, derechos—which are widespread, long-lived, straight-line windstorms—may occur in Daggett County, although less common.

- ***Location***

Straight-line wind events affect the entire county, including the jurisdictions of Dutch John and Manila. Dutch John, specifically, is located in a pocket that creates frequent microbursts.

- ***Extent***

The Beaufort Wind Scale explains different wind speeds based on how they would affect land conditions and sea conditions (NOAA, 2024).

Table 3-29. Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects on Land
0	Less than 1	Calm	Calm, smoke rises vertically
1	1–3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4–6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7–10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11–16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17–21	Fresh Breeze	Small trees in leaf begin to sway
6	22–27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28–33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34–40	Gale	Twigs breaking off trees, generally impedes progress
9	41–47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48–55	Storm	Seldom experienced on land, trees broken or uprooted, “considerable structural damage”
11	56–63	Violent Storm	
12	64+	Hurricane	
Source: NOAA, 2024			

- ***Historical Frequency & Probability of Future Occurrence***

High straight-line wind events are frequent in Daggett County, including in the towns of Dutch John and Manila. According to the Storm Events Database, there have been eight reported high wind, strong wind, or thunderstorm wind events 40 mph or greater in Daggett County between 2000–2024, as seen in the table below. Four of these high wind events occurred in Dutch John. The other four high wind events in the county occurred in the Eastern Uinta Mountains.

Table 3-30. High Wind Events in Daggett County, UT

Location Within County	Date	Wind Speed (kts.)
Eastern Uinta Mountains	04/18/2000	45 kts.
Eastern Uinta Mountains	06/02/2001	51 kts.
Dutch John	07/04/2007	55 kts.
Dutch John	06/16/2015	70 kts.
Dutch John	06/06/2020	67 kts.
Eastern Uinta Mountains	11/07/2020	67 kts.
Dutch John	09/18/2021	50 kts.

Location Within County	Date	Wind Speed (kts.)
Eastern Uinta Mountains	02/15/2023	68 kts.
Source: Storm Events Database, 2024		

Future significant straight-line wind events are likely to occur multiple times each year throughout the entire county, including in Dutch John and Manila. According to Neighborhoods at Risk, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049, which could influence the variability of regional and seasonal winds in Utah as carbon dioxide levels increase (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by straight-line wind, as presented in the table below.

Table 3-31. Impacts of Straight-Line Wind by Jurisdiction

Jurisdiction	Impacted by Straight-Line Wind	Experienced Significant Straight-Line Wind Damage ($1,000+) Since 2000	Potential Impacts of Straight-Line Wind
Daggett County	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
Town of Dutch John	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
Town of Manila	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities

The impacts of straight-line winds are virtually the same as those from tornadoes with similar wind speeds. The damage is distinguishable from that of a tornado only in that the debris is generally deposited in nearly parallel rows. Many homes in Dutch John and Manila are mobile homes and don't have the durability to withstand strong winds. Downbursts are particularly hazardous to aircraft in flight. Though losses aren't regularly reported, it is known that they occur because of the frequency and magnitude of high wind events.

Table 3-32. Strong Wind: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0.2 events per year	0.0	$1,504	$2,370	$10	$3,884	35.0	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to severe straight-line wind conditions.

Table 3-33. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Straight-line wind may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from straight-line wind or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-34. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila

Critical Facility Type	Location
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe straight-line wind events and even derechos (USGS, 2023). However, there are still many questions and factors yet to be resolved about wind with some studies suggesting climate change may even reduce wind speeds. Uncertainty remains high as it relates to climate change and its impact on this hazard. Further analysis and studies need to be conducted, specifically for this region.

Effects of Climate Change on Probability of Future Events

Table 3-35. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Wind Projections	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent straight-line wind events as more powerful storms develop.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
28.3	Relatively Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● SEVERE WINTER WEATHER

o HAZARD DESCRIPTION

Severe winter weather includes extreme cold, winter storm, and avalanche. Severe winter weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. It should be noted that straight-line wind is also associated with severe winter storms, commonly referred to as blizzard conditions, where snow is driven by wind-caused drifting.

o RELATED HAZARDS

▪ Extreme Cold

● *Hazard Description*

Potential Probability	High
Potential Consequence	Medium
Location	Countywide, including Dutch John and Manila
Seasonal Pattern or Conditions	Winter
Duration	Events may last hours to days
Analysis Used	NOAA, NWS, Public Health Post, National Risk Index, Neighborhoods at Risk, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

“Extreme cold” is another of the terms describing hazards that must be defined relative to what is considered normal in a given locale. What might be considered extreme cold varies considerably in the state of Utah where normal winter temperatures in the south are appreciably more moderate than those in the north. Very cold temperatures become a particular hazard when accompanied by winds of 10 mph or greater. As with extreme heat, extreme cold is of greatest concern when the condition persists for an extended period of time.

● *Location*

Extreme cold temperatures affect the entire county, including the jurisdictions of Dutch John and Manila.

● *Extent*

The NWS has developed a formula for calculating wind chill based on temperature and wind speed and issues wind chill advisories in this region when the wind chill temperature is predicted to be -10°F or less with winds of 10 mph or higher for one hour or more. Wind chill warnings are issued when wind chill temperature will be -20°F or less with winds of 10 mph or higher for one hour or more (see the figure below).

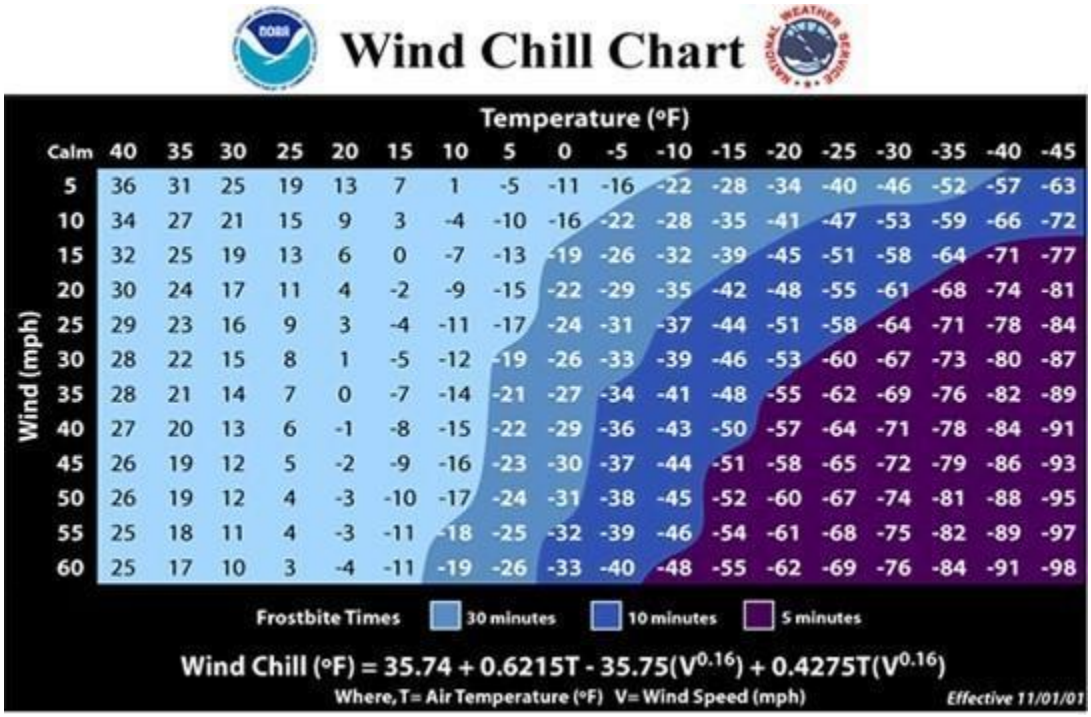


Figure 4-1. National Weather Service Wind Chill Chart

- ***Historical Frequency & Probability of Future Occurrence***

According to NWS available data, the record low temperature in the town of Manila is -33°F, which was recorded twice in February 1933 and January 1963 (NOWData, 2024). The record low temperature in the town of Dutch John at Flaming Gorge Reservoir is -38°F in January 1963. January is historically the coldest month of the year in Daggett County with an average temperature of 23.1°F in Manila and 22.8°F in Dutch John (NOWData, 2024). Cold clusters are particularly damaging. Most recently in January 2023, Manila, UT experienced 24 days of the month with a low of 10°F or less. There have been several months within the last decade with over 20 days of extreme cold. During the 10-year period from 2013–2023, Manila recorded a total of 448 extreme cold days of 10°F or less (NOWData, 2024).

Extreme cold temperatures are likely every year throughout the county, including in Dutch John and Manila. However, since Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049, extreme cold events may become less and less over the coming decades (Neighborhoods at Risk, 2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by extreme cold, as presented in the table below.

Table 4-1. Impacts of Extreme Cold by Jurisdiction

Jurisdiction	Impacted by Extreme Cold Events (≤ 10°F) Within Last 100 Years	Potential Impacts of Extreme Cold
Daggett County	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Dutch John	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Manila	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

Health effects of exposure to extreme cold include hypothermia and frostbite, both of which can be life-threatening. Infants and the elderly are most susceptible. In the United States, approximately 1,300 deaths are attributed to hypothermia or cold exposure annually (Lane, 2018).

Extreme cold may cause loss of wildlife and vegetation and kill livestock and other domestic animals. Economic loss may result from flooding due to burst pipes, large demands on energy resources, and diminished business activity. River flooding may take place as a result of the formation of ice jams.

Extreme cold affects the individual, families, cities, and the county. Damage typically occurs to individual properties; however, city water systems are usually vulnerable to extreme cold. Repairs to water line freeze-ups and breaks typically require the roadways to be excavated, necessitating additional maintenance and repairs during the warmer months.

Extreme cold can cause death and injury especially to those working or stranded outside for prolonged periods. Economic loss is related to private individuals, businesses, and government agencies in heating homes and facilities. Additional losses can be expected to the livestock industry. During extreme cold periods the schools are closed to protect children traveling to and from school.

During the spring, summer, and fall, temperatures can drop low enough to produce frost. While such temperatures are not low enough to damage infrastructure or require extra heating costs, it can be devastating to crops. Extreme minimum temperatures can fall below freezing much of the fall, winter, and spring.

Table 4-2. Cold Wave: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0.1 events per year	0.0	$3,093	$13	$387	$3,494	64.7	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter from the cold may be more vulnerable to extreme cold conditions. Additionally, those who cannot afford to sufficiently heat their homes may be at risk.

Table 4-3. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Extreme cold may cause significant damage to critical facilities in the county due to frozen or burst water lines. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups, which could delay emergency response.

Table 4-4. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John

Critical Facility Type	Location
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Extreme cold temperatures are likely to remain a common occurrence in Daggett County but may begin a slight downturn in frequency over the next century.

Effects of Climate Change on Probability of Future Events

Table 4-5. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Cold Projections	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to less frequent extreme cold events.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 4-6. Cold Wave: Overall National Risk Index Score for Daggett County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
58.9	Relatively Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Winter Storm

● *Hazard Description*

Potential Probability	High
Potential Consequence	Medium
Location	Countywide, including Dutch John and Manila
Seasonal Pattern or Conditions	Winter
Duration	Storms may last hours to days
Analysis Used	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, NCEI, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund, Neighborhoods at Risk

The NWS describes winter storm as weather conditions that produce heavy snow or significant ice accumulations. For the purposes of this analysis, a severe winter storm is defined as any winter condition where the potential exists for a blizzard (winds >/= 35mph and falling/drifting snow frequently reduce visibility < ¼ mile, for two hours or more), heavy snowfall (six inches or more snowfall in 24 hours in the valleys; nine inches or more snowfall in 24 hours in the mountains), ice storm, and/or strong winds.

● *Location*

Severe winter storms are a risk countywide and occur frequently, including in the jurisdictions of Dutch John and Manila.

● *Extent*

The magnitude or severity of a severe winter storm depends on several factors, including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day and week (e.g., weekday versus weekend), and time of season. The NOAA produces the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S., but Utah is not included in this scale. However, the scale is still included below for reference and can be a useful tool for considering extent values of snowfall throughout the planning area (NCEI, 2024).

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18.0+	Extreme

Figure 4-2. NCEI Regional Snowfall Index (RSI)

- ***Historical Frequency & Probability of Future Occurrence***

According to the Storm Events Database, Daggett County has had 180 instances of severe winter storm since 2010 (classified under "blizzard," "heavy snow," "winter storm," and "winter weather"). In the last five years (January 2018–January 2023), the county has experienced 52 winter storm events, many of which have occurred in the towns of Dutch John and Manila. The Eastern Uinta Mountains receive the most winter storms in the county.

Daggett County will continue to experience multiple winter storms every year throughout the county, including in Dutch John and Manila. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in winter storms is not currently likely (NCEI, 2022). Future winter storm trends are predicted to remain consistent in the next 20 years in Daggett County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades.

- ***Impacts & Loss Estimates***

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by winter storms, as presented in the table below.

Table 4-7. Impacts of Winter Storm by Jurisdiction

Jurisdiction	Impacted by Winter Storms	Experienced Significant Winter Storm with $1,000+ in Damage Since 2010	Potential Impacts of Winter Storms
Daggett County	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
Town of Dutch John	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding,

Jurisdiction	Impacted by Winter Storms	Experienced Significant Winter Storm with $1,000+ in Damage Since 2010	Potential Impacts of Winter Storms
			utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
Town of Manila	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services

The impacts of the very cold temperatures that may accompany a severe winter storm are discussed in the previous section. Other life-threatening impacts are numerous. Motorists may be stranded by road closures or may become trapped in their automobiles in heavy snow and/or low visibility conditions. Bad road conditions cause automobiles to go out of control. People can be trapped in homes or buildings for long periods of time without food, heat, and utilities. Those who are ill may be deprived of medical care by being stranded or through loss of utilities and lack of personnel at care facilities. Use of heaters in automobiles and buildings by those who are stranded may result in fires or carbon monoxide poisoning. Fires during winter storm conditions are a particular hazard because fire service response is hindered or prevented by road conditions and because water supplies may be frozen. Emergency Services may also not be available if telephone service is lost. People who attempt to walk to safety through winter storm conditions often become disoriented and lost. Downed power lines not only deprive the community of electricity for heat and light but pose an electrocution hazard. Death and injury may also occur if heavy snow accumulation causes roofs to collapse. There have been 41 fatalities in Utah from 1962–2018 due to winter storms. About 70% of these fatalities occur in automobiles, while 25% are a result of people caught out in the elements (Utah Hazard Mitigation Plan, 2019).

The total economic impact in Utah for a 24-hour statewide winter storm is $66.36 million, including $42.81 million in lost wages and salaries and overtime, $18.26 million in lost retail sales, $3.32 million in federal taxes, and $1.98 million for state and local taxes (Utah Hazard Mitigation Plan, 2019). Economic impacts arise from numerous sources, including hindered transportation of goods and services; flooding due to burst water pipes; forced closing of businesses; inability of employees to reach the workplace; damage to homes and structures, automobiles, and other belongings by downed trees and branches; loss of livestock and vegetation; and many others. Loss of crops is also common.

Table 4-8. Winter Weather: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
9.9 events per year	0.0	$15,930	$11,650	$8	$27,587	96.0	Relatively High
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

Table 4-9. Ice Storm: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0 events per year	0.0	$168	$1,436	N/A	$1,603	40.4	Relatively Low
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions or shelter from the cold and winter storms may be more vulnerable to winter conditions. Additionally, those who cannot afford to sufficiently heat their homes or transport themselves to a safe location may be at risk.

Table 4-10. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%

Vulnerability Category	Number	Percent
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Winter storms may cause significant damage to critical facilities in the county due to frozen or burst water lines. High wind during winter storms may knock down power lines, as well, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups or power outages, which could delay emergency response and access to life-saving medical equipment.

Table 4-11. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023).

Effects of Climate Change on Probability of Future Events

Table 4-12. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8" increase (from 17.5" to 18.3") in average annual precipitation.
	Increased participation can lead to more frequent and severe winter storms.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 4-13. Winter Weather: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Score	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
93.0	Relatively High	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

Table 4-14. Ice Storm: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
29.7	Very Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Avalanche

• *Hazard Description*

Potential Probability	Medium
Potential Consequence	Medium
Location	Uinta Mountains and any steep slopes that may accumulate snow
Seasonal Pattern or Conditions	Winter
Duration	Events may last seconds to minutes; snowstorms that cause avalanches may last hours to days
Analysis Used	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, North American Public Avalanche Danger Scale, Utah Avalanche Center, NCEI, Environmental Defense Fund, Neighborhoods at Risk

Snow avalanches are common in mountainous terrain where heavy snowfall accumulates on steep slopes. Avalanches generally occur on slopes between 30 and 45 degrees with 38 degrees being the "ideal" slope for development of avalanche conditions. They are often categorized as either "loose snow" or "slab" types. A loose snow avalanche is initiated when snow is dislodged at a point upslope and, in turn, dislodges more snow as it moves downward. Such avalanches usually grow wider and larger as they proceed but are usually somewhat limited in size. The generally more dangerous slab avalanche occurs when a cohesive mass of snow breaks free and moves downward, either as a single unit, or breaking into smaller pieces traveling together. Four factors combine to produce a slab avalanche: (1) a large mass of snow that is cohesive as a result of a single, large snowfall, or some physical change due to temperature, introduction of water content, or other factors; (2) some source of instability or weakness that forms a boundary capable of breaking free; (3) a surface, called a sliding layer, upon which the slab may easily slide; and (4) a triggering event, such as increased weight, strong vibration, wind, or a temperature increase, that overcomes the binding forces at, or further weakens the boundary of instability. It is estimated that around 90% of avalanches where victims are involved are triggered by their victims or those who accompany them.

Avalanches are comprised of three zones—the release zone where the mass breaks free and accelerates, the track where the mass travels downward at a relatively constant speed (often approaching 80 mph), and the runout zone where the mass slows and comes to rest. While the exact moment of an avalanche cannot be predicted, avalanche conditions are readily recognizable, and avalanches tend to recur on the same slopes year after year.

- ***Location***

Snow avalanches can occur anywhere in the county with mountains and/or slopes that accumulate with snow. However, the primary avalanche zone in Daggett County is the Uinta Mountains in the southern region (Utah Hazard Mitigation Plan, 2019).

- ***Extent***

The North American Public Avalanche Danger Scale is a tool used by avalanche forecasters throughout the U.S. to communicate the potential for avalanches to cause harm or injury to backcountry travelers.

North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size, and distribution of avalanches.
Safe backcountry travel requires training and experience. You control your risk by choosing when, where, and how you travel.

Danger Level	Travel Advice	Likelihood	Size and Distribution
5 - Extreme	**Extraordinarily dangerous avalanche conditions.** Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Very large avalanches in many areas.
4 - High	**Very dangerous avalanche conditions.** Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 - Considerable	**Dangerous avalanche conditions.** Careful snowpack evaluation, cautious route-finding, and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 - Moderate	**Heightened avalanche conditions on specific terrain features.** Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 - Low	**Generally safe avalanche conditions.** Watch for unstable snow on isolated terrain features.	Natural and human-trigged avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Figure 4-3. North American Public Avalanche Danger Scale

- ***Historical Frequency & Probability of Future Occurrence***

Avalanches occur often in Daggett County, primarily in the Uinta Mountains, but most go unreported and/or undetected. The Utah Avalanche Center records observations of avalanches throughout Utah, including in the Western Uinta Mountains. However, the eastern half of the Uintas in Daggett County is not tracked by the Utah Avalanche Center because this area is not a common recreation ground for backcountry users during the winter. No avalanches have been reported in the towns of Dutch John or Manila.

Avalanches in the Uinta Mountains are likely to continue at the existing trend, but avalanches in the towns of Dutch John and Manila would still be extremely unlikely in the future. However, avalanches in the surrounding areas of Dutch John are possible due to rising terrain. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in snowfall—and therefore avalanches— is not currently likely (NCEI, 2022). Future avalanche conditions are predicted to remain consistent in the next 20 years in Daggett County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades, which could lead to an uptick in avalanches. Additionally, an increase in average temperatures during the winter could cause unstable avalanche conditions, thus triggering more frequent events.

• *Impacts & Loss Estimates*

Parts of unincorporated Daggett County may be impacted by avalanches, as presented in the table below. However, the towns of Dutch John and Manila are not likely to be directly impacted by avalanches.

Table 4-15. Impacts of Avalanche by Jurisdiction

Jurisdiction	Impacted by Avalanches	Fatalities Due to Avalanches	Potential Impacts of Avalanches
Daggett County	Yes	0	Injury, trauma, hypoxia, suffocation, death, property damage, fallen trees/vegetation, rockslides, damage to power lines, road/railway closures, utility losses, rescue/recovery expenses, debris/snow removal expenses
Town of Dutch John	No	0	No impacts likely
Town of Manila	No	0	No impacts likely

It is common for avalanche impacts to be somewhat limited. Because avalanches usually occur in remote areas, the most frequent victims are recreational users of the slopes on which they occur. Of those who die in avalanches, approximately one third of the deaths are a result of trauma while the remaining two thirds are from suffocation. Trauma may be the result of being carried into obstructions, such as boulders and trees, or over cliffs, or from rocks, trees, or large chunks of snow being carried downward at high speed. Avalanches may also damage or destroy structures, break power lines, block roadways and railroads, and damage trees and vegetation.

Visiting tourists and recreational users may be at an increased risk of triggering avalanches and/or being caught in one if they are not well-versed in the area and where common avalanche hot spots are located. It's important for visitors to stay informed about the risks of any recreational activity they participate in.

As with landslides, losses from snow avalanches come from damage to roadways and the resulting snow and debris removal costs. Additionally, if a rescue and/or recovery is necessary for any people caught in the avalanche, physical and monetary resources must go toward rescue helicopters, rescue crew, rescue equipment, additional transport, medical treatment, etc., which can add up to thousands of dollars.

The Expected Annual Loss score for Avalanche from the National Risk Index is not available due to limited avalanche data in Daggett County.

Vulnerable Populations

Because those typically affected by avalanches in Daggett County are often recreational users who ventured into avalanche terrain by choice, the vulnerable populations in the county are unlikely to be at risk from this hazard, especially because the county's two towns are not directly located within avalanche terrain or mountains. No critical facilities in the county are located near avalanche terrain or potentially at risk of being damaged in an avalanche.

Changes in Development

There is no impact based on current development trends on either current or future development.

● *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additional heavy snow could create unstable avalanche conditions and lead to more frequent avalanches.

Effects of Climate Change on Probability of Future Occurrence

Table 4-16. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increased participation can lead to more unstable avalanche conditions and frequent avalanches.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

The Overall Risk Index score for Avalanche from the National Risk Index is not available due to limited avalanche data in Daggett County.

● WILDFIRE

o HAZARD DESCRIPTION

Potential Probability		High
Potential Consequence		High
Location	Countywide, including around Dutch John and Manila; URWIN zones near the foothills and in forested areas	
Seasonal Pattern or Conditions	Summer and fall months. Wildfire-prone areas are areas affected by drought and/or heavily overgrown and dry brush and debris. Lightning and human triggers cause wildfires.	
Duration	Wildfires typically last days but can last months, depending on climate and fuel load as well as resources (financial, manpower) to extinguish the fire.	
Analysis Used	U.S. Forest Service, National Climate Center, FEMA, AGRC, County Hazard Analysis Plans, 2019 Utah Hazard Mitigation Plan, NWCG, Utah Forestry, Fire & State Lands, local newspaper articles, Utah Fire Marshal, Wildfire Risk, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR	

Wildfires—uncontrolled fires spreading through both naturally occurring and non-native vegetative fuel sources—are a significant hazard, often beginning unnoticed and spreading quickly while threatening any structures in its path. Wildfires can cover a large geographic area, can be ignited by natural or human sources, and are hard to predict. They help to maintain a healthy ecosystem and have been a natural and fundamental part of the world's forests and grasslands for millions of years. Fires cleanse and regenerate forests, giving new life to the soil and encouraging biodiversity. They are responsible for the evolution of many of the grasses, brushes, and tree species found in Utah (Utah Hazard Mitigation Plan, 2019).

Wildfires are classified as Wildland and Wildland-Urban Interface (WUI). Wildland fires occur in areas where development is essentially nonexistent except for roads, railroads, or power lines. WUI fires materialize in a geographical area where structures and other human development adjoins wildlands. A fireshed is an area that will adversely affect a community or high-value resource and/or asset if ignited (Utah Hazard Mitigation Plan, 2019).

o LOCATION

On average in Utah, years with more spring rainfall typically have higher wildfire incidents in the summer and fall after vegetation dries out and becomes combustible material. Hot temperatures, high winds, and dry conditions brought on by years of drought have caused high mortality rates in low elevation timber and shrubs, all contributing to prime fire conditions (Utah Hazard Mitigation Plan, 2019). Wildfires may occur in any part of Daggett County, including in or around the towns of Dutch John and Manila. Daggett County is 80% forest land, and approximately 80% of lightning strikes in the county result in fires, which is of high concern in regard to wildfires.

Daggett County sees an average of approximately nine to 12 inches of precipitation per year (NOWData, 2024). The northwestern and eastern parts of the county typically see lower precipitation averages due to its mostly semi-arid climate. However, the Flaming Gorge region often sees three to four inches of additional rainfall than the rest of the county.

As documented in the previous regional plan, the following table identifies the roads and utilities within Daggett County at potential risk to wildfire.

Table 5-1. Roads and Utilities at Risk to Wildfire

Transportation	
Name	**Miles**
Local Neighborhood/Town Roads	218.1
State Route 43	1.18
State Route 44	21.31
US Highway 191	21
Utilities	
Name	**Description**
Flaming Gorge	Power Generation
Power Lines	53.45 miles
KV-230	4.25 miles
Natural Gas	6.41 miles

o EXTENT

The National Wildfire Coordinating Group (NWCG) classifies fire sizes using the following standards (NWCG, 2024). These standard data values are included in the data table below.



Figure 5-1. NWCG Size Class of Fire

The State of Utah Division of Forestry, Fire, and State Lands provides five categories of wildfire risk, which are listed below:

- Extreme
- High
- Medium
- Low
- Very Low

These ratings cover all of Daggett County and are based on the type and density of vegetation in each area. Additional factors influencing wildfires, such as weather conditions, wind speed, and direction, are not considered in this risk assessment.

The Utah Wildfire Risk Explorer from the Utah Division of Forestry, Fire & State Lands maps the Burn Probability and Damage Potential for wildfire for every county in Utah. Burn Probability is the probability that a specific geographic location will experience a wildland fire during the specified time period of one year. Estimates were generated with the large-wildfire simulation system (Utah FFSL, 2024). The Burn Probability for Daggett County can be seen in the first map below. The lower southeastern corner of the county has the greatest likelihood of wildfire, while the northern riverine region of the county and the northern side of the Uinta Mountains have a decreased likelihood of wildfire.

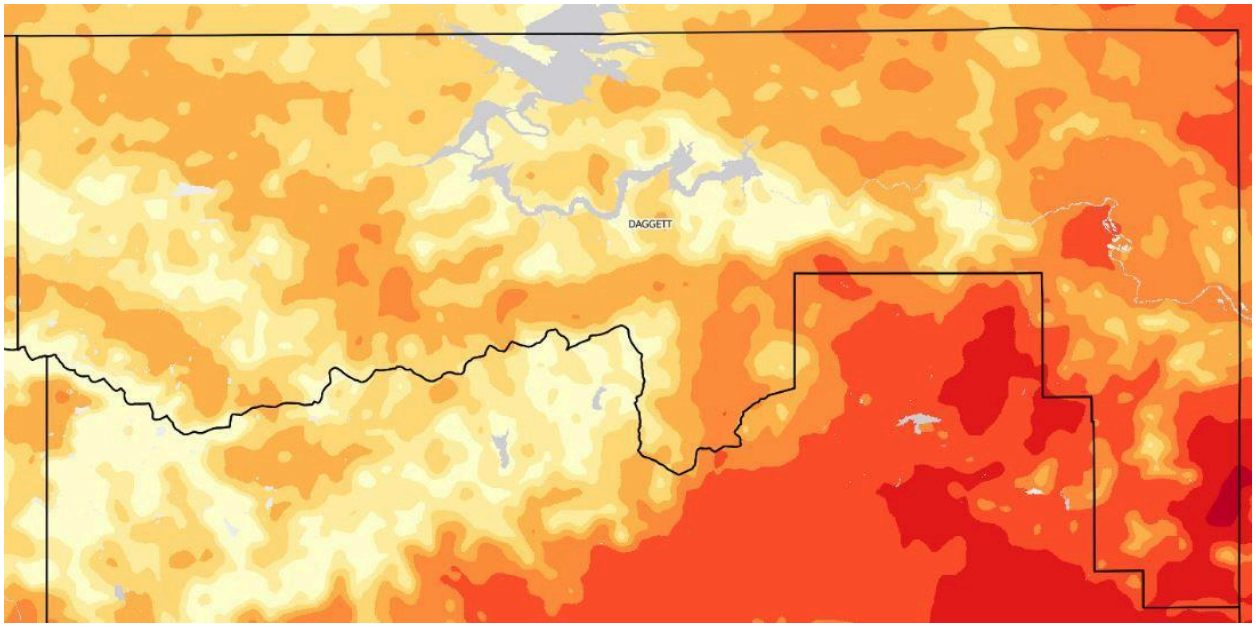


Figure 5-2. Daggett County Burn Probability

Damage Potential represents the potential consequences of fire to a home at a given location if a fire were to occur and if a home were located there. Damage Potential incorporates ember load and conditional risk to potential structures as a generalized measure of potential loss to homes (Utah FFSL, 2024). The Damage Potential for Daggett County can be seen in the second map below. Homes located in the higher elevations of Daggett County are most at risk to wildfire damage than those located in the lower elevations.

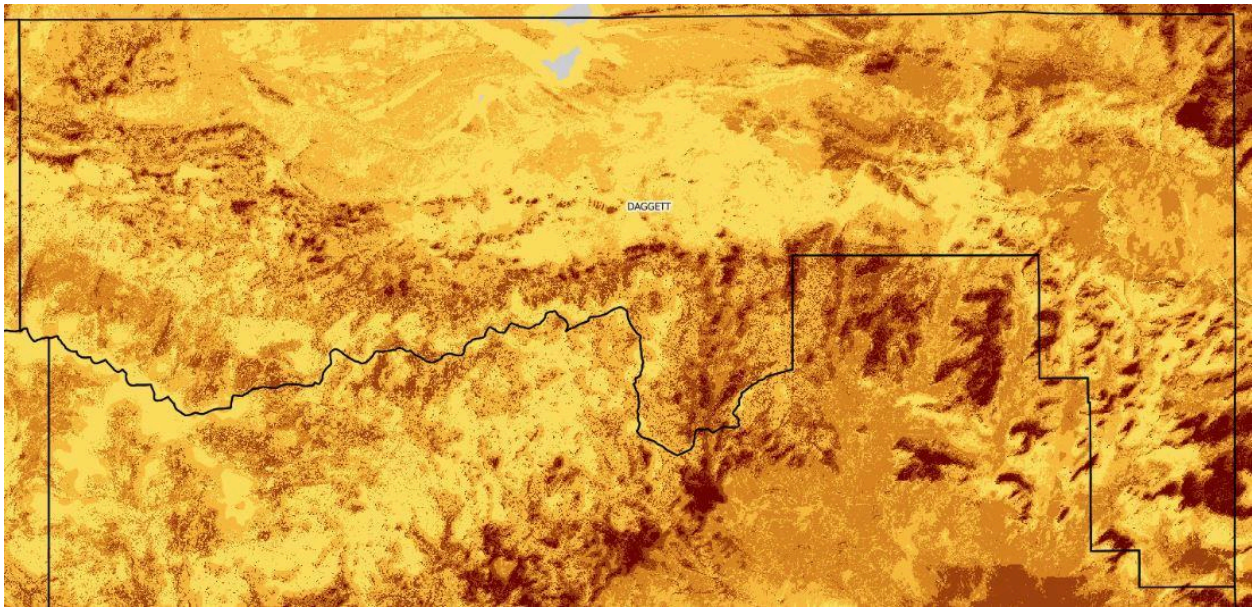


Figure 5-3. Daggett County Damage Potential

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The state of Utah experienced 808 reported wildfires over 18,061 acres in 2023. This is a 16.1% decrease in total wildfires from 2022 and a 29.3% decrease in human-caused fires. The Uintah Basin Region experienced 99 reported wildfires (Utah FFSL, 2023). One of the largest wildfires in Daggett County began on August 3, 2020 and lasted for a week as it burned through 7,632 acres between Daggett County in Utah and Sweetwater County in Wyoming. The wildfire, called the Richard Mountain Fire, began in Wyoming and spread south into Utah within the same day. No structures or lives were lost (ABC4 News, 2020).

The three most significant fires in Daggett County over 50 acres since 2017 are listed in the table below.

Table 5-2. Significant Fires in Daggett County

Date Discovered	Wildfire Name	Location	Size in Acres	Cause	Buildings Destroyed
09/02/2018	Bender Mountain	Eastern Daggett County over Utah-Colorado border	4,120	Vehicle Crash	0
08/03/2020	Richard Mountain	Northeast of Flaming Gorge over Utah-Wyoming border	7,632	N/A	0
07/17/2023	Sunny Cove	3 mi. northwest of Dutch John	85	Lightning	0

Source: Utah FFSL, 2017–2023

The most devastating fire in Daggett County occurred on July 16, 1977 near Flaming Gorge Dam in Ashley National Forest when lightning struck a grassy area nearby. Firefighters battled the blaze for two hours when the fire suddenly intensified and changed directions, overtaking and killing three firefighters. The fire, known as the Ashley National Forest Fire or Cart Creek Fire, burned 1,500 acres overall (NWCG, 2023).

o IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by wildfire, as presented in the table below.

Table 5-3. Impacts of Wildfire by Jurisdiction

Jurisdiction	Impacted by Wildfire	Experienced Significant Wildfire with $1,000+ in Damage Since 2000	Fatalities Due to Wildfire	Potential Impacts of Wildfire
Daggett County	Yes	Yes	3	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
Town of Manila	Yes	No	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
Town of Dutch John	Yes	Yes	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses

According to the 2019 Utah State Hazard Mitigation Plan, Daggett County has three schools, zero hospitals, and five emergency response facilities that are exposed to potential wildfires. The combined value of the residential buildings in Daggett County is $125,097,000, and the combined value of non-residential buildings is $25,304,000. The total building value is $150,401,000 (Utah Hazard Mitigation Plan, 2019).

Fatalities from wildfire in Utah are relatively uncommon, with 22 recorded deaths since 1950. Three deaths have occurred in Daggett County due to wildfire from the Ashley National Forest Fire in 1977 (Utah Hazard Mitigation Plan, 2019).

The potential losses to critical facilities in Daggett County due to wildfires are identified in the table below.

Table 5-4. Daggett County Potential Impacts from Wildfire

Facility	Impacted	Not Impacted	Description
Hospitals/Medical Clinics	X		Medical clinic could be inundated with inhalation issues due to smoke.
Schools	X		Manila has two schools on the edge of town that could potentially be at risk. Dutch John has one school that would be at risk.
EOC	X		The EOC lies on the outskirts of town in a wildfire area and would receive damage.
Police Stations	X		The Sheriff's Office is located on the outskirts of town in a potential wildfire area and would receive damage.
Fire Stations		X	
County/City Facilities		X	
Homes	X		Full and part-time residences in The Acres, Deer Lodge, and The Pines developments could be damaged or destroyed.
Crops	X		Hay and alfalfa fields, as well as ranchland, could be destroyed.
Businesses	X		Recreational and resort businesses (Flaming Gorge, Dutch John, Cedar Springs, etc.) located within forested areas could be destroyed.

Table 5-5. Wildfire: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0.182% chance per year	0.0	$2,082	$182,475	$47	$184,605	96.0	Relatively High
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology. *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

As documented in the previous regional plan, the following table identifies the roads and utilities within Daggett County at potential risk to wildfire.

Table 5-6. Cost of Roads and Utilities at Risk to Wildfire

Transportation	
Name	**Estimated Cost**
Local Neighborhood/Town Roads	$436,200,000
State Route 43	$2,847,930
State Route 44	$51,431,685
US Highway 191	$50,683,500
Utilities	
Name	**Estimated Cost**
Flaming Gorge Power Plant	$50,000,000
Power Lines	$2,580,566
KV-230	$205,190
Natural Gas	$1,547,309
Note: Costs are in 2012 dollars.	

▪ Vulnerable Populations

Potentially vulnerable populations may experience difficulty preparing for and responding to wildfire. The table below lists the vulnerable populations in Daggett County that may be at greater risk during a wildfire.

Table 5-7. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Wildfire places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 5-8. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of wildfire. As housing continues to encroach on WUI areas, more structures may become vulnerable to wildfire.

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought and heat, which can lead to more frequent and severe wildfires. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century, creating perfect dry conditions for wildfires (UCAR, 2023). Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, wildfires, and more intense urban heat island effects), compounding already existing stressors.

▪ Effects of Climate Change on Probability of Future Events

Table 5-9. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to longer and more catastrophic wildfire seasons.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 5-10. Wildfire: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
94.8	Relatively Moderate	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● FLOOD

o HAZARD DESCRIPTION

Flooding is defined by the National Weather Service (NWS) as "the inundation of normally dry areas as a result of increased water levels in an established water course." River flooding, the condition where the river rises to overflow its natural banks, may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams. In addition to these natural events, there are a number of factors controlled by human activity that may cause or contribute to flooding. These include dam failure (discussed below) and activities that increase the rate and amount of runoff, such as paving, reducing ground cover, and clearing forested areas. Flooding is a periodic event along most rivers, with the frequency depending on local conditions and controls, such as dams and levees. The land along rivers that is identified as being susceptible to flooding is called the floodplain.

Flooding is a dynamic natural process. Along rivers and streams, a cycle of erosion and deposition is continuously rearranging and rejuvenating the aquatic and terrestrial systems. Although many plants, animals, and insects have evolved to accommodate and take advantage of these ever-changing environments, property and infrastructure damage often occurs when people develop floodplains and natural processes are altered or ignored.

Flooding can also threaten life, safety, and health and often results in substantial damage to infrastructure, homes, and other property. The extent of damage caused by a flood depends on the topography, soils, and vegetation in an area, and the depth and duration of flooding, velocity of flow, rate of rise, and the amount and type of development in the floodplain.

o TYPES OF FLOODING

Flooding can occur in a number of ways, and many instances are not independent of each other and can occur simultaneously during a flood event. The types of flooding considered for this plan include:

- Heavy rainfall
- Urban stormwater overflow
- Rapid snowmelt
- Rising groundwater (generally in conjunction with heavy prolonged rainfall and saturated conditions)
- Riverine ice jams
- Flash floods
- Alluvial fan flooding
- Flooding from dam failure

o RELATED HAZARDS

▪ River or Stream Flood

● *Hazard Description*

Potential Probability		Low

Potential Consequence		Medium
Location	Along Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries	
Seasonal Pattern or Conditions	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer	
Duration	Flooding can last hours to days or even months	
Analysis Used	FIS, FIRM, GIS data, information from community residents, UGS, BasinNow, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund	

River flooding—the condition where the river rises to overflow its natural banks—may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams.

- ***Location***



Riverine flooding occurs in the low-lying areas of the county adjacent to streams and rivers, such as the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries. Erosion along rivers and streams can cause flooding during unusually wet years during spring snowmelt (UGS, 1987). Additionally, during high snowmelt years or high moisture conditions, the Green River can threaten bridges and lead to flooding. It's common for waters at Flaming Gorge Reservoir to rise several feet during high snowmelt years, often swallowing camper trailers left on the beaches. The photo to the right shows rising waters at Flaming Gorge Reservoir during the summer of 2023.

Because of their locations near Flaming Gorge Reservoir, the Green River, and many streams and creeks, Dutch John and Manila are vulnerable to flooding. However, the town of Manila, which is the county seat and the largest community in the county, is not directly in the path of any major rivers and is therefore at a reduced risk to significant flooding within town boundaries. Flooding is still possible within the town from the Sheep Creek Canal if it overtopped or failed (Manila General Plan, 2022).

Several roads in Daggett County are low water crossings that pass over creeks and are often inundated with water during high flow seasons. Browns Park Road, Red Creek Road, State Line Road, Bennion Lane, South Valley, Dutch John Bench, Hwy 43, Hwy 44, Hwy 191, Linwood Lane, E 3rd Road in Manila, Sols Canyon Road, and any roads that cross rivers or streams are all subject to repeat flooding in

Daggett County. Both Dutch John and Manila have primarily dirt roads, including many in Manila that slope from north to south. Emergency repairs are frequently necessary to maintain passage over the roads.

- ***Extent***

The NFIP classifies floods through the use of recurrence intervals as seen in the chart below.

Flood Recurrence Interval	Chance of occurrence during any given year
5 year	20%
10 year	10%
50 year	2%
100 year	1%
500 year	0.20%

Figure 6-3. NFIP Flood Recurrence Intervals

The federal standard for floodplain management under the National Flood Insurance Plan (NFIP) is the "100-year floodplain." This area is chosen using historical data such that in any given year there is a 1% chance of a "base flood" (also known as "100-year flood" or "regulatory flood"). A base flood is one that covers or exceeds the 100-year floodplain. A "500-year floodplain" is an area with at least a .2% chance of flood occurrence in any given year (HUD Exchange, 2024).

- ***Historical Frequency & Probability of Future Occurrence***

Changes in climate will likely increase the region's flood risk as the planning area experiences more extreme precipitation events triggering flash flooding, monsoons during late summer to early fall, and runoff from rain falling on snow events, common with warming temperatures.

Streams and rivers (Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek and their respective tributaries) create a very high flood threat and increases the probability of future events.

The Storm Events Database from the NOAA lists two river flood events in Daggett County between 2000–2023. Only one of these events affected Dutch John, and none of them occurred in Manila.

Table 6-1. River Flood Events in Daggett County, UT (2000–2023)

Location Within County	Date	Property Damage ($)	Cause
Eastern Uinta Mountains	05/21/2005	$0	Rapid snowmelt
Dutch John	07/03/2011	$0	High releases from Flaming Gorge Reservoir
Source: NOAA Storm Events Database, 2010–2023			

River flooding is likely to occur again in the future. According to Neighborhoods at Risk, Daggett County is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year). By 2049, Daggett County is also expected to have a 0.8" increase (from 17.5" to 18.3") in average annual precipitation. Heavy precipitation can lead to riverine flooding as the ground fails to

absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

● *Impacts & Loss Estimates*

The towns of Dutch John and Manila and parts of unincorporated Daggett County may be impacted by river flooding, as presented in the table below. Manila is not as likely to be impacted by river flooding since it is not located in the direct path of any large rivers. Dutch John is located in close proximity to Flaming Gorge Reservoir and therefore more vulnerable to river flooding.

Table 6-2. Impacts of River Flood by Jurisdiction

Jurisdiction	Impacted by River Floods	Fatalities Due to River Floods	Potential Impacts of River Floods
Daggett County	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Dutch John	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Manila	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Human death and injury sometimes occur as a result of river flooding but are not common. Daggett County has not seen any deaths related to river flooding. Human hazards during flooding include drowning, electrocution due to downed power lines, leaking gas lines, fires and explosions, hazardous chemicals, and displaced wildlife. Economic loss and disruption of social systems are often enormous. Floods may destroy or damage structures, furnishings, business assets including records, crops, livestock, roads, and highways. They often deprive large areas of electric service, potable water supplies, wastewater treatment, communications, and many other community services, including medical care, and may do so for long periods of time.

Daggett County participates in the Emergency Program of the National Flood Insurance Program (NFIP), which is the initial phase of NFIP participation. The towns of Dutch John and Manila do not participate.

Table 6-3. Riverine Flooding: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0.5 events per year	0.0	$0	$1	$0	$1	25.5	Very Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to river flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-4. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

River floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-5. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila

Critical Facility Type	Location
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of riverine flooding.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 6-6. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 6-7. Riverine Flooding: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
25.4	Very Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Flash Flood

● *Hazard Description*

Potential Probability		Medium
Potential Consequence		Medium
Location	Along Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries	
Seasonal Pattern or Conditions	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer	
Duration	Flooding can last hours to days or even months	
Analysis Used	FIS, FIRM, GIS data, information from community residents, UGS, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund	

Flash flood is defined by the NWS as "a rapid and extreme flow of high water into a normally dry area or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters." Flash floods differ from floods (discussed above in *River or Stream Flood*) in the rapidity with which they develop. River floods generally develop over a period of several days, providing more warning time and time for preparation and evacuation. Flash floods occur with little or no warning. They may occur during thunderstorms due to rapid runoff from steep terrain, from areas where the soil is already saturated, or in urban areas where vegetation has been removed and pavement has replaced exposed soil. Flash floods may also arise as the result of dam failure (discussed below).

● *Location*

Flooding affects the majority of Utah due to heavy mountain precipitation and runoff. Consistent wildfires also exacerbate existing flood risks. Daggett County can experience changes in the geography of the landscape from sediment movement during flash floods (Utah Hazard Mitigation Plan, 2019). Swelling or shrinking rocks and soils due to summer thunderstorms can cause favorable conditions for flash flooding in Daggett County. Swelling or shrinking soils are found in the Mancos Shale, the Brushy Basin Member of the Morrison Formation, the Chinle Formation, and the Moenkopi Formation within the county (UGS, 1964). However, despite their locations near many streams and rivers, Dutch John and Manila have a low flash flood threat.

Areas in Daggett County that are susceptible to flash flooding include Jarvie Ranch, Clay Basin, Browns Park, South Valley, Dutch John Bench, Birch Creek, Red Creek, and Sheep Creek. Browns Park Road, Red Creek Road, State Line Road, Bennion Lane, Hwy 43, Hwy 44, Hwy 191, Linwood Lane, E 3rd Road in Manila, and Sols Canyon Road are also prone to repeat flash flooding. Both Dutch John and

Manila have primarily dirt roads, including many in Manila that slope from north to south. Emergency repairs are frequently necessary to maintain passage over the roads.

- ***Extent***

Flash floods occur suddenly within six hours of intense rainfall from a thunderstorm or several thunderstorms. Flash floods are possible amongst Daggett County's creek beds, making these areas especially hazardous during rainfall.

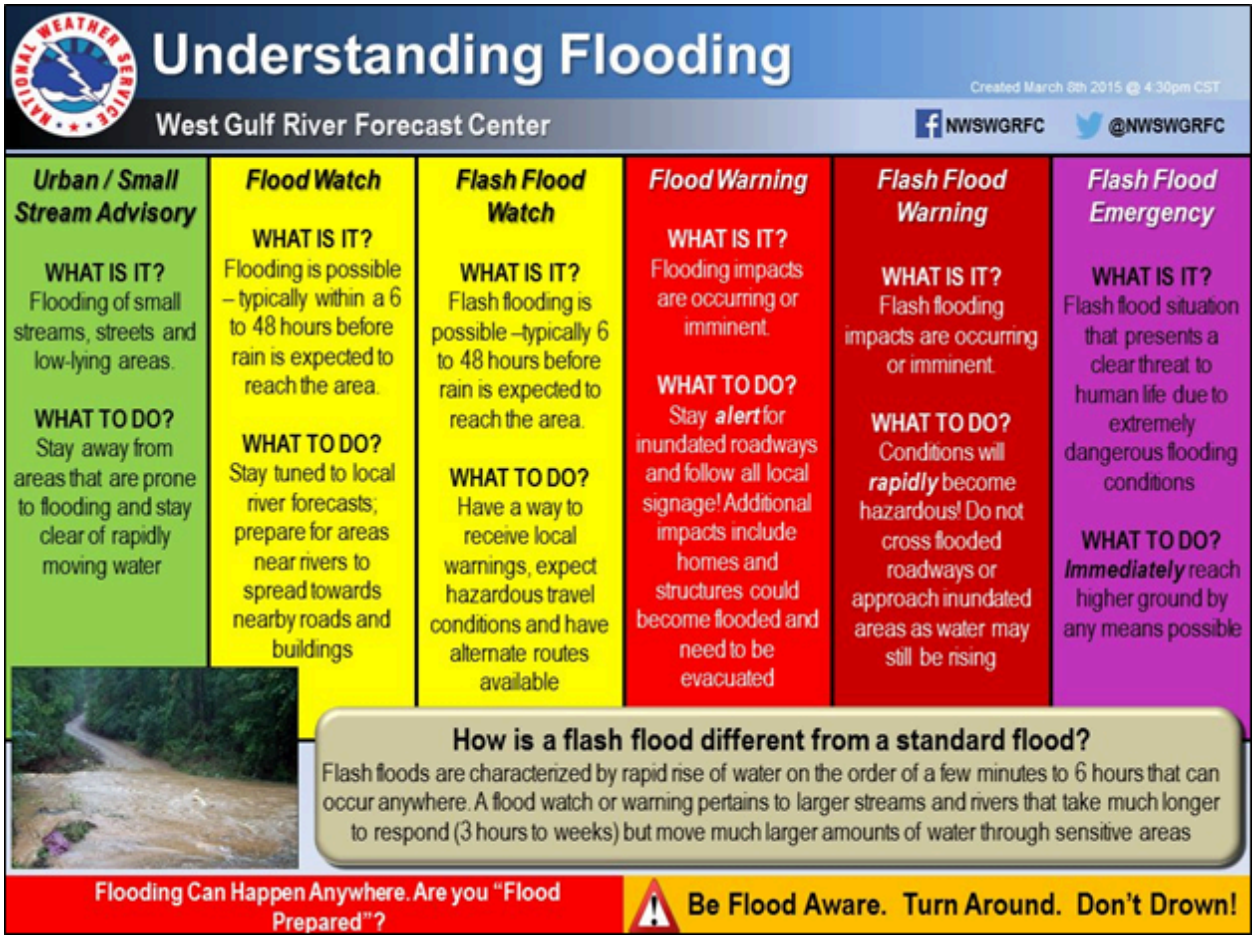


Figure 6-4. Understanding Flooding (NWS, 2015)

- ***Historical Frequency & Probability of Future Occurrence***

The Storm Events Database from the NOAA lists seven flash flood events and one debris flow event in Daggett County between 2000–2023. Five of these flash flood events occurred in Dutch John, two in Manila, and one in unincorporated Daggett County. The following table lists all documented flash flood and debris flow events since 2000.

Table 6-8. Flood Events in Daggett County, UT (2000–2023)

Location Within County	Date	Event Type	Property Damage ($)	Description
Manila	07/15/2004	Flash Flood	$30,000	Heavy rain and hail fell in a short period of time, causing water and mud to wash away a new construction area and several roads and flowing into garages and homes.
Eastern Uinta Mountains	08/09/2005	Debris Flow	$500	Heavy rains caused mudslides 12 mi. N of Lapoint, wiping out 200 feet of fence.
Dutch John	08/03/2007	Flash Flood	N/A	Heavy rain caused flash flooding near Jarvie Ranch.
Dutch John	09/05/2007	Flash Flood	$2,000	Heavy rain caused flash flood with water five feet deep that ran across Browns Park Road, damaging and eroding it.
Manila	07/22/2008	Flash Flood	$75,000	Heavy rain caused flash flooding over Hwy 43 and Hwy 44. Debris flowed onto roads, into canals, houses, and fields. Roads and a settling pond were washed out, and crops, fences, landscaping, and irrigation systems were damaged.
Dutch John	09/17/2013	Flash Flood	N/A	Flash flooding from rain and hail observed along Hwy 191.
Dutch John	08/26/2014	Flash Flood	$100,000	Flash flooding from heavy rain in Brown's Park basin, Jarvie Ranch, and Red Creek areas. Coffer dam failed.
Dutch John	07/20/2017	Flash Flood	N/A	Hail and heavy rain caused flash flooding on streets.

Source: NOAA Storm Events Database, 2000–2023

Flash flooding is likely to occur again in the future. According to Neighborhoods at Risk, Daggett County is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year). By 2049, Daggett County is also expected to have a 0.8" increase (from 17.5" to 18.3") in average annual precipitation. Heavy precipitation can lead to flash flooding as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

- ***Impacts & Loss Estimates***

Any area in Daggett County along Flaming Gorge Reservoir and the Green River, Henrys Fork, Blacks Fork, Birch Creek, Red Creek, Crouse Creek, Sheep Creek, and their respective tributaries, or along any gullies and washes are at risk to flash flooding, including the jurisdictions of Dutch John and Manila.

Table 6-9. Impacts of Flash Flood by Jurisdiction

Jurisdiction	Impacted by Flash Floods	Experienced Significant Flash Flood with $1,000+ in Damage Since 2000	Fatalities Due to Flash Floods	Potential Impacts of Flash Floods
Daggett County	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Dutch John	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Manila	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Because flash floods develop so rapidly, people on foot or in automobiles may be stranded or may be swept away and injured or drowned. They are characterized by high velocity water flow and large amounts of debris, both of which cause damage to or destroy structures and other objects in their path.

At least $207,500 in property damage has occurred since 2000 due to flash flooding, as reported by the Storm Events Database, although actual damage over this time period is likely much higher.

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to flash flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-10. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Flash floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-11. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of flash flooding.

● *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 6-12. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

FEMA does not evaluate flash flood as part of its National Risk Index.

▪ Dam Failure

● *Hazard Description*

Potential Probability	Low
Potential Consequence	Medium
Location	Dam locations are located throughout the county, including near Dutch John and Manila
Seasonal Pattern or Conditions	Rainy Day Failure happens primarily during heavy precipitation events and can have some warning time. Sunny Day Failure happens with no warning at all and can happen at any time.
Duration	Hours, days. Depends on spillway type and area, maximum cfs discharge, overflow or breach type, dam type. Refer to Dam Inventory for more information.
Analysis Used	FIS, Utah Division of Water Rights and Dam Safety, local input, 2019 Utah Hazard Mitigation Plan, National Inventory of Dams, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

Dam failure is the unintended release of impounded waters. Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Poor design and/or construction methods
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams.
- Inadequate maintenance and upkeep

Failures may be categorized into two types: component failure of a structure that does not result in a significant reservoir release, and uncontrolled breach failure that leads to a significant release. With an uncontrolled breach failure of a manmade dam there is a sudden release of the impounded water, sometimes with little warning. The ensuing flood wave and flooding have enormous destructive power. The Dam Safety Program of the Utah Division of Water Rights is responsible for dam safety in Utah.

- ***Location***

Daggett County has a total of 93 dams scattered throughout the county, with two high hazard and three moderate hazard dams that have the potential to cause significant loss to property and/or life in the event of a dam failure (Utah Division of Water Rights, 2024). As shown in the table below, Manila is the only jurisdiction in Daggett County that would potentially be affected by a dam breach if one occurred. However, there is a very small unincorporated community below Flaming Gorge Dam that would be completely inundated if the Flaming Gorge Dam failed. In addition, the community of Jensen in Uintah County would be at risk if the dam failed.

Table 6-13. Vulnerable Downstream Communities in Daggett County, UT

Dam Name	DWRi Hazard Rating	First Downstream Community	Distance in Miles
BOR Flaming Gorge	High	Jensen	55
Long Park (Daggett)	High	Manila, Lucerne Valley	13
Browne Lake	Moderate	None—drains to Carter Creek	N/A
Sheep Creek	Moderate	None—drains to Green River	N/A
Spirit Lake	Moderate	None—drains to Green River	N/A
Source: Utah Division of Water Rights, 2024			

- ***Extent***

Dams in Utah are classified according to hazard, size, and use. There are three hazard ratings used by the Dam Safety Program in Utah: high, moderate, and low. The hazard rating reflects proximity to people and property. High hazard dams are located where there are significant consequences downstream if the dam fails, such as loss of human life and significant property damage. Moderate hazard is typically defined as a dam whose failure will cause significant property destruction. Low hazard dams will cause minimal property destruction (Utah Hazard Mitigation Plan, 2019). As growth continues, homes are being built closer to dams, creating “hazard creep,” which creates additional urgency to ensure dams meet safety standards and don’t put lives and property at unnecessary risk (Dam Safety, 2024). The National Dam

Safety Program breaks out these three hazard ratings even further using the following scale (FEMA, 2015).

Urgency of action	Characteristics and considerations	Potential actions
I – VERY HIGH URGENCY	CRITICALLY NEAR FAILURE: There is direct evidence that failure is in progress, and the dam is almost certain to fail during normal operations if action is not taken quickly. OR EXTREMELY HIGH RISK: Combination of life or economic consequences and likelihood of failure is very high with high confidence.	• Take immediate action to avoid failure. Communicate findings to potentially affected parties. • Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Initiate intensive management and situation reports.
II - HIGH URGENCY	RISK IS HIGH WITH HIGH CONFIDENCE, OR IT IS VERY HIGH WITH LOW TO MODERATE CONFIDENCE: The likelihood of failure from one of these occurrences, prior to taking some action, is too high to delay action.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Give high priority to heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Expedite confirmation of classification.
III - MODERATE URGENCY	MODERATE TO HIGH RISK: Confidence in the risk estimates is generally at least moderate, but can include facilities with low confidence if there is a reasonable chance that risk estimates will be confirmed or potentially increase with further study.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Prioritize investigations and actions to support long-term risk reduction. • Prioritize confirmation of classification as appropriate.
IV – LOW TO MODERATE URGENCY	LOW TO MODERATE RISK: The risks are low to moderate with at least moderate confidence, or the risks are low with low confidence, and there is a potential for the risks to increase with further study.	• Ensure that routine risk management measures are in place. • Determine whether action can wait until after the next periodic review. • Before the next periodic review, take appropriate interim measures and schedule other actions as appropriate. • Give normal priority to investigations to validate classification, but do not plan for risk reduction measures at this time.
V – NO URGENCY	LOW RISK: The risks are low and are unlikely to change with additional investigations or studies.	• Continue routine dam safety risk management activities and normal operations and maintenance.

Figure 6-5. Joint Federal Risk Categories for Dam Failure

Of the 93 total dams in Daggett County, the Utah Division of Water Rights (DWRi) Dam Safety database identifies two high hazard dams in Daggett County (excluding inactive, planned, or under construction dams), as seen in the table below. A high hazard rating means there is a possibility of life being lost due to dam failure. Three dams are listed as having a moderate hazard rating, meaning there would be significant downstream property loss if the dam were to fail. 84 dams have a low hazard rating, which means if a dam failure were to occur, there would be insignificant property loss; however, these dams should still be monitored. The remaining four dams do not have a hazard rating but are still listed in the database. The classification of a high hazard dam does not mean that the dam has a high probability of failure. Dam safety hazard classifications simply delineate the downstream consequences if a dam were to fail.

Potential dam failure in Daggett County is rated as "possible." If a dam were breached in the county, the communities identified in the table in the *Location* section above would be affected.

The National Inventory of Dams (NID) ranks dams as high, significant, or low. The NID lists five dams in Daggett County that have a rating of high or significant.

In addition to listing all dams from DWRi Dam Safety in Daggett County with a rating of high or moderate, the following table notes all five dams from the National Inventory of Dams (NID) that have a rating of high or significant.

Table 6-14. Dams in Daggett County, UT

	Dam Name	DWRi Hazard Rating	NID Hazard Rating
1	BOR Flaming Gorge	High	High
2	Long Park (Daggett)	High	High
3	Browne Lake	Moderate	Significant
4	Sheep Creek	Moderate	Significant
5	Spirit Lake	Moderate	Significant
Source: Dam Safety, 2024; NID, 2024			

Flaming Gorge is a high hazard dam located in Daggett County. The first downstream community is Jensen, which is a census-designated place in Uintah County with 372 people and is 55 miles away. The dam was completed in 1964 and is owned by the Department of the Interior Bureau of Reclamation. The reservoir storage at spillway crest is 3,789,000 acre-feet, and the reservoir storage at dam crest is 4,003,000 acre-feet. The spillway type is a gated spillway, and the maximum dam breach flow is 999,000 cfs with a 0-square mile drainage basin area.

● *Historical Frequency & Probability of Future Occurrence*

Presently, there is no historical record of dam failure in Daggett County aside from the minor failure of a coffer dam installed in Red Creek near Dutch John during a flash flood due to heavy rain in 2014 (Storm Events Database, 2024). However, dam failure could occur at any time without warning, so it's imperative to continue monitoring each dam in the county, especially those with high or moderate hazard ratings. The town of Manila is most at risk of a dam failure. The town of Dutch John has minimal risk.

The risk of dam failure is not likely to increase so long as dams are maintained as they are required by law. However, according to Neighborhoods at Risk, Daggett County is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year). By 2049, Daggett County is also expected to have a 0.8" increase (from 17.5" to 18.3") in average annual precipitation. Heavy precipitation can lead to flooding as the ground fails to absorb the high volume of precipitation that falls in a short period, which has the potential to suddenly overwhelm a dam, especially if the dam is not carefully monitored and maintained.

● *Impacts & Loss Estimates*

The town of Manila and parts of unincorporated Daggett County may be impacted by dam failure, as presented in the table below. Dutch John has minimal direct risk since there are no full-sized dams located upstream of Dutch John.

Table 6-15. Impacts of Dam Failure by Jurisdiction

Jurisdiction	May Be Impacted by Dam Failure	Potential Impacts of Dam Failure
Daggett County	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
Town of Dutch John	Yes (by small coffer or retention dams)	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
Town of Manila	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses

High and moderate hazard dams have the potential to cause possible loss of human life (high hazard) or significant property damage (moderate hazard) if they were to fail and are therefore of most concern to the county. However, due to strict regulations, frequent monitoring, and periodic inspection of these high and moderate hazard dams, the likelihood of a dam failure is low.

The severity of a dam failure depends on the area surrounding the dam or levee, the volume and velocity of water that breaches the structure, and the structures and population in the area. A dam failure will result in flooding of normally protected areas, primarily low-lying areas downstream of the dam, resulting in impacts similar to those seen that are within the normal floodplain. Impacts include damaged or destroyed essential utilities, homes, major roads, crops, and businesses. See the table below for specific potential losses associated with the dam failure hazard.

Table 6-16. Critical Facilities Potentially Impacted by Dam Failure

Dam	Potentially Impacted if Dam Failed										
	Hospitals / Medical Clinics	Schools	EOC	Police Station	Fire Station	County/ City Facilities	Essential Utilities	Major Roads/ Bridges	Homes	Crops	Businesses
BOR Flaming Gorge							X	X	X	X	

Dam	Potentially Impacted if Dam Failed										
	Hospitals / Medical Clinics	Schools	EOC	Police Station	Fire Station	County/ City Facilities	Essential Utilities	Major Roads/ Bridges	Homes	Crops	Businesses
Long Park (Daggett)	X				X	X	X	X	X	X	X
Browne Lake											
Sheep Creek								X	X	X	
Spirit Lake								X			

The 2019 Utah State Hazard Mitigation Plan compiled the total potential dam inundation area for each county in Utah. For Daggett County, 24.74 square miles (out of 718.9 total square miles in the county) could potentially be affected by one or more dam failures. This is a percentage of 3.44%. The town of Manila has the most potential for significant loss of life and/or property.

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to dam failure. Structures without foundations are more likely to be swept away or damaged in the event of a dam failure and the subsequent flash flood. Additionally, those who are unable to quickly transport themselves to a safe location may be at risk.

Table 6-17. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Dam failure and subsequent flooding may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from dam failure, which could delay emergency response and access to life-saving medical equipment.

Table 6-18. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of dam failure.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding and places more pressure on existing dams (Neighborhoods at Risk, 2023).

Effects of Climate Change on Probability of Future Events

Table 6-19. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding and threaten reservoir/lake capacities, which may place additional pressure on existing dams.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

FEMA does not evaluate dam failure as part of its National Risk Index.

• DROUGHT

o HAZARD DESCRIPTION

Potential Probability		High
Potential Consequence		Medium
Location	Countywide, including Dutch John and Manila	
Seasonal Pattern or Conditions	Generally summer and early fall	
Duration	Drought events may last one month to several months to years	
Analysis Used	National Drought Mitigation Center, NCEI, 2019 Utah Hazard Mitigation Plan, RGJ, NOAA, NWS, Utah Division of Water Resources, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR	

Drought is an expected phase in the climactic cycle of almost any geographical region. Objective, quantitative definitions for drought exist but most authorities agree that, because of the many factors contributing to it and because its onset and relief are slow and indistinct, none is entirely satisfactory. According to the National Drought Mitigation Center, drought "originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector" (NDMC, 2024). What is clear is that a condition perceived as "drought" in a given location is the result of a significant decrease in water supply relative to what is "normal" in that area.

It should be noted that water supply is not only controlled by precipitation (amount, frequency, and intensity) but also by other factors, including evaporation (which is increased by higher-than-normal heat and winds), transpiration, temperature, soil moisture, and human use.

Utah specifically is a dry landscape and is among one of the driest states in the country, receiving on average approximately 13 inches of precipitation per year (Utah Hazard Mitigation Plan, 2019).

o LOCATION

Daggett County is subject to drought events due to its partial location in the semi-arid region of Utah. The county is represented by one of the seven different climate divisions in Utah, which is referred to as the Northern Mountains division (see following figure). The part of the Northern Mountains division that is located in Daggett County primarily consists of the Uinta Mountains, which have no real dry season with warm-to-hot summers and cold, snowy winters (Climate of Utah, 2009). Drought events affect the county, incorporated cities, and unincorporated communities.

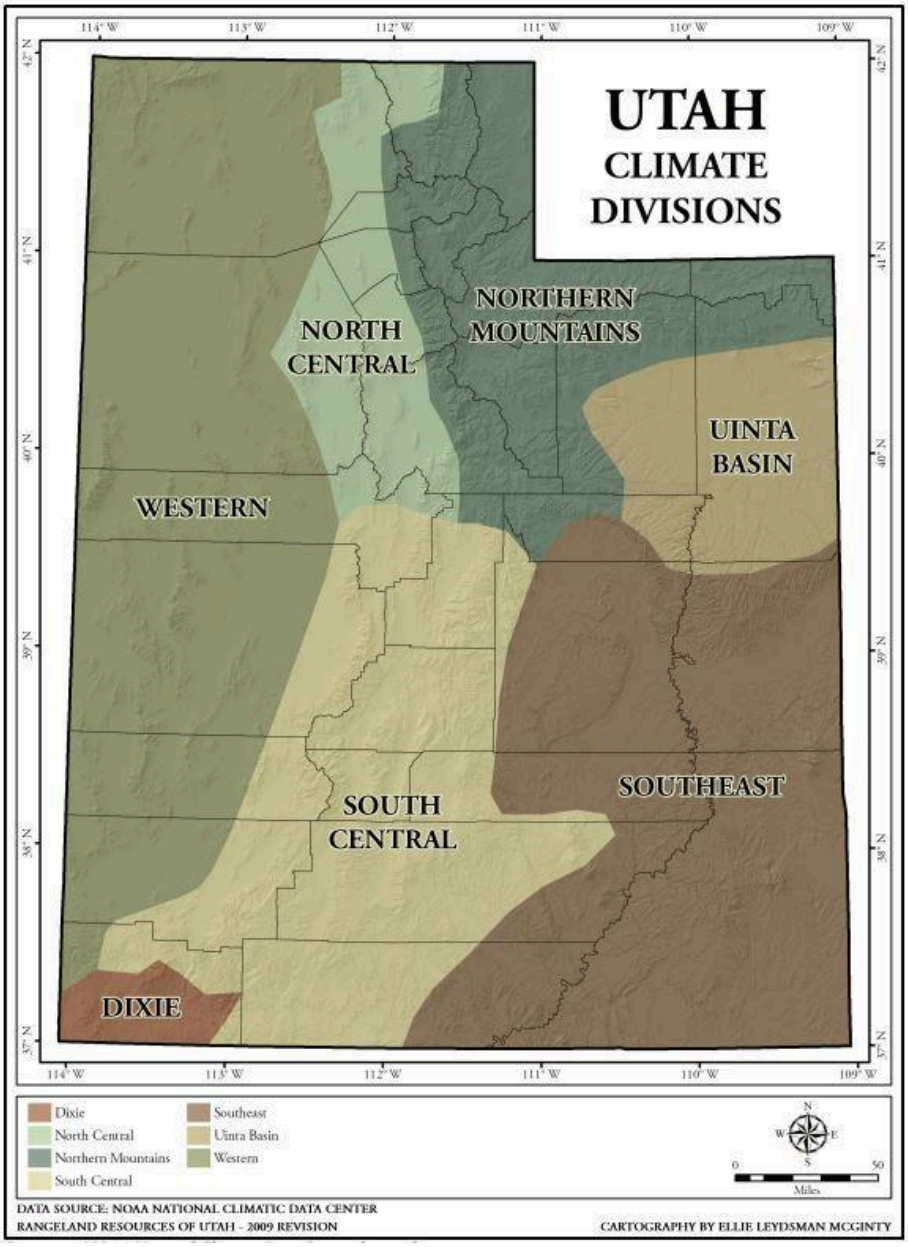


Figure 7-1. Utah Climate Divisions

o EXTENT

The following figure displays the precipitation conditions for the United States using the Palmer Drought Severity Index, which is taken from the National Weather Service (NWS). The Palmer Drought Severity Index (PDSI) is a means of quantifying drought in terms of prolonged and abnormal moisture deficiency or excess. This index indicates general conditions and not local variations caused by isolated rain. The PDSI is an important climatological tool for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather. It can be used to help delineate disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential intensity of forest fires (NWS, 2024).

The PDSI expresses this comparison of moisture deficiency and moisture excess on a numerical scale that usually ranges from positive five to negative five. Positive values reflect excess moisture supplies, while negative values indicate moisture demands in excess of supplies.

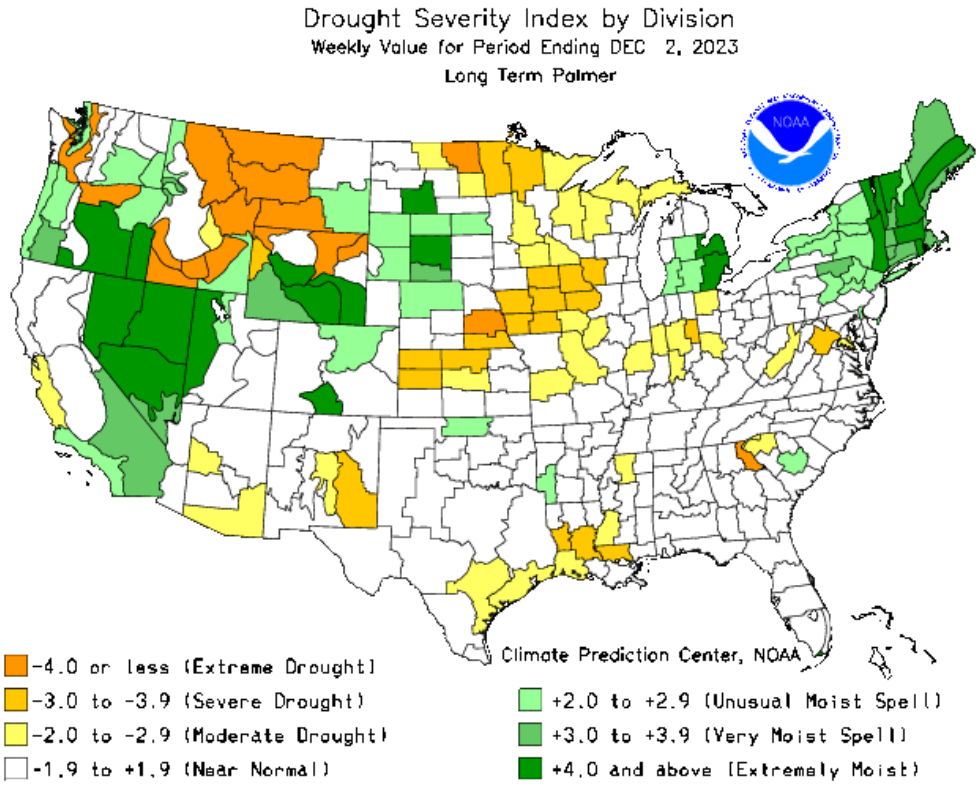


Figure 7-2. U.S. Drought Severity Index

The National Drought Mitigation Center also rates drought throughout the nation by intensity using a D0 (Abnormally Dry) to D4 (Exceptional Drought) scale, as seen in the map of Utah below. The majority of Daggett County is currently experiencing no drought but is abnormally dry (NDMC, 2024).

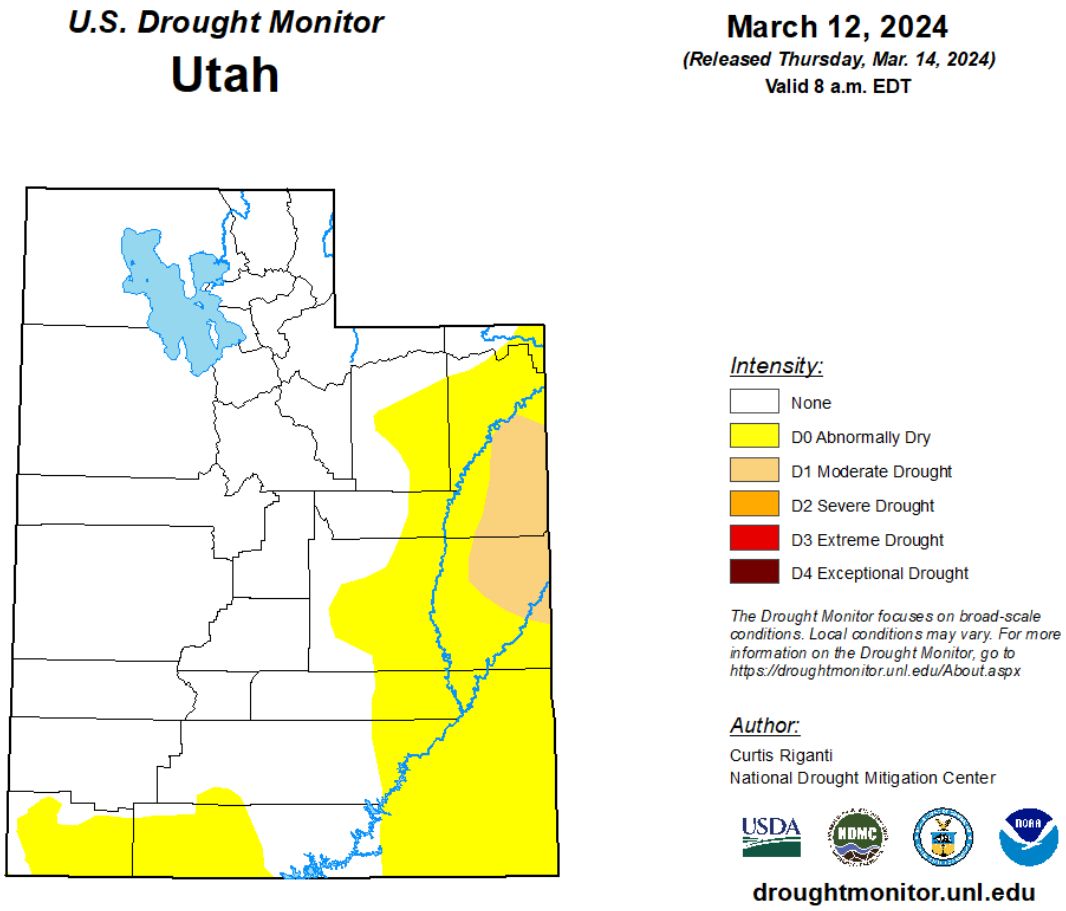


Figure 7-3. U.S. Drought Monitor Utah (NDMC, 2024)

The Standardized Precipitation Index (SPI) is a probability index that considers only precipitation. The SPI is based on the standardized probability of recording a given amount of precipitation in a specific area. The index is negative for drought and positive for wet conditions. The index becomes more positive or negative as conditions become more severe. The 1-month SPI for North America in February of 2024 can be seen below (NCEI, 2024).

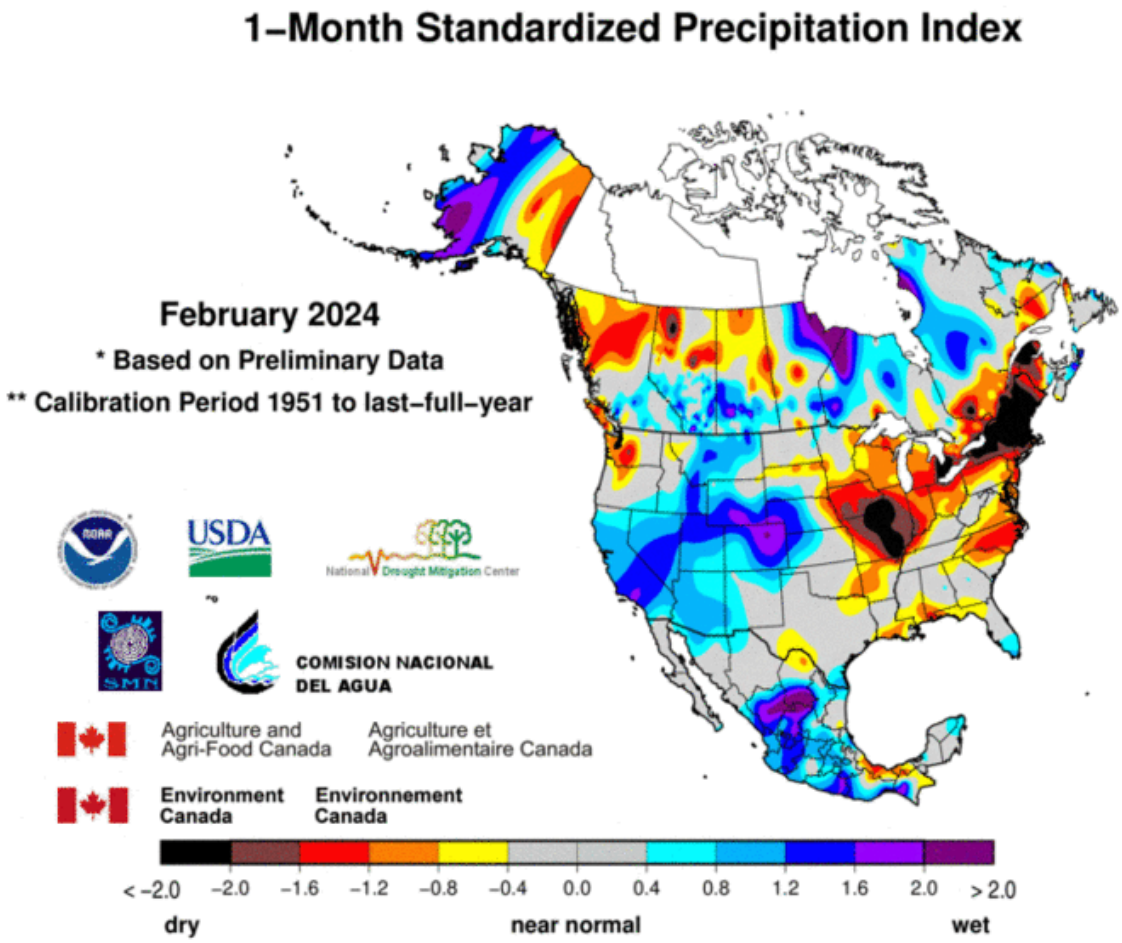


Figure 7-4. 1-Month Standardized Precipitation Index

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Droughts are common occurrences in Daggett County. There have been several multi-year droughts in Utah since 1898, which are listed below (Utah Hazard Mitigation Plan, 2019). Utah has been in a prolonged drought since 1987 until recently in 2023.

- 1898–1905
- 1933–1943
- 1950–1966
- 1971–1977
- 1987–2023

Daggett County has historically experienced prolonged drought events followed by nearly equally prolonged periods of no drought until about 2017 when droughts began occurring closer together (RGJ, 2024). The southeastern region of the county is currently abnormally dry, while the central region has no drought or notable dryness (Drought, 2024). The list below notes the periods of drought in Daggett County since 2000 (RGJ, 2024).

- July 2000–October 2000
- June 2001–November 2001
- February 2002–February 2006
- July 2006–October 2006
- November 2006–May 2008
- February 2010–June 2010
- January 2012–October 2013
- March 2014–August 2014
- January 2018–February 2019
- October 2019–March 2020
- July 2020–March 2023

An extended drought is likely to occur again in the future. According to Neighborhoods at Risk, Daggett County is expected to experience 4 more days that reach above 95°F by 2049 (2024). As annual temperatures continue to increase and dry conditions remain consistent, more frequent and lengthy droughts are likely to occur. In fact, Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NOAA, 2022).

o IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by drought, as presented in the table below.

Table 7-1. Impacts of Drought by Jurisdiction

Jurisdiction	Impacted by Drought	Experienced Exceptional Drought Since 2010	Potential Impacts of Drought
Daggett County	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
Town of Dutch John	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
Town of Manila	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages

Drought is agriculture's most expensive, frequent, and widespread form of natural disaster. Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the

area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services.

Impacts are commonly referred to as direct or indirect. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of direct impacts. The consequences of these impacts illustrate indirect impacts. For example, a reduction in crop, rangeland, and forest productivity may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues because of reduced expenditures, increased crime, foreclosures on bank loans to farmers and businesses, migration, and disaster relief programs. The impacts of drought can be categorized as economic, environmental, or social.

Many economic impacts occur in agricultural and related sectors because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls, and loss of tax revenue for local, state, and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy, and other products increase as supplies are reduced. In some cases, local shortages of certain goods result in the need to import these goods from outside the stricken region.

Table 7-2. Drought: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
77.6 events per year	N/A	N/A	N/A	$285	$285	80.1	Very Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

▪ Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People particularly susceptible to drought are farmers who rely on crop revenue, people living in poverty, and those with chronic illnesses, such as asthma.

Table 7-3. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Drought places high demands on the water supply and sometimes even electrical power supplies that can lead to blackouts or brownouts when accompanied by high heat. The following table lists types of critical facilities that could be negatively affected by power outages or limited water supply, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 7-4. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is no impact based on current development trends on either current or future development.

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century (UCAR, 2024).

Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors.

▪ Effects of Climate Change on Probability of Future Events

Table 7-5. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 7-6. Drought: Overall National Risk Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
78.5	Very Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● EARTHQUAKE

o HAZARD DESCRIPTION

Potential Probability		Low
Potential Consequence		Medium
Location	Countywide, including Dutch John and Manila; refer to earthquake quaternary faults map	
Seasonal Pattern or Conditions	Can occur at any time	
Duration	Event duration is short, but the recovery may be long term	
Analysis Used	USGS, UGS, GIS data, SMS Tsunami Warning, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS	

The U.S. Geological Survey (USGS) defines earthquake as "ground shaking caused by the sudden release of accumulated strain by an abrupt shift of rock along a fracture in the Earth or by volcanic or magmatic activity, or other sudden stress changes in the Earth." The hazards associated with earthquake are essentially secondary to ground shaking (also called seismic waves), which may cause buildings to collapse; displacement or cracking of the earth's surface; flooding as a result of damage to dams or levees; and fires from ruptured gas lines, downed power lines, and other sources. Earthquakes cause both vertical and horizontal ground shaking, which varies both in amplitude (the amount of displacement of the seismic waves) and frequency (the number of seismic waves per unit time), usually lasting less than thirty seconds.

o LOCATION

This hazard may affect every community in Daggett County, including the jurisdictions of Dutch John and Manila. The only quaternary fault in Daggett County is located in the extreme lower southeastern corner of the county along Pot Creek. This fault crosses remote ranchland and does not appear to present any fault rupture risk to structures or the population. However, a visible fault line in Dutch John would affect dam roads, pipelines, utilities, and systems, and older buildings and homes in the town if it were to rupture. Most of the structures in Dutch John and Manila are older and not up to current earthquake codes. A map of Daggett County's quaternary faults can be seen below (USGS, 2024).

Daggett County Quaternary Faults

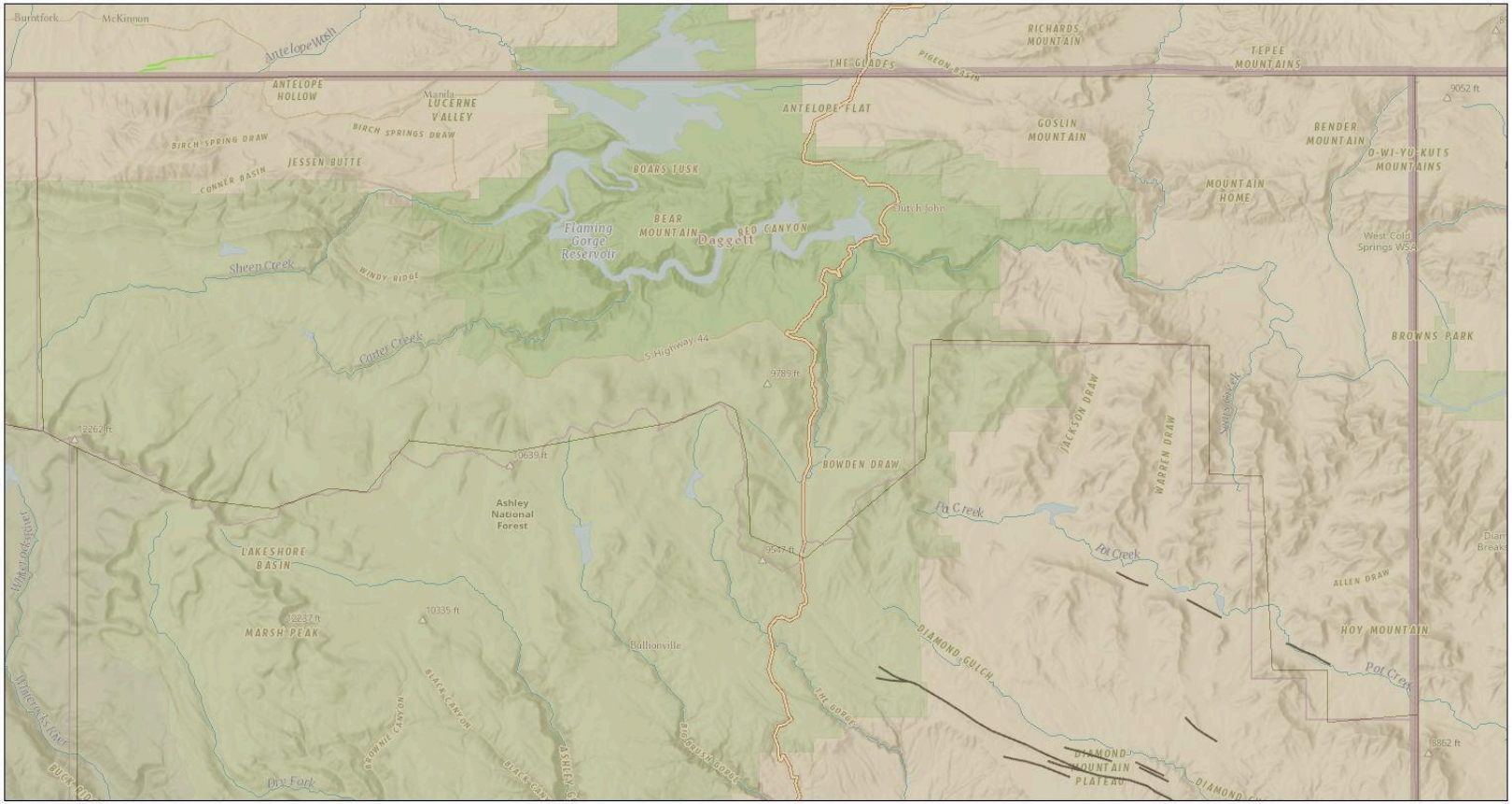


Figure 8-1. Daggett County Quaternary Faults (USGS, 2024)

o EXTENT

Earthquakes are measured both in terms of their inherent "magnitude" and in terms of their local "intensity."

The magnitude of an earthquake is essentially a relative estimate of the total amount of seismic energy released and may be expressed using the familiar "Richter scale" or using the "moment magnitude scale" now favored by most technical authorities. On either scale, significant damage can be expected from earthquakes with a magnitude of about 5.0 or higher. What determines the amount of damage that might occur in any given location, however, is not the magnitude of the earthquake but the intensity at that particular place. Earthquake intensity decreases with distance from the earthquake's "epicenter" (its focal point) but also depends on local geological features, such as depth of sediment and bedrock layers.

Intensity is most commonly expressed using the "Modified Mercalli Intensity Scale" (MMI). Mercalli intensity is assigned based on eyewitness accounts. More quantitatively, intensity may be measured in terms of "peak ground acceleration" (PGA) expressed relative to the acceleration of gravity (g) and determined by seismographic instruments.

While Mercalli and PGA intensities are arrived at differently, they correlate reasonably well. While the locations most susceptible to earthquakes are known, there is little ability to predict an earthquake in the short term.

The following table correlates the MMI intensity with the Richter scale and effects of ground shaking:

Category	Effects	Richter Scale (approximate)
I. Instrumental	Not felt	1-2
II. Just perceptible	Felt by only a few people, especially on upper floors of tall buildings	3
III. Slight	Felt by people lying down, seated on a hard surface, or in the upper stories of tall buildings	3.5
IV. Perceptible	Felt indoors by many, by few outside; dishes and windows rattle	4
V. Rather strong	Generally felt by everyone; sleeping people may be awakened	4.5
VI. Strong	Trees sway, chandeliers swing, bells ring, some damage from falling objects	5
VII. Very strong	General alarm; walls and plaster crack	5.5
VIII. Destructive	Felt in moving vehicles; chimneys collapse; poorly constructed buildings seriously damaged	6
IX. Ruinous	Some houses collapse; pipes break	6.5
X. Disastrous	Obvious ground cracks; railroad tracks bent; some landslides on steep hillsides	7
XI. Very disastrous	Few buildings survive; bridges damaged or destroyed; all services interrupted (electrical, water, sewage, railroad); severe landslides	7.5
XII. Catastrophic	Total destruction; objects thrown into the air; river courses and topography altered	8

Figure 8-2. Modified Mercalli Scale vs. Richter Scale (SMS Tsunami Warning, 2024)

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Daggett County is in the lowest earthquake risk zone in Utah, zone 1, according to the Utah State Building Code seismic zone map (UGS, 1987). Daggett County experiences very few earthquakes, with most earthquakes in Daggett County occurring at a magnitude of 4.0 or lower. Due to the low magnitude of these earthquakes, there is very little recordable damage, and they are rarely noticeable by residents within this rural and sparsely populated region.

The USGS keeps a record of earthquakes throughout the world in their Earthquake Catalog. The following table lists all earthquakes felt in Daggett County since 1980 with a magnitude of 3.0 or higher, which is only two earthquakes. The USGS also records all mining explosions and quarry blasts in their database, which usually register as a 3.5 magnitude or lower and account for over half of the "felt earthquakes" in the county (USGS, 2024). These blasts are not included in the table below.

Table 8-1. Felt Earthquakes with Magnitude 3.0+ in Daggett County, UT

Date	Location	Magnitude	MMI Rating (as felt in Daggett County)
01/05/2006	Northwest corner of county, 7 km SSW of McKinnon, WY	3.2	N/A
05/25/2016	15 km NNE of Tabiona	4.0	I–II
Source: USGS, 2024			

Low magnitude earthquakes of 4.0 or lower are expected to continue at the current trend. Higher magnitude earthquakes in Daggett County that cause significant damage are unlikely. Climate change currently has no known impact on earthquakes and is unlikely to contribute to earthquakes in Daggett County.

o IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by earthquakes, as presented in the table below.

Table 8-2. Impacts of Earthquake by Jurisdiction

Jurisdiction	May be Impacted by Earthquakes	Experienced Earthquake with Magnitude 3.0+	Potential Impacts of Earthquakes
Daggett County	Yes	Yes	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
Town of Dutch John	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
Town of Manila	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities,

Jurisdiction	May be Impacted by Earthquakes	Experienced Earthquake with Magnitude 3.0+	Potential Impacts of Earthquakes
			fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses

Earthquakes are capable of catastrophic consequences, especially in urban areas. Worldwide, earthquakes have been known to cost thousands of lives and enormous economic and social losses. In minor earthquakes, damage may be done only to household goods, merchandise, and other building contents, and people are occasionally injured or killed by falling objects. More violent earthquakes may cause the full or partial collapse of buildings, bridges and overpasses, and other structures. Most of the structures in Dutch John and Manila are older and not up to current earthquake codes and would be destroyed in a larger earthquake. Fires due to broken gas lines, downed power lines, and other sources are common following an earthquake and often account for much of the damage. Economic losses arise from destruction of structures and infrastructure, interruption of business activity, and innumerable other sources. Utilities may be lost for long periods of time and all modes of transportation may be disrupted. Emergency Services, including medical, may be both disabled and overwhelmed. In addition to broken gas lines, other hazardous materials may be released.

Table 8-3. Earthquake: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0.074% chance per year	0.0	$458	$5,810	N/A	$6,268	36.2	Very Low
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

▪ Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People living in structures that are not up to current earthquake code, particularly older structures, are more likely to be damaged in an earthquake. Additionally, those who are unable to seek protection during an earthquake or transport themselves to a safe location after an earthquake may be at further risk.

Table 8-4. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Earthquakes may cause significant damage to critical facilities, including power outages from downed power lines or damaged power plant facilities. The following table lists types of critical facilities that could be negatively affected by earthquakes, which could delay emergency response and access to life-saving medical equipment.

Table 8-5. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

No data exists demonstrating the impact of earthquakes on future development in Daggett County. However, past earthquakes have been shown to impact zoning regulations and building codes requiring developers to build structures more resistant to seismic activity.

▪ Probabilistic 100-Year Earthquake—Magnitude 5

- Based on HAZUS 6.1, the probabilistic 5.0 magnitude earthquake 100-year return period. Uintah County can anticipate damages listed in the tables below.

Direct Earthquake Damage

Building Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

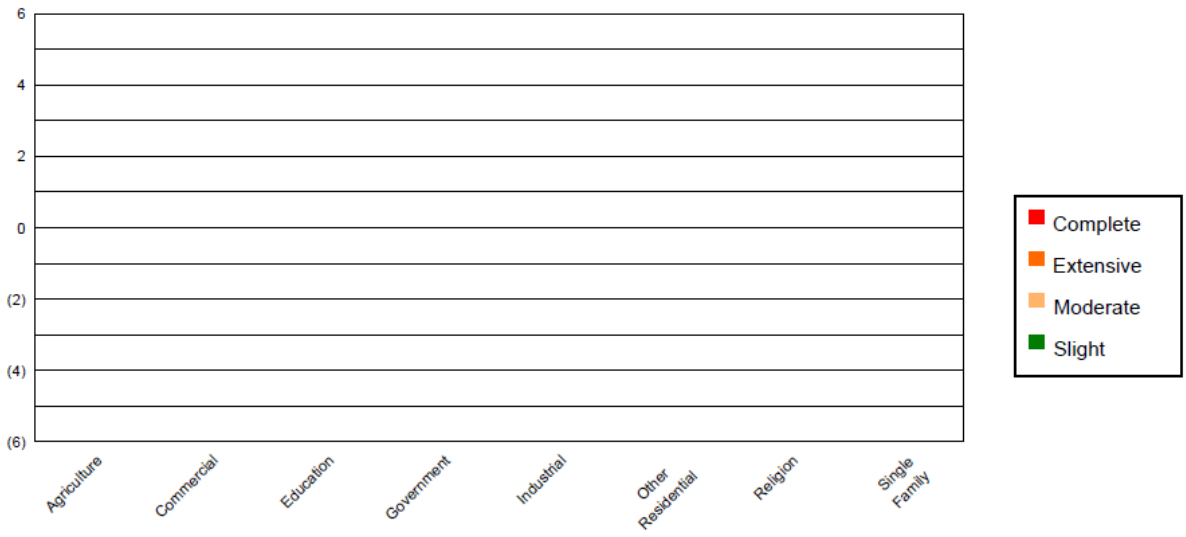


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	26.00	1.88	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Commercial	125.00	9.04	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Education	4.00	0.29	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government	10.00	0.72	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Industrial	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Residential	479.00	34.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Religion	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Single Family	738.00	53.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	1,382		0		0		0		0	

CLIMATE CHANGE IMPLICATIONS

Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

▪ Effects of Climate Change on Probability of Future Events

Climate change currently has no known impact on earthquakes and is unlikely to contribute to future earthquakes in Daggett County.

o FEMA NRI SCORE

Table 8-6. Earthquake: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
28.4	Very Low	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

• LANDSLIDE

o HAZARD DESCRIPTION

Potential Probability	___ ___ ___	Low
Potential Consequence	___ ___ ___	Low
Location		Along northern flank of Uinta Mountains, especially near outcroppings of the Cretaceous Hilliard Shale formation and Bishop Conglomerate; along U.S. 191
Seasonal Pattern or Conditions		Runoff or heavy rain
Duration		Events may last minutes to hours to months
Analysis Used		UDOT, NOAA, UGS, USGS, 2019 Utah Hazard Mitigation Plan, Utah State University, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

The term “landslide” encompasses several types of occurrences (including mudslides) in which slope-forming materials, such as rock and soil, move downward under the influence of gravity. Such downward movement may occur as the result of an increase in the weight of slope-forming materials, an increase in the gradient (angle) of the slope, a decrease in the forces resisting downward motion (friction or material strength), or a combination of these factors. Factors that may trigger a landslide include weather-related events, such as heavy rainfall (one of the most common contributors), erosion, and freeze-thaw weakening of geologic structures; human causes, such as excavation and mining, deforestation, and vibration from explosions or other source; and geologic causes, such as earthquake and shearing or fissuring. The speed of descent ranges from sudden and rapid to an almost imperceptibly slow creep where effects are only observable over a period of months or years.

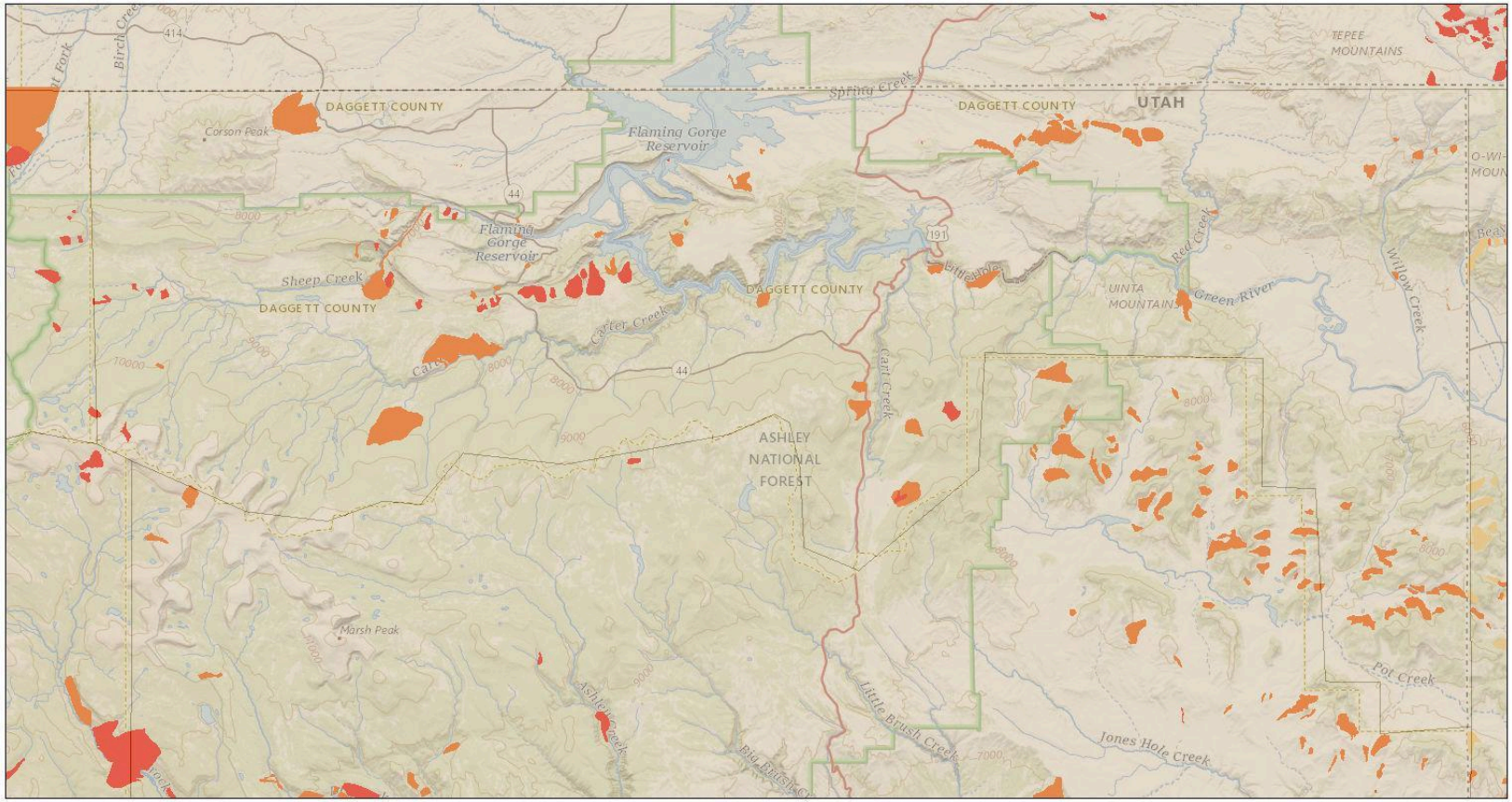
o LOCATION

Landslides in Daggett County are most common along the northern flank of the Uinta Mountains in areas with Cretaceous Hilliard Shale outcroppings and areas adjacent to the Bishop Conglomerate formation (Kowallis, 2005). The Bishop Conglomerate is a bedrock layer that extends across the Uinta Mountains and goes into Wyoming and Colorado. It consists of loosely cemented boulders, cobbly conglomerate, and pebbly sandstone (USGS, 2009). There are many outcroppings of the Bishop Conglomerate that are exposed along the slopes of the Uinta Mountains with weak Mesozoic shales and mudstones underneath. This leads to a perfect opportunity for landslides to develop, especially when the slopes become steep and moisture conditions increase. Loose gravel atop the Bishop Conglomerate makes landslides even more probable; however, these gravel layers are more common on the south flank of the Uinta Mountains in Uintah County than on the north flank in Daggett County (Kowallis, 2005).

Spring run-off or heavy rain periods may cause expansion of soils, such as clay and large rock. This is mainly a problem on U.S. 191 and is the responsibility of the Utah Department of Transportation (UDOT) to manage. However, routes that are affected can cause traffic and travel time delays.

The map below shows the likely and probable landslide locations within Daggett County. There are several areas, namely north of Conner Basin along Hwy 43, north of Half Moon Park along Forest Road 218, Hwy 191, Hwy 44, Carter Creek, Dowd Mountain, Hideout Draw, Red Canyon, Goslin Mountain Road, Jesse Ewing Canyon, Browns Park Road, and Allen Draw, that could pose a potential risk to recreational visitors (hikers, etc.), local roads, and some primary residences due to landslides.

Daggett County Landslides



3/21/2024, 2:59:41 PM

1:288,895

0 2.75 5.5 11 mi

0 4.25 8.5 17 km

USA Counties Generalized Boundaries - USA Counties - Generalized

US_Landslide_poly_v2

Confident consequential landslide at this location (5)

Likely landslide at or near this location (3)

Probable landslide in the area (2)

Possible landslide in the area (1)

USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; USGS

ArcGIS Web AppBuilder

Esri; U.S. Department of Commerce, Census Bureau; U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National Geodetic Survey (NGS) | USGS The National Map: National Boundaries Dataset, 3DEP Elevation Program, Geographic

Figure 9-1. Daggett County Probable Landslide Locations (USGS, 2024)

As stated in the previous regional plan, there are approximately 12.8 residential structures within Daggett County located on approximately 5,551 acres of historically active landslides. The potential threat to roads and utilities is shown in the following table.

Table 9-1. Potential Landslide Threat to Roads and Utilities

Transportation	
Name	**Miles**
Local Neighborhood/City Roads	4.07
State Route 44	0.4
Utilities	
Name	**Miles**
Power Lines	0.747

o EXTENT

Factors that influence landslides are soil type and steepness of slope. Soil type is a key indicator for landslide potential and is used by geologists and geotechnical engineers to determine soil stability for construction standards. Past movements are also a good indicator of where movements might possibly exist.

The following map from Utah State University depicts landslide susceptibility in parts of Daggett County, Duchesne County, and Uintah County. Landslide susceptibility in the Uinta Basin is classified within the categories of High, Moderate, Low, and Very Low, as seen below (USU, 2013).

- *High Susceptibility*: Areas of existing shallow and deep landslides are shown as red on the map. Slope and geologic unit were not included as criteria in this category.
- *Moderate Susceptibility*: Areas that have slopes prone to landslides based on observed landslide slope angles are shown as orange on the map. The category includes slopes greater than 12% (7 deg.) to greater than 32% (18 deg.), depending on the geologic unit present.
- *Low Susceptibility*: Areas that have slopes that may produce landslides are shown as yellow on the map. This category includes slopes from 9–12% (5–7 deg.) as the lower threshold ranging to 23–32% (13–18 deg.), for the upper threshold depending on the geologic unit present.
- *Very Low Susceptibility*: Areas that are unlikely to produce landslides are not assigned any particular color, but generally show up as tan on the map. This category includes slopes less than 9% (5 deg.) to less than 12% (7 deg.), depending on the geologic unit.

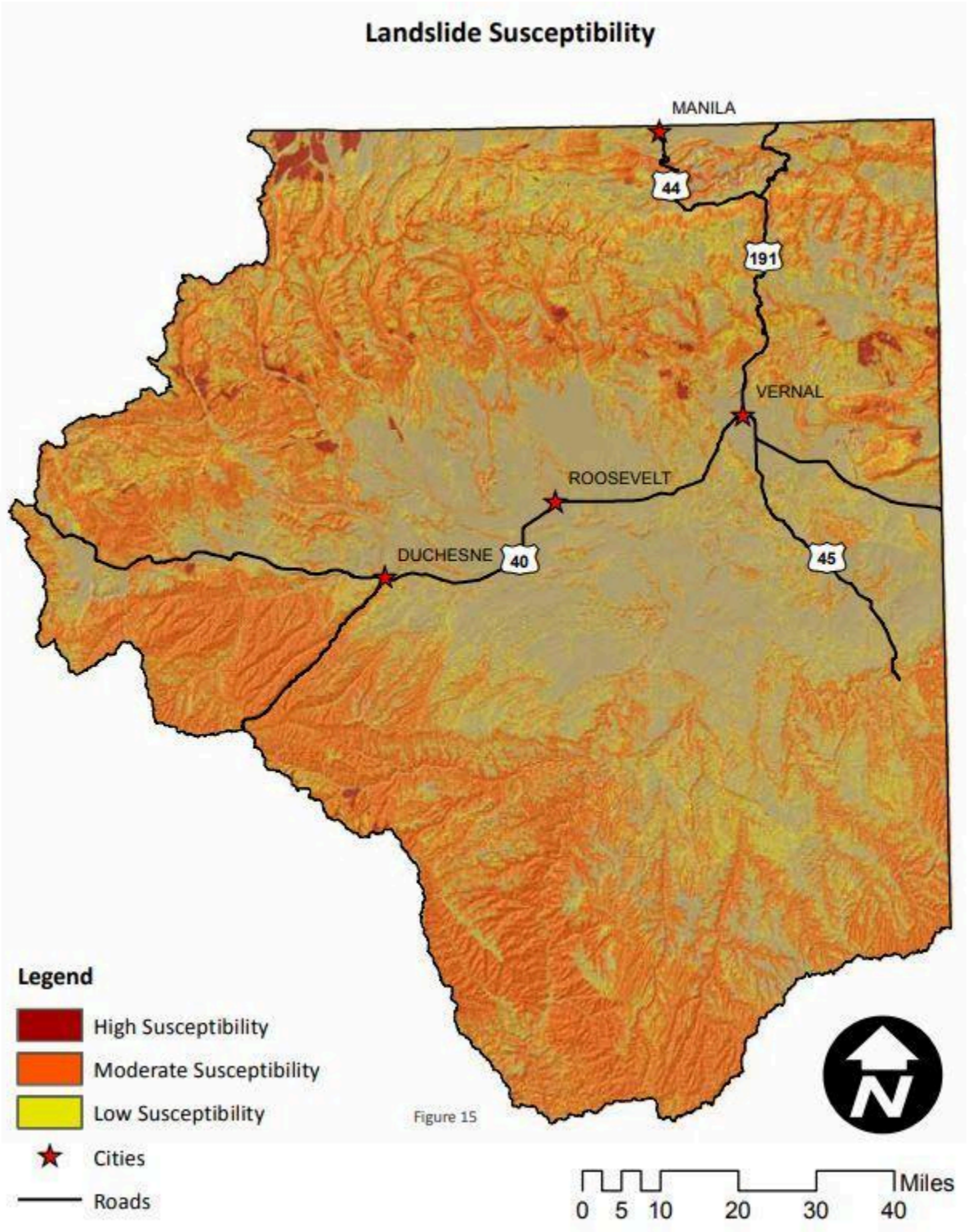


Figure 9-2. Landslide Susceptibility in the Uinta Basin (USU, 2013)

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Historically, many of the past landslides in the county occurred in the southern mountainous region of Daggett County. Generally, these landslides develop in well-defined, localized areas. Previous landslide areas will most likely be the location of future landslides. Additionally, several small-scale rockslides and landslides occur annually in Daggett County, usually due to heavy rain and flash flooding. These rockslides are often classified as debris flows, in which moving water carries mud, rocks, and other debris over the affected areas. The following table shows one mudslide between 2000–2023.

Table 9-2. Rockslide/Mudslide/Landslide Events in Daggett County, UT (2000–2023)

Location Within County	Date	Description
Eastern Uinta Mountains	08/09/2005	Heavy rain caused several mudslides 12 miles north of Lapoint, wiping out 200 feet of fence
Source: NOAA Storm Events Database, 2000–2023		

Landslides are influenced by weather and climate events, such as drought, severe weather, wildfire, and flooding, which are expected to increase in severity with climate change. According to Neighborhoods at Risk, Daggett County is expected to experience 4 more days that reach above 95°F by 2049 with an increase in average annual temperature of 3°F. Additionally, the county is expected to experience 0.3 more days of heavy precipitation per year by 2049 (from 1.3 days to 1.6 days per year) with a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation (2024). The planning area should anticipate potential for heightened landslide risk because of climate change and changing weather patterns. The planning area is subject to severe storms and weather on an annual basis, with monsoon rains regularly triggering flash flooding or debris flow events. Where severe storm events are expected to increase in frequency and intensity, landslides are likewise expected to become more frequent. Events such as wildfire and drought can change the landscape of an area as vegetation is damaged or lost with these events. These changes can make landscapes vulnerable to landslides and debris flows.

o IMPACTS & LOSS ESTIMATES

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by landslides, as presented in the table below.

Table 9-3. Impacts of Landslide by Jurisdiction

Jurisdiction	Impacted by Landslides	Potential Impacts of Landslides
Daggett County	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
Town of Dutch John	No	No impacts likely
Town of Manila	No	No impacts likely

Some of the many direct and indirect impacts of landslides are:

- Human and animal deaths and injuries and resulting productivity losses
- Damage or destruction of structures
- Destruction or blockage of roadways and resulting transportation interruption
- Loss of or reduced land usage
- Loss of industrial, agricultural, and forest productivity
- Reduced property values in areas threatened by landslide
- Loss of tourist revenues and recreational opportunities
- Damaged or destroyed infrastructure and utilities
- Damming or alteration of the course of streams and resulting flooding
- Reduced water quality

There is only limited information on the direct and indirect economic costs of geologic hazards in the U.S., such as landslides. However, it is estimated that landslides in the U.S. cause between $1.7 and $3.4 billion in damages each year (Utah Hazard Mitigation Plan, 2019).

Losses due to landslide events are generally tied to the repair of roadways or the removal of debris on roadways. These roads are maintained by UDOT. Limited course of mitigation may occur because it is not economically feasible for UDOT to spend tax dollars to rebuild a new road route or remove the large facing walls of rock and soil.

Based upon figures provided by the Daggett County Assessor's Office in 2012, the market value of residential structures at risk to potential landslides was estimated to be $960,000. The potential loss to roads and utilities is shown in the table below.

Table 9-4. Potential Landslide Losses to Roads and Utilities

Transportation	
Name	**Estimated Cost**
Local Neighborhood/City Roads	$8,140,000
State Route 44	$1,000,000
Utilities	
Name	**Estimated Cost**
Power Lines	$36,065
Note: Costs are in 2012 dollars.	

The Expected Annual Loss scores from the National Risk Index can be seen below.

Table 9-5. Landslide: Expected Annual Loss for Daggett County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
0 events per year	0.0	$17,400	$4,500	N/A	$21,900	98.7	Relatively High

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County							
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

▪ Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People who are unable to seek immediate protection during a landslide or transport themselves to a safe location after a landslide may be at further risk.

Table 9-6. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Landslides may cause significant damage to critical facilities and could take out power or communication lines. The following table lists types of critical facilities that could be negatively affected by landslides, which could delay emergency response and access to life-saving medical equipment.

Table 9-7. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is no impact based on current development trends on either current or future development.

o CLIMATE CHANGE IMPLICATIONS

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. This can make the ground more unstable and at risk for increased landslides. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2023).

Effects of Climate Change on Probability of Future Events

Table 9-8. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8” increase (from 17.5” to 18.3”) in average annual precipitation.
	Increasing annual precipitation can lead to unstable ground and contribute to landslides.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 9-9. Landslide: Overall National Risk Index Score for Daggett County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 960100: Town of Dutch John, Town of Manila, and Unincorporated Daggett County			
97.8	Relatively High	Very Low	Relatively High
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● PROBLEM SOILS

o HAZARD DESCRIPTION

Problem soils, such as expansive, compressible, and collapsible soils, can cause extensive damage to structures and foundations. Land subsidence, earth fissures, and radon gas are a few of the effects of problem soils and rock. Problem soils also prevent or limit successful crop production because the land is not fertile or productive, and there is a possibility of erosion hazard when cultivated.

Expansive soils and land subsidence are of most concern to the communities of Daggett County, so they are broken down further in the following *Related Hazards* section.

o RELATED HAZARDS

▪ Expansive Soils

● *Hazard Description*

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Dutch John and Manila	
Seasonal Pattern or Conditions	Year-round event	
Duration	Ongoing variable	
Analysis Used	UGS, 2019 Utah Hazard Mitigation Plan, Science Direct, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk	

Expansive soil and rock consist of high clay content that swells when wet and shrinks when dry (UGS, 2024). Expansive clay is prone to large volume changes when affected by water. In drier seasons, soils experience shrinkage, often causing deep cracks in the ground, which are called vertisols. These soils are considered to be one of the more problematic soils because they can cause damage to various structures, especially lightweight civil structures such as sidewalks and driveways, due to the shifting soils beneath the structures (Science Direct, 2024).

Soils consisting of coarse-grained particles (e.g., cobbles, pebbles, and sands) can also be expansive depending on the percentage and type of clay minerals present in the soil's fine content. The primary elements present in clays are silicone, aluminum, and oxygen, although other elements such as hydrogen, sodium, calcium, magnesium, and sulphur may also be present. Common clay minerals that are prone to swelling include smectite, bentonite, montmorillonite, vermiculite, and chlorite (Science Direct, 2024).

● *Location*

Expansive soils as a hazard is site-specific, meaning that each incorporated jurisdiction will have its own vulnerability level. Every jurisdiction, including Dutch John and Manila, may be affected by expansive

soils, although limited data currently exists on specific locations. Alkali soils are especially a concern in Dutch John and Manila.

- ***Extent***

Expansive soils have a swelling potential that depends on the mineral composition of the soil and the in situ moisture content and density. Soil permeability also affects the rate of swelling. According to Atterberg limits, which are useful in predicting soil behavior, the degree of expansion of a soil can be classified as seen in the table below (Science Direct, 2024).

Table 10-1. Degree of Expansion

Soil Properties	Low	Medium	High	Very High
Liquid Limit	20–25	35–50	50–70	70–90
Plasticity Index	< 12	12–23	23–32	> 32
Shrinkage Index	< 15	15–30	30–60	> 60
Free Swell Percentage	< 50	50–100	100–200	> 200
Source: Science Direct, 2024				

Expansive soils can also be classified in terms of linear extensibility percent (LEP), which ranges from low to very high. LEP is the linear expression of the volume difference of natural soil fabric at 1/3 bar or 1/10 bar water content and oven dryness, as reported as a percent change for the whole soil (Canadian County, 2013). The following table shows the LEP classifications.

Table 10-2. Linear Extensibility Percent (LEP) Classifications

Expansion Potential	Linear Extensibility Percent
Very High	> 9%
High	6%–9%
Moderate	3%–6%
Low	< 3%
Water	0%
Source: Canadian County, 2013	

- ***Historical Frequency & Probability of Future Occurrence***

Due to lack of data, there is no way to predict the likely frequency of expansive soil impacts. As of the time of this plan's development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as the county's infrastructure ages, especially dated water and sewer lines, it becomes more susceptible to damage from expansive soils. A prolonged period of drought could also significantly speed and intensify infrastructure deterioration.

- ***Impacts & Loss Estimates***

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by expansive soils, as presented in the table below.

Table 10-3. Impacts of Expansive Soils by Jurisdiction

Jurisdiction	May Be Impacted by Expansive Soils	Potential Impacts of Expansive Soils
Daggett County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Dutch John	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Manila	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Structural damage to lightweight structures, such as sidewalks, driveways, and roadways, is most common due to expansive soils. Lifting of buildings, damage to basements, building settlement, and cracks in walls and ceilings are other problems related to the continual shrinking and swelling of soils. Damage may occur to pipelines and other public utilities, as well. Lateral movement of foundations and retaining walls is a likely impact due to pressure exerted on vertical walls from shifting soils. This can also lead to loss of residual shear strength (Science Direct, 2024).

Damaged pavements may result in high maintenance and replacement costs, along with increased legal and financial liability from pavement separation and gaps causing possible trip hazards. Future maintenance may disrupt business activities, resulting in increased costs or loss of revenue. While problem soils have caused significant infrastructure damage and economic impact, there have been no deaths recorded in Utah due to problem soils directly (Utah Hazard Mitigation Plan, 2019).

Due to the nature of expansive soils, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by expansive soils.

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an incident may be at further risk.

Table 10-4. Vulnerable Populations in Daggett County, UT

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%

Vulnerability Category	Number	Percent
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Problem soils could cause significant damage to critical facilities depending on location. The following table lists types of critical facilities that could be negatively affected by problem soils, which could delay emergency response and access to life-saving medical equipment.

Table 10-5. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

Effects of Climate Change on Probability of Future Events

Table 10-6. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Daggett County is expected to experience 0.3 more days of heavy precipitation per year (from 1.3 days to 1.6 days per year).
	By 2049, Daggett County is expected to have a 0.8" increase (from 17.5" to 18.3") in average annual precipitation.
	Increasing annual precipitation can lead to unstable ground and contribute to additional soil swelling.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

FEMA does not evaluate expansive soils as part of its National Risk Index.

▪ Land Subsidence

● *Hazard Description*

Potential Probability	Low
Potential Consequence	Low
Location	Countywide, including Dutch John and Manila
Seasonal Pattern or Conditions	Year-round event
Duration	Ongoing variable
Analysis Used	UGS, USGS, NOAA, 2019 Utah Hazard Mitigation Plan, Water Education Foundation, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk

Land subsidence is the sinking or settling of the Earth's surface caused by groundwater depletion and/or underground mine subsidence or collapse. Earth fissures may result from subsidence, which are permanent, linear tension cracks in the ground that extend upward from the groundwater table (UGS, 2024). Primary causes of subsidence include groundwater withdrawals, drainage of organic soils, underground mining, and natural compaction or collapse (e.g., sinkholes). Natural hazards like earthquakes and erosion can cause subsidence, as well (USGS, 2019). The photo to the right depicts an earth fissure from land subsidence and groundwater withdrawal in Enoch, Utah (UGS, 2011).



● *Location*

Every jurisdiction, including Dutch John and Manila, may be affected by expansive soils, although limited data currently exists on specific locations.

- ***Extent***

The NOAA National Geodetic Survey maintains a network of GPS receivers throughout the country, called a Continuously Operating Reference Station (CORS). This can track height changes at local stations to monitor subsidence. Areas without a CORS can measure subsidence from satellite radar, temporary GPS receivers, repeated surveys of geodetic leveling, or installations of ground and water sensors (NOAA, 2024).

Extensometers are another way to measure subsidence and aquifer compaction by measuring the amount of compaction between the well anchor and the ground level. Extensometers are deep wells of up to 3000 feet below the ground surface. The following figure depicts a diagram of a borehole extensometer (Harris-Galveston, 2024).

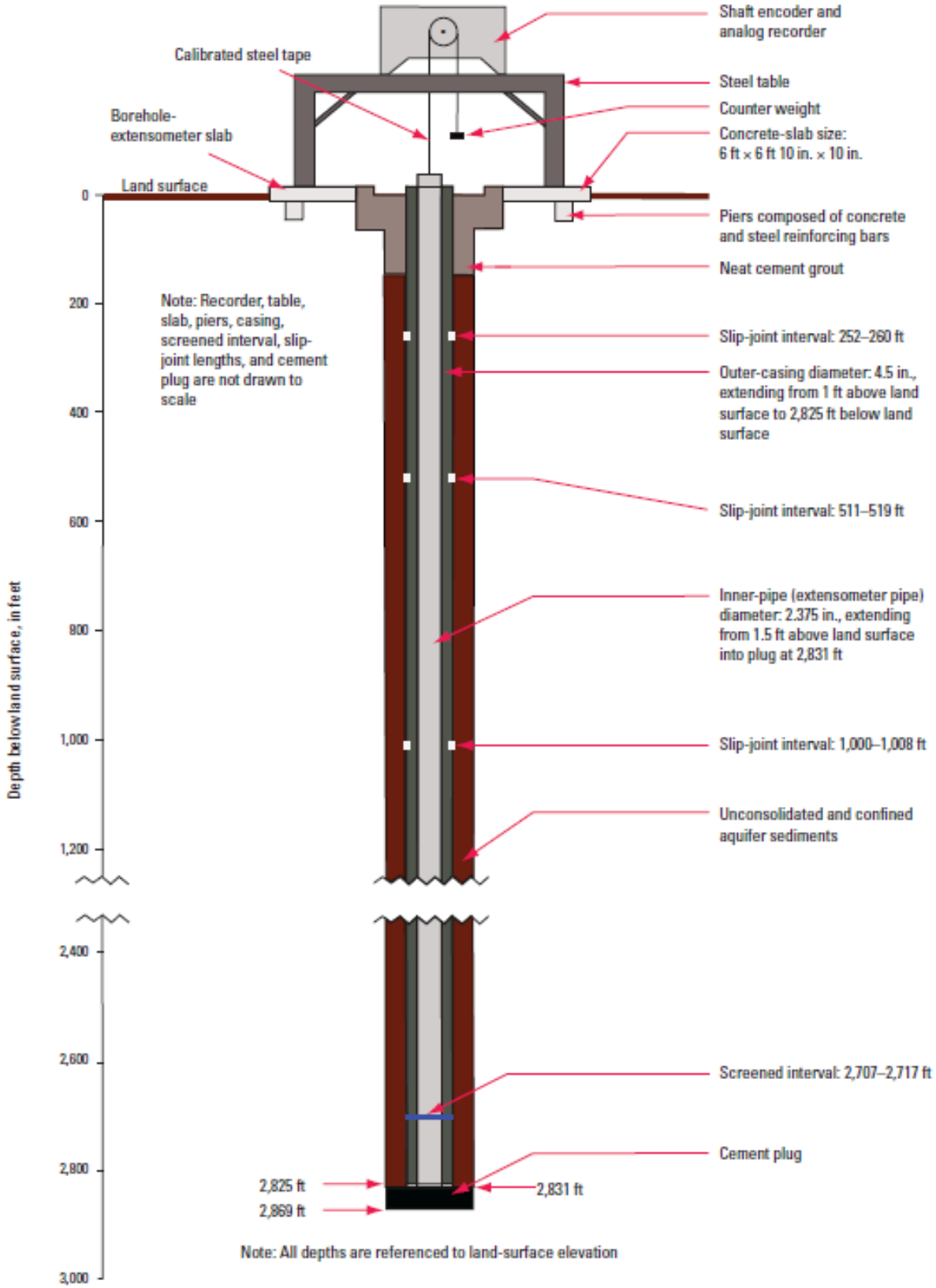

Shaft encoder and analog recorder
Calibrated steel tape
Steel table
Counter weight
Borehole-extensometer slab
Concrete-slab size: 6 ft × 6 ft 10 in. × 10 in.
Land surface
0
Piers composed of concrete and steel reinforcing bars
Neat cement grout
200
Note: Recorder, table, slab, piers, casing, screened interval, slip-joint lengths, and cement plug are not drawn to scale
Slip-joint interval: 252–260 ft
Outer-casing diameter: 4.5 in., extending from 1 ft above land surface to 2,825 ft below land surface
400
Slip-joint interval: 511–519 ft
600
Inner-pipe (extensometer pipe) diameter: 2.375 in., extending from 1.5 ft above land surface into plug at 2,831 ft
800
1,000
Slip-joint interval: 1,000–1,008 ft
Unconsolidated and confined aquifer sediments
1,200
2,400
2,600
Screened interval: 2,707–2,717 ft
2,800
Cement plug
2,825 ft
2,831 ft
2,869 ft
3,000
Depth below land surface, in feet
Note: All depths are referenced to land-surface elevation

Figure 10-2. Borehole Extensometer Diagram

● *Historical Frequency & Probability of Future Occurrence*

As of the time of this plan's development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as more water is pumped from the ground and prolonged periods of drought continue, land subsidence in Daggett County will only worsen. Damage from subsidence may occur more frequently as the county's infrastructure ages.

● *Impacts & Loss Estimates*

Daggett County and the jurisdictions of Dutch John and Manila may be impacted by land subsidence, as presented in the table below.

Table 10-7. Impacts of Land Subsidence by Jurisdiction

Jurisdiction	May Be Impacted by Land Subsidence	Potential Impacts of Land Subsidence
Daggett County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Dutch John	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Manila	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Land subsidence may damage buildings, civil structures, aqueducts, well casings, bridges, and highways. Flooding events can increase or intensify as the land sinks. This can also impact sewer lines, water lines, and storm drainage. Drought can magnify impacts as more groundwater is extracted from aquifers, causing the ground to compact and cave in on itself (Water Education, 2024).

Due to the nature of land subsidence, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by subsidence.

Vulnerable Populations

There are many vulnerable populations in Daggett County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in

disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an earth fissure or sinkhole opens up may be at further risk.

Table 10-8. Vulnerable Populations in Daggett County

Vulnerability Category	Number	Percent
Families in poverty	3	2.2%
People with disabilities	75	13%
People over 65 years	118	18.5%
Difficulty with English	0	0%
Households with no car	11	4.7%
Mobile homes	85	36.2%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

Daggett County as a whole is recognized as partially disadvantaged by the Climate and Economic Justice Screening Tool (2024). Only the lands of Federally Recognized Tribes that cover less than 1% of Daggett County are considered disadvantaged.

Problem soils could cause significant damage to critical facilities depending on location. For example, if a sinkhole opened up under or near a hospital or fire station, the impact to the community could become detrimental. The following table lists types of critical facilities that could be negatively affected by land subsidence, which could delay emergency response and access to life-saving medical equipment.

Table 10-9. Critical Facility Types in Daggett County

Critical Facility Type	Location
2 Fire Stations	Manila
2 Fire Stations	Dutch John
Power Plant	Near Dutch John
Local Law Enforcement	Manila
Solid Waste Landfill Facility	South of Manila
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Daggett County, 269 people are beneficiaries of Medicare, and 47 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

Effects of Climate Change on Probability of Future Events

Table 10-10. Climate Projections for Daggett County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Daggett County is expected to experience 4 more days that reach above 95°F (from 2 days to 6 days per year).
	By 2049, Daggett County is expected to have a 3°F increase (from 41°F to 44°F) in average annual temperatures.
	Increasing annual temperatures and prolonged periods of frequent drought can contribute to land subsidence as more groundwater is drained.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

FEMA does not evaluate land subsidence as part of its National Risk Index.

• CAPABILITY ASSESSMENT

o JURISDICTIONAL CAPABILITY ASSESSMENT

▪ Daggett County

Table 11-1. Daggett County Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Daggett County Emergency Management	2024 Hazard Mitigation Plan; EOP; 2009 Hazardous Materials Response Plan	X			EOP: Currently in the development phase Hazardous Materials Response Plan: Addresses hazmat concerns, hazmat facilities, incident command centers, hazmat response plans, response training, etc. Landslides, mudslides, flash floods, and earthquakes are briefly mentioned.
Daggett County Planning & Zoning Commission	2008 General Plan; 2017 General Plan Appendix; Land Use Code; Zoning and Subdivision Ordinance; 2017 Resource Management Plan; Landownership/Parcel Maps	X			General Plan: No hazard section, but includes resource info and goals about building codes, land use, recreation/tourism, agriculture, public safety, transportation and infrastructure, environmentally sensitive areas, natural resources, and economic development. Recognizes need for mitigating development in hazardous areas.
Daggett County GIS	Parcel Map; Zoning Map	X			Parcel/Zoning Maps: Available through online interactive portal

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

- ***Opportunities for Plan Integration***

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Daggett County Local Emergency Planning Committee (LEPC), Daggett County department heads, and the incorporated towns of Dutch John and Manila. The Daggett County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Daggett County will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every Tuesday at 9am.

Table 11-2. Daggett County Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants. The county will also anticipate that the time and cost of maintaining the hazard mitigation plan will be significantly higher than in previous updates due to increased planning requirements by FEMA. Funds to support the cost match for updating this plan will need to be strategically determined.

Table 11-3. Daggett County Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	No
Floodplain Ordinance(s)	No
Post Disaster Recovery Program	No
Growth Management	Yes

Legal and Regulatory Capability	
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	Yes
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Daggett County will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-4. Daggett County Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Commission
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Planning & Zoning Commission
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Commission
Personnel skilled or trained in GIS applications	Yes	Full Time	Daggett County GIS
Emergency manager	Yes	Full Time	Daggett County Emergency Management Office
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-5. Daggett County National Flood Insurance Compliance

National Flood Insurance Compliance

What department is responsible for floodplain management in your jurisdiction?	Daggett County Planning & Zoning
Who is your jurisdiction's floodplain administrator? (department/position)	?
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	Yes
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Work toward NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a CRS Classification. Floodplain mapping for the entire county is limited and needs to be completed.

▪ Town of Dutch John

Table 11-6. Town of Dutch John Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Town of Dutch John	2022 General Plan; 2023 Planning and Zoning Ordinance; Zoning Map; Open Burn Notice; Planning Commission Ordinance; Subdivision Plan	X			General Plan: Chapter 2 outlines hazardous areas within the town due to faults, landslides, snow slides, and floodplains. Hazmat and wildfires are discussed. Chapter 3 includes a Land Use Map. The plan also references zoning ordinances and economic development.

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

• *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Daggett County Local Emergency Planning Committee (LEPC), Daggett County department heads, and the incorporated towns

of Dutch John and Manila. The Daggett County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Dutch John will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission holds workshop meetings once a month on the third Wednesday of each month at 7pm.

Table 11-7. Town of Dutch John Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-8. Town of Dutch John Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	No
Floodplain Ordinance(s)	No
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	No

Expansion, Implementation, and Improvement: Dutch John will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-9. Town of Dutch John Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Planning & Zoning
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning
Personnel skilled or trained in GIS applications	Yes	Full Time	Daggett County GIS
Emergency manager	Yes	Full Time	Daggett County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-10. Town of Dutch John National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	NA
Who is your jurisdiction's floodplain administrator? (department/position)	NA
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Work toward the town's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a CRS Classification.

▪ Town of Manila

Table 11-11. Town of Manila Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Town of Manila	2022 General Plan; Zoning Ordinance; Wildlife Corridors Map	X			Chapter 2 discuss land use and includes a land use map. Chapter 4 provides an outlook on future economic development. A hazard mitigation section is included in Chapter 9, which outlines how the town participates in hazard mitigation. Floodplains and wildfire hazard areas are identified.

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

● *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Daggett County Local Emergency Planning Committee (LEPC), Daggett County department heads, and the incorporated towns of Dutch John and Manila. The Daggett County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Manila will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every first Monday of each month.

Table 11-12. Town of Manila Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-13. Town of Manila Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	No
Floodplain Ordinance(s)	No
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	No

Expansion, Implementation, and Improvement: Manila will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-14. Town of Manila Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning
Personnel skilled or trained in GIS applications	Yes	Full Time	Daggett County GIS
Emergency manager	Yes	Full Time	Daggett County Emergency Management

Administrative and Technical Capability			
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-15. Town of Manila National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	NA
Who is your jurisdiction's floodplain administrator? (department/position)	NA
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the town's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

o BUILDING CODES

Updating and adopting new building codes, as well as addressing the effectiveness of these codes, can be one of the best ways to conduct mitigation. When properly designed and constructed, many buildings can withstand the impacts of high winds, earthquakes, floods, snow loads, or a tornado. The communities in Daggett County are working with various versions of the International Codes published by the International Code Council, Inc. (ICC). These codes include:

- 2015 International Residential Code
- 2017 International Building Code
- 2017 International Mechanical Code
- 2017 International Plumbing Code
- 2017 International Fuel Gas Code
- The residential provisions of the 2015 International Energy Conservation Code
- The commercial provisions of the 2017 International Energy Conservation Code
- 2017 International Existing Building Code
- 2006 edition of the Utah Wildland Urban Interface Code

Additionally, Daggett County enforces the 2017 National Electrical Code and the 2005 edition of the NFPA 225 Model Manufactured Home Installation Standard, both issued by the National Fire Protection Association. Ground snow loads are found by entering specific locations into the 2018 Utah Ground Snow Load Map.

The towns of Dutch John and Manila all follow the above International Codes.

▪ Code Administration

Enforcement of code standards is very important to hazard mitigation. Adequate inspections are needed during the course of construction to ensure that the builder understands and implements the requirements. The Building Code Effectiveness Grading Schedule (BCEGS) is a national program used by the insurance industry to determine how well new construction is protected from wind, earthquake, and other non-flood hazards. It is similar to the CRS program and the fire insurance rating scheme: building permit programs are reviewed and scored. A class 1 community is the highest rating, and a class 10 community is the most basic rating.

Training of code officials is also very important for code enforcement. Training of code officials and inspectors is a large part of the BCEGS rating for a community. Courses are offered through the building code associations to help local officials understand standards that apply to seismic, wind, and flood hazards.

The table below lists building code adoptions in use within Daggett County.

Table 11-16. Building Code Adoptions in Daggett County

	Building Code Residential	Building Code Commercial
Daggett County	IRC 2015	IBC 2017
Dutch John	IRC 2021	Not specified; default to Daggett County code usage
Manila	IRC 2021	Not specified; default to Daggett County code usage

o PUBLIC SAFETY AGENCIES

▪ Fire Protection

The Utah Fire Marshal lists two fire departments in Daggett County, which include Manila Fire Department and Dutch John Fire Department (2020). The county's fire warden is Corey Auger, who serves Uintah County and Daggett County (Uintah Fire District, 2024). Dutch John and Manila both have fire departments with rescue capabilities for accidents on highways.

When needed, Daggett County also has access to fire crews and resources from the U.S. Forest Service, BLM, National Park Service, U.S. Fish and Wildlife Service, and the U.S. Bureau of Indian Affairs. The state of Utah trains and provides hand crews and engine crews, as well.

▪ Healthcare Facilities

There are no hospitals in Daggett County, but there is one health clinic in Manila called The Clinic as part of Uintah Basin Healthcare. Ashley Regional Medical Center is the closest hospital to Daggett County, which is located in Vernal and provides 24/7 emergency services, a variety of surgery options, radiology and lab services, OB services, intensive care unit, cardiac rehabilitation, and chemotherapy/infusions (Ashley Regional, 2024). The 39-bed facility is owned by LifePoint Hospitals. The hospital has been in service since 1941 when it was known as Uintah Basin Hospital. It has changed names and ownership several times over the years and recently completed a new Women's Center and Infusion Center in 2019.

▪ Emergency Services

The Daggett County Emergency Management Office is located in Manila, Utah and is under the direction of Leonard Isaacson, who is the county's Emergency Manager.

EMS for the county are dispatched from Consolidated Dispatch through the Daggett County Sheriff's Office in Vernal, Utah. EMTs are paid volunteers and are all certified by the state of Utah, Bureau of EMS. Additional ambulance services are provided by Ashley Regional Medical Center and Uintah Basin Medical Center.

Several air ambulance and helicopter transport/rescue companies service the Daggett County area, including, but not limited to, Air Ambulance World, Classic Air Medical, Angel MedFlight, Intermountain Life Flight, and the Utah Department of Public Safety Aero Bureau.

▪ Law Enforcement & Public Safety

The Daggett County Sheriff's Office is located at 590 S Sheriff's Way in Manila. The Sheriff's Office also operates out of the Consolidated Dispatch located at 641 E 300 S in Vernal, Utah. The Daggett County Sheriff is Erik Bailey. The Sheriff's Office provides law enforcement throughout Daggett County, including in Dutch John and Manila. Manila has no individual law enforcement and instead contracts with the Daggett County Sheriff's Office. There are also BLM-administered lands, U.S. Forest Service lands, SITLA lands, and one National Recreation Area in the county that each have their own attendant law enforcement authorities in addition to the county sheriff.

The Highway Patrol Office in the county is located at 641 E 300 S Suite 300 in Vernal. This office services the entire Uintah Basin Region of Daggett, Duchesne, and Uintah Counties.

o LAND USE PLANNING & CHANGES IN DEVELOPMENT AND FUTURE DEVELOPMENT

This section of the Daggett County Hazard Mitigation Plan Annex examines the relationship between the county's General Plan, Land Use or Zoning Ordinances, and the AHMP. Incorporating hazard mitigation practices into land use planning is extremely important as future developments are planned and constructed. Through proper planning within the individual jurisdictions, risk to property owners can be reduced and future disaster related economic losses avoided. Land Use and Mitigation Planning Integration are seen as critical components of the mitigation program in Daggett County.

Daggett County's General Plan was last revised and adopted in 2008, with an amendment to the appendix in 2017. The plan should be reviewed and updated to address condition changes within the county and the economy.

A Land Use section can be found in the Daggett County General Plan Resource Management Plan Appendix beginning on page 31, which was last updated in 2017. This section provides a comprehensive, legal, and strategic basis for implementing zoning changes and land use code updates that the county may want to pursue in the immediate term. It will also provide the basis for future decisions regarding individual rezone requests for years to come. The end goal is to produce a sustainable, well-balanced development pattern for the future.

The hazard risk assessment (see *Chapter 2 Hazard Risk Summary*) took into consideration changes in development and future development trends based on planning and zoning maps and documents. The following tables highlight those sections of the assessment:

Hazard Event	**Changes in Development and Hazard Vulnerability (High, Medium, Low)**	**Vulnerability Factor** (Adjust Impact Factor to Change Scores)	**Multiplied by Weighting Factor (1)**
Extreme Heat	Low	1	1
Lightning	Low	1	1
Hail	Low	1	1
Tornado	Low	1	1
Straight-line Wind	Low	1	1
Extreme Cold	Low	1	1
Winter Storm	Low	1	1
Avalanche	Low	1	1
Wildfire	Medium	2	2
River or Stream Flood	Medium	2	2
Flash Flood	Medium	2	2
Dam Failure	Low	1	1
Drought	Low	1	1
Earthquake	Medium	2	2
Landslide	Low	1	1
Expansive Soils	Low	1	1
Land Subsidence	Low	1	1
Changes in Development Factor—Changes in development since the previous plan was approved (if this is an update) or in the past five years (if this is a new plan) have increased or decreased the community's vulnerability/exposure to this hazard. **[Weighted Factor: 1]**			
High—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)			
Medium—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)			

Hazard Event	Changes in Development and Hazard Vulnerability (High, Medium, Low)	Vulnerability Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Low—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)			
No Vulnerability—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)			

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Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Extreme Heat	Low	1	1
Lightning	Low	1	1
Hail	Low	1	1
Tornado	Low	1	1
Straight-line Wind	Low	1	1
Extreme Cold	Low	1	1
Winter Storm	Low	1	1
Avalanche	Low	1	1
Wildfire	Medium	2	2
River or Stream Flood	Medium	2	2
Flash Flood	Medium	2	2
Dam Failure	Low	1	1
Drought	Low	1	1
Earthquake	Medium	2	2
Landslide	Low	1	1
Expansive Soils	Low	1	1
Land Subsidence	Low	1	1
Future Development Factor—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard. **[Weighted Factor: 1]**			
High—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)			
Medium—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)			
Low—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)			

Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
No Impact—Future development trends will not increase the impact/consequence of this hazard, and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)			

▪ Town of Dutch John

The town of Dutch John updated their General Plan in 2022. The plan establishes how Dutch John will "maintain a safe, clean, healthy, economically diverse, and attractive environment. It will be a friendly, progressive community that strives to be affordable and sustainable" (Dutch John General Plan, 2022). It describes the town's plans and goals for transportation, public services, public safety, varied housing options, economic development, recreation, parks, open space, aesthetics, historic preservation, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, climate, history, socioeconomic drivers, and demographics of the area.

▪ Town of Manila

The town of Manila updated their General Plan in 2022. The plan's mission is to "clarify the Town's priorities and goals for the next 10–20 years to help maintain that character, while still welcoming the growth necessary to give the community economic strength and resilience" (Manila General Plan, 2022). It describes the town's plans and goals for transportation, public services, public safety, moderate income housing, community beautification and economic development, infrastructure, historic preservation, community design, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, history, socioeconomic drivers, land capacity, and demographics of the area.

o NFIP CONTINUITY STRATEGY

Daggett County participates in the Emergency Program of the National Flood Insurance Program (NFIP) as of July 22, 2004, but the towns of Dutch John and Manila do not participate. No major rivers flow through or threaten the towns directly, although flooding can still occur. Daggett County is in the initial phase of the NFIP and has no Flood Hazard Boundary Map or Flood Insurance Rate Map (FIRM) and a limited amount of flood insurance coverage.

Daggett County does not currently participate in CRS but is open to pursuing participation in the future if deemed appropriate.

Table 11-17. NFIP Participation in Daggett County

NFIP Participation Category	Daggett County
Emergency Program Date	07/22/2004
Participating in CRS (Class)	N/A
Number of NFIP Policies	1
Total Coverage	$45,000
Total Written Premium + FPF	248
Repetitive Loss Properties	0
Severe Repetitive Loss Properties	0

NFIP Participation Category	Daggett County
Source: FEMA Repetitive Losses/BCX Claims Utah, 2023	

PART III: MITIGATION STRATEGY

● CHANGES IN PRIORITY

o CHANGES IN PRIORITY

Mitigation priorities have not significantly changed for either Daggett County or the towns of Dutch John and Manila since the update of the last plan. For the 2024 plan update, mitigation goals for Daggett County and the towns of Dutch John and Manila were significantly updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations. The plan also underwent a complete rewrite to better align with new local mitigation plan requirements.

Also, for past mitigation projects identified in previous iterations of the plan, a *2024 Status Update and Changes in Priority* section was included for each past action. A description of the update and changes in priority were included, if appropriate and applicable.

● MITIGATION STRATEGIES

o MITIGATION ACTION PLAN

The action plan helps to prioritize mitigation initiatives according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The action plan also provides the framework for how the proposed projects and initiatives will be implemented and administered over the next five years.

▪ Mitigation Strategy/Goals

The planning team reviewed the existing mitigation goals for Daggett County and the towns of Dutch John and Manila were updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations.

Goal 1. Protection of life before, during, and after the occurrence of a disaster and reducing the impact of damage where problems cannot be eliminated.

Goal 2. Protection of emergency response capabilities (critical infrastructure)

Goal 3. Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social and economic needs.

Goal 4. Protection of natural resources and the environment, when considering mitigation measures.

Goal 5. Promoting public awareness through education of community hazards and mitigation measures.

Goal 6. Preserving and/or restoring natural features that provide mitigation such as floodplains.

Goal 7. Provide a basis for funding of projects outlined as hazard mitigation strategies.

Goal 8. Establish a framework and database for the jurisdictions to use to apply for aid.

▪ Mitigation Strategy/Action Timeline Parameters

While the preference is to provide definitive project completion dates, this is not possible for every mitigation strategy/action. Therefore, the parameters for the timeline (Projected Completion Date) are as follows:

- **Short-term**—To be completed in 1 to 5 years
- **Long-term**—To be completed in greater than 5 years
- **Ongoing**—Currently being implemented under existing programs but without a definite completion date

▪ Mitigation Strategy/Action Benefit Parameters

Benefit ratings are defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.

- **Medium**—Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low**—Long-term benefits of the project are difficult to quantify in the short term.

Mitigation Strategy/Action Estimated Cost Parameters

While the preference is to provide definitive costs (dollar figures) for each mitigation strategy/action, this is not possible for every mitigation strategy/action. Therefore, the estimated costs for the mitigation initiatives identified in this plan are identified as high, medium, or low, using the following ranges:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (e.g., bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Mitigation Strategy/Action Prioritization Process

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was conducted. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

The priorities are defined as follows:

- **High**—A project that addressed numerous goals or hazards, has benefits that exceed cost, has funding secured or is an ongoing project, and meets eligibility requirements for the HMGP or BRIC grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium**—A project that addressed multiple goals and hazards, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, BRIC, or other grant programs. The project can be completed in the short term once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low**—A project that will address few or no goals, mitigate the risk of one or few hazards, has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or BRIC grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or HMA programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define “benefits” according to parameters that meet the goals and objectives of this plan.

o MITIGATION PROJECTS

Listed below are the goals and objectives developed by the mitigation plan and the priority projects that were developed to address the risks posed. Included in the list are a rough estimate of cost and an anticipated period for further investigation, project development, and implementation.

Participating jurisdictions agreed upon [] mitigation actions that apply to the county and all or some participating jurisdictions (see *17.2.1 New Mitigation Projects* and *17.2.2 Ongoing Mitigation Projects*). These shared actions, some of which address all hazards, help to meet the following FEMA requirement: "Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? Does the plan include one or more action(s) per jurisdiction for each hazard identified within the risk assessment?" In addition to the [] mitigation measures that apply to the county and all participating jurisdictions, most communities identified additional mitigation actions unique to their jurisdiction. The following table summarizes the jurisdictions' mitigation measures in relationship to the hazards addressed in the risk assessment.

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▪ New Mitigation Projects

● *Daggett County New Projects*

Mitigation Project: Provide additional fire training and update fire equipment to industry standards.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Daggett County	Daggett County Emergency Management	Dutch John Fire Department; Manila Fire Department	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Wildfire		High		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Acquire digital road signage and portable road warnings and condition warnings.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Daggett County	Daggett County Road Department	Daggett County Emergency Management	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		All Hazards Severe Summer Weather Severe Winter Weather Wildfire Flood Drought Earthquake Landslide Problem Soils		High		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Elevate and improve roads that are susceptible to flooding, including, but not limited to, Red Creek Rd, Browns Park, State Line Rd, Birch Creek, Bennion Lane, South Valley, and Dutch John Bench.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Daggett County	Daggett County Road Department	Daggett County Emergency Management		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Flood				Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project:						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low,	**Projected Completion Date**	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project:						
				Medium, High)	(Short-term, Long-term, or Ongoing)	
2024	Daggett County	Daggett County Emergency Management	N/A		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.

Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
	All Hazards Severe Summer Weather Severe Winter Weather Wildfire Flood Drought Earthquake Landslide Problem Soils		Daggett County general funds, SHGP, HMGP

Action/Implementation Plan and Project Description:

- ***Town of Dutch John New Projects***

Mitigation Project:						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Town of Dutch John	Town of Dutch John	Daggett County		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
						Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

- ***Town of Manila New Projects***

Mitigation Project:						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Town of Manila	Town of Manila	Daggett County		Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
						Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

- ## Ongoing Mitigation Projects

  - ### *Daggett County Ongoing Projects*

Mitigation Project: Update Emergency Operations Plan to include dam failure estimates with inundation maps.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	BOR	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Dam Failure		Medium		Daggett County general funds, BOR, Sheep Creek Irrigation Co., Long Park Dam, local water districts
Action/Implementation Plan and Project Description:						
2024 Update: Table tops with BOR are complete.						

Mitigation Project: Educate local elected officials about dam Emergency Action Plans each time new officials take office.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	BOR	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Dam Failure		Medium		Daggett County general funds, BOR, Sheep Creek Irrigation Co., Long Park Dam, local water districts
Action/Implementation Plan and Project Description:						
2024 Update: Table tops with BOR are complete.						

Mitigation Project: Obtain and retain updated Emergency Action Plans for dams with inundation areas within the county.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance**	**Projected Completion Date**	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Obtain and retain updated Emergency Action Plans for dams with inundation areas within the county.						
				(Low, Medium, High)	(Short-term, Long-term, or Ongoing)	
2015	Daggett County	Daggett County Emergency Management		Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.

Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
	Dam Failure	Medium	Daggett County general funds, BOR, Sheep Creek Irrigation Co., Long Park Dam, local water districts

Action/Implementation Plan and Project Description:

2024 Update: Emergency Operations Plan is halfway complete.

Mitigation Project: Conduct public awareness campaign(s) to promote reduced water usage.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Conduct public awareness campaign(s) to promote reduced water usage.						
2014	Daggett County	Daggett County Emergency Management		High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Drought		High		Daggett County general funds, BOR, local water districts
Action/Implementation Plan and Project Description:						
2024 Update: The county conducts a preparedness fair each September during which they provide hazard awareness and water usage reduction information through flyers. Information is also disseminated through public newsletters that cover drought and wildfire mitigation, as well as identify websites for more info.						

Mitigation Project: The LEPC will hold meetings semi-annually to educate the public on the need to be water wise.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: The LEPC will hold meetings semi-annually to educate the public on the need to be water wise.						
2019	Daggett County	Daggett County Emergency Management	LEPC	Low	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Drought		Low		Daggett County general funds, BOR, local water districts
Action/Implementation Plan and Project Description:						
2024 Update: The LEPC has met four times per year in the last few years.						

Mitigation Project: Make citizens aware of programs whereby they can apply for funding to install new wheel lines that improve efficient water use.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	NRCS; Salinity Control Program	Low	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item

Mitigation Project: Make citizens aware of programs whereby they can apply for funding to install new wheel lines that improve efficient water use.						
						is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Drought		Low		Daggett County general funds, NRCS, Salinity Control Program
Action/Implementation Plan and Project Description:						

Mitigation Project: Promote county and school participation in the Great Utah ShakeOut.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	Daggett School District	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their

Mitigation Project: Promote county and school participation in the Great Utah ShakeOut.						
						community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Earthquake		Medium		Daggett County general funds, Daggett School District, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Perform a seismic assessment of select county critical facilities.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2015	Daggett County	Daggett County Emergency Management	Planning & Zoning	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of

Mitigation Project: Perform a seismic assessment of select county critical facilities.						
						redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Earthquake		Medium		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Implement storm drainage plans for new development in areas of the county that are susceptible to flooding due to storm runoff.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2016	Daggett County	Daggett County Emergency Management	Road Department; UDOT	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Implement storm drainage plans for new development in areas of the county that are susceptible to flooding due to storm runoff.			
	Flood	Medium	Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:			

Mitigation Project: Perform landslide study of areas susceptible to landslide.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2016	Daggett County	Daggett County Emergency Management	Daggett County GIS	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Landslide		Medium		Daggett County general funds, SHGP, HMGP

Mitigation Project: Perform landslide study of areas susceptible to landslide.
Action/Implementation Plan and Project Description:
2024 Update: The county is in the process of identifying areas of landslide.

Mitigation Project: Enforce Wildland Urban Interface code requirements on all new construction through the building permit process.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2013	Daggett County	Daggett County Planning & Zoning	Daggett County Emergency Management	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Wildfire		Medium		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Develop an alternate EOC location that is outside the wildfire area.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Daggett County	Daggett County Emergency Management	Manila Fire Department; Dutch John Fire Department	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Wildfire		High		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project:						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low,	**Projected Completion Date**	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project:						
				Medium, High)	(Short-term, Long-term, or Ongoing)	
	Daggett County	Daggett County Emergency Management			Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
						Daggett County general funds, BOR, local water districts
Action/Implementation Plan and Project Description:						

- ***Town of Dutch John Ongoing Projects***

Mitigation Project: Place a restrictive clause in the town ordinances that will prohibit any new development in the floodplain.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low,	**Projected Completion Date**	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Place a restrictive clause in the town ordinances that will prohibit any new development in the floodplain.						
				Medium, High)	(Short-term, Long-term, or Ongoing)	
2019	Town of Dutch John	Town of Dutch John Planning & Zoning	Town of Dutch John; Daggett County Emergency Management	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.

Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
	Flood	Medium	Daggett County general funds, SHGP, HMGP

Action/Implementation Plan and Project Description:

Mitigation Project: Attend and participate in training provided by the local LEPC on homeowner risk to wildfire and how to reduce that risk.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Attend and participate in training provided by the local LEPC on homeowner risk to wildfire and how to reduce that risk.						
2019	Town of Dutch John	Daggett County Emergency Management	Town of Dutch John; LEPC	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Wildfire		Medium		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Maintain defensible space around schools located in a wildfire area.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Town of Dutch John	Dutch John Fire Department	Town of Dutch John; Daggett School District; Daggett	Low	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item

Mitigation Project: Maintain defensible space around schools located in a wildfire area.						
			County Emergency Management			is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Wildfire		Low		Daggett County general funds, SHGP, HMGP, Daggett School District
Action/Implementation Plan and Project Description:						

Mitigation Project: Mitigate risks of water supply pipeline that is primary source of water runs over fault from Flaming Gorge Dam.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
	Town of Dutch John	Daggett County Emergency Management	Town of Dutch John	Medium	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their

Mitigation Project: Mitigate risks of water supply pipeline that is primary source of water runs over fault from Flaming Gorge Dam.						
						community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Dam Failure		Medium		Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

- ***Town of Manila Ongoing Projects***

Mitigation Project: Enforce rate policies that encourage water conservation.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Town of Manila	Daggett County Emergency Management	Town of Manila	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation

Mitigation Project: Enforce rate policies that encourage water conservation.						
						capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Drought		High		Daggett County general funds, BOR, local water districts, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Provide adequate clearances for power lines, and conduct ongoing line maintenance. Maintain power outage plan.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2015	Town of Manila	Town of Manila Utilities	Town of Manila; Bridger Valley Electric; Moon Lake Electric; Daggett County Emergency Management	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis**		**Potential Funding Source(s)**

Mitigation Project: Provide adequate clearances for power lines, and conduct ongoing line maintenance. Maintain power outage plan.			
		(Low, Medium, High)	
	Severe Summer Weather, Severe Winter Weather	High	Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:			
2024 Update: Ongoing in conjunction with Bridger Valley Electric and Moon Lake Electric			

Mitigation Project: Place a restrictive clause in Daggett County and Manila ordinances that prohibit any new development within county floodplains.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2013	Town of Manila	Daggett County Planning & Zoning	Town of Manila; FEMA; Daggett County Emergency Management	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Place a restrictive clause in Daggett County and Manila ordinances that prohibit any new development within county floodplains.			
	Flood	High	Daggett County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:			

Mitigation Project: Ensure through county and town building inspectors and LEPC that zoning ordinances are up to date or revised every five to six years.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2013	Town of Manila	Daggett County Planning & Zoning	Town of Manila; Daggett County Emergency Management; LEPC	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
		Flood		High		Daggett County general funds, SHGP, HMGP

Mitigation Project: Ensure through county and town building inspectors and LEPC that zoning ordinances are up to date or revised every five to six years.
Action/Implementation Plan and Project Description:

▪ Completed Mitigation Projects

COMPLETED MITIGATION PROJECTS						
Mitigation Project	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Status**	**Hazard(s) Mitigated**
Daggett County (County-Led)						
Provide information to public on how the storm drainage plans will assist in preventing flood damage to residents of Daggett County.	2016	Daggett County	Planning & Zoning	High	Completed	Flood
Develop more redundant piping and stormwater lines for Dutch John and Flaming Gorge Reservoir.	2015	Daggett County	Pipeline Safety and Emergency Response	High	Completed	Drought
Install new wheel lines to improve efficiency of water use.	2015	Daggett County	Planning & Zoning	High	Completed	Drought
Conduct a public awareness campaign.	2015	Daggett County	Daggett County Emergency Management	Medium	Completed	Earthquake
Educate public on importance of vaccinating their animals against the threat of West Nile Virus and other diseases.	2015	Daggett County	Daggett County Emergency Management	High	Completed	Agricultural
Identify and maintain critical transportation and utility services.	2014	Daggett County	Daggett County Utilities; UDOT	Medium	Completed	Earthquake

COMPLETED MITIGATION PROJECTS						
Spread insect bait and spray for mosquitoes.	2013	Daggett County	Daggett County	High	Completed	Agricultural
Ensure 80 MPH wind load requirement if met by builders.	2013	Daggett County	Planning & Zoning	High	Completed	Severe Summer Weather, Severe Winter Weather
Town of Dutch John						
Town of Manila						
Improve water delivery system and implement strategies to encourage residents and businesses to utilize water saving devices and procedures.	2015	Town of Manila	Daggett County Emergency Management	High	Completed	Drought
Daggett County and Manila will form a partnership with the current owners of the Sheep Creek Canal to line or pipe portions of the canal as funding becomes available.	2015	Town of Manila	Daggett County Emergency Management	High	Completed	Flood
County and town building inspectors and the planning committee will implement a maintenance and inspection schedule in coordination with the owners of the canal.	2014	Town of Manila	Manila Utilities	High	Completed	Flood
Educate public on canal maintenance and repair.	2013	Town of Manila	Manila Utilities	High	Completed	Flood
Place a restrictive clause in the county and Manila ordinances that prohibit any undercutting of the canal.	2013	Town of Manila	Road Department	High	Completed	Flood
The LEPC will provide semi-annual training for the citizens of Daggett County and Manila regarding homeowner	2013	Town of Manila	Daggett County Emergency Management	High	Completed	Wildfire

COMPLETED MITIGATION PROJECTS						
risk to wildfire and how to reduce risk.						

APPENDIX

APPENDIX A: REFERENCES

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ANNEX B

Duchesne County, Utah Annex

2024 Uintah Basin Region

Multi-Jurisdictional All Hazard Mitigation Plan

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The Uinta Mountains are the highest mountain range in the contiguous United States with no modern glaciers. Lush mountain forests, as part of Ashley National Forest, cover the lower parts of the range while rock and permafrost dominate the upper elevations. The most common species of tree in the lowest elevations of the forested land in the county is pinyon pine and juniper. Douglas-fir, white fir,

ponderosa pine, limber pine, and lodgepole pine can be found at mid-elevations. The highest elevation species are primarily Englemann spruce and Subalpine fir. Quaking aspen can be found at all elevations, and blue spruce is often found in the lower riparian areas. Many species of grasses, shrubs, and forbs can also be found throughout the county (Duchesne County General Plan, 2022)..... 19

The Duchesne River flows southward from the Uinta Mountains in the northwestern corner of the county and then eastward through the central part of the county. Salt cedar (Tamarisk), Russian olive tree, cottonwood, and willow are common species found in the riparian areas of the county (Duchesne County General Plan, 2022).....19

Nine Mile Canyon in the southeastern corner of the county is approximately 40 miles long and extends through both Duchesne and Carbon Counties. Nine Mile Canyon Road weaves through the canyon and was once the primary transportation corridor for the region during the late 1800s. Nine Mile Creek is the small stream that originally formed the canyon and is a minor tributary of the Green River. The stream empties into Desolation Canyon in the east. Several smaller canyons branch off the larger Nine Mile Canyon, and a few have roads traveling through them, as well (Flickr, 2010).....19

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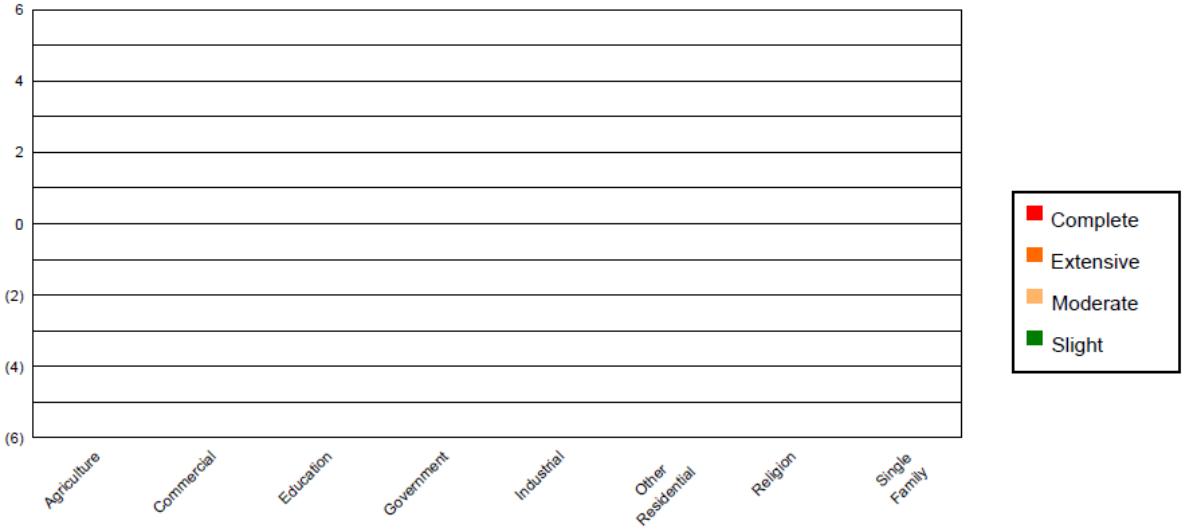
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Direct Earthquake Damage

Building Damage

Hazus estimates that about 0 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

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PART I: COMMUNITY PROFILE

• DUCHESNE COUNTY PROFILE

o LOCATION

Duchesne County is located in the northeastern part of Utah and the western portion of the Uinta Basin. The Uinta Mountains make up the northern border of the county. The Duchesne River flows southward from the Uinta Mountains in the northwestern corner of the county and then eastward through the central part of the county. It is bordered on the north by Summit County; on the northeast by Daggett County; on the east by Uintah County; on the south by Carbon County; on the southwest by Utah County; and on the west by Wasatch County. Total area of the county is 3,256 square miles, of which 15 square miles is water (U.S. Census QuickFacts, 2022). It is the 12th largest county by area in Utah.

o TOPOGRAPHY & VEGETATION

Duchesne County is in the semi-arid region of northeastern Utah. The county is positioned on the south side of the Uinta Mountains. The county's terrain slopes to the south and the east on the southern side of the Uintas, which run east to west along the northern border of the county. The highest point in the range is King's Peak at 13,528 feet, which is also the highest point in the state of Utah. Duchesne has an elevation of 5,518 feet, Myton has an elevation of 5,085 feet, and Roosevelt has an elevation of 5,095 feet. Of the two towns, Altamont has an elevation of 6,388 feet, and Tabiona has an elevation of 6,516 feet. The elevation range within the county is from 13,528 feet in the Uinta Mountains to 4,619 feet in Nine Mile Canyon in the southeastern part of the county near the shared borders with Uintah County and Carbon County (Duchesne County Topographic Map, 2023).

The Uinta Mountains are the highest mountain range in the contiguous United States with no modern glaciers. Lush mountain forests, as part of Ashley National Forest, cover the lower parts of the range while rock and permafrost dominate the upper elevations. The most common species of tree in the lowest elevations of the forested land in the county is pinyon pine and juniper. Douglas-fir, white fir, ponderosa pine, limber pine, and lodgepole pine can be found at mid-elevations. The highest elevation species are primarily Englemann spruce and Subalpine fir. Quaking aspen can be found at all elevations, and blue spruce is often found in the lower riparian areas. Many species of grasses, shrubs, and forbs can also be found throughout the county (Duchesne County General Plan, 2022).

The Duchesne River flows southward from the Uinta Mountains in the northwestern corner of the county and then eastward through the central part of the county. Salt cedar (Tamarisk), Russian olive tree, cottonwood, and willow are common species found in the riparian areas of the county (Duchesne County General Plan, 2022).

Nine Mile Canyon in the southeastern corner of the county is approximately 40 miles long and extends through both Duchesne and Carbon Counties. Nine Mile Canyon Road weaves through the canyon and was once the primary transportation corridor for the region during the late 1800s. Nine Mile Creek is the small stream that originally formed the canyon and is a minor tributary of the Green River. The stream empties into Desolation Canyon in the east. Several smaller canyons branch off the larger Nine Mile Canyon, and a few have roads traveling through them, as well (Flickr, 2010).

o NATURAL RESOURCES

The mining of energy and minerals is an important part of life in the county. Duchesne County is the second largest producer of natural gas in the state of Utah as of January 2024 with a lifetime production of 1,303,955,911 MCF. The county produced 62,559,763 MCF of natural gas in 2023. It is also the largest producer of oil in Utah with a lifetime production of 598,278,350 barrels (Utah DNR, 2024). In addition to oil and gas, Duchesne County also currently mines rock and building stone, rip rap, calcite, silver, copper, uranium, and gold (Duchesne County General Plan, 2022).

o CLIMATE

The climate in Duchesne County is primarily semi-arid, with occasional severe cold in the winter. The climate in the upper elevations of the Uinta Mountains is often colder with increased snowfall (Duchesne County General Plan, 2022).

In the summer, the average daily temperature in the city of Duchesne is 69.3°F, with the warmest month of each year typically being July (NOWData, 2024). In the winter, the average daily temperature is 24.1°F in Duchesne, and the coldest month is typically January (NOWData, 2024).

Average annual precipitation is approximately 8.72 inches in Duchesne (NOWData, 2024). Temperature in Myton is similar to the temperature in Duchesne, but Myton averages much less rainfall with 5.96 inches each year. The wettest month in Duchesne is September, and the driest month is February. The growing season is usually blank through blank. During this time the county receives approximately inches of precipitation, depending on location. The table below outlines monthly average maximum and minimum temperatures and average precipitation and snowfall at Duchesne.

Table 1-1. Duchesne Monthly Climate Summary

Duchesne, UT												
Average Maximum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
32.4	40.4	54.0	63.2	71.4	83.1	87.8	84.4	76.9	62.0	47.6	33.3	59.2
Average Minimum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
9.9	16.4	26.5	33.1	41.4	49.6	56.6	54.2	45.8	34.4	22.9	12.4	32.7
Average Total Precipitation (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
0.45	0.4	0.62	0.7	0.86	0.53	0.7	1.09	1.13	0.96	0.46	0.66	8.72
Average Total Snowfall (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
6.1	5.9	3.7	1.1	0.2	0.0	0.0	0.0	0.0	0.5	2.5	6.4	26.4
Source: NOWData, 2024; Western Regional Climate Center, 2016												

o LAND OWNERSHIP, LAND USE, & FUTURE DEVELOPMENT

Duchesne County has about 2.1 million acres of land. Approximately 72% of this land is public land managed by the federal and state government or is tribal land. The BLM and U.S. Forest Service oversee much of the federal land, and the State School and Institutional Trust Lands Administration, State Office of Sovereign Lands and Forestry, Utah Division of Wildlife Resources, and Utah Division of State Parks oversee the state lands (Duchesne County General Plan, 2022).

The figure below shows the land ownership statistics for Duchesne County, as taken from the Headwaters Economic Profile System:

Land Ownership

	Duchesne County, UT
Total Acres	2,080,208
Private Lands	590,767
Conservation Easement	4,506
Federal Lands	931,669
Forest Service	723,445
BLM	208,224
National Park Service	0
Military	0
Other Federal	0
State Lands	157,303
State Trust Lands*	54,446
Other State	102,857
Tribal Lands	400,463
City, County, Other	0
Percent of Total	
Private Lands	28.4%
Conservation Easement	0.2%
Federal Lands	44.8%
Forest Service	34.8%
BLM	10.0%
National Park Service	0.0%
Military	0.0%
Other Federal	0.0%
State Lands	7.6%
State Trust Lands*	2.6%
Other State	4.9%
Tribal Lands	19.3%
City, County, Other	0.0%

Figure 1-1. Land Ownership in Duchesne County

According to the USDA Census of Agriculture, Duchesne County had 1,063 farms covering 1,057,413 acres in 2017 (USDA, 2022). 59,527 acres of this land is harvested cropland, and 96,513 acres is irrigated land. Many of the crops that are produced in the county are used to support and feed livestock. The most prominent branch of agriculture in Duchesne County is livestock grazing. The county has historically often had more livestock than people. In 2022, the county had approximately 56,000 head of cattle and calves, which is almost three times the number of people (USDA, 2022). Rangeland is especially important for livestock grazing.

28.4% of the lands within Duchesne County are privately owned. Private lands are typically used for new development, which means that future residential, commercial, and industrial land use needs in the county must be met through the limited supply of privately owned land. Of the approximately 597,004 acres of private land in the county, 96.4% is undeveloped (Duchesne County General Plan, 2022).

There is currently enough undeveloped private land to meet the demand of future population growth in Duchesne County. According to the Governors Office and Envision Utah, Utah develops at a rate of about 3.2 people per acre or 14%. Duchesne County, however, has a much slower overall growth rate of 5.3% and even declines in population some years. No land shortages are currently expected in Duchesne County in the coming decades.

o HISTORY

The first known group of humans to occupy the land that is now Duchesne County was the Fremont peoples (AD 1–1301) hundreds of years ago. Specifically, evidence of their presence exists throughout Nine Mile Canyon in the southeastern corner of the county in the form of thousands of petroglyphs and pictographs. There are also hundreds of pit-houses, rock shelters, and granaries. The Utes lived in the area in the 1500s through the 1800s and left many artifacts and petroglyphs, as well.

In 1776, Fathers Dominguez and Escalante traveled through the Uinta Basin in search of a land route to Monterey, California, mapping large parts of the region that had never been mapped or documented before. Fur trappers and traders moved through the basin in search of pelts in the 1820s and 1830s.

In 1861, Brigham Young sent a small party to the Uinta Basin to explore new areas for settlement. However, they determined that the basin was "one vast contiguity of waste and measurably valueless" (Duchesne County General Plan, 2022) and decided not to settle there. Also in 1861, President Abraham Lincoln created the Uintah and Ouray Indian Reservation in what is now much of Duchesne County for the relocation of Indians living throughout Utah and Colorado at the time.

The United States federal government constructed Fort Duchesne in 1886 to create a military presence in the area. Several years later, the government divided the Indian reservations into individual allotments for the Indians living there and sold the rest of the land in parcels to homesteaders for $1.25 per acre. Duchesne County officially became a county in 1915, and its borders were revised once in 1917.

o POPULATION & DEMOGRAPHICS

In 2022, Duchesne County had a population of 20,142 (U.S. Census QuickFacts, 2022). This is an increase of 2.7% from the population taken during the 2020 Census, which was 19,596. Since 1915 when Duchesne County was designated as a county, the population has fluctuated up and down multiple times from decennial census to decennial census. The most dramatic changes occurred in 1960 with a -11.7% population decline, 1980 with a 72.1% increase, and 2010 with a 29.5% increase (U.S. Census, 1960, 1980, 2010).

The population trends for Duchesne County and the five largest cities/towns in the county are shown in the table below.

Table 1-2. Duchesne County Population Trends

County Location	2010	2020	Percent Change 2010–2020
Entire County	18,607	19,596	5.3%
Roosevelt	6,046	6,747	11.6%
Duchesne	1,690	1,588	-6%
Myton	569	561	-1.4%
Altamont	225	239	6.2%
Tabiona	171	143	-16.4%
Source: U.S. Census Bureau, 2010, 2020			

Between 2010 and 2020, the county as a whole increased in population by 5.3%, although there were periods of growth within that time. The city of Roosevelt and town of Altamont increased in population, as well. However, the cities of Duchesne and Myton and town of Tabiona all declined in population.

Of the total population in the county, 49.1% are female (U.S. Census QuickFacts, 2022). 32% of the total population are under 18 years of age, and 13.2% are 65 years and older. The median age in 2022 was 33.1 years. 3.2% of residents were foreign born. The population is mainly homogenous with 90.6% of county residents listed as white alone. The county's racial and ethnic distribution is listed in the table below. Only the six most common ethnicities in the county are included, and some members of the population may identify as more than one race.

Table 1-3. Duchesne County Racial and Ethnic Distribution

Race	Percent of Population
White	90.6%
Black or African American	0.6%
American Indian and Alaska Native	4.9%
Asian	0.6%
Native Hawaiian and Other Pacific Islander	0.4%
Hispanic or Latino	8.8%
Source: U.S. Census Bureau, 2020; American Community Survey, 2022	

o HOUSING

In 2018–2022, there were 6,461 households in Duchesne County. The average household size was 3.01 people. 87.2% of residents who are one year or older are living in the same house now that they were a year ago (U.S. Census QuickFacts, 2022).

In July 2022, Duchesne County had a total of 9,002 housing units, 25.4% of which were vacant (U.S. Census QuickFacts, 2022). An estimated 30.4% of occupied housing units were built since the year 2000. Of the total occupied housing units, 78% were single-unit structures, 8.9% were multi-unit structures, and 13% were mobile homes or another type of unit (American Community Survey, 2022). The median value of owner-occupied housing units in the county from 2018 to 2022 was $228,600. Duchesne County has a homeownership rate of 77.3%, which is higher than the national average of 64.6% (Data USA, 2024). Median gross rent was $894 from 2018 to 2022 (U.S. Census QuickFacts, 2022). An estimated 0.9% of households did not have telephone service, and 4.7% had no vehicles available (American Community Survey, 2022).

o ECONOMY

An estimated 59.9% of the population 16 years or older in Duchesne County is in the civilian labor force (8,365). An estimated 73.7% of the people employed in 2022 were private wage and salary workers; 17.7% were federal, state, or local government; and 8% were self-employed (American Community Survey, 2022). The Mining, Quarrying, & Oil & Gas Extraction (975 people); Construction (809 people); and Educational Services (804 people) industries currently hold the highest number of employees of any other industry in the county (Data USA, 2024). The most common job groups, regardless of industry, are Management (957 people); Construction & Extraction (875 people); and Office & Administrative Support (811 people).

The adjusted unemployment rate is 3.3% for Duchesne County as of February 2024 compared to the state of Utah unemployment rate of 2.8% and the United States unemployment rate of 3.9% for the same period (Utah Department of Workforce Services, 2024).

The median household income in 2022 in Duchesne County was $70,821. An estimated 79.3% of households received earnings, and 17.4% received retirement income. 27.4% of households received Social Security (American Community Survey, 2022). In 2022, 350 people in the county received Supplemental Security Income (SSI), including 45 people who were 65 years or older (SSA, 2022). These income sources are not mutually exclusive; that is, some households received income from more than one source. The poverty rate in the county is 13.8% (U.S. Census QuickFacts, 2022).

o EDUCATION

The total school enrollment from kindergarten to 12th grade in Duchesne County was 4,639 students in 2022 (American Community Survey, 2022). Nursery school and preschool enrollment was 525. Duchesne County School District is the only public school district in the county, with 13 in-person schools and one online school (Duchesne County School District, 2024). The district also offers adult education in Roosevelt and Duchesne where adults can earn a high school diploma. There are no charter or private schools in Duchesne County.

College or graduate school enrollment for residents in the county was 492 in 2022 (American Community Survey, 2022). There are two colleges with locations in Duchesne County: Uintah Basin Technical College and Utah State University Uintah Basin. Uintah Basin Technical College enrolled 4,566 total students during 2022, which includes secondary (high school) and adult students (these students may reside in Duchesne County, Uintah County, or another county). The college offers 42 certificate programs and has two campuses in Roosevelt and Vernal (UBTech, 2024). Utah State University has a campus in the Uintah Basin region with two locations in Roosevelt and Vernal. As of January 2023, USU Uintah Basin enrolled over 700 higher education students in a number of associate programs, bachelor's programs, master's programs, certificate programs, and professional licensures (USU Uintah Basin, 2024). Additionally, USU has two extension locations in Duchesne and Roosevelt where it offers research-based community education, resources, and programs in several topics (e.g., agriculture, business, food, health, home, finance, and 4-H and youth) to the community (USU Extension, 2024).

o BRIDGES

The following table provides a list of all 45 Duchesne County bridge locations, lengths, years constructed, and daily traffic counts, taken from the National Bridge Inventory.

Table 1-4. Duchesne County Bridges

Location	Length (ft)	Year Built	Average Daily Traffic Count
0.5 mi. SE of Hanna	18.9	1965	13
1.5 mi. SE of Hanna	18.9	1965	340
3 mi. NW of Tabiona	12.8	1978	69
West of Tabiona	18.9	1968	139
1 mi. SE of Tabiona	15.2	1942	63
3 mi. W of Altonah	7.2	1999	120

Location	Length (ft)	Year Built	Average Daily Traffic Count
4.5 mi. N of Mountain Home	21.9	1955	195
3.5 mi. NE of Mountain Home	18.6	1985	202
1 mi. N of Bridgeland	7.4	1993	915
3 mi. SW of Altonah	7.8	1999	63
2.5 mi. W of Altonah	18.6	1992	120
1.5 mi. NW of Altonah	7.6	1989	66
2 mi. NW of Altamont	8.1	1995	32
2050 N 15000 W Upalco	14.6	2002	189
3.5 mi. NW of Upalco	13.7	1999	189
2 mi. NW of Neola	7.5	1945	66
3 mi. SW of Fruitland	23.5	1999	63
24 mi. W of Duchesne	8.7	1981	340
24.6 mi. W of Duchesne	12.9	1981	340
16 mi. W of Duchesne	24.7	2002	63
15 mi. W of Duchesne	22.4	2002	126
14 mi. W of Duchesne	32.9	2002	126
13 mi. W of Duchesne	22.3	2002	126
10.5 mi. W of Duchesne	25.9	1998	100
9.5 mi. W of Duchesne	25.9	1998	63
9 mi. W of Duchesne	25.9	1998	340
8 mi. W of Duchesne	40.8	1972	100
S side of Duchesne	18.3	2008	310
E end of Main St	38.7	1985	14000
5 mi. N of Duchesne	24.7	1966	132
7 mi. N of Bridgeland	72.1	2008	915
4 mi. NW of Myton	33.2	2007	14000
In Bridgeland	37.6	2006	915
Red Creek Canyon 1 mi S of SR-40	7.7	1977	340
1 mi. NW of Altamont	7.2	1986	38
In Hanna	14.6	1952	25
12 mi. W of Duchesne	23.1	2008	30
1500 N 14300 W	15.4	2010	63
38250 W over Duchesne River	22.1	2017	50
Over Duchesne River	37.8	2017	100
300 N over Cottonwood Creek	7.4	2016	1000
1.5 mi. SE of Bridgeland	10.9	1985	14000
18 mi. W of Duchesne	16.8	2016	32

Location	Length (ft)	Year Built	Average Daily Traffic Count
7 mi. SW of Talmage	18.5	1952	45
Source: National Bridge Inventory, 2024			

o COUNTY FACILITIES/CRITICAL INFRASTRUCTURE

The following table lists important facilities in Duchesne County:

Table 1-5. Duchesne County Critical Facilities/Infrastructure

Classification	Total
Hospitals/Medical Clinics	5
Schools	14
Emergency Operations Centers	1
Law Enforcement Facilities	3
Fire Stations	7
Critical County and City Facilities[1]	11
Essential Utilities[2]	21
Major Roadways[3]	5

Notes:

[1] Duchesne City office, CUWCD office, County Admin, Myton City Office, Roosevelt Office, Altamont office, Tabiona office, Duchesne Tri-County Health Department, Villa, County Events Center, School District Warehouse

[2] Water utilities (Roosevelt City, Duchesne City, Tabiona Town, Myton City, Altamont Town, Neola Water, Hanna Water, Fruitland Water, East Duchesne Water, South Duchesne Water, Upper Country Water, Johnson Water), Sewer utilities (Tabiona, Myton, Altamont, Neola, Duchesne, Roosevelt), Strata (telecom) main building in Roosevelt, Moon Lake Electric main buildings in Roosevelt, Chevron crude oil pipeline

[3] Hwy 40, SR-191, SR-87, SR-35, SR-121

o CULTURAL & HISTORICAL SITES

Sites in Duchesne County listed on the National Register of Historic Places can be found in the table below.

Table 1-6. Historic Places in Duchesne County

Site	Address	Nearest City/Location
Indian Canyon Ranger Station	UT 33, Duchesne Ranger District	Duchesne
Simmons Ranch	8 mi. S of US 40	Fruitland
Myton Presbyterian Church	225 E 100 S	Myton
Nine Mile Canyon (site 42Dc0331)	Address Restricted	Price
Nine Mile Canyon (site 42Dc0530)	Address Restricted	Price
Nine Mile Canyon (site 42Dc0645)	Address Restricted	Price
Nine Mile Canyon (site 42Dc1302)	Address Restricted	Price
Nine Mile Canyon (site 42Dc1618)	Address Restricted	Price
Nine Mile Canyon (site 42Dc1619)	Address Restricted	Price
Nine Mile Canyon (site 42Dc1620)	Address Restricted	Price
Nine Mile Canyon (site 42Dc306)	Address Restricted	Price
Nine Mile Canyon (site 42Dc638)	Address Restricted	Price
Nine Mile Canyon (site 42Dc682)	Address Restricted	Price
Nine Mile Canyon (site 42Dc683)	Address Restricted	Price
Nine Mile Canyon (site 42Dc684)	Address Restricted	Price
Nine Mile Canyon (site 42Dc685)	Address Restricted	Price
Nine Mile Canyon (site 42Dc686)	Address Restricted	Price
Nine Mile Canyon (site 42Dc687)	Address Restricted	Price
Nine Mile Canyon (site 42Dc688)	Address Restricted	Price
Nine Mile Canyon (site 42Dc696)	Address Restricted	Price
Nine Mile Canyon (site 42Dc700)	Address Restricted	Price
Nine Mile Canyon (site 42Dc702)	Address Restricted	Price
Nine Mile Canyon (site 42Dc703)	Address Restricted	Price
Nine Mile Canyon (site 42Dc704)	Address Restricted	Price
Nine Mile Canyon (site 42Dc705)	Address Restricted	Price
Nine Mile Canyon (site 42Dc708)	Address Restricted	Price
Nine Mile Canyon (site 42Dc709)	Address Restricted	Price
Nine Mile Canyon (site 42Dc710)	Address Restricted	Price
Nine Mile Canyon (site 42Dc712)	Address Restricted	Price
Centennial House	Address Restricted	Price
Fool's Pinnacle	Address Restricted	Price
Karen's Cist	Address Restricted	Price
Maxies Pad	Address Restricted	Price
Nordell's Fort	Address Restricted	Price
Redman Village	Address Restricted	Price
Sunstone Village	Address Restricted	Price
Taylor's City	Address Restricted	Price
Stockmore Ranger Station	UT 30, Duchesne Ranger District	Tabiona
Source: National Register of Historic Places, 2024		

PART II: RISK ASSESSMENT

● HAZARD RISK SUMMARY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy, and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the DMA (44 CFR, Section 201.6(c)(2)).

o IDENTIFIED HAZARDS

There are countless hazards that pose a threat to human life, health, and well-being, and no attempt is made here to compile an exhaustive list. Those that are addressed in disaster planning are generally categorized as “natural” or “technological” (sometimes “manmade”). The FEMA website contains a thorough discussion and list of hazards in the section entitled “National Risk Index for Natural Hazards” (FEMA, 2022). Some hazards are a threat to all geographic areas while others (e.g., flooding) are more limited in their extent. Studies were conducted to determine which hazards are of concern in Duchesne County.

Duchesne County hazards were identified and their frequency of occurrence evaluated using a number of resources, including:

- 2019 Uintah Basin Region 5 Hazard Mitigation Plan
- 2022 Duchesne County General Plan & Resource Management Plan
- 2017 Duchesne County Transportation Master Plan
- Hazard planning documents developed by state, federal, and private agencies
- NOAA weather data from the past 74 years
- Data from the United States Geological Survey (USGS) and the Utah State Geological Survey (UGS)

Hazards that have been identified as significant in this county and that will be considered in this plan are listed below:

Natural Hazards

- Severe Summer Weather
    - Extreme Heat
    - Lightning
    - Hail
    - Tornado
    - Straight-line Wind
- Severe Winter Weather
    - Extreme Cold

    - Winter Storm
    - Avalanche
- Wildfire
- Flood
    - River or Stream Flood
    - Flash Flood
    - Dam Failure
- Drought

Geological Hazards

- Earthquake
- Landslide
- Problem Soils
    - Expansive Soils
    - Land Subsidence

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact Duchesne County or the cities of Duchesne, Myton, and Roosevelt or the towns of Altamont and Tabiona due to geographic location:

- Hurricane
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Eruption

HAZARD PROFILE

The risk assessments in the following chapters describe the risks associated with each identified hazard of concern. The following sections were used to describe each hazard and communicate each respective level of risk:

- **Hazard Description**—Each hazard profile contains a description of the general definition and causes of the hazard. It may also include background information for understanding the context of the hazard within Duchesne County.
- **Location**—The location or region in Duchesne County where each hazard may occur is described.
- **Extent**—The strength or magnitude of each hazard is defined, usually through a form of measurement, such as a formula, scale, chart, or graph.
- **Historical Frequency & Probability of Future Occurrence**—This section identifies past hazard events of note that have occurred in Duchesne County. It also includes the likelihood of each hazard occurring again if available.
- **Impacts & Loss Estimates**—The potential impacts of each hazard on the county are discussed. This section also outlines the potential economic/monetary loss from a hazard event, in addition to loss of property, structures, facilities, systems, livestock, and life. An assessment of affected vulnerable populations and changes in development is included.
- **Climate Change Implications**—The effects of climate change on the probability of future events and severity of impacts for each hazard are assessed.

- **FEMA NRI Score**—The hazard-specific FEMA National Risk Index scores for each natural hazard are included.
- **Related Hazards**—The hazard profiles that fall under a greater hazard category can be found within this section.

RISK ASSESSMENT METHODOLOGY

Each hazard included in this plan was assessed and ranked based on a pre-defined hazard risk methodology consistent with FEMA's mitigation plan requirements. Information from the hazard profiles and input from subject matter experts were used to inform the hazard risk assessment process. The following is a description of the key factors.

Probability/Likelihood of Occurrence

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- **High**—Significant hazard event is likely to occur annually (Probability Factor = 3)
- **Medium**—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)
- **Low**—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)
- **Unlikely**—There is little to no probability of significant occurrence, or the recurrence interval is greater than every 100 years (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area.

Extent

Extent was assessed in two categories: extent/intensity and catastrophic potential of the hazard. Numerical impact factors were assigned as follows:

Extent/Intensity—Extent is defined as the range of anticipated intensities of the identified hazards. Extent is most commonly expressed using various scientific scales, such as the Enhanced Fujita scale.

- **High**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a high-intensity incident (Extent Factor = 3)
- **Medium**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a medium-intensity incident (Extent Factor = 2)
- **Low**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a low-intensity incident (Extent Factor = 1)
- **Unlikely**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of little to no intensity (Extent Factor = 0)

Catastrophic—The potential that an occurrence of this hazard could be catastrophic.

- **High**—High potential that this hazard could be catastrophic (Extent Factor = 3)
- **Medium**—Medium potential that this hazard could be catastrophic (Extent Factor = 2)
- **Low**—Low potential that this hazard could be catastrophic (Extent Factor = 1)
- **Unlikely**—Virtually no potential that this hazard could be catastrophic (Extent Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Extent/Intensity* and its potential to be *Catastrophic*.

▪ Vulnerability

Vulnerabilities were assessed in three categories: population exposure, property exposure, and exposure based on changes in development. Numerical impact factors were assigned as follows:

People—Values were assigned based on the percentage of the total population exposed to the hazard event.

- **High**—30% or more of the population is exposed to this hazard (Vulnerability Factor = 3)
- **Medium**—15% to 29% of the population is exposed to this hazard (Vulnerability Factor = 2)
- **Low**—14% or less of the population is exposed to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the population is exposed to this hazard (Vulnerability Factor = 0)

Property Exposed—Values were assigned based on the percentage of the total property value exposed to the hazard event.

- **High**—25% or more of the total assessed property value is exposed to the hazard (Vulnerability Factor = 3)
- **Medium**—10% to 24% of the total assessed property value is exposed to the hazard (Vulnerability Factor = 2)
- **Low**—9% or less of the total assessed property value is exposed to the hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the total assessed property value is exposed to the hazard (Vulnerability Factor = 0)

Changes in Development—Changes in development since the previous plan was approved have increased or decreased the community's vulnerability/exposure to this hazard.

- **High**—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)
- **Medium**—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)
- **Low**—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *People*, and a weighting factor of 1 was assigned for *Property Exposed* and *Changes in Development*.

▪ Impact

Hazard impacts were assessed in eight categories: population and life/safety, underserved/equity, property damages, economic, environmental, essential operations, future development, and climate change. Numerical impact factors were assigned as follows:

Population and Life/Safety—Values were assigned based on (1) best available historical and probabilistic data for individuals who are vulnerable to the hazard event and (2) the likelihood to experience adverse impacts in the event of its occurrence.

- **High—**Populations exposed to this hazard are likely to experience significant adverse impacts (Impact Factor = 3)

- **Medium**—Populations exposed to this hazard are likely to experience some adverse impacts (Impact Factor = 2)
- **Low**—Populations exposed to this hazard are likely to experience minimal adverse impacts (Impact Factor = 1)
- **No Impact**—Populations exposed to this hazard are not likely to experience significant adverse impacts (Impact Factor = 0)

Underserved/Equity—Values were (1) assigned based on best available data for underserved populations vulnerable to the hazard event and (2) are likely to experience adverse/disproportionate impacts from the hazard incident resulting in greater disparity in equity.

- **High**—Underserved populations exposed to this hazard are likely to experience significant adverse/disproportionate impacts (Impact Factor = 3)
- **Medium**—Underserved populations exposed to this hazard are likely to experience some adverse/disproportionate impacts (Impact Factor = 2)
- **Low**—Underserved populations exposed to this hazard are likely to experience minimal adverse/disproportionate impacts (Impact Factor = 1)
- **No Impact**—Underserved populations exposed to this hazard are not likely to experience significant adverse/disproportionate impacts (Impact Factor = 0)

Property Damages—Values were assigned based on the expected total property damages incurred from a hazard incident. It is important to note that values represent estimates of the loss from a major incident based on historical data or probabilistic models/studies.

- **High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
- **Medium**—More than $500,000 but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
- **Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
- **No Impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Economic—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, crops, worker wages, and local tax revenues or on the impact on the local gross domestic product (GDP).

- **High**—Total economic impact is likely to be greater than $10,000,000 (Impact Factor = 3)
- **Medium**—Total economic impact is likely to be greater than $100,000 but less than or equal to $10,000,000 (Impact Factor = 2)
- **Low**—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
- **No Impact**—Virtually no significant economic impact (Impact Factor = 0)

Environmental Factor—Environmental impact from a major hazard event requiring outside resources and support; and/or repair, clean-up, restoration, and/or preservation work.

- **High**—Environmental impact from a single major hazard event is likely to be significant, requiring extensive outside resources and support; and/or repair, clean-up, restoration, and/or preservation work (Impact Factor = 3)

- **Medium**—Environmental impact from a single major hazard event is likely to be localized, requiring some outside resources and support; and/or repair, clean-up, restoration, or preservation work (Impact Factor = 2)
- **Low**—Environmental impact from a single major hazard event is likely to be minimal, requiring little to no outside resources and support, and/or minimal repair, clean-up, restoration, or preservation work (Impact Factor = 1)
- **No Impact**—No environmental impacts from a single major hazard event is likely (Impact Factor = 0)

Essential Operations Factor—Impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event.

- **High**—Significant impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 3)
- **Medium**—Some impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 2)
- **Low**—Minimal impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 1)
- **No Impact**—No impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 0)

Future Development—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard.

- **High**—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)
- **Medium**—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)
- **Low**—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)
- **No Impact**—Future development trends will not increase the impact/consequence of this hazard and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)

Climate Change—The potential that climate change will increase the risk of this hazard (e.g., type, location, and range of anticipated intensities of the identified hazard and impacts).

- **High**—Climate change trends will significantly increase the risk of this hazard and its impacts (Impact Factor = 3)
- **Medium**—Climate change trends will increase the risk of this hazard and its impacts, but not significantly (Impact Factor = 2)
- **Low**—Climate change trends will minimally increase the risk of this hazard and its impacts (Impact Factor = 1)
- **No Impact**—Climate change trends will not increase the risk of this hazard and its impacts (Impact Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Population and Life Safety* and *Underserved/Equity*, and a weighting factor of 2 was assigned for

Property Damages. In addition, a weighting factor of 1 was assigned for *Economic*, *Environmental*, *Essential Operations*, *Future Development*, and *Climate Change*.

o FEMA NRI RISK SCORES

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: avalanche, coastal flooding, cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, tsunami, volcanic activity, wildfire, and winter weather. Because not all hazards are applicable to Duchesne County, only those hazards with a defined risk to the county are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, and Social Vulnerability and Community Resilience to develop a baseline relative risk measurement for each United States county and census tract (National Risk Index, 2024d). These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

▪ Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Table 2-1. Social Vulnerability for Duchesne County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Social Vulnerability Score	Rating
940300	City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County	76.5	Relatively High
940600	City of Myton, Town of Altamont, and Unincorporated Duchesne County	62.1	Relatively High
940502	City of Roosevelt and Unincorporated Duchesne County	56.7	Relatively Moderate
940501	City of Roosevelt	93.7	Very High
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2024e; 2024f			

▪ Community Resilience

Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table 2-2. Community Resilience for Duchesne County, UT |FEMA National Risk Index

Census Tract	Communities in Census Tract	Community Resilience Score	Rating
940300	City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County	31.4	Relatively Low

Census Tract	Communities in Census Tract	Community Resilience Score	Rating
940600	City of Myton, Town of Altamont, and Unincorporated Duchesne County	31.4	Relatively Low
940502	City of Roosevelt and Unincorporated Duchesne County	31.4	Relatively Low
940501	City of Roosevelt	31.4	Relatively Low
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2024b; 2024e			

▪ Expected Annual Loss

The table below shows the overall Expected Annual Loss score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *Impacts & Loss Estimates*.

Table 2-3. Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Expected Annual Loss Score	Rating
940300	City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County	81.75	Relatively Moderate
940600	City of Myton, Town of Altamont, and Unincorporated Duchesne County	75.25	Relatively Moderate
940502	City of Roosevelt and Unincorporated Duchesne County	11.64	Very Low
940501	City of Roosevelt	3.24	Very Low
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2024d; 2024e			

▪ Overall NRI Score

The table below shows the overall FEMA National Risk Index Score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *FEMA NRI Score*.

Table 2-4. Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
940300	City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County	85.93	Relatively High
940600	City of Myton, Town of Altamont, and Unincorporated Duchesne County	77.57	Relatively Moderate
940502	City of Roosevelt and Unincorporated Duchesne County	13.95	Very Low
940501	City of Roosevelt	8.09	Very Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024c; 2024e			

o OVERALL RISK SCORES

The following table represents the new overall risk scores for Duchesne County based on the described methodology. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores.

Double click the Microsoft Excel icon below to access the full assessment and tool (this is only accessible when utilizing the Microsoft Word version of the plan).

▪ Duchesne County

	Probability	Consequence				Total Risk	
Hazard Event	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Facto	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)	
Flash Flood	2	6	8	25	39	41	M
Wildfire	3	6	9	24	39	57	H
Winter Storm	3	6	11	22	39	57	H
River or Stream Flood	1	6	6	13	25	15	L
Drought	3	6	7	25	38	56	H
Extreme Heat	2	6	12	23	41	42	M
Staright-line Wind	2	6	6	11	23	26	L
Extreme Cold	3	12	11	26	49	70	H
Lightning	1	18	12	31	61	33	L
Hail	1	6	9	19	34	20	L
Landslide	1	6	6	13	25	15	L
Exansive Soild	1	6	6	13	25	15	L
Land Subsidence	1	12	9	24	45	25	L
Avalance	2	12	14	18	44	45	M
Earthquake	1	6	6	10	22	14	L
Dam Failure	1	9	12	24	45	25	L
Tornado	1	9	7	15	31	19	L

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score			
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–49	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	50–100	High (H)

The **Legend—specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

● SEVERE SUMMER WEATHER

o HAZARD DESCRIPTION

Severe summer weather includes those hazards that are typically found during the spring, summer, and early fall season of the year in Duchesne County. Severe summer weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. Included in this category are extreme heat, lightning, hail, tornado, and straight-line wind. Each hazard is examined independently; however, it is recognized that these hazards typically occur together.

o RELATED HAZARDS

▪ Extreme Heat

● *Hazard Description*

Potential Probability	Medium
Potential Consequence	Medium
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona
Seasonal Pattern or Conditions	Late spring, summer, and early fall
Duration	Events may last hours to days
Analysis Used	NOAA, NWS, Western Regional Climate Center, NCEI, EWG, Neighborhoods at Risk, National Risk Index, Headwaters Economics, U.S. Census, Climate and Economic Justice Screening Tool, Resilience Analysis and Planning Tool, HHS, UCAR

The term “extreme heat,” sometimes called “heat wave,” is to some extent a relative one describing a period when weather conditions include temperatures and humidity significantly higher than those usual for a particular geographic area.

● *Location*

Due to the dry, semi-arid climate of Duchesne County in desert Utah, the entire county may be affected by extreme heat, including the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

● *Extent*

The National Weather Service (NWS) issues alerts to the public based on its Heat Index (HI), which takes both temperature and humidity into account. The NWS will initiate alert procedures when the HI is expected to exceed 105°–110°F (depending on local climate) for at least two consecutive days (NWS, 2024).

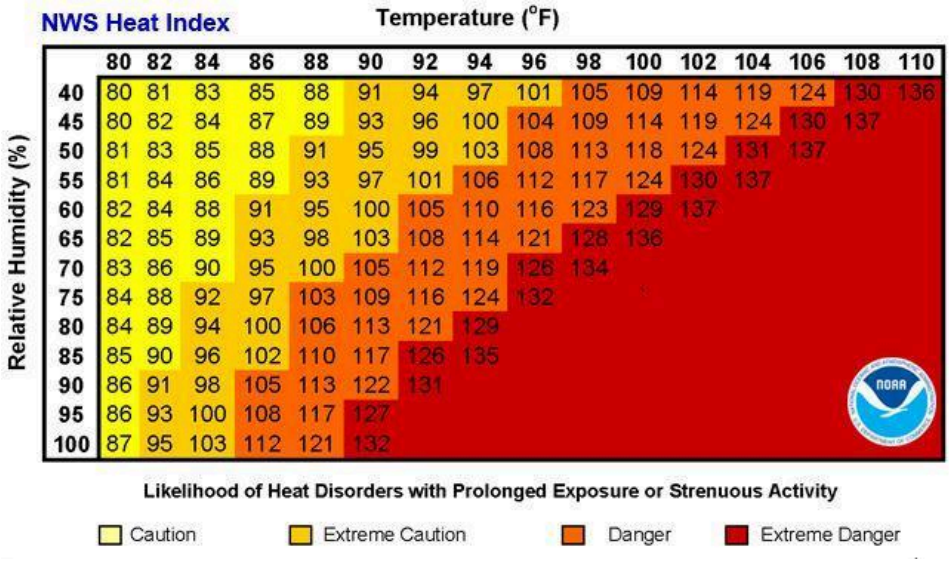


Figure 3-1. NOAA National Weather Service Heat Index (NWS, 2024)

- ***Historical Frequency & Probability of Future Occurrence***

According to NWS available data, the record high temperature in the city of Duchesne, Utah is 101°F in August 1970 and July 2002 (NOWData, 2024). The record high temperature in the city of Myton is 104°F in July 1990. July is historically the hottest month of the year in Duchesne County, with an average temperature of 70.2°F in Duchesne and 72.5°F in Myton (NOWData, 2024). The average high in Duchesne in July is 87.2°F and 90.2°F in Myton. Both Duchesne and Myton have had zero instances of extreme heat of 105°F or higher since 1900.

According to Neighborhoods at Risk, Duchesne County is expected to experience 4 more days that reach above 95°F by 2049. As annual temperatures continue to increase, more extreme heat events are likely to occur. In fact, Duchesne County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by extreme heat, as presented in the table below.

Table 3-1. Impacts of Extreme Heat by Jurisdiction

Jurisdiction	Impacted by Heat Events (95–104°F) Within Last 25 Years	Impacted by Extreme Heat Events (105+°F) Within Last 25 Years	Potential Impacts of Extreme Heat
Duchesne County	Yes	Yes	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

Jurisdiction	Impacted by Heat Events (95–104°F) Within Last 25 Years	Impacted by Extreme Heat Events (105+°F) Within Last 25 Years	Potential Impacts of Extreme Heat
City of Duchesne	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Myton	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Roosevelt	Yes	Yes	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Altamont	Yes	Yes	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Tabiona	Yes	Yes	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

The primary impact of extreme heat is on human health, with disorders such as sunstroke, heat exhaustion, and heat cramps. There are also undoubtedly indirect and chronic health effects from extreme heat, the magnitude of which are difficult or impossible to estimate. Environmental effects can include loss of wildlife and vegetation and increased probability of wildfires.

Power outages may occur during times of extreme heat. Large electrical panels and motors used in water production may also be negatively affected by extreme heat. Economic impacts result from such factors as increased energy prices and loss of business as people avoid leaving their homes to escape the heat. Agricultural losses can also occur. During the years 1995–2022, the EWG reported $12,417 in crop insurance indemnities due to heat in Duchesne County (EWG, 2022). The magnitude of these and other, more indirect impacts is, again, difficult to assess, but for severe heat waves, the economic impact has been estimated to be significant.

Table 3-2. Heat Wave: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.1 events per year	0.0	$27,006	$264	$147	$27,417	74.5	Relatively Moderate
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0.3 events per year	0.0	$52,404	$363	$900	$53,667	86.7	Relatively High
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0.3 events per year	0.0	$41,644	$187	$48	$41,879	82.7	Relatively High
Census Tract 940501: City of Roosevelt							
0.3 events per year	0.0	$21,404	$124	$2	$21,530	69.8	Relatively Moderate

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People particularly susceptible to extreme heat are the elderly, small children, and persons with chronic illnesses.

Table 3-3. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to effectively stay cool during extreme heat events.

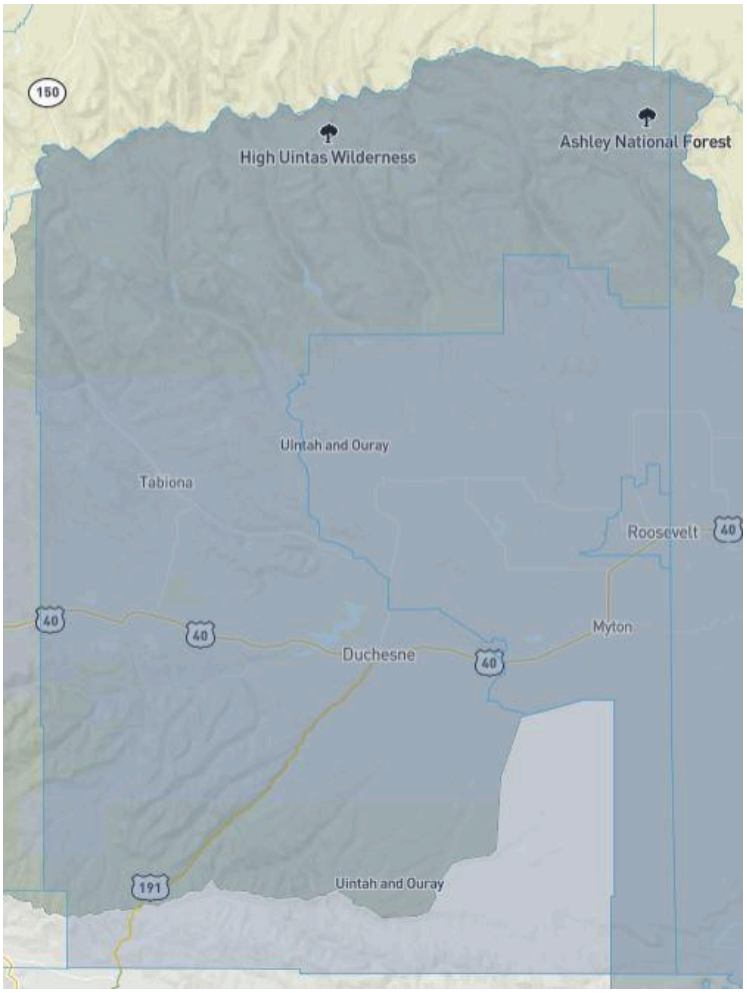
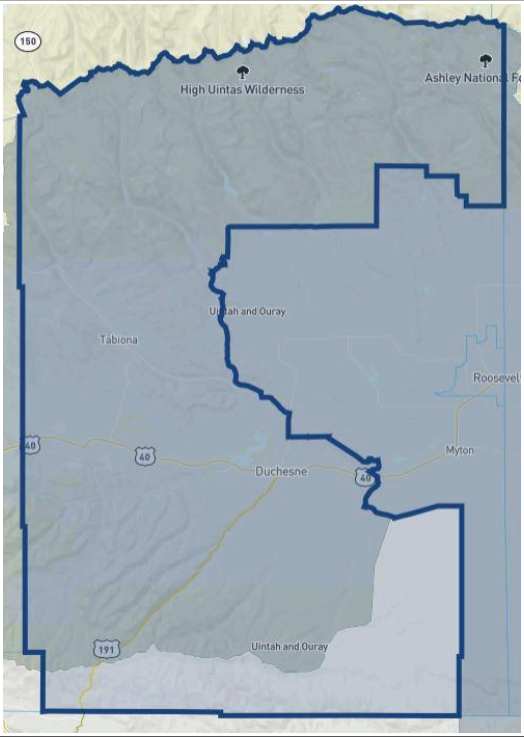


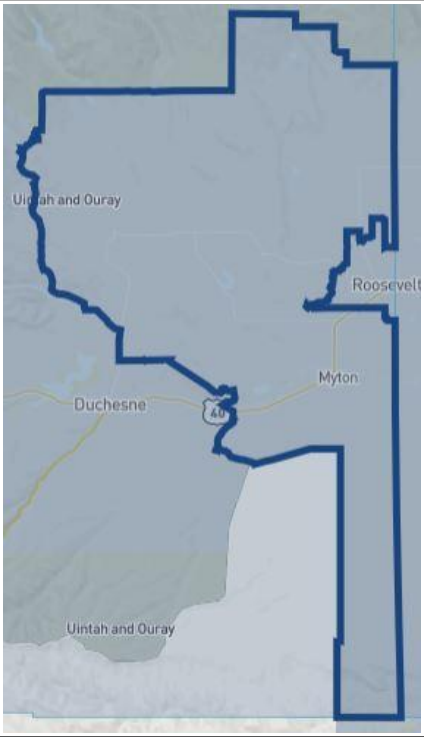
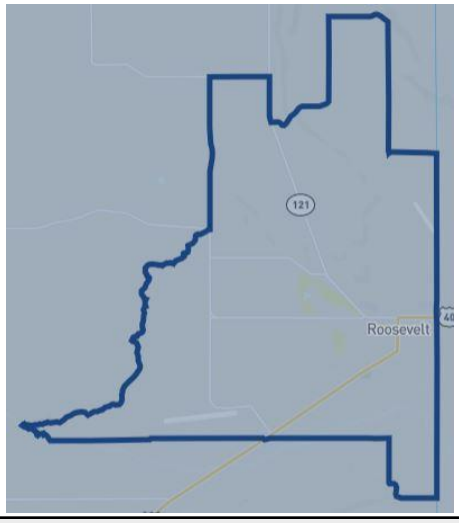
Figure 3-2. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 3-4. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
97th *% (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
93rd *% (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Extreme heat places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-5. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme temperatures. Places prone to high heat are expected to become even drier and hotter over the following century (UCAR, 2024). Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors. According to Neighborhoods at Risk, extremely hot days are the leading cause of weather-related fatalities in the U.S. and contribute to economic stress as the need for and cost of air conditioning rises.

Effects of Climate Change on Probability of Future Events

Table 3-6. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Duchesne County is expected to experience 4 more days that reach above 95°F (from 3 days to 7 days per year).
	By 2049, Duchesne County is expected to have a 3°F increase (from 41°F to 43°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-7. Heat Wave: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
78.4	Relatively High	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
87.3	Relatively High	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
82.9	Relatively High	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
77.1	Relatively Moderate	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Lightning

- ***Hazard Description***

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona	
Seasonal Pattern or Conditions	Late spring, summer, and early fall	
Duration	Storms that produce lightning may last hours to days	
Analysis Used	NOAA, NWS, Vaisala, NCEI, NFPA, NIFC, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

Lightning is defined by the NWS as “a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground, or between the ground and a cloud.” A lightning discharge may be over five miles in length,

generate temperatures upwards of 50,000°F, and carry 50,000 volts of electrical potential. Lightning is most often associated with thunderstorm clouds, but lightning can strike as far as five to 10 miles from a storm. Thunder is caused by the rapid expansion of air heated by a lightning strike. Cloud-to-ground lightning strikes occur with much less frequency in the northwestern U.S. than in other parts of the country.

- ***Location***

This hazard can affect the entire county and the state of Utah, but the risk to the county is relatively low. The jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may experience lightning, as well.

- ***Extent***

A lightning flash is created by a transfer of significant charge between two charged objects. Lightning discharges can occur inter-cloud, cloud-to-cloud, cloud-to-air, and cloud-to-ground. Cloud-to-ground (CG) lightning has the greatest risk to society. A CG stroke can kill, destroy equipment, start fires, and disturb power delivery systems.

Lightning is commonly measured using the Lightning Activity Level (LAL), which is a scale that describes the frequency of lightning strikes in a specific area (NWS, 2024).

Lightning Activity Level (LAL)	
Is a scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater then 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Figure 3-3. NWS Lightning Activity Level

• *Historical Frequency & Probability of Future Occurrence*

Lightning is common in Utah, with an average of 1,040,446 lightning strikes per year in the state from 2015 to 2019 (Vaisala, 2020). However, this average is much less compared to other states, such as those in the Midwest and Southeast. For example, Florida received an average of 13,989,300 strikes per year within the same time period.

The Storm Events Database records three significant lightning events in Duchesne County, as seen in the table below.

Table 3-8. Significant Lightning Events in Duchesne County, UT

Location Within County	Date	Fatalities/ Injuries	Property Damage	Description
Myton	06/09/2000	0	$200,000	Lightning damaged treatment unit, destroying 400-gallon oil tanks
Mountain Home	08/02/2005	1	N/A	Lightning struck and killed a 15-year-old boy camping in an Adirondack-style shelter
Altamont	07/15/2013	0	$80,000	Lightning struck oil storage tanks, starting a fire and causing an explosion
Source: Storm Events Database, 2024				

Significant lightning strikes causing significant damage and/or injuries or fatalities are likely to occur again within the next 10 years and could occur anywhere in the county or in the cities of Duchesne, Myton, and Roosevelt or the towns of Altamont and Tabiona. Damage-causing lightning is more likely in Roosevelt than in other parts of the county due to Roosevelt's higher population. Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in Duchense County. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

• *Impacts & Loss Estimates*

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by lightning, as presented in the table below.

Table 3-9. Impacts of Lightning by Jurisdiction

Jurisdiction	Impacted by Lightning	Experienced Significant Lightning Strike with $1,000+ in Damage Since 2000	Fatalities Due to Lightning	Potential Impacts of Lightning
Duchesne County	Yes	Yes	2	Burns, nerve damage, cardiac effects, hearing loss, trauma,

Jurisdiction	Impacted by Lightning	Experienced Significant Lightning Strike with $1,000+ in Damage Since 2000	Fatalities Due to Lightning	Potential Impacts of Lightning
				mental disorders, death, wildfires, property damage, loss of utilities
City of Duchesne	Yes	No	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
City of Myton	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
City of Roosevelt	Yes	No	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
Town of Altamont	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
Town of Tabiona	Yes	No	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities

Lightning is the second most deadly weather phenomenon in the U.S., being second only to floods. On average, 20 to 50 deaths per year are attributed to lightning nationally, and in Utah the average is less than one per year. The last death in Utah due to lightning was in 2016, with six total deaths in Utah since 2008 (NWS, 2022). There have been two deaths in Duchesne County due to lightning. One occurred in 1997 when a Boy Scout leader—a 52-year-old man—was struck by lightning while hiking in the Uinta Mountains. In 2005, a 15-year-old boy was struck and killed in Mountain Home while camping. Despite the enormous energy carried by lightning, only about 10% of strikes are fatal (NWS, 2022). Injuries include central nervous system damage, burns, cardiac effects, hearing loss, and trauma. The effects of central nervous system injuries tend to be long-lasting and severe, leading to such disorders as depression, alcoholism, chronic fatigue, and in some cases suicide. Lightning also strikes structures, causing fires and damaging electrical equipment. Wildland fires are often initiated by lightning strikes as are petroleum storage tank fires. About one third of all power outages are lightning-related.

The magnitude of economic losses is difficult to estimate. Between 2007 to 2011, $451 million in property damage was reported due to fires caused by lightning strikes in the U.S. (NFPA, 2013). The state of Utah experienced 408 fires caused by lightning strikes in 2023 alone (NIFC, 2023).

Table 3-10. Lightning: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
26.7 events per year	0.01	$64,218	$3,541	N/A	$67,759	99.4	Very High
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
16 events per year	0.01	$69,540	$2,292	N/A	$71,831	99.5	Very High
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
9.2 events per year	0.0	$42,239	$862	N/A	$43,101	97.6	Very High
Census Tract 940501: City of Roosevelt							
9.3 events per year	0.0	$21,611	$577	N/A	$22,187	88.9	Relatively High

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. Any community, whether vulnerable or not, may experience lightning. However, those with inadequate living conditions or shelter may be more vulnerable to a strike.

Table 3-11. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native

Americans, the majority of whom are low income and may lack resources to adequately shelter during thunderstorms and/or lightning.

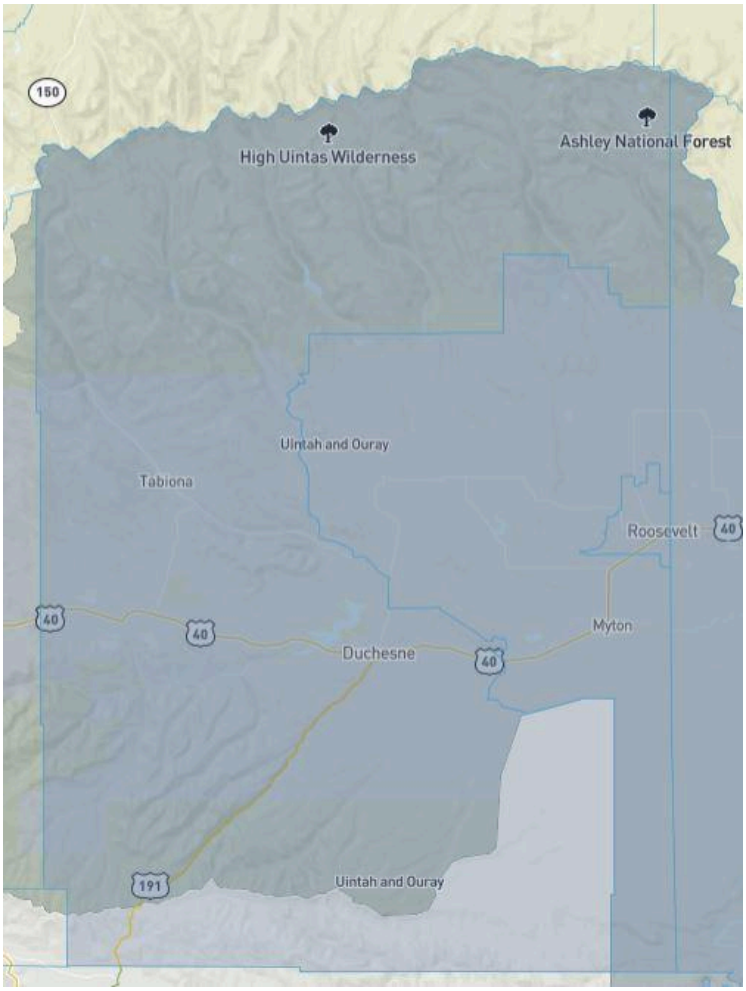
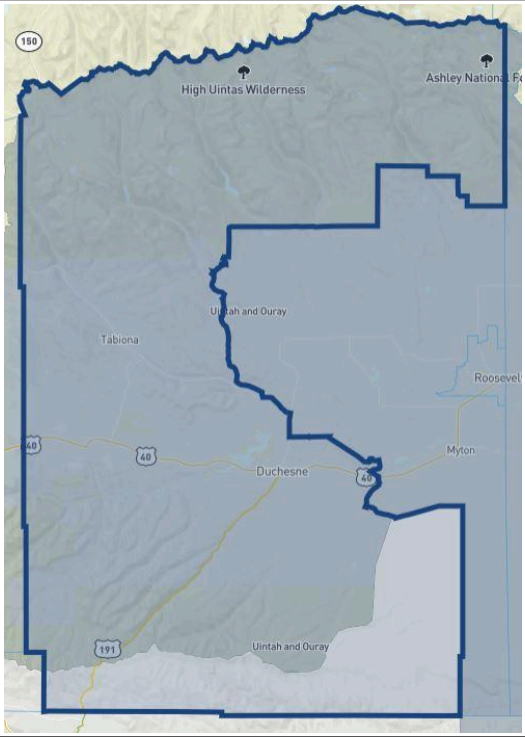


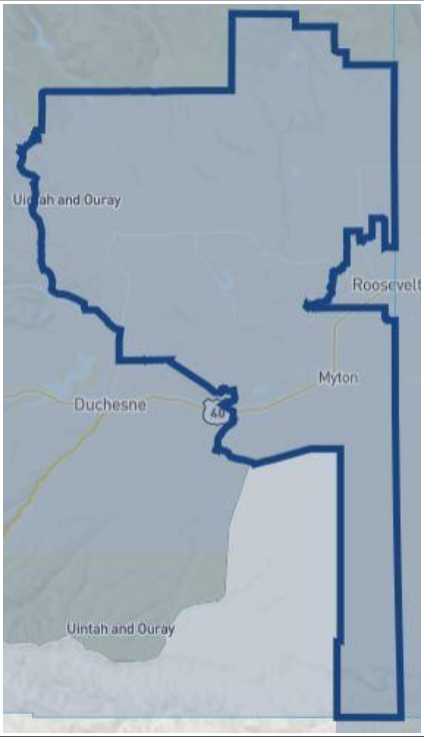
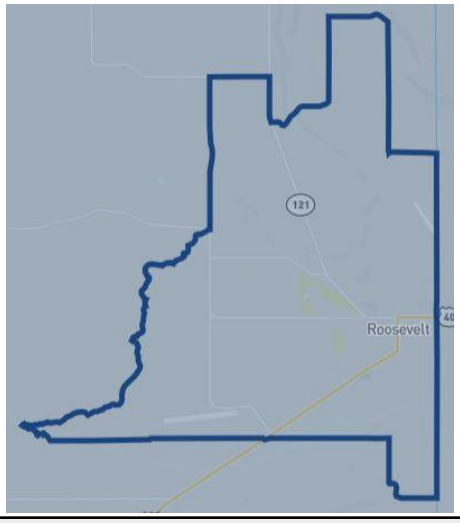
Figure 3-4. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 3-12. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
97th *% (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
93rd *% (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Lightning strikes may lead to power outages depending on the location of the strike and amount of damage inflicted. The following table lists types of critical facilities that could be negatively affected by power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment. Any damage to any of these locations due to lightning could delay critical resources to those in need.

Table 3-13. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). An uptick in lightning strikes could lead to more frequent and severe lightning damage.

Effects of Climate Change on Probability of Future Events

Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in Duchesne County, although precipitation may increase slightly. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

Table 3-14. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Lightning Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9” increase (from 19.7” to 20.5”) in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of lightning may increase.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-15. Lightning: Overall National Risk Index Score for Duchesne County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
99.6	Very High	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
99.5	Very High	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
97.4	Very High	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
94.5	Very High	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Hail

- ***Hazard Description***

Potential Probability	Low
Potential Consequence	Low
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona
Seasonal Pattern or Conditions	Late spring, summer, and early fall
Duration	Hailstorms may last hours to days

Analysis Used	NOAA, NWS, Weather on the Web, III, TORRO, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS

The NWS definition of hail is "showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud. Its size can vary from the defined minimum, a little over a quarter of an inch, up to 4.5 inches or larger." Severe hail is defined as being 0.75 inches or more in diameter. The largest hailstones are formed in supercell thunderstorms because of their sustained updrafts and long duration.

- ***Location***

Duchesne County can experience hailstorms countywide, including the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

- ***Extent***

The TORRO Hailstorm Intensity Scale was developed by Jonathan Webb to measure and categorize hailstorms (TORRO, 2024). It extends from H0 (hard hail, no damage) to H10 (super hailstorm, extensive structural damage, risk of severe/fatal injuries) with its increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind. The scale could be modified depending on factors such as building materials and types (e.g., whether roofing tiles are predominantly slate, shingle, or concrete). See the scale in the figure below (TORRO, 2024).

Scale	Intensity category	Typical hail diameter (mm)*	Probable kinetic energy J m^{-2}	Typical damage impacts
H0	Hard hail	5	0-20	No damage
H1	Potentially damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Figure 3-5. TORRO Hailstorm Intensity Scale

Hail is considered severe when reaching a size of 0.75 inches in diameter or greater. The following figure shows different hail sizes with a description for comparison (TORRO, 2024).

Size code	Maximum diameter (mm)	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > soft ball
9	91-100	Grapefruit
10	>100	Melon

Figure 3-6. TORRO Hail Size and Diameter

As demonstrated below, the National Weather Service also defines the local threat of severe hail for specified areas based on the likelihood that severe hail will occur combined with the anticipated size or diameter of the largest hailstones (NWS, 2024).

Severe Hail Threat Level	Threat Level Descriptions
Extreme	**"An Extreme Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a moderate likelihood or greater (16% probability or greater) of severe hail, with storms capable of baseball to softball sized stones. *See diameter description below.* AND/OR...a high likelihood or greater (26% probability or greater) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.* AND/OR...a very high likelihood (36% or greater) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
High	**"A High Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a low likelihood (6% to 15% probability) of severe hail with storms capable of baseball to softball sized stones. *See diameter description below.* AND/OR...a moderate likelihood (16% to 25% probability) of very large hail (golf ball to baseball sized hail stones). *See diameter description below.* AND/OR...a high likelihood (26% to 35% probability) of large hail (nickel to golf ball sized hail stones). *See diameter description below.*
Moderate	**"A Moderate Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of baseball to softball sized stones. *See description below.* AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See description below.* AND/OR...a moderate likelihood (16% to 25% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
Low	**"A Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.* AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
Very Low	**" A Very Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.* AND/OR...a low likelihood or greater (6% or greater) of small hail (less than 3/4 inch). *See diameter description below.*
Non-Threatening	**" No Discernable Threat to Life and Property from Severe Hail."** Within 12 miles of a location, environmental conditions do not support the occurrence of severe hail.

Note: To be considered severe, hail stones must be at least 3/4 inch in diameter.

Figure 3-7. Severe Hail Threat Level

- ***Historical Frequency & Probability of Future Occurrence***

In the 10-year period from 1986 to 1995, the NWS recorded severe hail in Utah on 101 occasions, while in the same time period, severe hail was recorded in Colorado nearly 1,400 times (Weather on the Web, 2024).

Hail has been recorded throughout the county and in the cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. The Storm Events Database has recorded 15 instances of severe hail in Duchesne County since 2000. The hailstones from these events range in size from 0.75 inches to 1.75

inches. Three of these hail events occurred in Duchesne, three in Myton, three in Tabiona, two in Altamont, and four in unincorporated Duchesne County (Storm Events Database, 2024).

Hail is likely to occur again in the future in any part of the county, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona. Although many parts of the United States are experiencing increased precipitation, Utah has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades.

• *Impacts & Loss Estimates*

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by hail, as presented in the table below.

Table 3-16. Impacts of Hail by Jurisdiction

Jurisdiction	Impacted by Hail	Experienced Significant Hail Damage ($1,000+) Since 2000	Fatalities Due to Hail	Potential Impacts of Hail
Duchesne County	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
City of Duchesne	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
City of Myton	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
City of Roosevelt	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
Town of Altamont	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
Town of Tabiona	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation

Deaths and injuries due to hail have occurred but are rare. Most impacts are economic, but hailstorms can also cause utility failure through damage to critical infrastructure. Hailstorms may also lead to car accidents and road closures.

Economic loss can be extensive, especially to agriculturally based economies. Hail is very damaging to crops. Severe hail may also cause extensive property damage, including damage to vehicle paint and

bodywork, glass, shingles and roofs, plastic surfaces, etc. Hail-related insured losses averaged between $8 billion to $14 billion each year in the years 2000–2019 in the U.S. (III, 2024).

Table 3-17. Hail: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.2 events per year	0.0	$539	$4,028	$100	$4,666	65.0	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0.1 events per year	0.0	$716	$3,008	$353	$4,078	63.4	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0.1 events per year	0.0	$535	$1,439	$18	$1,993	53.5	Relatively Low
Census Tract 940501: City of Roosevelt							
0.1 events per year	0.0	$263	$914	$1	$1,178	45.4	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to hailstorms.

Table 3-18. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during hailstorms.

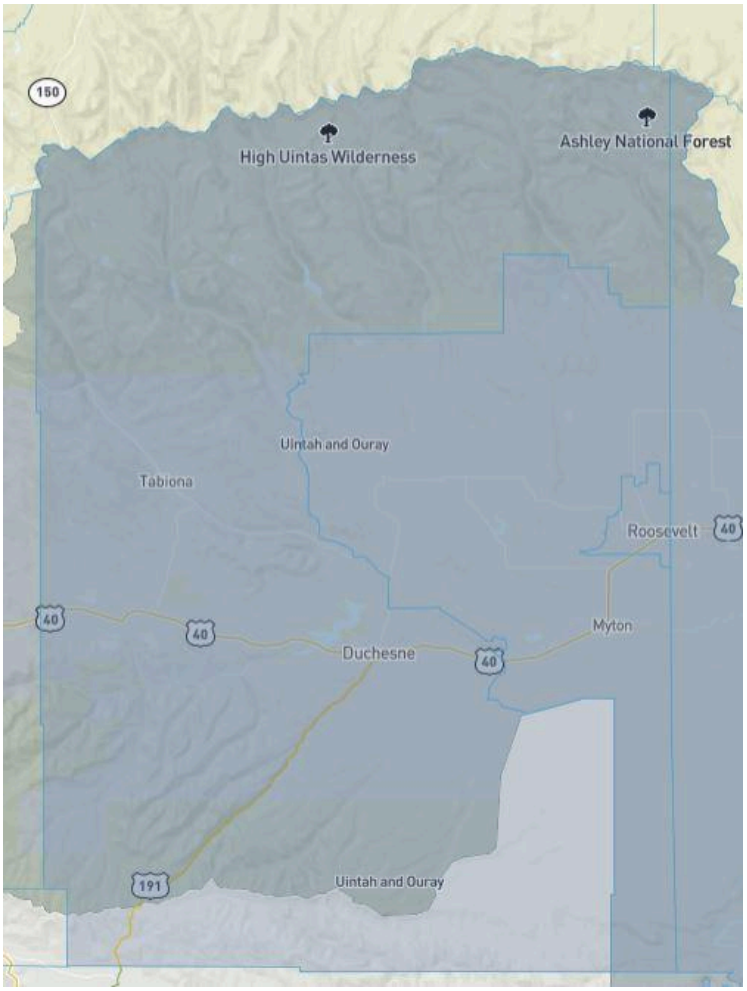
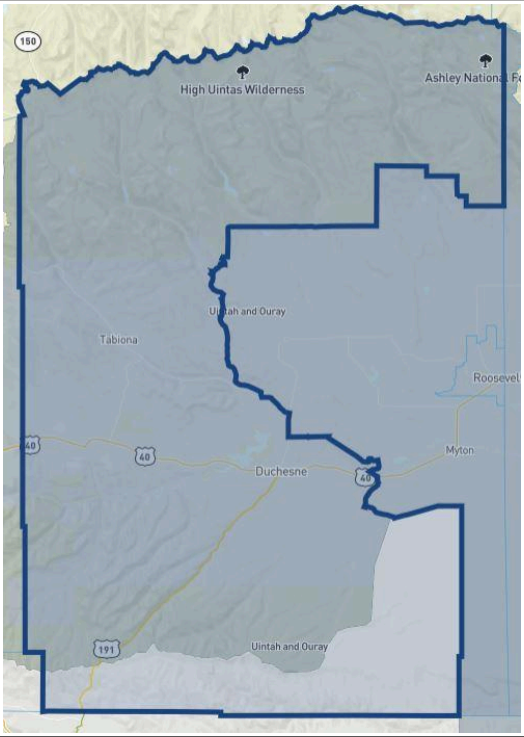


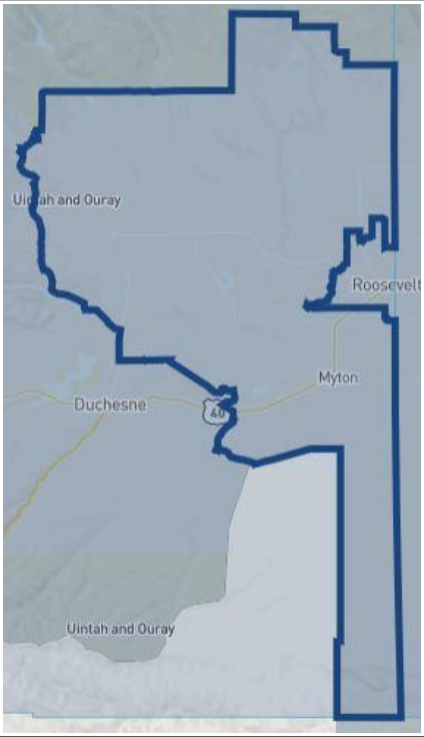
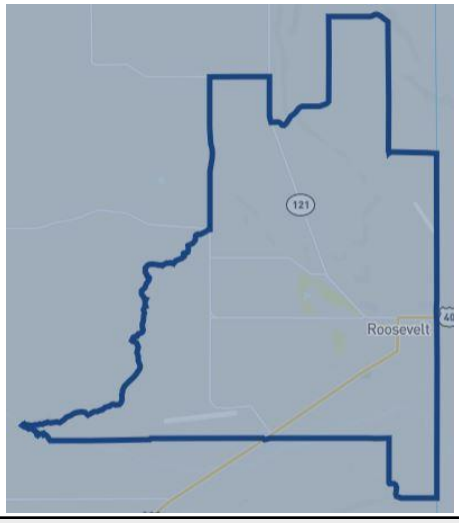
Figure 3-8. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 3-19. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
97th *% (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
93rd *% (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Severe hailstorms may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from hailstorms or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-20. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). Although many parts of the United States are experiencing increased precipitation, Utah as a whole has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades, and a slight increase in precipitation is expected in Duchesne County within 25 years.

Table 3-21. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Hail Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of hail may increase.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-22. Hail: Overall National Risk Index Score for Duchesne County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
67.3	Relatively Low	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
64.3	Relatively Low	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
54.2	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
51.4	Relatively Low	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Tornado

- ***Hazard Description***

Potential Probability		Low
Potential Consequence		Medium
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona	
Seasonal Pattern or Conditions	Spring, summer, and early fall	
Duration	Tornadoes may last seconds to hours	
Analysis Used	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

The NWS describes a tornado as "a violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena" (NWS,

2024g). Like hail, most tornadoes are spawned by supercell thunderstorms. They usually last only a few minutes, although some have lasted more than an hour and traveled several miles.

- ***Location***

Although the risk is low, a tornado event is possible anywhere in the county, including in the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

- ***Extent***

Wind speeds within tornadoes are estimated based on the damage caused and expressed using the Enhanced Fujita (EF) Scale.

Table 3-23. Enhanced Fujita (EF) Scale for Estimation of Tornado Wind Speeds

EF Scale	Class	Windspeed (mph)	Windspeed (km/h)	Description
EF0	Weak	65–85	105–137	Gale
EF1	Weak	86–110	138–177	Weak
EF2	Strong	111–135	178–217	Strong
EF3	Strong	136–165	218–266	Severe
EF4	Violent	166–200	267–322	Devastating
EF5	Violent	> 200	> 322	Incredible
Source: NOAA, 2024				

- ***Historical Frequency & Probability of Future Occurrence***

Tornado occurrence in Duchesne County is low. The Storm Events Database records five tornadoes in the county since 1950, as seen in the table below. The city of Duchesne has seen three tornadoes, and the city of Roosevelt has seen one. One tornado also occurred in unincorporated Fruitland. Myton, Altamont, and Tabiona have not experienced any tornadoes.

Table 3-24. Tornado Events in Duchesne County, UT

Location Within County	Date	EF Scale	Property Damage	Description
Duchesne	09/11/1984	EF0	$250	Tornado touched down east of Duchesne
Duchesne	07/08/1990	EF0	$0	Tornado momentarily touched down on a golf course
Roosevelt	08/11/1993	EF3	$50,000	Tornado touched down three times in Ashley National Forest, damaging around 1000 acres of trees. Trees were uprooted or snapped and four vehicles were damaged.
Duchesne	06/23/2005	EF0	$0	Tornado briefly touched down along Hwy 40 near Duchesne

Location Within County	Date	EF Scale	Property Damage	Description
Fruitland	06/19/2022	EF2	$0	Tornado developed near summit of US 191, moved into Indian Canyon, descended the valley, and crossed US 191 again. Tornado significantly damaged large sections of trees for two miles.
Source: Storm Events Database, 2024				

Future tornadoes are possible and likely, but significant damage is improbable. However, according to Neighborhoods at Risk, Duchesne County is expected to experience an increase in average annual temperature of 3°F by 2049, which could prompt the formation of additional tornadoes in the fall and winter with the increased warm air (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by tornadoes, as presented in the table below.

Table 3-25. Impacts of Tornado by Jurisdiction

Jurisdiction	May Be Impacted by Tornado	Experienced Significant Tornado Damage ($1,000+) Since 2000	Fatalities Due to Tornadoes	Potential Impacts of Tornadoes
Duchesne County	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
City of Duchesne	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
City of Myton	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
City of Roosevelt	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
Town of Altamont	Yes	No	0	Injury, death, property damage, loss of utilities,

Jurisdiction	May Be Impacted by Tornado	Experienced Significant Tornado Damage ($1,000+) Since 2000	Fatalities Due to Tornadoes	Potential Impacts of Tornadoes
				crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
Town of Tabiona	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services

Loss of utilities (primarily due to fallen trees and wind damage) is common following tornadoes, and depending on circumstances, communities might be deprived of almost any kind of goods and services including food, water, and medical care. Agriculturally, crop and livestock loss are also possible.

The Storm Events Database records $50,250 in total property damage from tornadoes in Duchesne County since 1950. See the table under *Historical Frequency & Probability of Future Occurrence* for specific events and descriptions. Most property damage from tornadoes has come from damage to trees, sheds, roofs, mobile homes, and utility poles.

Table 3-26. Tornado: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.1 events per year	0.0	$3,886	$6,120	$76	$10,082	25.9	Very Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0 events per year	0.0	$5,332	$4,997	$63	$10,392	26.3	Very Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0 events per year	0.0	$3,137	$2,201	$2	$5,340	16.2	Very Low
Census Tract 940501: City of Roosevelt							
0 events per year	0.0	$1,461	$1,366	$0	$2,828	8.2	Very Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to tornadoes.

Table 3-27. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during tornadoes.

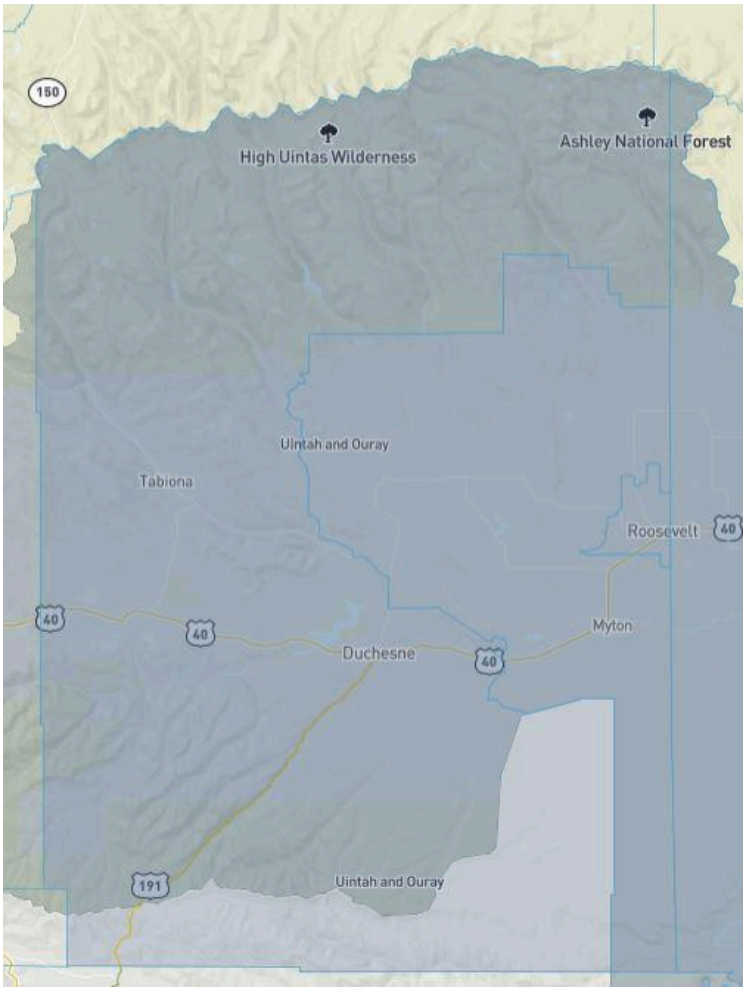
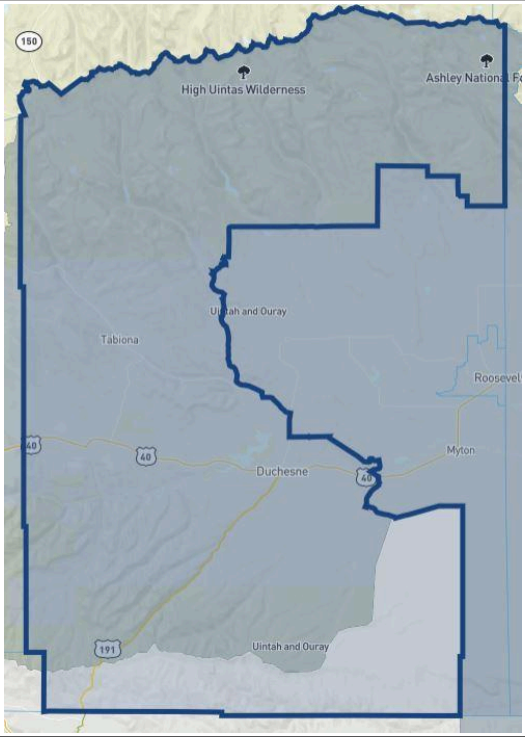


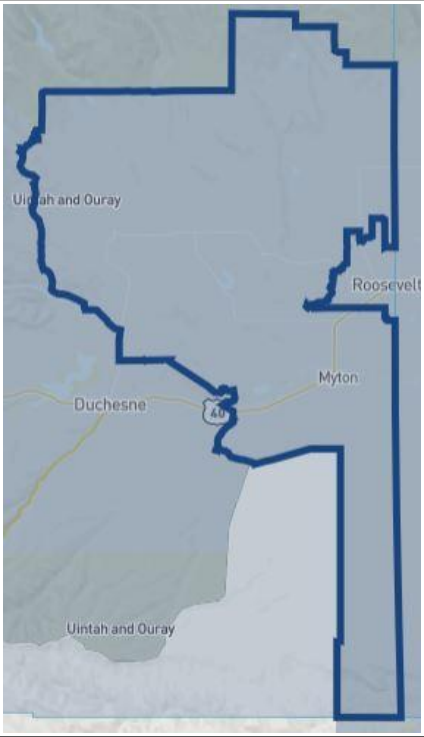
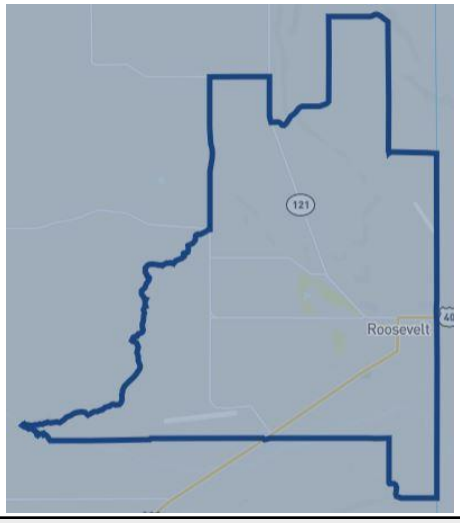
Figure 3-9. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 3-28. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
97th *% (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
93rd *% (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

A tornado may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from a tornado or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-29. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe tornadoes (USGS, 2023).

Effects of Climate Change on Probability of Future Events

Table 3-30. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Tornado Projections	By 2049, Duchesne County is expected to experience 4 more days that reach above 95°F (from 3 days to 7 days per year).
	By 2049, Duchesne County is expected to have a 3°F increase (from 41°F to 43°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent tornadoes in the fall and winter due to the increased warm air.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-31. Tornado: Overall National Risk Index for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
28	Very Low	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
26.8	Very Low	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
15.6	Very Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
11.3	Very Low	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Straight-line Wind

- ***Hazard Description***

Potential Probability		Medium
Potential Consequence		Medium
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona	
Seasonal Pattern or Conditions	All seasons	
Duration	Events may last hours to days	
Analysis Used	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

The term “straight-line wind” is used to describe any wind not associated with rotation, particularly tornadoes. Of concern is high wind, defined by the NWS as “sustained wind speeds of 40 mph or greater, lasting for one hour or longer, or winds of 58 mph or greater for any duration.” Like tornadoes, strong, straight-line winds are generated by thunderstorms, and they can cause similar damage. Straight-line wind

speeds can approach 150 mph, equivalent to those in an EF3 tornado. Additionally, derechos—which are widespread, long-lived, straight-line windstorms—may occur in Duchesne County, although less common.

• Location

Straight-line wind events affect the entire county, including the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

• Extent

The Beaufort Wind Scale explains different wind speeds based on how they would affect land conditions and sea conditions (NOAA, 2024).

Table 3-32. Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects on Land
0	Less than 1	Calm	Calm, smoke rises vertically
1	1–3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4–6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7–10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11–16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17–21	Fresh Breeze	Small trees in leaf begin to sway
6	22–27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28–33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34–40	Gale	Twigs breaking off trees, generally impedes progress
9	41–47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48–55	Storm	Seldom experienced on land, trees broken or uprooted, “considerable structural damage”
11	56–63	Violent Storm	
12	64+	Hurricane	
Source: NOAA, 2024			

• Historical Frequency & Probability of Future Occurrence

High straight-line wind events are frequent in Duchesne County, including in the cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. According to the Storm Events Database, there have been 53 reported high wind, strong wind, or thunderstorm wind events 40 mph or greater in Duchesne County between 2010–2024, as seen in the table below. The majority of the high wind events in the county occur in the Western Uinta Basin and Western Uinta Mountains.

Table 3-33. High Wind Events in Duchense County, UT

Location Within County	Date	Wind Speed (kts.)
Western Uinta Basin	06/16/2010	54 kts.
Western Uinta Basin	07/02/2010	54 kts.
Neola	07/21/2010	50 kts.
Western Uinta Mountains	11/25/2011	72 kts.
Western Uinta Mountains	12/31/2011	70 kts.
Western Uinta Mountains	02/22/2012	82 kts.

Location Within County	Date	Wind Speed (kts.)
Western Uinta Basin	02/22/2012	56 kts.
Western Uinta Basin	02/25/2012	50 kts.
Western Uinta Basin	05/18/2012	51 kts.
Western Uinta Mountains	05/26/2012	76 kts.
Western Uinta Basin	05/26/2012	52 kts.
Western Uinta Mountains	06/05/2012	72 kts.
Duchesne	09/06/2012	54 kts.
Western Uinta Mountains	05/23/2013	73 kts.
Western Uinta Mountains	06/13/2013	55 kts.
Roosevelt	07/05/2013	50 kts.
Western Uinta Basin	02/16/2014	53 kts.
Western Uinta Mountains	03/01/2014	75 kts.
Western Uinta Basin	03/17/2014	56 kts.
Duchesne	06/23/2014	54 kts.
Bridgeland	07/15/2014	66 kts.
Bridgeland	08/29/2014	56 kts.
Western Uinta Mountains	11/18/2015	72 kts.
Western Uinta Mountains	02/17/2016	98 kts.
Ioka	06/20/2017	55 kts.
Duchesne	07/02/2017	51 kts.
Duchesne	04/02/2018	50 kts.
Western Uinta Mountains	01/21/2019	61 kts.
Western Uinta Mountains	02/13/2019	65 kts.
Western Uinta Mountains	04/26/2019	57 kts.
Western Uinta Mountains	05/16/2019	61 kts.
Duchesne	09/16/2019	56 kts.
Western Uinta Basin	02/24/2020	50 kts.
Fruitland	04/30/2020	57 kts.
Duchesne	04/30/2020	51 kts.
Ioka	04/30/2020	50 kts.
Fruitland	06/05/2020	60 kts.
Western Uinta Mountains	10/14/2020	81 kts.
Western Uinta Mountains	03/20/2021	67 kts.
Bridgeland	07/28/2021	58 kts.
Duchesne	09/18/2021	50 kts.
Western Uinta Basin	04/05/2022	54 kts.
Fruitland	06/19/2022	54 kts.
Altonah	06/19/2022	59 kts.
Myton	07/01/2022	50 kts.
Western Uinta Mountains	12/01/2022	77 kts.
Western Uinta Mountains	12/21/2022	73 kts.
Wasatch Plateau/Book Cliffs	12/22/2022	73 kts.
Western Uinta Mountains	04/18/2023	80 kts.
Fruitland	07/24/2023	56 kts.
Western Uinta Basin	09/13/2023	43 kts.
Duchesne	09/20/2023	52 kts.
Western Uinta Mountains	12/03/2023	79 kts.
Source: Storm Events Database, 2024		

Future significant straight-line wind events are likely to occur multiple times each year throughout the entire county, including in Duchesne, Myton, Roosevelt, Altamont, and Tabiona. According to Neighborhoods at Risk, Duchesne County is expected to experience an increase in average annual temperature of 3°F by 2049, which could influence the variability of regional and seasonal winds in Utah as carbon dioxide levels increase (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

• *Impacts & Loss Estimates*

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by straight-line wind, as presented in the table below.

Table 3-34. Impacts of Straight-Line Wind by Jurisdiction

Jurisdiction	Impacted by Straight-Line Wind	Experienced Significant Straight-Line Wind Damage ($1,000+) Since 2000	Potential Impacts of Straight-Line Wind
Duchesne County	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
City of Duchesne	Yes	No	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
City of Myton	Yes	No	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
City of Roosevelt	Yes	No	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
Town of Altamont	Yes	No	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
Town of Tabiona	Yes	No	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities

The impacts of straight-line winds are virtually the same as those from tornadoes with similar wind speeds. The damage is distinguishable from that of a tornado only in that the debris is generally deposited in nearly parallel rows. Downbursts are particularly hazardous to aircraft in flight.

Since 2000 there has been $335,100 in reported losses due to high wind, thunderstorm wind, and strong wind damage in Duchesne County (Storm Events Database, 2024). Though losses aren't regularly reported, it is known that they occur because of the frequency and magnitude of high wind events.

Table 3-35. Strong Wind: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.3 events per year	0.0	$4,394	$4,810	$38	$9,242	50.3	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0.1 events per year	0.0	$4,341	$2,474	$89	$6,903	44.5	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0.1 events per year	0.0	$3,126	$1,106	$5	$4,237	36.3	Relatively Low
Census Tract 940501: City of Roosevelt							
0.1 events per year	0.0	$1,602	$755	$0	$2,357	28.4	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to severe straight-line wind conditions.

Table 3-36. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%

Vulnerability Category	Number	Percent
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during straight-line wind events.

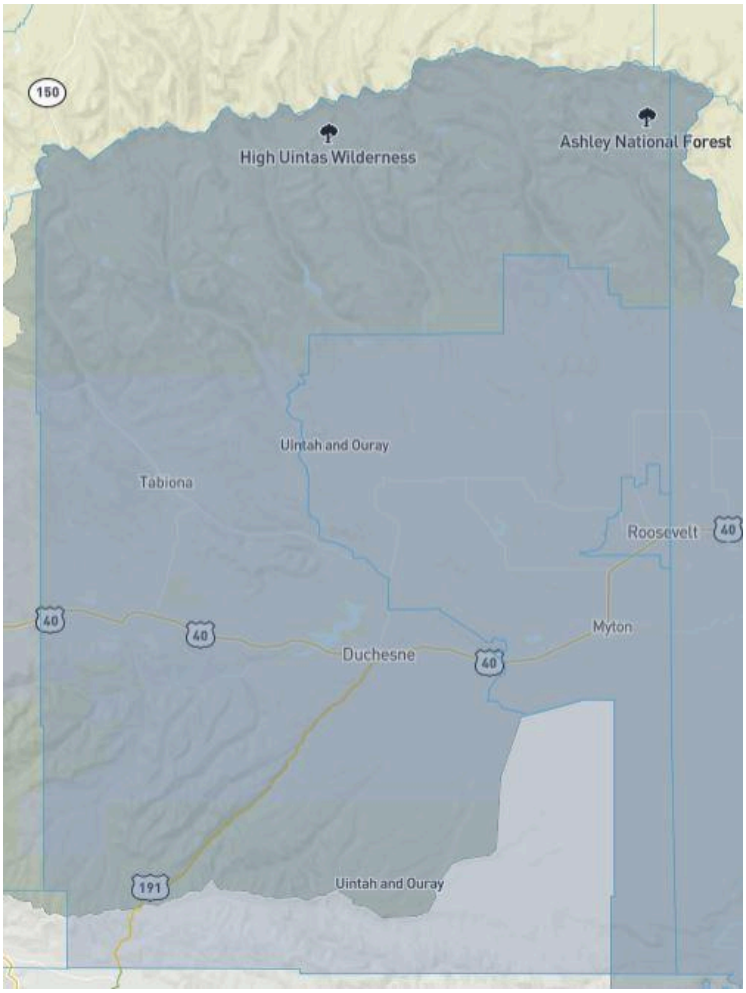


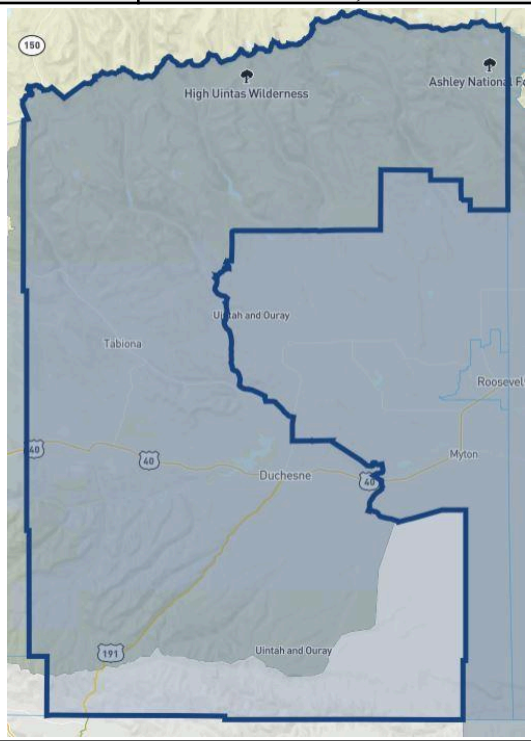
Figure 3-10. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 3-37. Disadvantaged Communities in Duchesne County

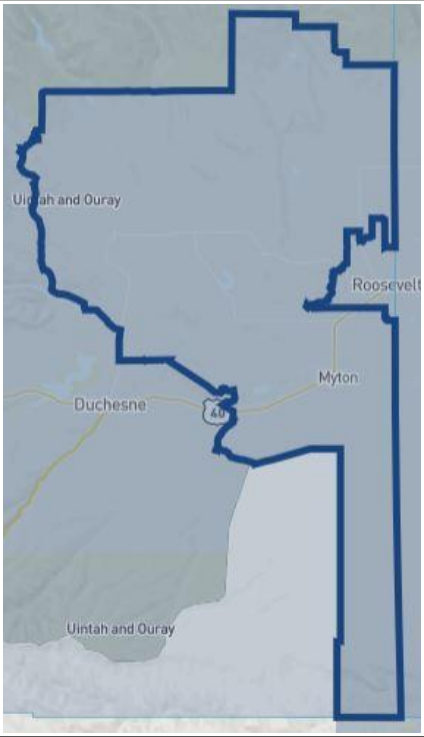
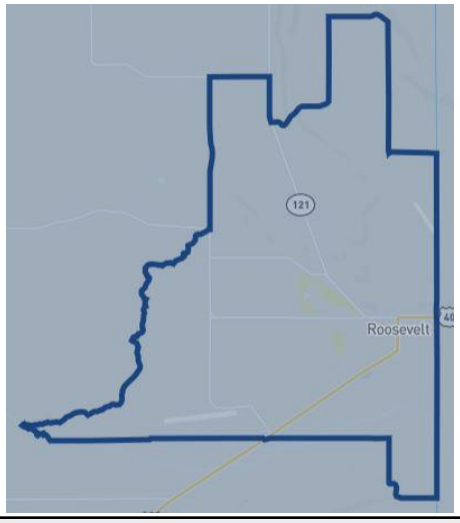
DUCHESNE COUNTY, UT
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT

DUCHESNE COUNTY, UT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940300	4,523	YES



CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution	
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*
YES	*Presence of one or more abandoned mine land within the tract*

CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Straight-line wind may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from straight-line wind or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-38. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe straight-line wind events and even derechos (USGS, 2023). However, there are still many questions and factors yet to be resolved about wind with some studies suggesting climate change may even reduce wind speeds. Uncertainty remains high as it relates to climate change and its impact on this hazard. Further analysis and studies need to be conducted, specifically for this region.

Effects of Climate Change on Probability of Future Events

Table 3-39. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Wind Projections	By 2049, Duchesne County is expected to experience 4 more days that reach above 95°F (from 3 days to 7 days per year).
	By 2049, Duchesne County is expected to have a 3°F increase (from 41°F to 43°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent straight-line wind events as more powerful storms develop.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-40. Strong Wind: Overall National Risk Index Score for Duchesne County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
55.1	Relatively Low	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
46.7	Relatively Low	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
37.0	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
33.0	Relatively Low	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● SEVERE WINTER WEATHER

o HAZARD DESCRIPTION

Severe winter weather includes extreme cold, winter storm, and avalanche. Severe winter weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. It should be noted that straight-line wind is also associated with severe winter storms, commonly referred to as blizzard conditions, where snow is driven by wind-caused drifting.

o RELATED HAZARDS

▪ Extreme Cold

● *Hazard Description*

Potential Probability		High
Potential Consequence		Medium
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona	
Seasonal Pattern or Conditions	Winter	
Duration	Events may last hours to days	
Analysis Used	NOAA, NWS, Public Health Post, National Risk Index, Neighborhoods at Risk, EWG, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund	

“Extreme cold” is another of the terms describing hazards that must be defined relative to what is considered normal in a given locale. What might be considered extreme cold varies considerably in the state of Utah where normal winter temperatures in the south are appreciably more moderate than those in the north. Very cold temperatures become a particular hazard when accompanied by winds of 10 mph or greater. As with extreme heat, extreme cold is of greatest concern when the condition persists for an extended period of time.

● *Location*

Extreme cold temperatures affect the entire county, including the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

● *Extent*

The NWS has developed a formula for calculating wind chill based on temperature and wind speed and issues wind chill advisories in this region when the wind chill temperature is predicted to be -10°F or less with winds of 10 mph or higher for one hour or more. Wind chill warnings are issued when wind chill temperature will be -20°F or less with winds of 10 mph or higher for one hour or more (see the figure below).

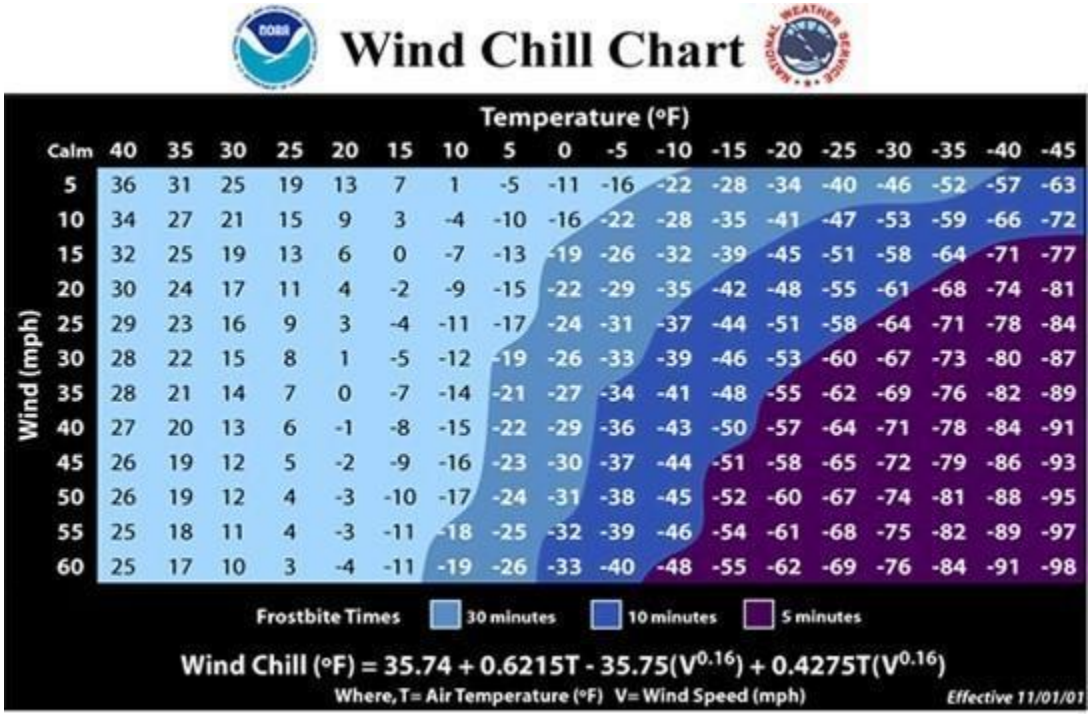


Figure 4-1. National Weather Service Wind Chill Chart

- ***Historical Frequency & Probability of Future Occurrence***

According to NWS available data, the record low temperature in the city of Duchesne is -43°F, which was recorded in January 1937 (NOWData, 2024). The record low temperature in the city of Myton is -39°F, which was recorded twice in January 1952 and February 1989. January is historically the coldest month of the year in Duchesne County with an average temperature of 18.5°F in Duchesne and 15.5°F in Myton (NOWData, 2024). Cold clusters are particularly damaging. Most recently in February 2023, Myton, UT experienced 28 days of the month with a low of 10°F or less, which is every day in February. There have been several months within the last decade with over 20 days of extreme cold. During the 10-year period from 2013–2023, Myton recorded a total of 262 extreme cold days of 10°F or less (NOWData, 2024).

Extreme cold temperatures are likely every year throughout the county, including in Duchesne, Myton, Roosevelt, Altamont, and Tabiona. However, since Daggett County is expected to experience an increase in average annual temperature of 3°F by 2049, extreme cold events may become less and less over the coming decades (Neighborhoods at Risk, 2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by extreme cold, as presented in the table below.

Table 4-1. Impacts of Extreme Cold by Jurisdiction

Jurisdiction	Impacted by Extreme Cold Events (≤ 10°F) Within Last 100 Years	Potential Impacts of Extreme Cold
Duchesne County	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Duchesne	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Myton	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Roosevelt	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Altamont	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
Town of Tabiona	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

Health effects of exposure to extreme cold include hypothermia and frostbite, both of which can be life-threatening. Infants and the elderly are most susceptible. In the United States, approximately 1,300 deaths are attributed to hypothermia or cold exposure annually (Lane, 2018).

Extreme cold may cause loss of wildlife and vegetation and kill livestock and other domestic animals. Economic loss may result from flooding due to burst pipes, large demands on energy resources, and diminished business activity. River flooding may take place as a result of the formation of ice jams.

Extreme cold affects the individual, families, cities, and the county. Damage typically occurs to individual properties; however, city water systems are usually vulnerable to extreme cold. Repairs to water line freeze-ups and breaks typically require the roadways to be excavated, necessitating additional maintenance and repairs during the warmer months.

Extreme cold can cause death and injury especially to those working or stranded outside for prolonged periods. Economic loss is related to private individuals, businesses, and government agencies in heating

homes and facilities. Additional losses can be expected to the livestock industry. During extreme cold periods the schools are closed to protect children traveling to and from school.

During the spring, summer, and fall, temperatures can drop low enough to produce frost. While such temperatures are not low enough to damage infrastructure or require extra heating costs, it can be devastating to crops. Extreme minimum temperatures can fall below freezing much of the fall, winter, and spring.

During the spring, summer, and fall, temperatures can drop low enough to produce frost. While such temperatures are not low enough to damage infrastructure or require extra heating costs, it can be devastating to crops. According to the EWG, $8,789 in crop indemnity payments were due to frost in Duchesne County for the period of 1995–2022. Extreme minimum temperatures can fall below freezing much of the fall, winter, and spring.

Table 4-2. Cold Wave: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0 events per year	0.0	$0	$0	$0	$0	43.0	Very Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0 events per year	0.0	$12	$0	$1	$13	43.3	Very Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0 events per year	0.0	$0	$0	$0	$0	42.9	Very Low
Census Tract 940501: City of Roosevelt							
0 events per year	0.0	$0	$0	$0	$0	0.0	No Expected Annual Losses

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions or shelter from the cold may be more vulnerable to extreme cold conditions. Additionally, those who cannot afford to sufficiently heat their homes may be at risk.

Table 4-3. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during extreme cold events or keep their homes sufficiently heated.

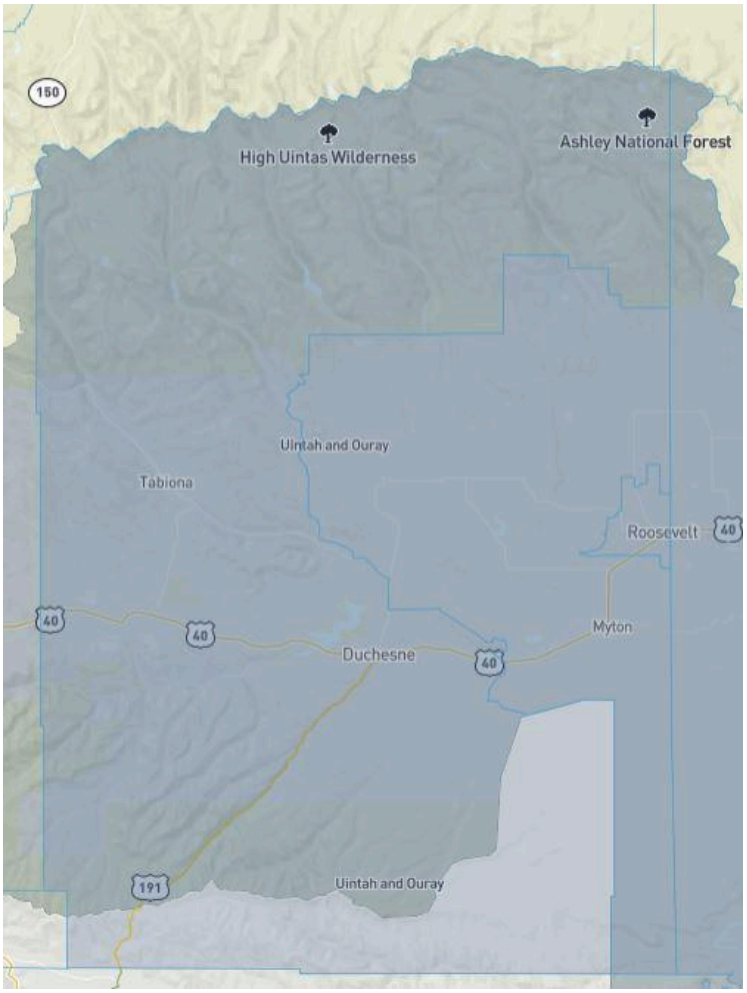
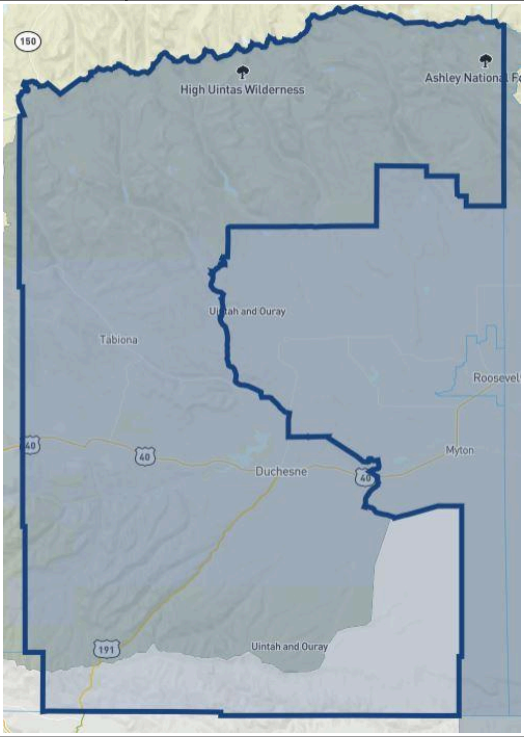
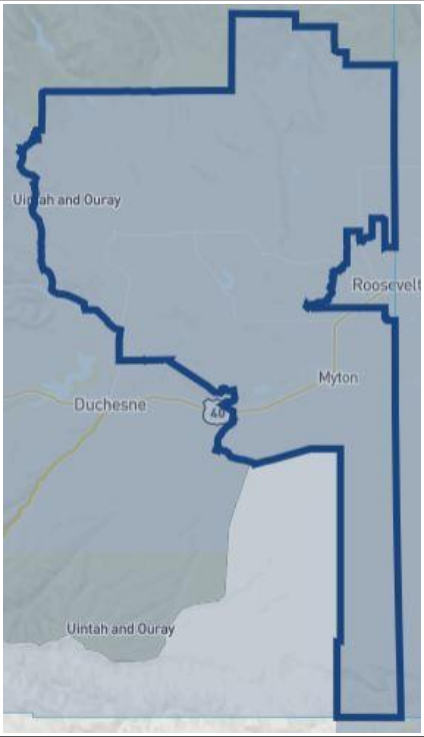
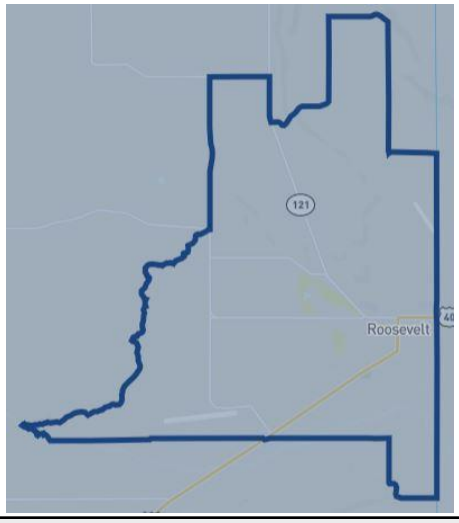


Figure 4-2. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 4-4. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940300	4,523	YES
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Extreme cold may cause significant damage to critical facilities in the county due to frozen or burst water lines. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups, which could delay emergency response.

Table 4-5. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Extreme cold temperatures are likely to remain a common occurrence in Duchesne County but may begin a slight downturn in frequency over the next century.

Effects of Climate Change on Probability of Future Events

Table 4-6. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Cold Projections	By 2049, Duchesne County is expected to experience 4 more days that reach above 95°F (from 3 days to 7 days per year).
	By 2049, Duchesne County is expected to have a 3°F increase (from 41°F to 43°F) in average annual temperatures.
	Increasing annual temperatures can contribute to less frequent extreme cold events.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 4-7. Cold Wave: Overall National Risk Index Score for Duchesne County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
42.2	Very Low	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
42.6	Very Low	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
42.2	Very Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
0.0	No Rating	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Winter Storm

- ***Hazard Description***

Potential Probability	High
Potential Consequence	Medium
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona
Seasonal Pattern or Conditions	Winter
Duration	Storms may last hours to days
Analysis Used	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, NCEI, EWG, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund, Neighborhoods at Risk

The NWS describes winter storm as weather conditions that produce heavy snow or significant ice accumulations. For the purposes of this analysis, a severe winter storm is defined as any winter condition where the potential exists for a blizzard (winds >/= 35mph and falling/drifting snow frequently reduce

visibility < ¼ mile, for two hours or more), heavy snowfall (six inches or more snowfall in 24 hours in the valleys; nine inches or more snowfall in 24 hours in the mountains), ice storm, and/or strong winds.

- ***Location***

Severe winter storms are a risk countywide and occur frequently, including in the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

- ***Extent***

The magnitude or severity of a severe winter storm depends on several factors, including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day and week (e.g., weekday versus weekend), and time of season. The NOAA produces the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S., but Utah is not included in this scale. However, the scale is still included below for reference and can be a useful tool for considering extent values of snowfall throughout the planning area (NCEI, 2024).

Category	RSI Value	Description
1	1–3	Notable
2	3–6	Significant
3	6–10	Major
4	10–18	Crippling
5	18.0+	Extreme

Figure 4-3. NCEI Regional Snowfall Index (RSI)

- ***Historical Frequency & Probability of Future Occurrence***

According to the Storm Events Database, Duchesne County has had 137 instances of severe winter storm since 2010 (classified under "blizzard," "heavy snow," "winter storm," and "winter weather"). In the last five years (January 2019–December 2023), the county has experienced 60 winter storm events, many of which have occurred in the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona. The Western Uinta Mountains and Wasatch Plateau/Book Cliffs receive the most winter storms in the county.

Duchesne County will continue to experience multiple winter storms every year throughout the county, including in Duchesne, Myton, Roosevelt, Altamont, and Tabiona. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in winter storms is not currently likely (NCEI, 2022). Future winter storm trends are predicted to remain consistent in the next 20 years in Duchesne County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades.

- ***Impacts & Loss Estimates***

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by winter storms, as presented in the table below.

Table 4-8. Impacts of Winter Storm by Jurisdiction

Jurisdiction	Impacted by Winter Storms	Experienced Significant Winter Storm with $1,000+ in Damage Since 2010	Potential Impacts of Winter Storms
Duchesne County	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
City of Duchesne	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
City of Myton	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
City of Roosevelt	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
Town of Altamont	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
Town of Tabiona	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of

Jurisdiction	Impacted by Winter Storms	Experienced Significant Winter Storm with $1,000+ in Damage Since 2010	Potential Impacts of Winter Storms
			crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services

The impacts of the very cold temperatures that may accompany a severe winter storm are discussed in the previous section. Other life-threatening impacts are numerous. Motorists may be stranded by road closures or may become trapped in their automobiles in heavy snow and/or low visibility conditions. Bad road conditions cause automobiles to go out of control. People can be trapped in homes or buildings for long periods of time without food, heat, and utilities. Those who are ill may be deprived of medical care by being stranded or through loss of utilities and lack of personnel at care facilities. Use of heaters in automobiles and buildings by those who are stranded may result in fires or carbon monoxide poisoning. Fires during winter storm conditions are a particular hazard because fire service response is hindered or prevented by road conditions and because water supplies may be frozen. Emergency Services may also not be available if telephone service is lost. People who attempt to walk to safety through winter storm conditions often become disoriented and lost. Downed power lines not only deprive the community of electricity for heat and light but pose an electrocution hazard. Death and injury may also occur if heavy snow accumulation causes roofs to collapse. There have been 41 fatalities in Utah from 1962–2018 due to winter storms. About 70% of these fatalities occur in automobiles, while 25% are a result of people caught out in the elements (Utah Hazard Mitigation Plan, 2019).

The total economic impact in Utah for a 24-hour statewide winter storm is $66.36 million, including $42.81 million in lost wages and salaries and overtime, $18.26 million in lost retail sales, $3.32 million in federal taxes, and $1.98 million for state and local taxes (Utah Hazard Mitigation Plan, 2019). Economic impacts arise from numerous sources, including hindered transportation of goods and services; flooding due to burst water pipes; forced closing of businesses; inability of employees to reach the workplace; damage to homes and structures, automobiles, and other belongings by downed trees and branches; loss of livestock and vegetation; and many others. Loss of crops is also common. The EWG reported $8,789 in crop indemnity payments due to frost in Duchesne County for the period of 1995–2022.

Table 4-9. Winter Weather: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
13.6 events per year	0.0	$4,835	$5,290	$10	$10,134	87.5	Relatively High
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
4 events per year	0.0	$3,425	$1,565	$15	$5,004	76.2	Relatively Moderate
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
1.1 events per year	0.0	$2,591	$729	$1	$3,321	68.2	Relatively Moderate
Census Tract 940501: City of Roosevelt							
1.1 events per year	0.0	$1,332	$483	$0	$1,815	56.0	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Table 4-10. Ice Storm: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0 events per year	0.0	$722	$4,371	N/A	$5,092	66.9	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0 events per year	0.0	$1,282	$4,919	N/A	$6,201	70.6	Relatively Moderate
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0 events per year	0.0	$1,015	$2,514	N/A	$3,529	59.1	Relatively Low
Census Tract 940501: City of Roosevelt							
0 events per year	0.0	$522	$1,667	N/A	$2,189	48.1	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f							

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions or shelter from the cold and winter storms may be more vulnerable to winter conditions. Additionally, those who cannot afford to sufficiently heat their homes or transport themselves to a safe location may be at risk.

Table 4-11. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during winter storms or keep their homes sufficiently heated.

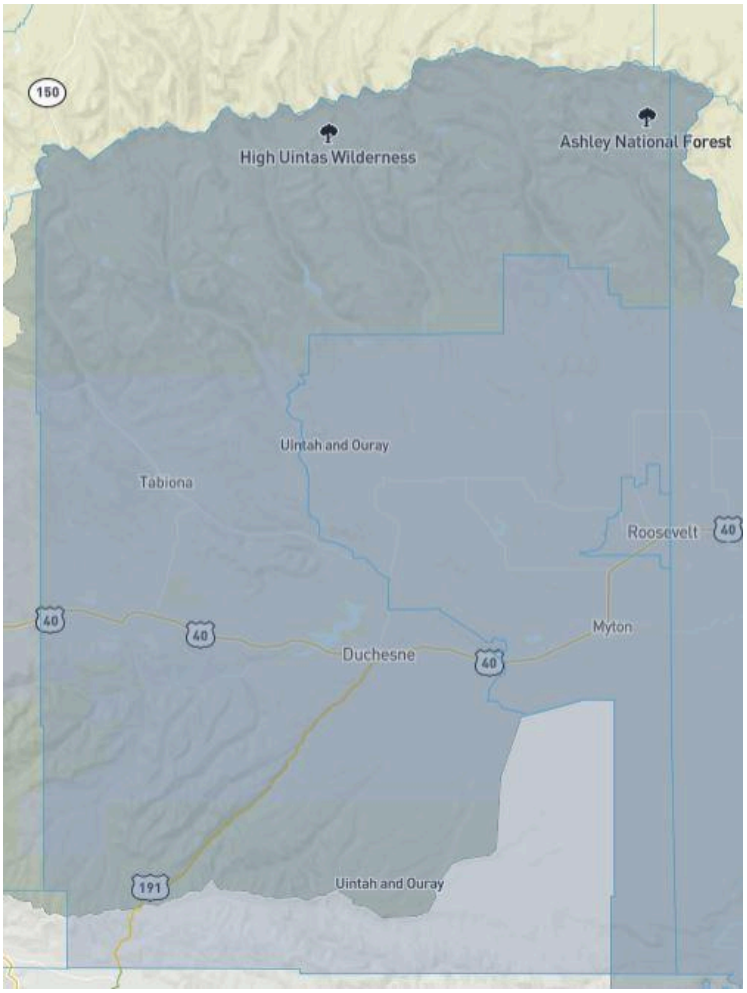
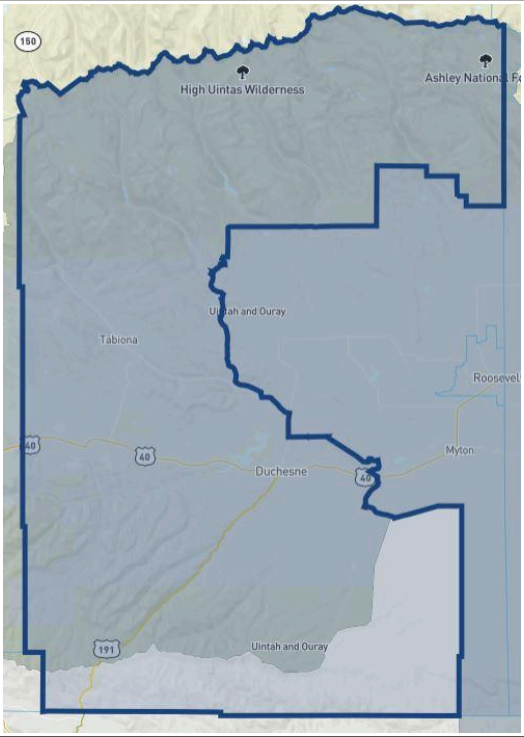


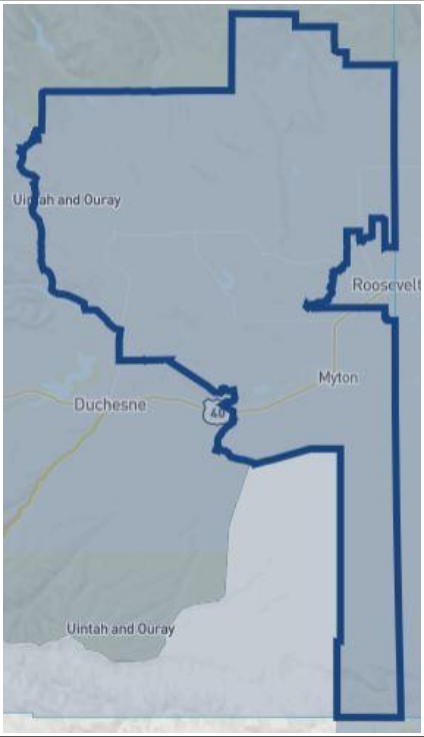
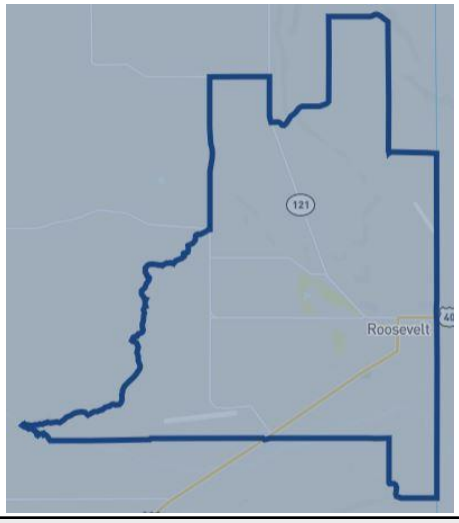
Figure 4-4. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 4-12. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Winter storms may cause significant damage to critical facilities in the county due to frozen or burst water lines. High wind during winter storms may knock down power lines, as well, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups or power outages, which could delay emergency response and access to life-saving medical equipment.

Table 4-13. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023).

Effects of Climate Change on Probability of Future Events

Table 4-14. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	Increased participation can lead to more frequent and severe winter storms.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 4-15. Winter Weather: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
90.0	Relatively High	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
78.3	Relatively Moderate	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
69.9	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
64.6	Relatively Moderate	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

Table 4-16. Ice Storm: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
71.7	Relatively Moderate	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
72.9	Relatively Moderate	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
61.5	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
58.4	Relatively Low	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Avalanche

- ***Hazard Description***

Potential Probability		Medium

Potential Consequence	Medium
Location	Uinta Mountains and any steep slopes that may accumulate snow; along US-191 and US-40
Seasonal Pattern or Conditions	Winter
Duration	Events may last seconds to minutes; snowstorms that cause avalanches may last hours to days
Analysis Used	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, North American Public Avalanche Danger Scale, Utah Avalanche Center, NCEI, Environmental Defense Fund, Neighborhoods at Risk

Snow avalanches are common in mountainous terrain where heavy snowfall accumulates on steep slopes. Avalanches generally occur on slopes between 30 and 45 degrees with 38 degrees being the "ideal" slope for development of avalanche conditions. They are often categorized as either "loose snow" or "slab" types. A loose snow avalanche is initiated when snow is dislodged at a point upslope and, in turn, dislodges more snow as it moves downward. Such avalanches usually grow wider and larger as they proceed but are usually somewhat limited in size. The generally more dangerous slab avalanche occurs when a cohesive mass of snow breaks free and moves downward, either as a single unit, or breaking into smaller pieces traveling together. Four factors combine to produce a slab avalanche: (1) a large mass of snow that is cohesive as a result of a single, large snowfall, or some physical change due to temperature, introduction of water content, or other factors; (2) some source of instability or weakness that forms a boundary capable of breaking free; (3) a surface, called a sliding layer, upon which the slab may easily slide; and (4) a triggering event, such as increased weight, strong vibration, wind, or a temperature increase, that overcomes the binding forces at, or further weakens the boundary of instability. It is estimated that around 90% of avalanches where victims are involved are triggered by their victims or those who accompany them.

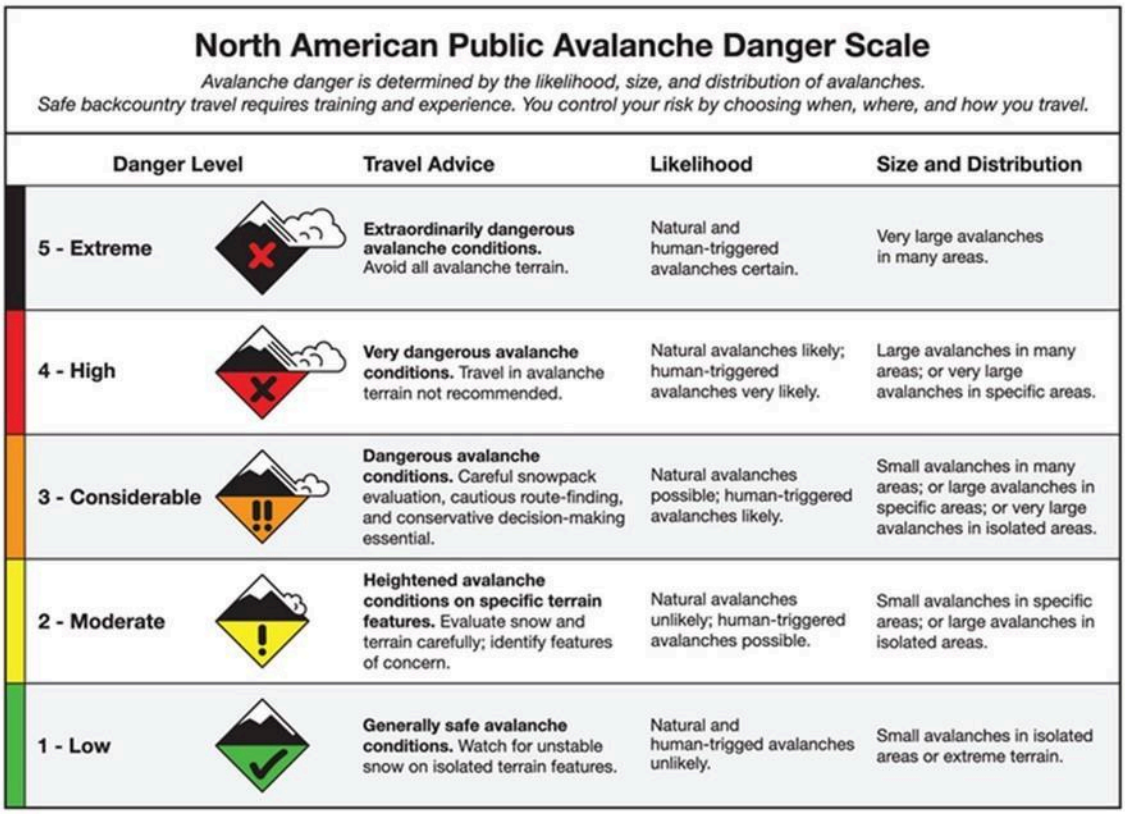
Avalanches are comprised of three zones—the release zone where the mass breaks free and accelerates, the track where the mass travels downward at a relatively constant speed (often approaching 80 mph), and the runout zone where the mass slows and comes to rest. While the exact moment of an avalanche cannot be predicted, avalanche conditions are readily recognizable, and avalanches tend to recur on the same slopes year after year.

- ***Location***

Snow avalanches can occur anywhere in the county with mountains and/or slopes that accumulate with snow. However, the primary avalanche zone in Duchesne County is the Uinta Mountains in the northern region, especially along US-191 and US-40 (Utah Hazard Mitigation Plan, 2019).

- ***Extent***

The North American Public Avalanche Danger Scale is a tool used by avalanche forecasters throughout the U.S. to communicate the potential for avalanches to cause harm or injury to backcountry travelers.



North American Public Avalanche Danger Scale

Avalanche danger is determined by the likelihood, size, and distribution of avalanches.
Safe backcountry travel requires training and experience. You control your risk by choosing when, where, and how you travel.

Danger Level	Travel Advice	Likelihood	Size and Distribution
5 - Extreme	**Extraordinarily dangerous avalanche conditions.** Avoid all avalanche terrain.	Natural and human-triggered avalanches certain.	Very large avalanches in many areas.
4 - High	**Very dangerous avalanche conditions.** Travel in avalanche terrain not recommended.	Natural avalanches likely; human-triggered avalanches very likely.	Large avalanches in many areas; or very large avalanches in specific areas.
3 - Considerable	**Dangerous avalanche conditions.** Careful snowpack evaluation, cautious route-finding, and conservative decision-making essential.	Natural avalanches possible; human-triggered avalanches likely.	Small avalanches in many areas; or large avalanches in specific areas; or very large avalanches in isolated areas.
2 - Moderate	**Heightened avalanche conditions on specific terrain features.** Evaluate snow and terrain carefully; identify features of concern.	Natural avalanches unlikely; human-triggered avalanches possible.	Small avalanches in specific areas; or large avalanches in isolated areas.
1 - Low	**Generally safe avalanche conditions.** Watch for unstable snow on isolated terrain features.	Natural and human-trigged avalanches unlikely.	Small avalanches in isolated areas or extreme terrain.

Figure 4-5. North American Public Avalanche Danger Scale

- ***Historical Frequency & Probability of Future Occurrence***

Avalanches occur often in Duchesne County, primarily in the Uinta Mountains, but many go unreported and/or undetected. The Utah Avalanche Center records observations of avalanches throughout Utah, including in the Western Uinta Mountains. However, the majority of the section of the Uintas in Duchesne County is not tracked by the Utah Avalanche Center because this area is not a common recreation ground for backcountry users during the winter. No avalanches have been reported in the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

Avalanches in the Uinta Mountains are likely to continue at the existing trend, but avalanches in the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona would still be extremely unlikely in the future. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in snowfall—and therefore avalanches—is not currently likely (NCEI, 2022). Future avalanche conditions are predicted to remain consistent in the next 20 years in Duchesne County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades, which could lead to an uptick in avalanches. Additionally, an increase in average temperatures during the winter could cause unstable avalanche conditions, thus triggering more frequent events.

• *Impacts & Loss Estimates*

Parts of unincorporated Duchesne County may be impacted by avalanches, as presented in the table below. However, the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona are not likely to be impacted by avalanches.

Table 4-17. Impacts of Avalanche by Jurisdiction

Jurisdiction	Impacted by Avalanches	Fatalities Due to Avalanches	Potential Impacts of Avalanches
Duchesne County	Yes	0	Injury, trauma, hypoxia, suffocation, death, property damage, fallen trees/vegetation, rockslides, damage to power lines, road/railway closures, utility losses, rescue/recovery expenses, debris/snow removal expenses
City of Ballard	No	0	No impacts likely
City of Naples	No	0	No impacts likely
City of Vernal	No	0	No impacts likely
Town of Altamont	No	0	No impacts likely
Town of Tabiona	No	0	No impacts likely

It is common for avalanche impacts to be somewhat limited. Because avalanches usually occur in remote areas, the most frequent victims are recreational users of the slopes on which they occur. Of those who die in avalanches, approximately one third of the deaths are a result of trauma while the remaining two thirds are from suffocation. Trauma may be the result of being carried into obstructions, such as boulders and trees, or over cliffs, or from rocks, trees, or large chunks of snow being carried downward at high speed. Avalanches may also damage or destroy structures, break power lines, block roadways and railroads, and damage trees and vegetation.

Visiting tourists and recreational users may be at an increased risk of triggering avalanches and/or being caught in one if they are not well-versed in the area and where common avalanche hot spots are located. It's important for visitors to stay informed about the risks of any recreational activity they participate in.

As with landslides, losses from snow avalanches come from damage to roadways and the resulting snow and debris removal costs. Additionally, if a rescue and/or recovery is necessary for any people caught in the avalanche, physical and monetary resources must go toward rescue helicopters, rescue crew, rescue equipment, additional transport, medical treatment, etc., which can add up to thousands of dollars.

Table 4-18. Avalanche: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.1 events per year	0.05	$562,224	$633	N/A	$562,857	76.7	Relatively High
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0.1 events per year	0.05	$562,224	$633	N/A	$562,857	76.7	Relatively High

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Census Tract 940501: City of Roosevelt							
N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

Because those typically affected by avalanches in Duchesne County are often recreational users who ventured into avalanche terrain by choice, the vulnerable populations in the county are unlikely to be at risk from this hazard. Similarly, those who live in Duchesne County's cities and towns are not at risk from avalanches due to the area's lack of avalanche terrain or mountains. No critical facilities in the county are located near avalanche terrain or potentially at risk of being damaged in an avalanche.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additional heavy snow could create unstable avalanche conditions and lead to more frequent avalanches.

Effects of Climate Change on Probability of Future Occurrence

Table 4-19. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	Increased participation can lead to more unstable avalanche conditions and frequent avalanches.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 4-20. Avalanche: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
82.2	Relatively High	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
80.6	Relatively High	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
N/A	N/A	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
N/A	N/A	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

• WILDFIRE

o HAZARD DESCRIPTION

Potential Probability	High
Potential Consequence	High
Location	Countywide, including around Duchesne, Myton, Roosevelt, Altamont, and Tabiona; URWIN zones near the foothills and in forested areas
Seasonal Pattern or Conditions	Summer and fall months. Wildfire-prone areas are areas affected by drought and/or heavily overgrown and dry brush and debris. Lightning and human triggers cause wildfires.
Duration	Wildfires typically last days but can last months, depending on climate and fuel load as well as resources (financial, manpower) to extinguish the fire.
Analysis Used	U.S. Forest Service, National Climate Center, FEMA, AGRC, County Hazard Analysis Plans, 2019 Utah Hazard Mitigation Plan, NWCG, Utah Forestry, Fire & State Lands, local newspaper articles, Utah Fire Marshal, Wildfire Risk, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR

Wildfires—uncontrolled fires spreading through both naturally occurring and non-native vegetative fuel sources—are a significant hazard, often beginning unnoticed and spreading quickly while threatening any structures in its path. Wildfires can cover a large geographic area, can be ignited by natural or human sources, and are hard to predict. They help to maintain a healthy ecosystem and have been a natural and fundamental part of the world's forests and grasslands for millions of years. Fires cleanse and regenerate forests, giving new life to the soil and encouraging biodiversity. They are responsible for the evolution of many of the grasses, brushes, and tree species found in Utah (Utah Hazard Mitigation Plan, 2019).

Wildfires are classified as Wildland and Wildland-Urban Interface (WUI). Wildland fires occur in areas where development is essentially nonexistent except for roads, railroads, or power lines. WUI fires materialize in a geographical area where structures and other human development adjoins wildlands. A fireshed is an area that will adversely affect a community or high-value resource and/or asset if ignited (Utah Hazard Mitigation Plan, 2019).

o LOCATION

On average in Utah, years with more spring rainfall typically have higher wildfire incidents in the summer and fall after vegetation dries out and becomes combustible material. Hot temperatures, high winds, and dry conditions brought on by years of drought have caused high mortality rates in low elevation timber and shrubs, all contributing to prime fire conditions (Utah Hazard Mitigation Plan, 2019). Wildfires may occur in any part of Duchesne County, including in or around the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona. High risk areas include Pinion Ridge, Argyle Canyon, the Neola area, and the Tabby Mountain subdivision.

Duchesne County sees an average of approximately nine inches of precipitation per year (NOWData, 2024). The central to southeastern parts of the county typically see lower precipitation averages due to its mostly semi-arid climate.

As documented in the previous regional plan, the following table identifies the roads and utilities within Duchesne County at potential risk to wildfire.

Table 5-1. Roads and Utilities at Risk to Wildfire

Transportation	
Name	**Miles**
Local Neighborhood/City Roads	619
State Route 35	1.1
State Route 87	13.07
State Route 121	0.90
State Route 150	3.68
State Route 191	4.88
State Route 208	5.85
State Route 311	2.59
U.S. Highway 40	25
Utilities	
Name	**Description**
Moon Lake Plant	Power Generation
KV-138	6.01 miles
Power Lines	46.27 miles
Natural Gas	9.37 miles

o EXTENT

The National Wildfire Coordinating Group (NWCG) classifies fire sizes using the following standards (NWCG, 2023). These standard data values are included in the data table below.



Figure 5-1. NWCG Size Class of Fire

The State of Utah Division of Forestry, Fire, and State Lands provides five categories of wildfire risk, which are listed below:

- Extreme
- High
- Medium
- Low
- Very Low

These ratings cover all of Duchesne County and are based on the type and density of vegetation in each area. Additional factors influencing wildfires, such as weather conditions, wind speed, and direction, are not considered in this risk assessment.

The Utah Wildfire Risk Explorer from the Utah Division of Forestry, Fire & State Lands maps the Burn Probability and Damage Potential for wildfire for every county in Utah. Burn Probability is the probability that a specific geographic location will experience a wildland fire during the specified time period of one year. Estimates were generated with the large-wildfire simulation system (Utah FFSL, 2024). The Burn Probability for Duchesne County can be seen in the first map below. The upper Uinta Mountains have the greatest likelihood of wildfire, while the northern side of the mountains and the lower Uinta Basin have a decreased likelihood of wildfire.

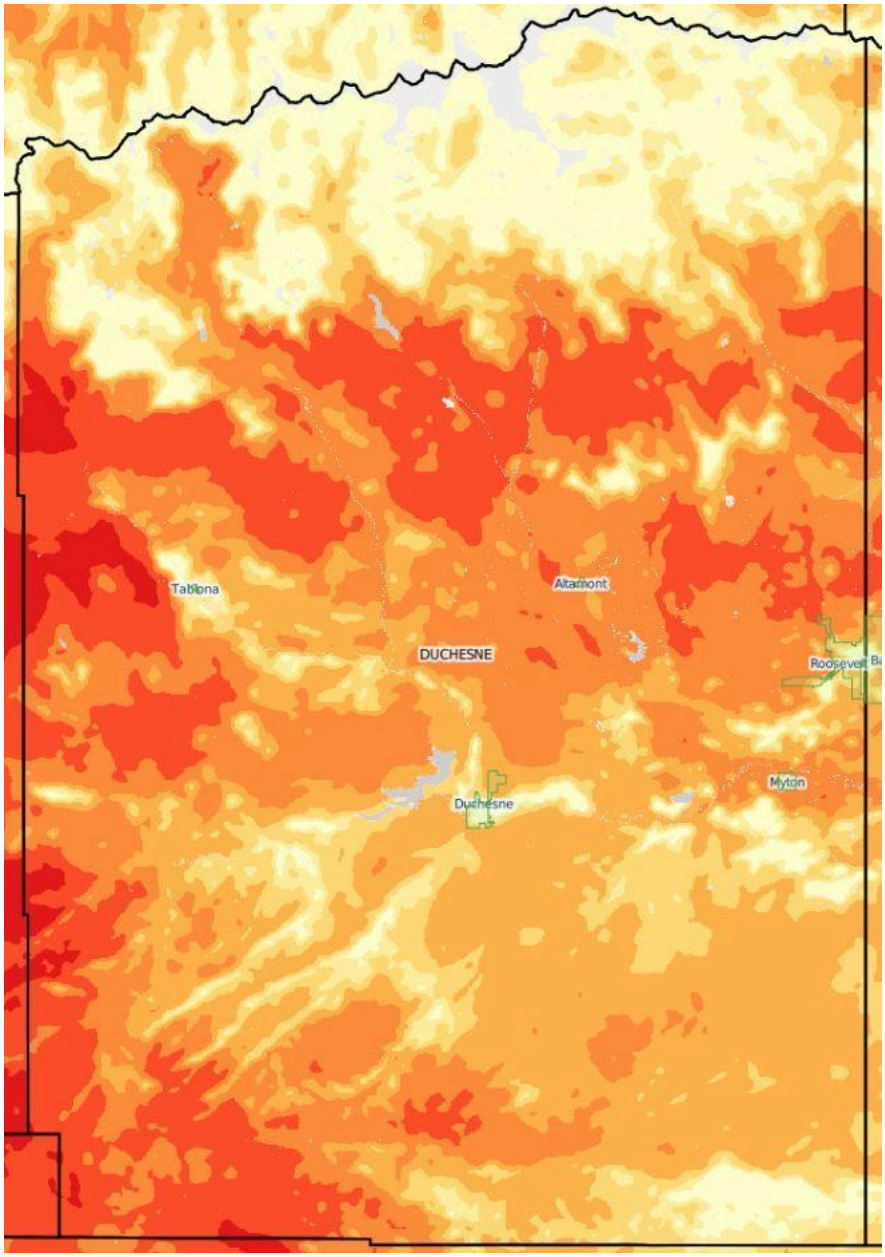


Figure 5-2. Duchesne County Burn Probability

Damage Potential represents the potential consequences of fire to a home at a given location if a fire were to occur and if a home were located there. Damage Potential incorporates ember load and conditional risk to potential structures as a generalized measure of potential loss to homes (Utah FFSL, 2024). The Damage Potential for Duchesne County can be seen in the second map below. Homes located in the higher elevations of Duchesne County are most at risk to wildfire damage than those located in the lower elevations.

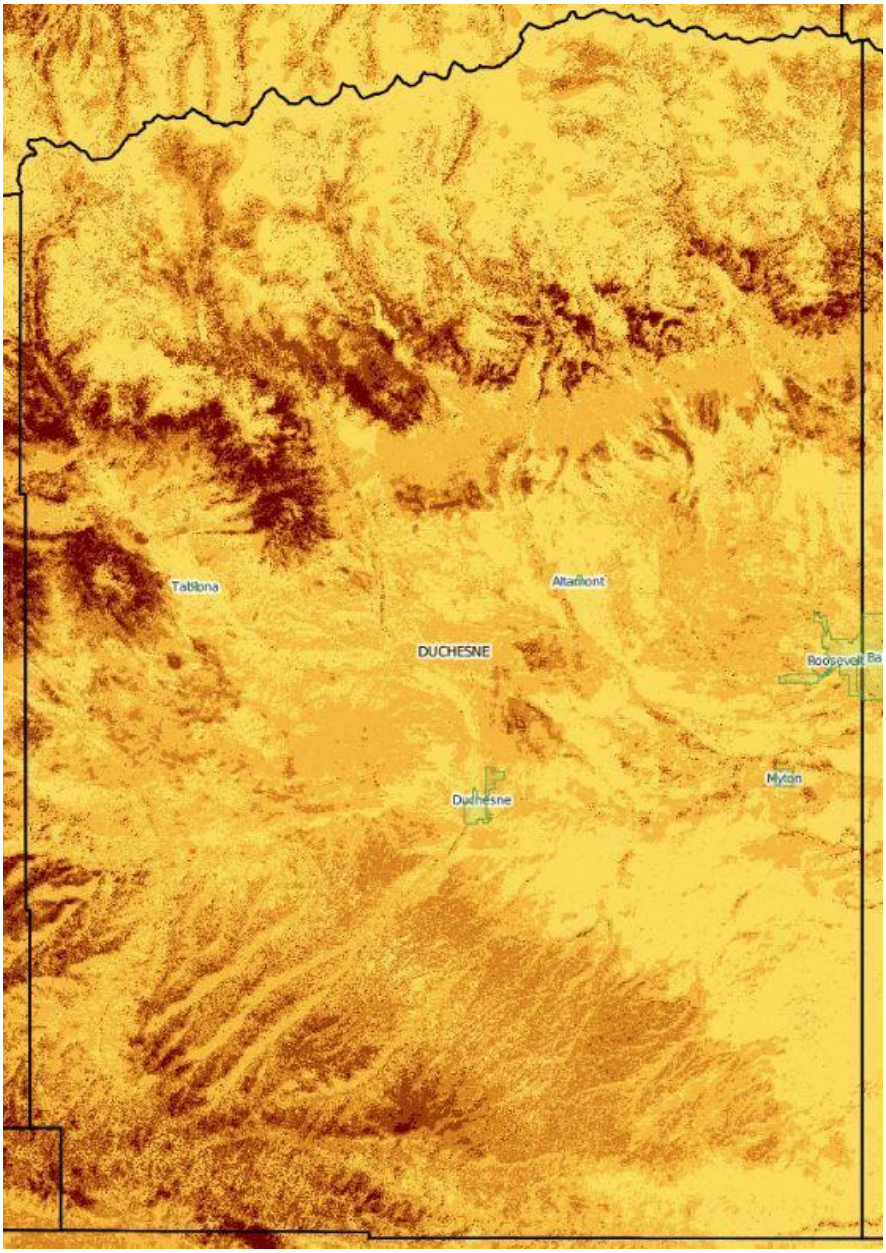


Figure 5-3. Duchesne County Damage Potential

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The state of Utah experienced 808 reported wildfires over 18,061 acres in 2023. This is a 16.1% decrease in total wildfires from 2022 and a 29.3% decrease in human-caused fires. The Uintah Basin Region experienced 99 reported wildfires (Utah FFSL, 2024). One of the largest wildfires in Duchesne County—the Dollar Ridge Fire—began on July 1, 2018 and lasted for several days as it burned through 70,001 acres between Duchesne and Wasatch Counties. Approximately 200–300 structures, including 75 homes, were lost. Another significant wildfire, called the Neola North Fire, began on June 29, 2007 north

of Neola in Ute tribal land in Duchesne County and spread eastward into Uintah County, resulting in 43,511 acres burned, three fatalities, and the destruction of 12 homes (New York Times, 2007).

The nine most significant fires in Duchesne County over 100 acres since 2017 are listed in the table below.

Table 5-2. Significant Fires in Duchesne County

Date Discovered	Wildfire Name	Location	Size in Acres	Cause	Buildings Destroyed
07/01/2018	Dollar Ridge	East of Strawberry Reservoir in Wasatch and Duchesne Counties	70,001	Human-caused, unknown	232
07/17/2018	Santaquin	Northwest of Fruitland	188	Lightning	0
07/19/2018	Twin	Northwest of Talmage	121	Lightning	0
08/28/2018	Murdock	Northwest Duchesne County in Murdock Basin	4,926	Natural	0
08/09/2020	4600	Above Currant Creek next to Duchesne-Wasatch border	226	Small equipment	6
08/25/2020	Center Creek Trail	Upper Uintas along Yellowstone Creek	1,283	Lightning	0
08/25/2020	Phinney Lake	Northwest Duchense County along Rock Creek	8,583	Lightning	0
03/28/2021	North River	East of Myton	1,751	Undetermined	0
03/29/2021	East Myton	East of Myton	954	Human-caused, unknown	0
Source: Utah FFSL, 2017–2023					

The following table shows the number of fires and types of fires that occurred between 2010 and 2022 that fire departments in Duchesne, Fruitland, Roosevelt, and Tabiona/Hanna responded to, according to the Utah Fire Marshal.

Table 5-3. Duchesne County Fires (2010–2022)

Year	Fire Incident Type	Number of Fires
Duchesne		
2010	Structure Fires	1
	Vehicle Fires	2
	Outside Fires	8
	All Other Fires	0
	Total Fires	**11**
2011	Structure Fires	7
	Vehicle Fires	2
	Outside Fires	3
	All Other Fires	1
	Total Fires	**13**
2012	Structure Fires	1
	Vehicle Fires	3
	Outside Fires	8
	All Other Fires	0
	Total Fires	**12**
2013	Structure Fires	6
	Vehicle Fires	4
	Outside Fires	4
	All Other Fires	0
	Total Fires	**14**
2014	Structure Fires	5
	Vehicle Fires	1
	Outside Fires	19
	All Other Fires	2
	Total Fires	**27**
2015	Structure Fires	1
	Vehicle Fires	2
	Outside Fires	8
	All Other Fires	0
	Total Fires	**11**
2016	Structure Fires	3
	Vehicle Fires	0
	Outside Fires	5
	All Other Fires	0
	Total Fires	**8**
2017	Structure Fires	3
	Vehicle Fires	1
	Outside Fires	2
	All Other Fires	0
	Total Fires	**6**
2018	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	2
	All Other Fires	0
	Total Fires	**3**
2019	Structure Fires	N/A
	Vehicle Fires	N/A

Year	Fire Incident Type	Number of Fires
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2020	Structure Fires	6
	Vehicle Fires	2
	Outside Fires	14
	All Other Fires	0
	Total Fires	**22**
2021	Structure Fires	8
	Vehicle Fires	5
	Outside Fires	12
	All Other Fires	0
	Total Fires	**25**
2022	Structure Fires	7
	Vehicle Fires	2
	Outside Fires	13
	All Other Fires	3
	Total Fires	**25**
Fruitland		
2010	Structure Fires	0
	Vehicle Fires	1
	Outside Fires	2
	All Other Fires	1
	Total Fires	**4**
2011	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	1
	All Other Fires	0
	Total Fires	**2**
2012	Structure Fires	0
	Vehicle Fires	1
	Outside Fires	8
	All Other Fires	0
	Total Fires	**9**
2013	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	16
	All Other Fires	0
	Total Fires	**16**
2014	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2015	Structure Fires	5
	Vehicle Fires	2
	Outside Fires	3
	All Other Fires	0
	Total Fires	**10**
2016	Structure Fires	0

Year	Fire Incident Type	Number of Fires
	Vehicle Fires	0
	Outside Fires	1
	All Other Fires	0
	Total Fires	**1**
2017	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	8
	All Other Fires	0
	Total Fires	**8**
2018	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	3
	All Other Fires	0
	Total Fires	**3**
2019	Structure Fires	2
	Vehicle Fires	0
	Outside Fires	1
	All Other Fires	0
	Total Fires	**3**
2020	Structure Fires	2
	Vehicle Fires	0
	Outside Fires	10
	All Other Fires	0
	Total Fires	**12**
2021	Structure Fires	1
	Vehicle Fires	2
	Outside Fires	7
	All Other Fires	2
	Total Fires	**12**
2022	Structure Fires	3
	Vehicle Fires	0
	Outside Fires	10
	All Other Fires	1
	Total Fires	**14**
Roosevelt		
2010	Structure Fires	10
	Vehicle Fires	4
	Outside Fires	27
	All Other Fires	3
	Total Fires	**44**
2011	Structure Fires	21
	Vehicle Fires	6
	Outside Fires	13
	All Other Fires	3
	Total Fires	**43**
2012	Structure Fires	16
	Vehicle Fires	9
	Outside Fires	51
	All Other Fires	1
	Total Fires	**77**

Year	Fire Incident Type	Number of Fires
2013	Structure Fires	8
	Vehicle Fires	9
	Outside Fires	27
	All Other Fires	0
	Total Fires	**44**
2014	Structure Fires	11
	Vehicle Fires	3
	Outside Fires	30
	All Other Fires	1
	Total Fires	**45**
2015	Structure Fires	8
	Vehicle Fires	5
	Outside Fires	21
	All Other Fires	0
	Total Fires	**34**
2016	Structure Fires	9
	Vehicle Fires	5
	Outside Fires	23
	All Other Fires	1
	Total Fires	**38**
2017	Structure Fires	19
	Vehicle Fires	7
	Outside Fires	30
	All Other Fires	1
	Total Fires	**57**
2018	Structure Fires	14
	Vehicle Fires	9
	Outside Fires	39
	All Other Fires	1
	Total Fires	**63**
2019	Structure Fires	12
	Vehicle Fires	8
	Outside Fires	25
	All Other Fires	0
	Total Fires	**45**
2020	Structure Fires	7
	Vehicle Fires	7
	Outside Fires	43
	All Other Fires	0
	Total Fires	**57**
2021	Structure Fires	8
	Vehicle Fires	7
	Outside Fires	27
	All Other Fires	0
	Total Fires	**42**
2022	Structure Fires	7
	Vehicle Fires	5
	Outside Fires	22
	All Other Fires	0
	Total Fires	**34**

Year	Fire Incident Type	Number of Fires
Tabiona/Hanna		
2010	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2011	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2012	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	3
	All Other Fires	0
	Total Fires	**4**
2013	Structure Fires	2
	Vehicle Fires	1
	Outside Fires	8
	All Other Fires	0
	Total Fires	**11**
2014	Structure Fires	1
	Vehicle Fires	2
	Outside Fires	2
	All Other Fires	0
	Total Fires	**5**
2015	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	2
	All Other Fires	0
	Total Fires	**3**
2016	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2017	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	3
	All Other Fires	0
	Total Fires	**3**
2018	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	3
	All Other Fires	0
	Total Fires	**3**
2019	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A

Year	Fire Incident Type	Number of Fires
	Total Fires	**N/A**
2020	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2021	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2022	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
Source: Utah Fire Marshal, 2010–2022		

o IMPACTS & LOSS ESTIMATES

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by wildfire, as presented in the table below.

Table 5-4. Impacts of Wildfire by Jurisdiction

Jurisdiction	Impacted by Wildfire	Experienced Significant Wildfire with $1,000+ in Damage Since 2000	Fatalities Due to Wildfire	Potential Impacts of Wildfire
Duchesne County	Yes	Yes	4	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
City of Duchesne	Yes	No	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
City of Myton	Yes	Yes	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines,

Jurisdiction	Impacted by Wildfire	Experienced Significant Wildfire with $1,000+ in Damage Since 2000	Fatalities Due to Wildfire	Potential Impacts of Wildfire
				mass evacuations, risk to emergency services, economic losses
City of Roosevelt	Yes	Yes	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
Town of Altamont	Yes	No	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
Town of Tabiona	Yes	No	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses

According to the 2019 Utah State Hazard Mitigation Plan, Duchesne County has 12 schools, one hospital, and 12 emergency response facilities that are exposed to potential wildfires. The combined value of the residential buildings in Duchesne County is $1,660,528,000, and the combined value of non-residential buildings is $359,267,000. The total building value is $2,019,795,000 (Utah Hazard Mitigation Plan, 2019).

Fatalities from wildfire in Utah are relatively uncommon, with 22 recorded deaths since 1950. Four deaths have occurred in Duchesne County due to wildfire, with one death from the Fruitland Fire in 1996 and three deaths from the Neola North Fire in 2007 (Utah Hazard Mitigation Plan, 2019).

The potential losses to critical facilities in Duchesne County due to wildfires are identified in the table below.

Table 5-5. Duchesne County Potential Impacts from Wildfire

Facility	Impacted	Not Impacted	Description
Hospitals/Medical Clinics		X	
Schools		X	
EOC		X	
Police Stations		X	

Facility	Impacted	Not Impacted	Description
Fire Stations		X	
County/City Facilities		X	
Homes	X		Approximately $4 to $5 million in damages
Crops		X	
Businesses		X	

Table 5-6. Wildfire: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.134% chance per year	0.0	$2,780	$399,675	$0	$402,455	97.9	Relatively High
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0.040% chance per year	0.0	$1,114	$77,428	$0	$78,542	93.4	Relatively Moderate
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0.038% chance per year	0.0	$392	$11,126	$0	$11,518	85.0	Relatively Low
Census Tract 940501: City of Roosevelt							
0.007% chance per year	0.0	$9	$1,038	$0	$1,047	66.3	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

As documented in the previous regional plan, the following table identifies the roads and utilities within Duchesne County at potential risk to wildfire.

Table 5-7. Cost of Roads and Utilities at Risk to Wildfire

Transportation	
Name	**Estimated Cost**
Local Neighborhood/City Roads	$1,237,836,000

State Route 35	$2,654,850
State Route 87	$31,544,445
State Route 121	$2,172,150
State Route 150	$8,881,680
State Route 191	$11,777,880
State Route 208	$14,118,975
State Route 311	$6,250,965
US Highway 40	$75,000,000
Utilities	
Name	**Estimated Cost**
Moon Lake Power Plant	$10,000,000
KV-138	$290,162
Power Lines	$2,233,915
Natural Gas	$2,261,824
Note: Costs are in 2012 dollars.	

▪ Vulnerable Populations

Potentially vulnerable populations may experience difficulty preparing for and responding to wildfire. The table below lists the vulnerable populations in Duchesne County that may be at greater risk during a wildfire.

Table 5-8. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a wildfire.

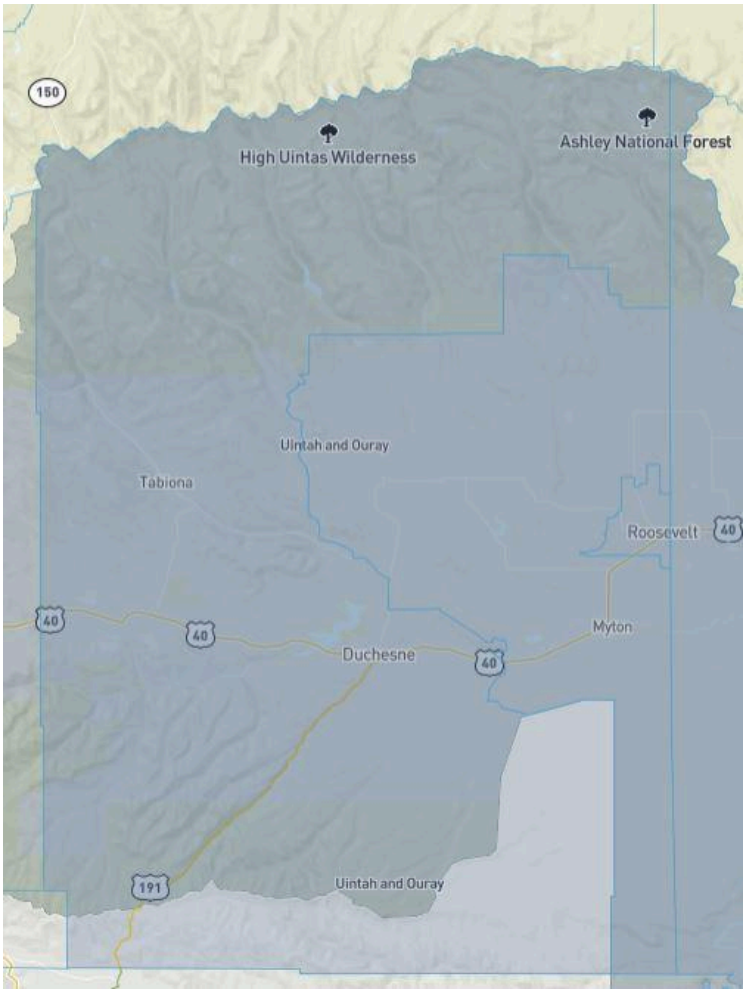
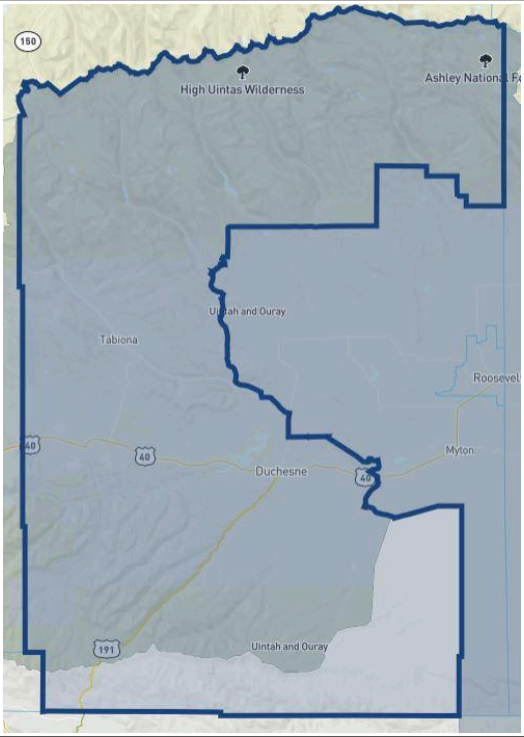


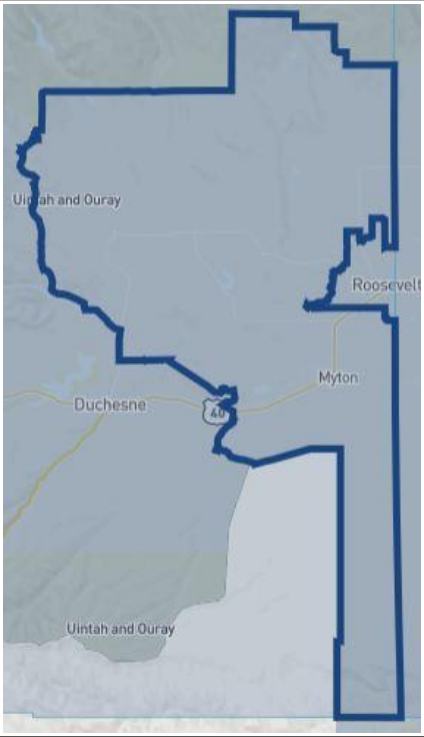
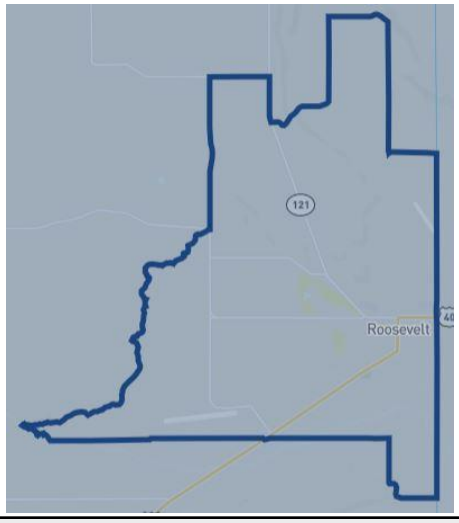
Figure 5-4. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 5-9. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Wildfire places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 5-10. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of wildfire. As housing continues to encroach on WUI areas, more structures may become vulnerable to wildfire.

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought and heat, which can lead to more frequent and severe wildfires. UCAR explains that warmer temperatures cause more evaporation, turning water into

vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century, creating perfect dry conditions for wildfires (UCAR, 2023). Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, wildfires, and more intense urban heat island effects), compounding already existing stressors.

▪ Effects of Climate Change on Probability of Future Events

Table 5-11. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Duchesne County is expected to experience 4 more days that reach above 95°F (from 3 days to 7 days per year).
	By 2049, Duchesne County is expected to have a 3°F increase (from 41°F to 43°F) in average annual temperatures.
	Increasing annual temperatures can contribute to longer and more catastrophic wildfire seasons.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 5-12. Wildfire: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
98.4	Relatively High	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
93.8	Relatively Moderate	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
85.4	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
72.8	Relatively Low	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● FLOOD

o HAZARD DESCRIPTION

Flooding is defined by the National Weather Service (NWS) as "the inundation of normally dry areas as a result of increased water levels in an established water course." River flooding, the condition where the river rises to overflow its natural banks, may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams. In addition to these natural events, there are a number of factors controlled by human activity that may cause or contribute to flooding. These include dam failure (discussed below) and activities that increase the rate and amount of runoff, such as paving, reducing ground cover, and clearing forested areas. Flooding is a periodic event along most rivers, with the frequency depending on local conditions and controls, such as dams and levees. The land along rivers that is identified as being susceptible to flooding is called the floodplain.

Flooding is a dynamic natural process. Along rivers and streams, a cycle of erosion and deposition is continuously rearranging and rejuvenating the aquatic and terrestrial systems. Although many plants, animals, and insects have evolved to accommodate and take advantage of these ever-changing environments, property and infrastructure damage often occurs when people develop floodplains and natural processes are altered or ignored.

Flooding can also threaten life, safety, and health and often results in substantial damage to infrastructure, homes, and other property. The extent of damage caused by a flood depends on the topography, soils, and vegetation in an area, and the depth and duration of flooding, velocity of flow, rate of rise, and the amount and type of development in the floodplain.

o TYPES OF FLOODING

Flooding can occur in a number of ways, and many instances are not independent of each other and can occur simultaneously during a flood event. The types of flooding considered for this plan include:

- Heavy rainfall
- Urban stormwater overflow
- Rapid snowmelt
- Rising groundwater (generally in conjunction with heavy prolonged rainfall and saturated conditions)
- Riverine ice jams
- Flash floods
- Alluvial fan flooding
- Flooding from dam failure



o RELATED HAZARDS

▪ River or Stream Flood

● *Hazard Description*

Potential Probability		Low

Potential Consequence		High
Location	Along the Duchesne River, Rock Creek, Lake Fork River, Yellowstone River, Strawberry River, Dry Gulch Creek, Cottonwood Creek, Uinta River, Red Creek, Currant Creek, and their respective tributaries	
Seasonal Pattern or Conditions	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer	
Duration	Flooding can last hours to days or even months	
Analysis Used	FIS, FIRM, GIS data, information from community residents, UGS, BasinNow, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund	

River flooding—the condition where the river rises to overflow its natural banks—may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams.

- ***Location***



Riverine flooding occurs in the low-lying areas of the county adjacent to streams and rivers, such as the Duchesne River, Rock Creek, Lake Fork River, Yellowstone River, Strawberry River, Dry Gulch Creek, Cottonwood Creek, Uinta River, Red Creek, Currant Creek, and their tributaries. Erosion along rivers and streams can cause flooding during unusually wet years during spring snowmelt (UGS, 1987). Additionally, during high snowmelt years or high moisture conditions, rivers can threaten bridges and lead to flooding. The photo to the right shows lowland and road flooding from high levels of Red Creek during the summer of 2019.

Because of their locations near many streams and rivers, all jurisdictions in the county have a very high flood threat. The city of Duchesne is the county seat and the second largest community in the county and has a large floodplain zone around Strawberry River and Duchesne River.

Several roads in Duchesne County are low water crossings that pass over creeks and are often inundated with water during high flow seasons. Strawberry River Road, Rock Creek Road, Moon Lake Road, burn scar areas, and any roads that cross rivers or streams are all subject to repeat flooding in Duchesne County. Emergency repairs are frequently necessary to maintain passage over the roads.

- ***Extent***

The NFIP classifies floods through the use of recurrence intervals as seen in the chart below.

Flood Recurrence Interval	Chance of occurrence during any given year
5 year	20%
10 year	10%
50 year	2%
100 year	1%
500 year	0.20%

Figure 6-3. NFIP Flood Recurrence Intervals

The federal standard for floodplain management under the National Flood Insurance Plan (NFIP) is the "100-year floodplain." This area is chosen using historical data such that in any given year there is a 1% chance of a "base flood" (also known as "100-year flood" or "regulatory flood"). A base flood is one that covers or exceeds the 100-year floodplain. A "500-year floodplain" is an area with at least a .2% chance of flood occurrence in any given year (HUD Exchange, 2024).

The following maps, including the FIRM, show the flood zones with inundation areas for Duchesne, Myton, Roosevelt, Altamont, and Tabiona.

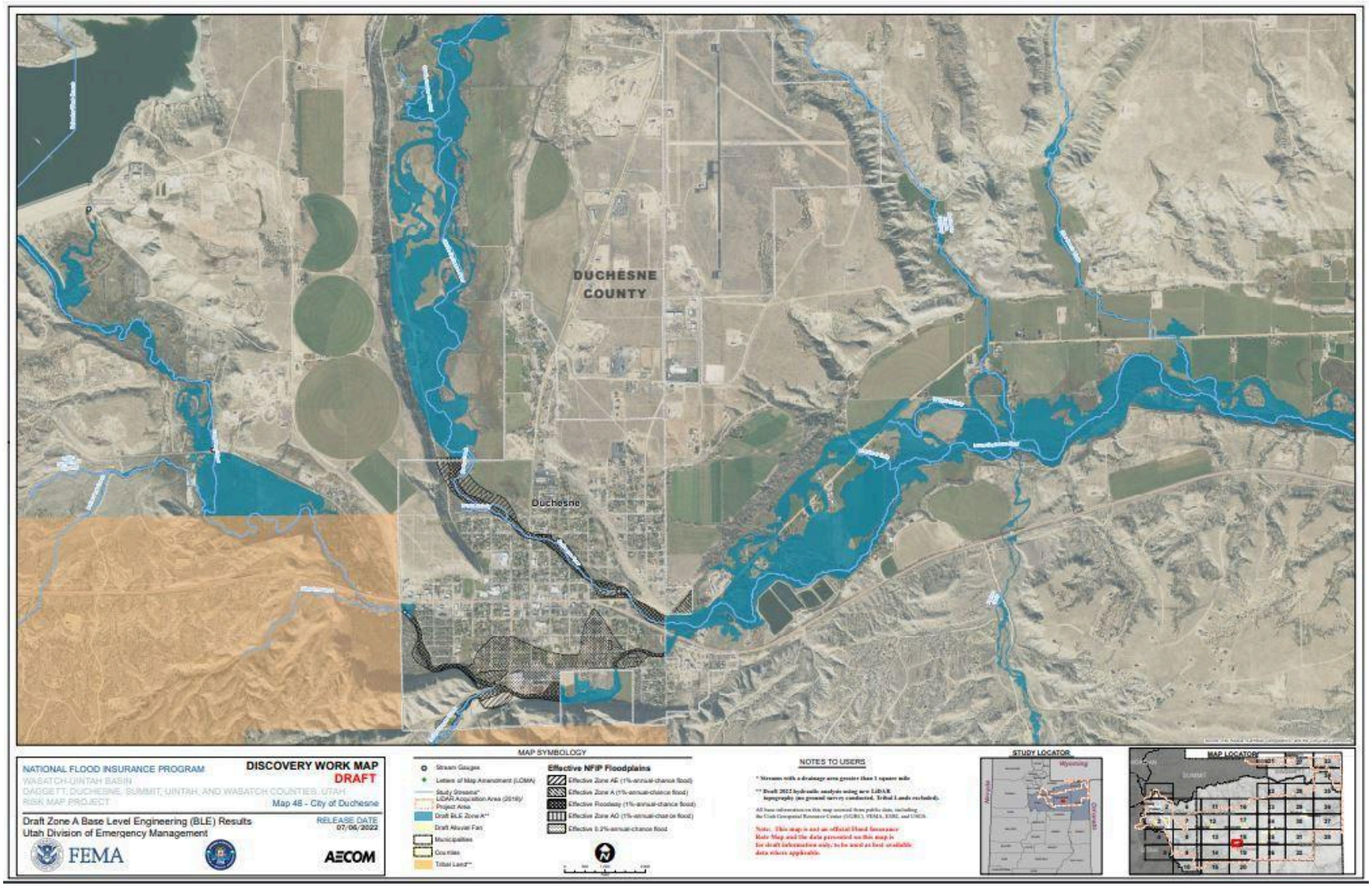


Figure 6-4. City of Duchesne Flood Map

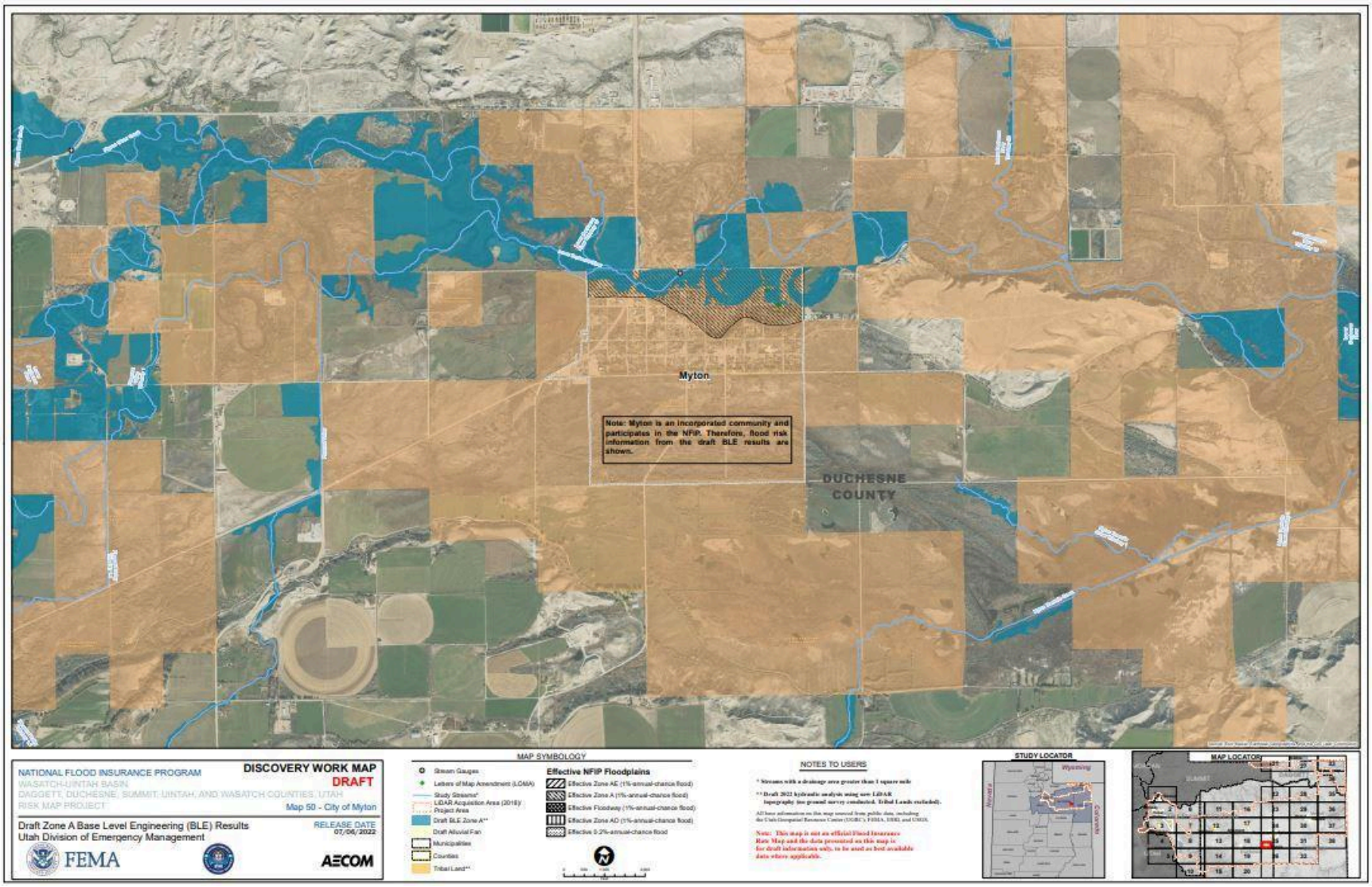


Figure 6-5. City of Myton Flood Map

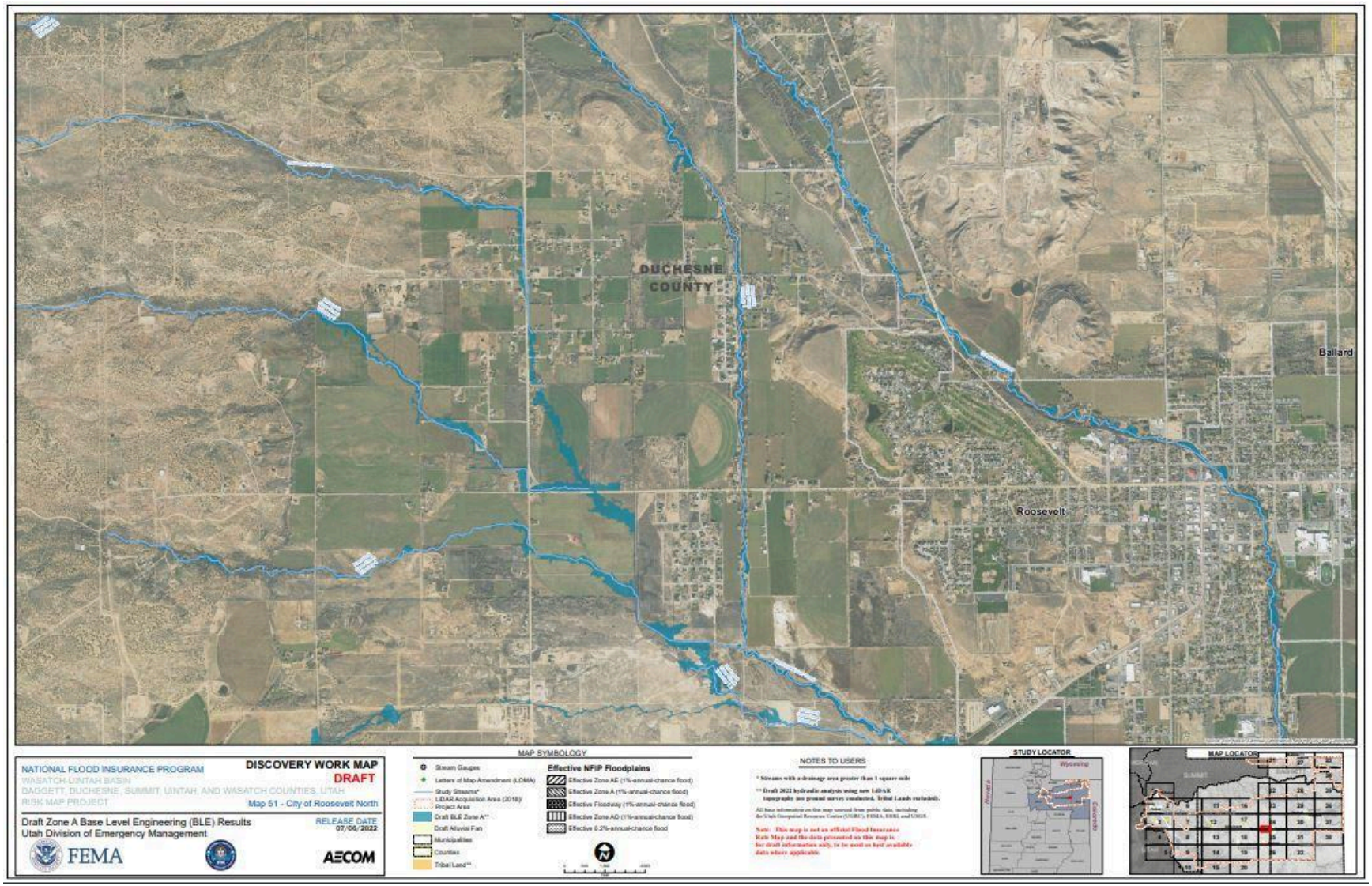


Figure 6-6. City of Rosevelt North Flood Map

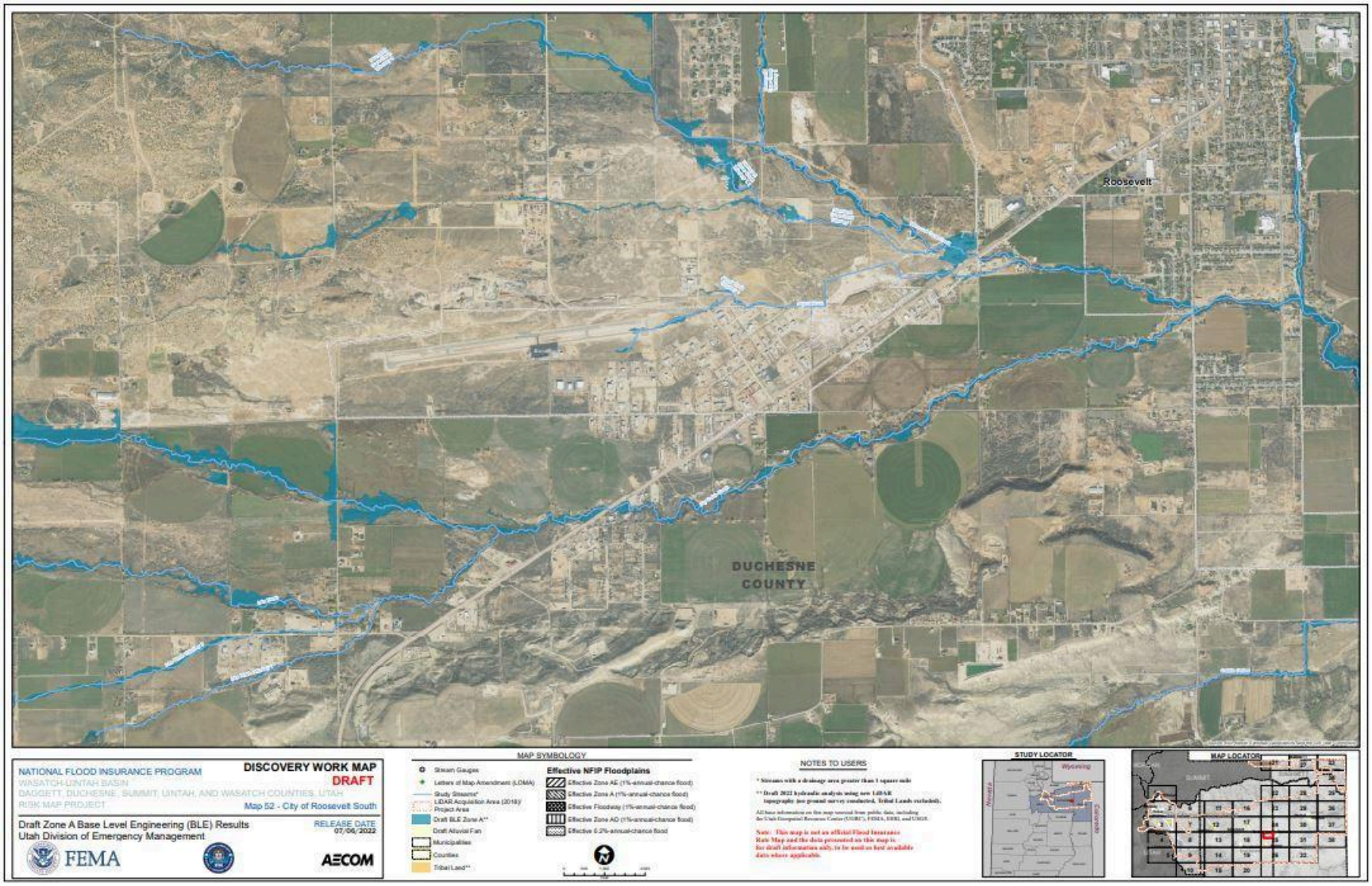


Figure 6-7. City of Roosevelt South Flood Map

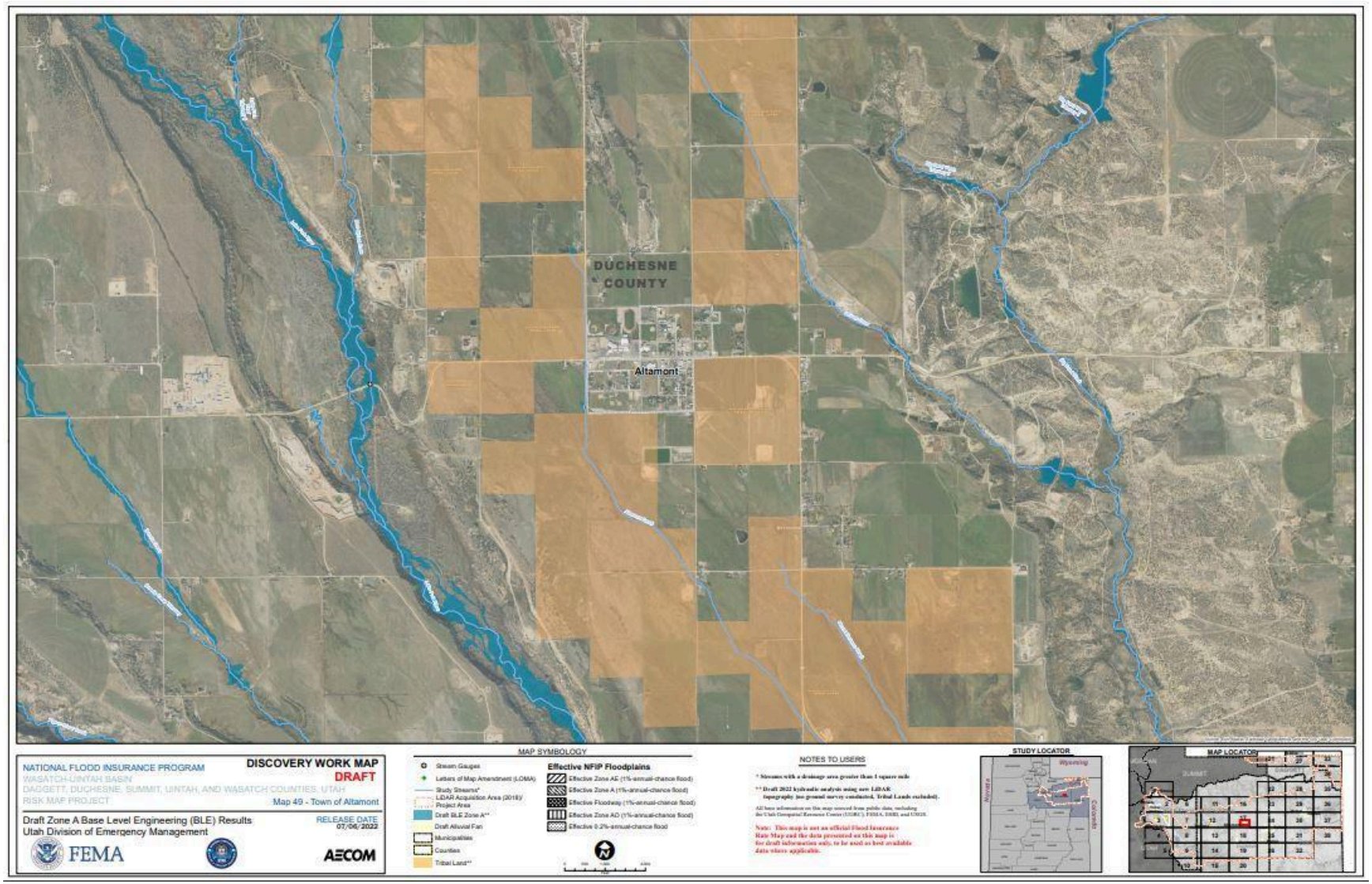


Figure 6-8. Town of Altamont Flood Map

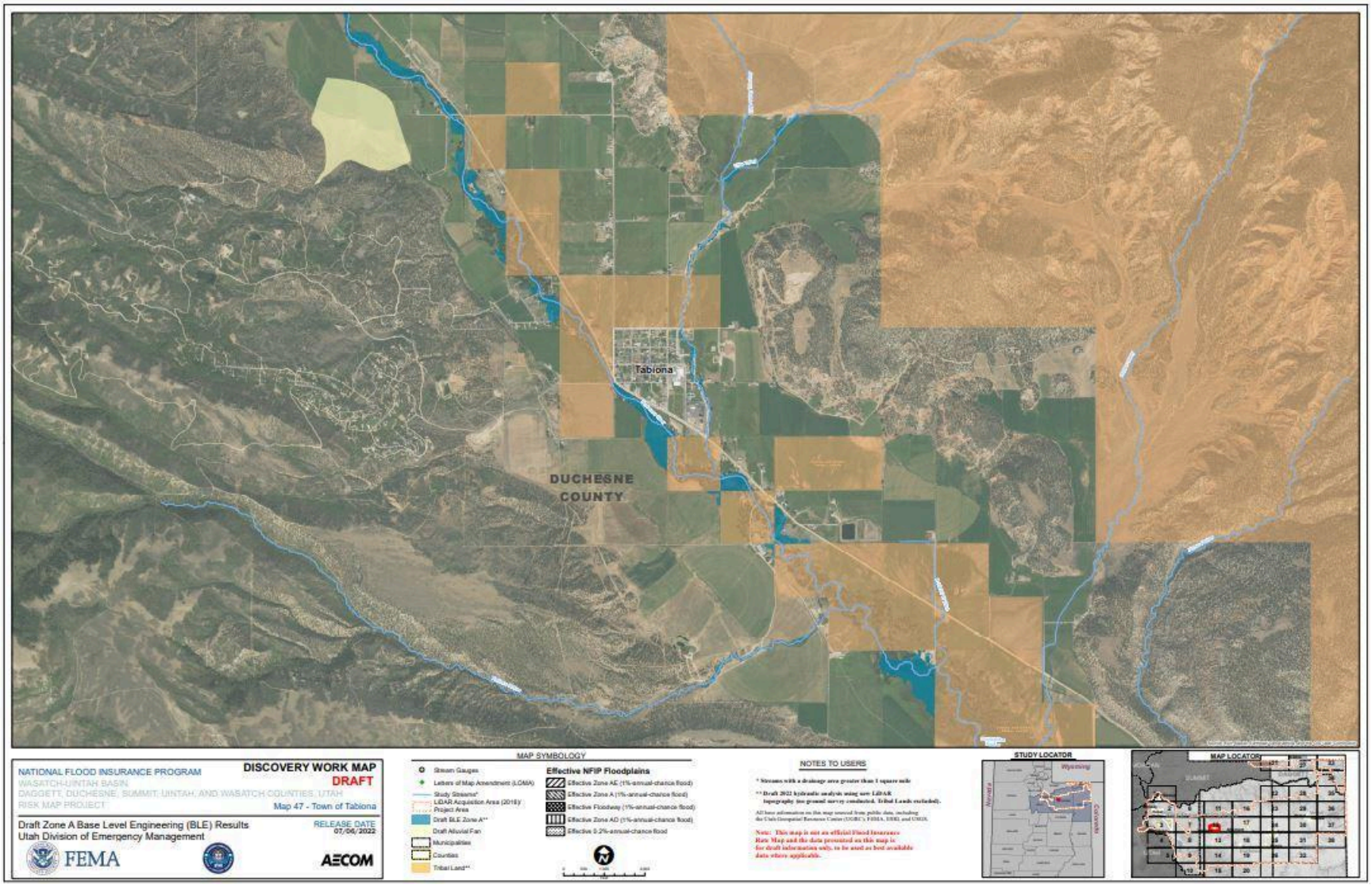

Tabiona
DUCHESNE
COUNTY
NATIONAL FLOOD INSURANCE PROGRAM
WASATCH-UINTAH BASIN
DAGGETT, DUCHESNE, SUMMIT, UINTAH, AND WASATCH COUNTIES, UTAH
RISK MAP PROJECT
DISCOVERY WORK MAP
DRAFT
Map 47 - Town of Tabiona
Draft Zone A Base Level Engineering (BLE) Results
Utah Division of Emergency Management
RELEASE DATE
07/06/2022
FEMA
AECOM
MAP SYMBOLOGY
Stream Gauges
Letters of Map Amendment (LOMA)
Study Streams*
LiDAR Acquisition Area (2018)
Project Area
Draft BLE Zone A**
Draft Alluvial Fan
Municipalities
Counties
Tribal Land**
Effective NFIP Floodplains
Effective Zone AE (1%-annual-chance flood)
Effective Zone A (1%-annual-chance flood)
Effective Floodway (1%-annual-chance flood)
Effective Zone AO (1%-annual-chance flood)
Effective 0.2%-annual-chance flood
NOTES TO USERS
* Streams with a drainage area greater than 1 square mile
** Draft 2021 hydraulic analysis using new LiDAR topography (no ground survey conducted. Tribal Lands excluded).
Note: This map is not an official Flood Insurance Rate Map and the data presented on this map is for draft information only, to be used as best available data where applicable.
STUDY LOCATOR
Wyoming
Nevada
Colorado
MAP LOCATOR
SUMMIT

Figure 6-9. Town of Tabiona Flood Map

● *Historical Frequency & Probability of Future Occurrence*

Changes in climate will likely increase the region's flood risk as the planning area experiences more extreme precipitation events triggering flash flooding, monsoons during late summer to early fall, and runoff from rain falling on snow events, common with warming temperatures.

Streams and rivers (Duchesne River, Rock Creek, Lake Fork River, Yellowstone River, Strawberry River, Dry Gulch Creek, Cottonwood Creek, Uinta River, Red Creek, Currant Creek, and their respective tributaries) create a very high flood threat and increases the probability of future events.

The Storm Events Database from the NOAA lists four river flood events in Duchesne County between 2000–2023. Only one of these events affected Roosevelt, and the rest occurred in unincorporated Duchesne County.

Table 6-1. River Flood Events in Duchesne County, UT (2000–2023)

Location Within County	Date	Property Damage ($)	Cause
Neola	06/24/2011	$50,000	Rapid spring snowmelt
Hanna	07/01/2011	$50,000	Rapid spring snowmelt
Fruitland	09/12/2013	$15,000	Heavy rain
Roosevelt	09/22/2016	$100,000	Thunderstorms, large hail
Source: NOAA Storm Events Database, 2010–2023			

One particularly damaging flood occurred in September 2013 when widespread heavy precipitation kept rivers and creeks across Duchesne County running at elevated to above bank conditions. Flooding occurred in Duchesne from the Duchesne River and along SR 191. Several streets, including Main Street, in Duchesne were flooded. Multiple mudslides also occurred on SR 191 between Duchesne and Helper, depositing mud and debris on the road and trapping several motorists (Storm Events Database, 2024).

River flooding is likely to occur again in the future. According to Neighborhoods at Risk, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year by 2049 (from 1.7 days to 2 days per year). By 2049, Duchesne County is also expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation. Heavy precipitation can lead to riverine flooding as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

● *Impacts & Loss Estimates*

The jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona and parts of unincorporated Duchesne County may be impacted by river flooding, as presented in the table below.

Table 6-2. Impacts of River Flood by Jurisdiction

Jurisdiction	Impacted by River Floods	Fatalities Due to River Floods	Potential Impacts of River Floods
Duchesne County	Yes	1	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock,

Jurisdiction	Impacted by River Floods	Fatalities Due to River Floods	Potential Impacts of River Floods
			loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Duchesne	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Myton	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Roosevelt	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Altamont	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Tabiona	Yes	1	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Human death and injury sometimes occur as a result of river flooding but are not common. Sometimes deaths are a result of hazards created by flooding. Duchesne County has seen one death related to flooding near Tabiona that washed out a culvert and took out part of SR 35, killing a 15-year-old girl who was riding as a passenger in a vehicle traveling on the road. Two others were injured during this incident (Deseret News, 2011). Human hazards during flooding include drowning, electrocution due to downed power lines, leaking gas lines, fires and explosions, hazardous chemicals, and displaced wildlife. Economic loss and disruption of social systems are often enormous. Floods may destroy or damage structures, furnishings, business assets including records, crops, livestock, roads, and highways. They often deprive large areas of electric service, potable water supplies, wastewater treatment, communications, and many other community services, including medical care, and may do so for long periods of time.

At least $215,000 in property damage has occurred since 2000 due to river flooding, as reported by the Storm Events Database, although actual damage over this time period is likely much higher.

Duchesne County participates in the National Flood Insurance Program (NFIP). As of 2019, the county had a total premium of $4,912, six policies, and $532,700 in total coverage (Utah Hazard Mitigation Plan, 2019). The county has had seven claims since becoming a participating community in 2017.

Table 6-3. Riverine Flooding: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.7 events per year	0.0	$23,441	$1,886	$44	$25,371	68.3	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0.7 events per year	0.01	$121,117	$9,243	$134	$130,494	89.0	Relatively Moderate
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0.7 events per year	0.0	$0	$0	$1	$1	25.6	Very Low
Census Tract 940501: City of Roosevelt							
0 events per year	0.0	$0	$0	$0	$0	0.0	No Expected Annual Losses

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to river flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-4. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%

Vulnerability Category	Number	Percent
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a flood.

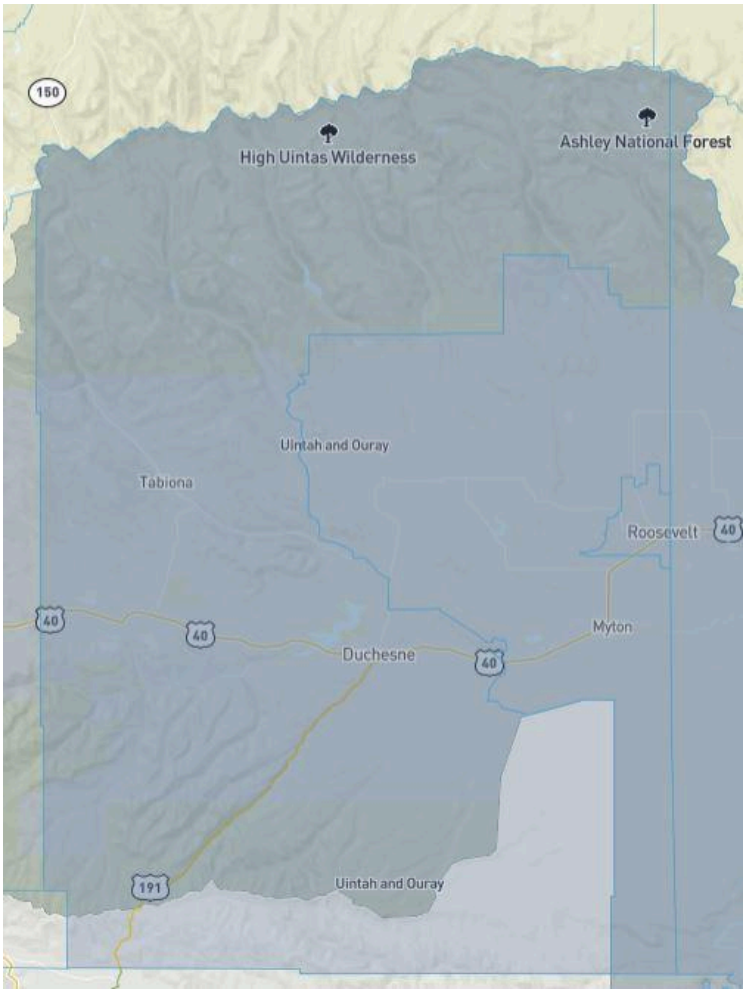
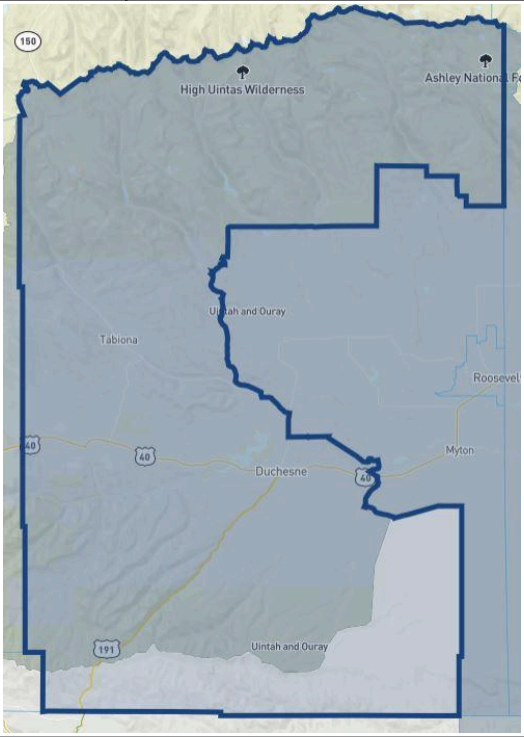
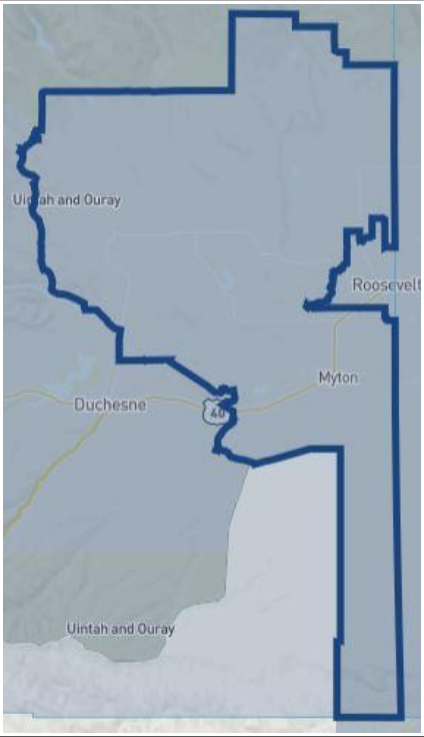
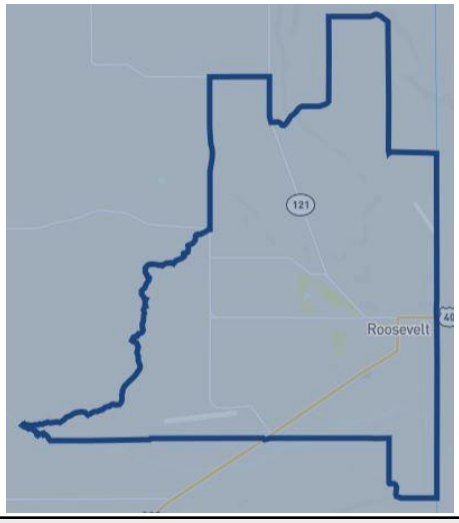


Figure 6-10. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 6-5. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940300	4,523	YES
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

River floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-6. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of riverine flooding.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 6-7. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 6-8. Riverine Flooding: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
72.1	Relatively Moderate	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
89.7	Relatively Moderate	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
25.6	Very Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
0.0	No Rating	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Flash Flood

- ***Hazard Description***

Potential Probability	Medium
Potential Consequence	Medium
Location	Along the Duchesne River, Rock Creek, Lake Fork River, Yellowstone River, Strawberry River, Dry Gulch Creek, Cottonwood Creek, Uinta River, Red Creek, Currant Creek, and their respective tributaries; surrounding riparian areas
Seasonal Pattern or Conditions	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer
Duration	Flooding can last hours to days or even months
Analysis Used	FIS, FIRM, GIS data, information from community residents, UGS, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

Flash flood is defined by the NWS as "a rapid and extreme flow of high water into a normally dry area or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters." Flash floods differ from floods (discussed above in *River or Stream Flood*) in the rapidity with which they develop. River floods generally develop over a period of several days, providing more warning time and time for preparation and evacuation. Flash floods occur with little or no warning. They may occur during thunderstorms due to rapid runoff from steep terrain, from areas where the soil is already saturated, or in urban areas where vegetation has been removed and pavement has replaced exposed soil. Flash floods may also arise as the result of dam failure (discussed below).

- ***Location***

Flooding affects the majority of Utah due to heavy mountain precipitation and runoff. Consistent wildfires also exacerbate existing flood risks. Duchesne County can experience changes in the geography of the landscape from sediment movement during flash floods (Utah Hazard Mitigation Plan, 2019). Swelling or shrinking rocks and soils due to summer thunderstorms can cause favorable conditions for flash flooding in Duchesne County. Swelling or shrinking soils are found in the Mancos Shale, the Brushy Basin Member of the Morrison Formation, the Chinle Formation, and the Moenkopi Formation within the county (UGS, 1964).

Areas in Duchesne County that are susceptible to flash flooding include Duchesne River, Rock Creek, Lake Fork River, Yellowstone River, Strawberry River, Dry Gulch Creek, Cottonwood Creek, Uinta River, Red Creek, and Currant Creek. Repeat flash flooding has occurred at Strawberry River Road, Rock Creek Road, Moon Lake Road, the Dollar Ridge Fire burn scar areas, Hwy 40, Camelot Road, River Road, US 191, Indian Canyon, Timber Canyon, and the Strawberry Pinnacles area. Future flooding is likely to occur in these areas again.

- ***Extent***

Flash floods occur suddenly within six hours of intense rainfall from a thunderstorm or several thunderstorms. Flash floods are common amongst Duchesne County's creek beds, making these areas especially hazardous during rainfall.

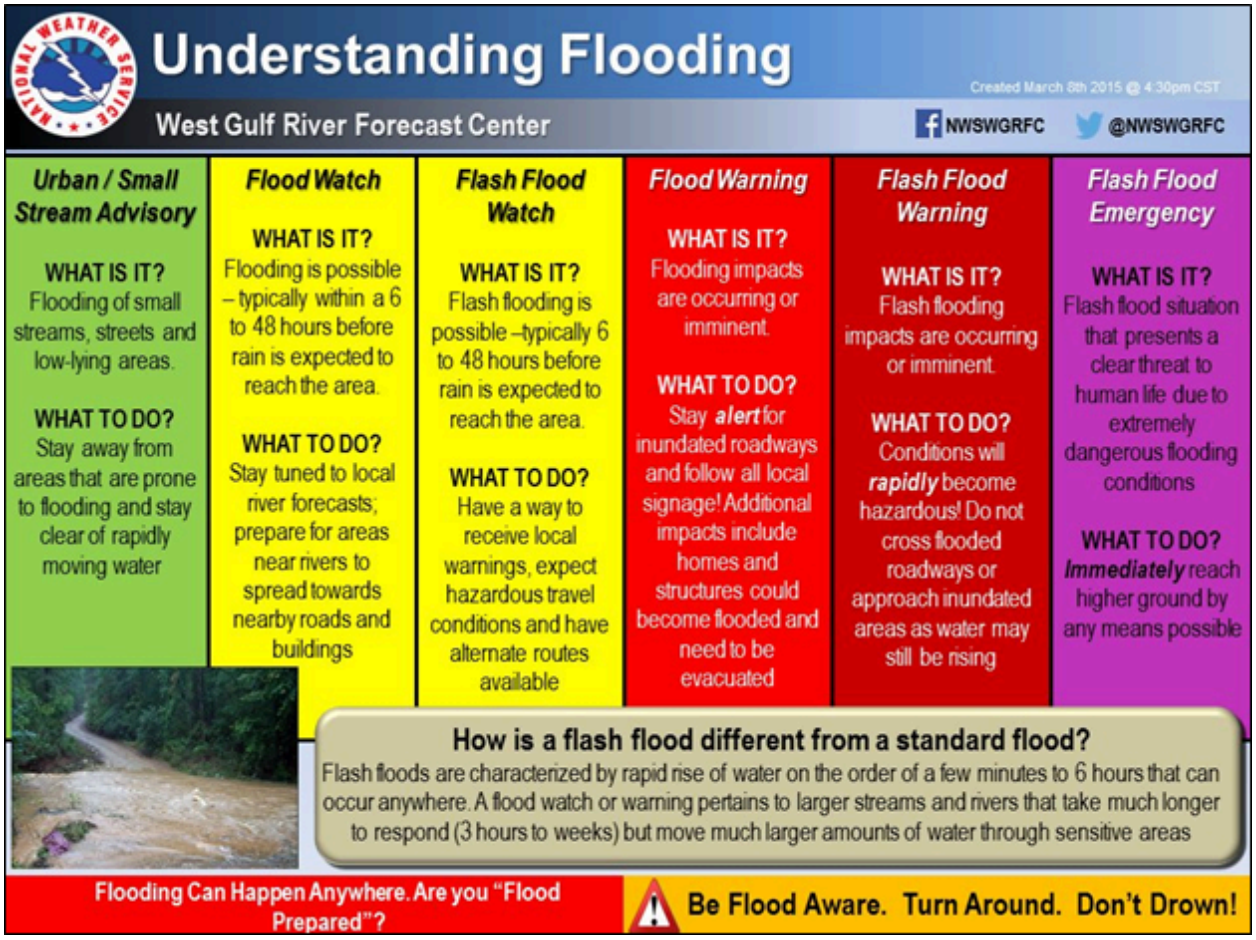


Figure 6-11. Understanding Flooding (NWS, 2015)

- ***Historical Frequency & Probability of Future Occurrence***

The Storm Events Database from the NOAA lists 10 flash flood events and three debris flow events in Duchesne County between 2000–2023. Six of these flash flood events occurred in Fruitland, five in Duchesne, one in Tabiona, and the rest in unincorporated Duchesne County. The following table lists all flash flood and debris flow events since 2000.

Table 6-9. Flood Events in Duchesne County, UT (2000–2023)

Location Within County	Date	Event Type	Property Damage ($)	Description
Duchesne	08/16/2003	Flash Flood	N/A	Heavy rain caused flash flooding along Hwy 40
Duchesne	06/23/2005	Flash Flood	N/A	Water rose quickly and flowed over Hwy 40
Fruitland	09/08/2005	Flash Flood	N/A	Portion of Camelot Rd washed out

Location Within County	Date	Event Type	Property Damage ($)	Description
Duchesne	08/06/2006	Flash Flood	N/A	Flash flood washed out road in Indian Canyon
Tabiona	07/13/2011	Flash Flood	$200,000	Heavy rain caused flash flooding and washed out SR 35, causing two vehicles to crash. One was killed and two were injured.
Duchesne	07/27/2011	Flash Flood	N/A	Thunderstorms caused flooding along River Rd as the Duchesne River rose
Fruitland	07/22/2018	Flash Flood	$150,000	Heavy rain caused flash flooding over Dollar Ridge Fire burn scar and along Strawberry River. Dozens were trapped in Camelot Resort area and Timber Canyon.
Fruitland	07/26/2019	Flash Flood	N/A	Heavy rain over Dollar Ridge Fire burn scar caused debris flows and flash flood
Duchesne	07/31/2021	Flash Flood	N/A	Heavy rain caused debris flow
Fruitland	08/01/2021	Flash Flood	$1,100	Heavy rain caused debris flow in Timber Canyon
Fruitland	08/01/2022	Debris Flow	N/A	Large debris flow from Dollar Ridge Fire burn scar to Strawberry Pinnacles area
Fruitland	03/15/2023	Debris Flow	$1,000	Snowmelt caused debris flow over US 191
Utah Railway Junction	09/03/2023	Debris Flow	$5,000	Heavy rain resulted in mudslides and debris flows across US 191

Source: NOAA Storm Events Database, 2000–2023

Flash flooding is likely to occur again in the future. According to Neighborhoods at Risk, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year by 2049 (from 1.7 days to 2 days per year). By 2049, Duchesne County is also expected to have a 0.9” increase (from 19.7” to 20.5”) in average annual precipitation. Heavy precipitation can lead to flash flooding as the ground fails

to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

• *Impacts & Loss Estimates*

Any area in Duchesne County along the Duchesne River, Rock Creek, Lake Fork River, Yellowstone River, Strawberry River, Dry Gulch Creek, Cottonwood Creek, Uinta River, Red Creek, Currant Creek, and their respective tributaries or along any gullies and washes are at risk to flash flooding, including the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona. Susceptible roads and areas include Strawberry River Road, Rock Creek Road, Moon Lake Road, the Dollar Ridge Fire burn scar areas, Hwy 40, Camelot Road, River Road, US 191, Indian Canyon, Timber Canyon, and the Strawberry Pinnacles area.

Table 6-10. Impacts of Flash Flood by Jurisdiction

Jurisdiction	Impacted by Flash Floods	Experienced Significant Flash Flood with $1,000+ in Damage Since 2010	Fatalities Due to Flash Floods	Potential Impacts of Flash Floods
Duchesne County	Yes	Yes	1	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Duchesne	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Myton	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Roosevelt	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power

Jurisdiction	Impacted by Flash Floods	Experienced Significant Flash Flood with $1,000+ in Damage Since 2010	Fatalities Due to Flash Floods	Potential Impacts of Flash Floods
				lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Altamont	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
Town of Tabiona	Yes	Yes	1	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Because flash floods develop so rapidly, people on foot or in automobiles may be stranded or may be swept away and injured or drowned. They are characterized by high velocity water flow and large amounts of debris, both of which cause damage to or destroy structures and other objects in their path.

Human death and injury sometimes occur as a result of flash flooding but are not common. Sometimes deaths are a result of hazards created by flooding. Duchesne County has seen one death related to flash flooding near Tabiona that washed out a culvert and took out part of SR 35, killing a 15-year-old girl who was riding as a passenger in a vehicle traveling on the road. Two others were injured during this incident (Deseret News, 2011).

At least $357,100 in property damage has occurred since 2000 due to flash flooding, as reported by the Storm Events Database, although actual damage over this time period is likely much higher.

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be

more vulnerable to flash flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-11. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a flood.

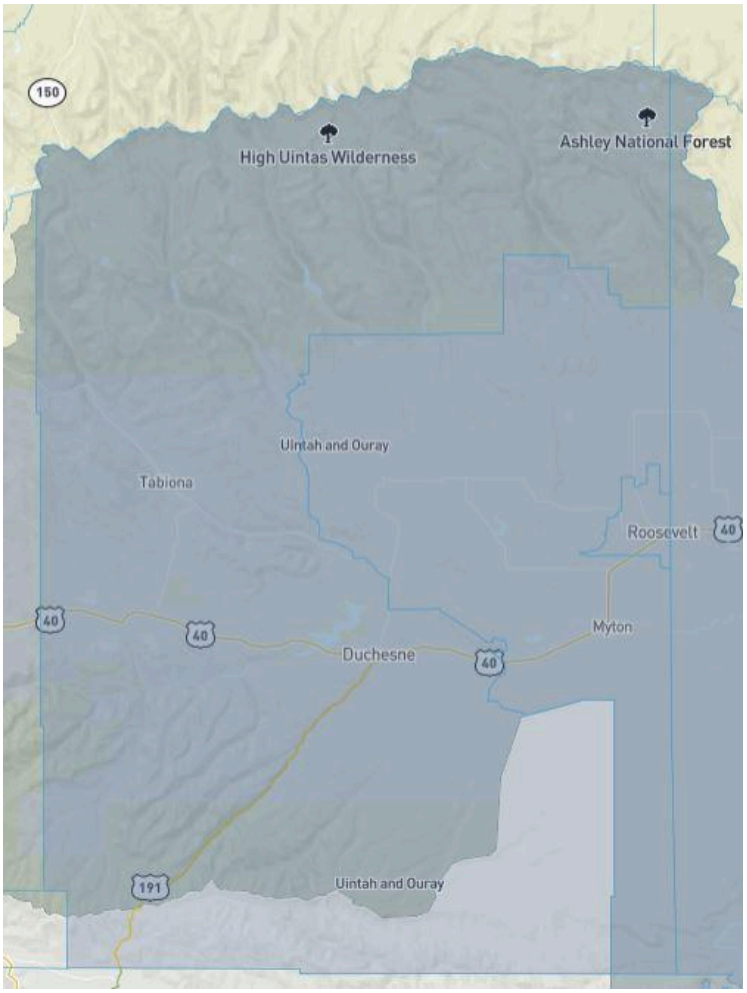
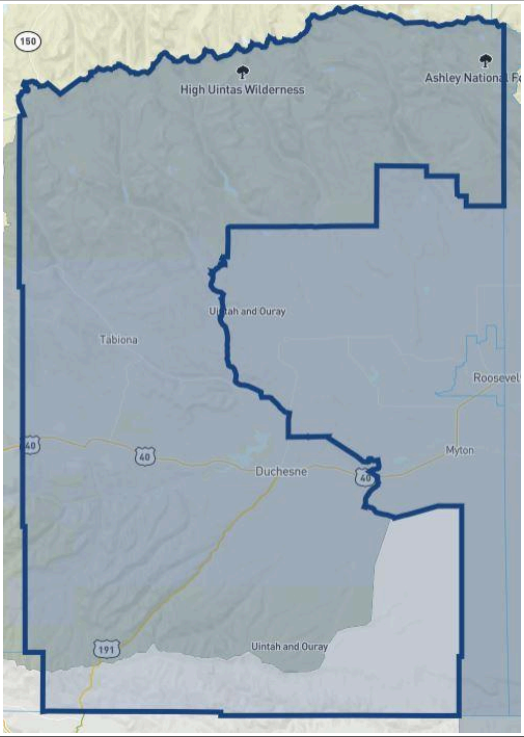


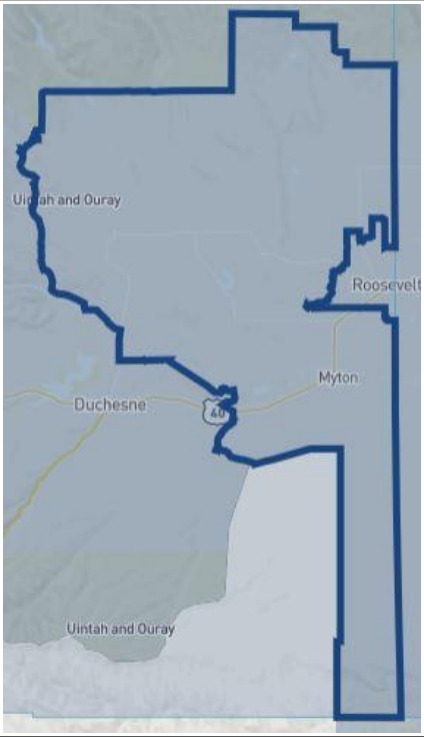
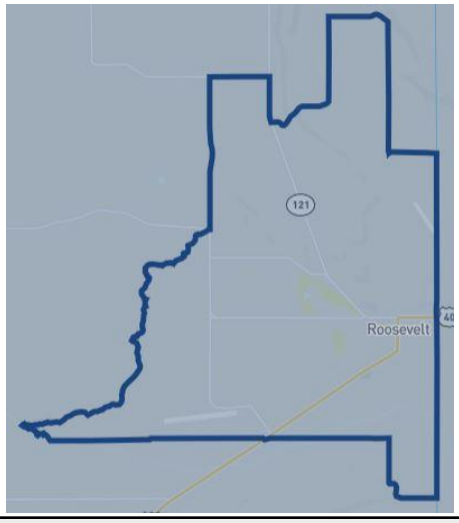
Figure 6-12. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 6-12. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Flash floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-13. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of flash flooding.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2023).

Effects of Climate Change on Probability of Future Events

Table 6-14. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

FEMA does not evaluate flash flood as part of its National Risk Index.

▪ Dam Failure

● *Hazard Description*

Potential Probability	Low
Potential Consequence	Medium
Location	Dam locations are mainly located within the east-central region of the county, including in and near Duchesne, Myton, Roosevelt, Altamont, and Tabiona.
Seasonal Pattern or Conditions	Rainy Day Failure happens primarily during heavy precipitation events and can have some warning time. Sunny Day Failure happens with no warning at all and can happen at any time.
Duration	Hours, days. Depends on spillway type and area, maximum cfs discharge, overflow or breach type, dam type. Refer to Dam Inventory for more information.
Analysis Used	FIS, Utah Division of Water Rights and Dam Safety, local input, 2019 Utah Hazard Mitigation Plan, National Inventory of Dams, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

Dam failure is the unintended release of impounded waters. Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Poor design and/or construction methods
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams.
- Inadequate maintenance and upkeep

Failures may be categorized into two types: component failure of a structure that does not result in a significant reservoir release, and uncontrolled breach failure that leads to a significant release. With an

uncontrolled breach failure of a manmade dam there is a sudden release of the impounded water, sometimes with little warning. The ensuing flood wave and flooding have enormous destructive power. The Dam Safety Program of the Utah Division of Water Rights is responsible for dam safety in Utah.

- ***Location***

Duchesne County has a total of 315 dams throughout the county, with 12 high hazard and 14 moderate hazard dams that have the potential to cause significant loss to property and/or life in the event of a dam failure (Dam Safety, 2024). As listed in the table below, there are several communities in Duchesne County that would potentially be affected by a dam breach if one occurred. Soldier Creek Dam in Wasatch County is also included because a dam failure would impact the city of Duchesne.

Table 6-15. Vulnerable Downstream Communities in Duchesne County, UT

Dam Name	DWRi Hazard Rating	First Downstream Community	Distance in Miles
Big Sand Wash Dam	High	Upalco	.8
Big Sand Wash East	High	Upalco	.8
Big Sand Wash West	High	Upalco	.8
BOR Moon Lake	High	Myton	36
BOR Soldier Creek (Wasatch County)	High	Duchesne	44
BOR Starvation	High	Duchesne	3
BOR Stillwater (Upper)	High	None—drains to Rock Creek, then Duchesne River	N/A
Browns Draw	High	Roosevelt	12
Chepeta Lake	High	Whiterocks	30
Cliff Lake (Duchense)	High	Whiterocks	20
Midview (Lake Boreham)	High	Myton	7
Red Creek (Duchesne)	High	Fruitland	7
Twin Pots	High	Altonah	10
Atwood Lake	Moderate	Whiterocks	27
Chain Lake (Lower)	Moderate	Neola	21
Chain Lake (Upper)	Moderate	Whiterocks	20
Crescent Lake	Moderate	Whiterocks	24
Duchesne County (Wascob Dam)	Moderate	None	N/A
Fox Lake	Moderate	Whiterocks	29
Roosevelt City Golf Course Pond	Moderate	Roosevelt	.5
Art Taylor	Moderate	None	N/A
Town of Altamont	Moderate	None	N/A
Upper Sandwash Ranch—Dog 6	Moderate	None	N/A
Upper Sandwash Ranch—Honeymoon—1	Moderate	None	N/A
Van Tassell Land & Livestock LLC	Moderate	None	N/A
Wasatch Energy Management—East Pond	Moderate	None	N/A
Wasatch Energy Management—West Pond	Moderate	None	N/A

Dam Name	DWRi Hazard Rating	First Downstream Community	Distance in Miles
Source: Dam Safety, 2024			

The majority of dams in the county can be found within the east-central region of the county. All other dams are scattered throughout the county in various locations.

- ***Extent***

Dams in Utah are classified according to hazard, size, and use. There are three hazard ratings used by the Dam Safety Program in Utah: high, moderate, and low. The hazard rating reflects proximity to people and property. High hazard dams are located where there are significant consequences downstream if the dam fails, such as loss of human life and significant property damage. Moderate hazard is typically defined as a dam whose failure will cause significant property destruction. Low hazard dams will cause minimal property destruction (Utah Hazard Mitigation Plan, 2019). As growth continues, homes are being built closer to dams, creating "hazard creep," which creates additional urgency to ensure dams meet safety standards and don't put lives and property at unnecessary risk (Dam Safety, 2024). The National Dam Safety Program breaks out these three hazard ratings even further using the following scale (FEMA, 2015).

Urgency of action	Characteristics and considerations	Potential actions
I – VERY HIGH URGENCY	CRITICALLY NEAR FAILURE: There is direct evidence that failure is in progress, and the dam is almost certain to fail during normal operations if action is not taken quickly. OR EXTREMELY HIGH RISK: Combination of life or economic consequences and likelihood of failure is very high with high confidence.	• Take immediate action to avoid failure. Communicate findings to potentially affected parties. • Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Initiate intensive management and situation reports.
II - HIGH URGENCY	RISK IS HIGH WITH HIGH CONFIDENCE, OR IT IS VERY HIGH WITH LOW TO MODERATE CONFIDENCE: The likelihood of failure from one of these occurrences, prior to taking some action, is too high to delay action.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Give high priority to heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Expedite confirmation of classification.
III - MODERATE URGENCY	MODERATE TO HIGH RISK: Confidence in the risk estimates is generally at least moderate, but can include facilities with low confidence if there is a reasonable chance that risk estimates will be confirmed or potentially increase with further study.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Prioritize investigations and actions to support long-term risk reduction. • Prioritize confirmation of classification as appropriate.
IV – LOW TO MODERATE URGENCY	LOW TO MODERATE RISK: The risks are low to moderate with at least moderate confidence, or the risks are low with low confidence, and there is a potential for the risks to increase with further study.	• Ensure that routine risk management measures are in place. • Determine whether action can wait until after the next periodic review. • Before the next periodic review, take appropriate interim measures and schedule other actions as appropriate. • Give normal priority to investigations to validate classification, but do not plan for risk reduction measures at this time.
V – NO URGENCY	LOW RISK: The risks are low and are unlikely to change with additional investigations or studies.	• Continue routine dam safety risk management activities and normal operations and maintenance.

Figure 6-13. Joint Federal Risk Categories for Dam Failure

Of the 315 total dams in Duchesne County, the Utah Division of Water Rights (DWRi) Dam Safety database identifies 12 high hazard dams in Duchesne County (excluding inactive, planned, or under construction dams), as seen in the table below. A high hazard rating means there is a possibility of life being lost due to dam failure. 14 dams are listed as having a moderate hazard rating, meaning there would be significant downstream property loss if the dam were to fail. 267 dams have a low hazard rating, which means if a dam failure were to occur, there would be insignificant property loss; however, these dams should still be monitored. The remaining 22 dams do not have a hazard rating but are still listed in the database. The classification of a high hazard dam does not mean that the dam has a high probability of failure. Dam safety hazard classifications simply delineate the downstream consequences if a dam were to fail. Potential dam failure in Duchesne County is rated as "possible." If a dam were breached in the county, the communities identified in the table in the *Location* section above would be affected.

The National Inventory of Dams (NID) ranks dams as high, significant, or low. The NID lists 26 dams in Duchesne County that have a rating of high or significant.

In addition to listing all dams from DWRi Dam Safety in Duchesne County with a rating of high or moderate, the following table notes all 26 dams from the National Inventory of Dams (NID) that have a rating of high or significant.

Table 6-16. Dams in Duchesne County, UT

	Dam Name	DWRi Hazard Rating	NID Hazard Rating
1	Big Sand Wash Dam	High	High
2	Big Sand Wash East	High	High
3	Big Sand Wash West	High	High
4	BOR Moon Lake	High	High
5	BOR Starvation	High	High
6	BOR Stillwater (Upper)	High	High
7	Browns Draw	High	High
8	Chepeta Lake	High	High
9	Cliff Lake (Duchense)	High	High
10	Midview (Lake Boreham)	High	High
11	Red Creek (Duchesne)	High	High
12	Twin Pots	High	High
13	Atwood Lake	Moderate	Significant
14	Chain Lake (Lower)	Moderate	Significant
15	Chain Lake (Upper)	Moderate	Significant
16	Crescent Lake	Moderate	Significant
17	Duchesne County (Wascob Dam)	Moderate	Significant
18	Fox Lake	Moderate	Significant
19	Roosevelt City Golf Course Pond	Moderate	Significant
20	Art Taylor	Moderate	Significant
21	Town of Altamont	Moderate	Significant
22	Upper Sandwash Ranch—Dog 6	Moderate	Significant
23	Upper Sandwash Ranch—Honeymoon—1	Moderate	Significant
24	Van Tassell Land & Livestock LLC	Moderate	Significant
25	Wasatch Energy Management—East Pond	Moderate	Significant
26	Wasatch Energy Management—West Pond	Moderate	Significant
Source: Dam Safety, 2024; NID, 2024			

Soldier Creek is a high hazard dam located in Wasatch County; however, the risk is region wide, and the first downstream community is Duchesne, which is a city in Duchesne County with 1,588 people and is 44 miles away. The dam was completed in 1973 and is owned by the Department of the Interior Bureau of Reclamation. The reservoir storage at spillway crest is 1,106,500 acre-feet, and the reservoir storage at dam crest is 1,127,000 acre-feet. The maximum dam breach flow is 999,000 cfs with a 0-square mile drainage basin area.

● *Historical Frequency & Probability of Future Occurrence*

The only significant dam failure to occur in Duchesne County was the Little Deer Creek Dam on June 16, 1963. The reservoir and dam were newly constructed for additional water storage along Little Deer Creek, which was a small tributary of the upper Duchesne River. Shortly after being filled with water for the first time, the dam was breached, and approximately 1,200 acre-feet of water poured out, scouring Little Deer Creek Canyon below. A family was camping below along the North Fork of the Duchesne River, and a four-year-old boy was killed in the flood waters. Ten bridges were also washed out and several farms were damaged. The flood waters reached the communities of Hanna and Tabiona within five hours and were approximately 15 miles away. Duchesne was 45 miles away and saw the flood waters in 12 hours. The dam failure caused an estimated $318,000 in damages (ASDSO, 2024; Lindon, 2004).

Dam failure could occur at any time without warning, so it's imperative to continue monitoring each dam in the county, especially those with high or moderate hazard ratings. The cities of Duchesne and Roosevelt are most at risk of a dam failure. The city of Myton has minimal risk. The towns of Altamont and Tabiona are not in the direct path of any high or moderate rated dams but could still be affected by smaller dams, canals, or culverts.

The risk of dam failure is not likely to increase so long as dams are maintained as they are required by law. However, according to Neighborhoods at Risk, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year by 2049 (from 1.7 days to 2 days per year). By 2049, Duchesne County is also expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation. Heavy precipitation can lead to flooding as the ground fails to absorb the high volume of precipitation that falls in a short period, which has the potential to suddenly overwhelm a dam, especially if the dam is not carefully monitored and maintained.

● *Impacts & Loss Estimates*

The jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona and parts of unincorporated Duchesne County may be impacted by dam failure, as presented in the table below.

Table 6-17. Impacts of Dam Failure by Jurisdiction

Jurisdiction	May Be Impacted by Dam Failure	Potential Impacts of Dam Failure
Duchesne County	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
City of Duchesne	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
City of Myton	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities,

Jurisdiction	May Be Impacted by Dam Failure	Potential Impacts of Dam Failure
		shortage of water storage, disruption to medical care, risk to emergency services, economic losses
City of Roosevelt	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
Town of Altamont	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
Town of Tabiona	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses

High and moderate hazard dams have the potential to cause possible loss of human life (high hazard) or significant property damage (moderate hazard) if they were to fail and are therefore of most concern to the county. However, due to strict regulations, frequent monitoring, and periodic inspection of these high and moderate hazard dams, the likelihood of a dam failure is low.

One fatality has occurred in Duchesne County due to dam failure from the Little Deer Creek Dam failure in 1963 when a four-year-old boy was drowned.

The severity of a dam failure depends on the area surrounding the dam or levee, the volume and velocity of water that breaches the structure, and the structures and population in the area. A dam failure will result in flooding of normally protected areas, primarily low-lying areas downstream of the dam, resulting in impacts similar to those seen that are within the normal floodplain. Impacts include damaged or destroyed essential utilities, homes, major roads, crops, and businesses. See the table below for specific potential losses associated with the dam failure hazard.

Table 6-18. Critical Facilities Potentially Impacted by Dam Failure

Dam	Potentially Impacted if Dam Failed										
	Hospitals / Medical Clinics	Schools	EOC	Police Station	Fire Station	County/City Facilities	Essential Utilities	Major Roads/ Bridges	Homes	Crops	Businesses
Big Sand Wash								X	X	X	
Moon Lake								X	X	X	
Starvation	X	X			X	X	X	X	X	X	X
Upper Stillwater								X		X	
Browns Draw								X	X	X	
Chepeta Lake								X			
Cliff Lake											
Midview							X	X	X	X	
Red Creek							X	X	X	X	
Twin Pots							X	X		X	
Atwood Lake											
Lower Chain Lake											
Upper Chain Lake											
Crescent Lake											
Fox Lake											
Milk Lake											
Roosevelt City Golf Course Pond								X	X	X	
Soldier Creek	X	X			X	X	X	X	X	X	X

The 2019 Utah State Hazard Mitigation Plan compiled the total potential dam inundation area for each county in Utah. For Duchesne County, 111.51 square miles (out of 3,248.13 total square miles in the county) could potentially be affected by one or more dam failures. This is a percentage of 3.43%. The cities of Duchesne and Roosevelt have the most potential for significant loss of life and/or property.

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to dam failure. Structures without foundations are more likely to be swept away or damaged in the event of a dam failure and the subsequent flash flood. Additionally, those who are unable to quickly transport themselves to a safe location may be at risk.

Table 6-19. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a dam failure.

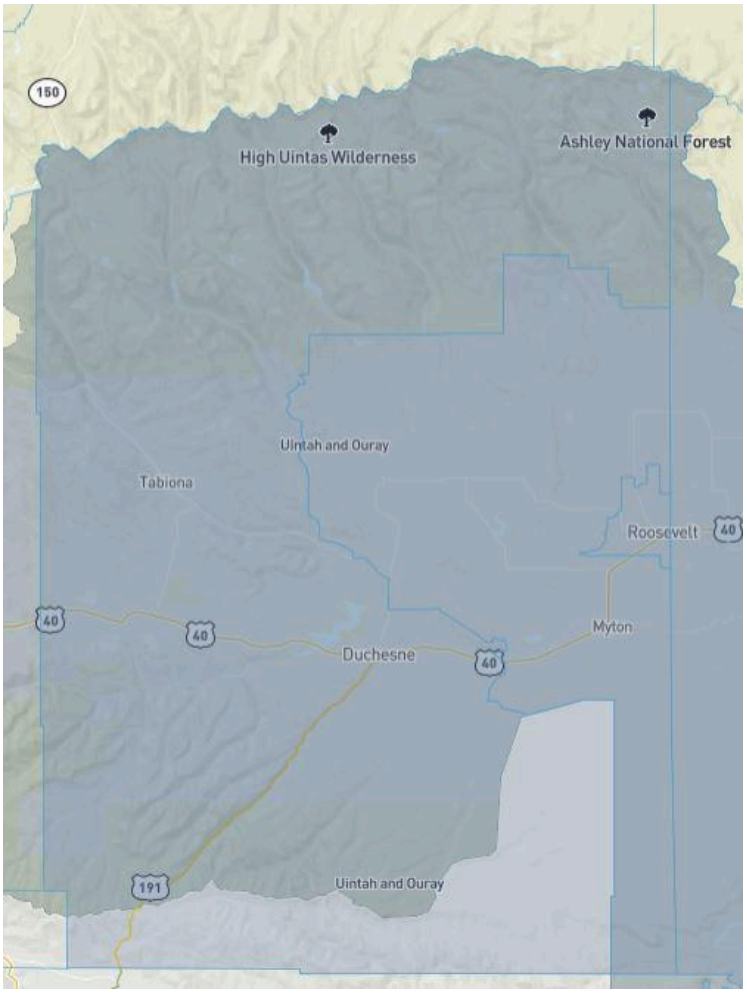
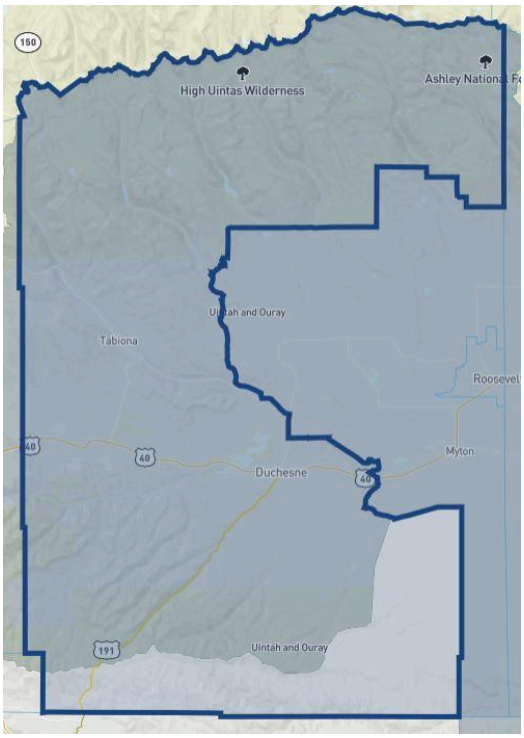
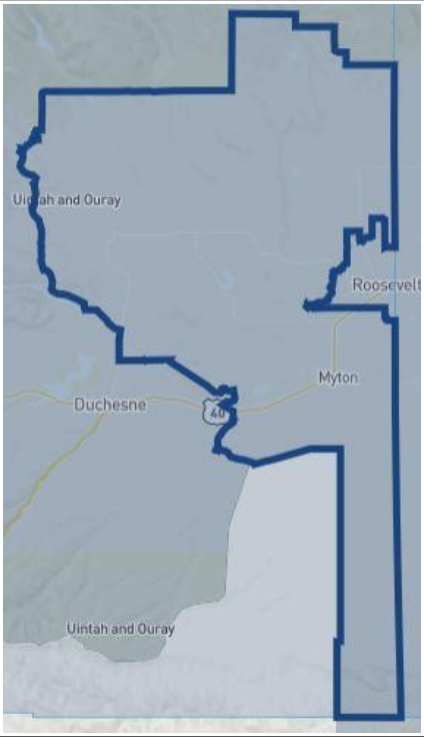
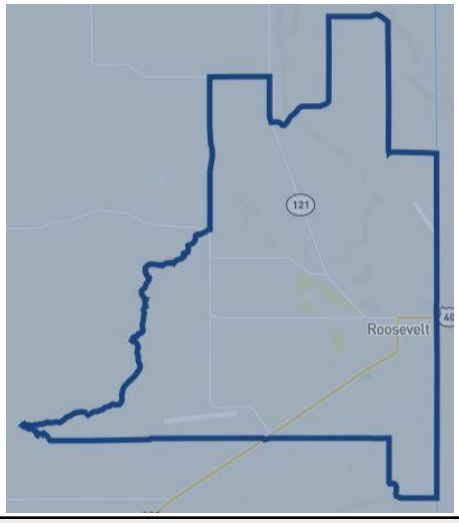


Figure 6-14. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 6-20. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940300	4,523	YES
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Dam failure and subsequent flooding may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from dam failure, which could delay emergency response and access to life-saving medical equipment.

Table 6-21. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of dam failure.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding and places more pressure on existing dams (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 6-22. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding and threaten reservoir/lake capacities, which may place additional pressure on existing dams.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

FEMA does not evaluate dam failure as part of its National Risk Index.

• DROUGHT

o HAZARD DESCRIPTION

Potential Probability		High
Potential Consequence		Medium
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona	
Seasonal Pattern or Conditions	Generally summer and early fall	
Duration	Drought events may last one month to several months to years	
Analysis Used	National Drought Mitigation Center, NCEI, 2019 Utah Hazard Mitigation Plan, RGJ, NOAA, NWS, Utah Division of Water Resources, EWG, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR	

Drought is an expected phase in the climactic cycle of almost any geographical region. Objective, quantitative definitions for drought exist but most authorities agree that, because of the many factors contributing to it and because its onset and relief are slow and indistinct, none is entirely satisfactory. According to the National Drought Mitigation Center, drought "originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector" (NDMC, 2024a). What is clear is that a condition perceived as "drought" in a given location is the result of a significant decrease in water supply relative to what is "normal" in that area.

It should be noted that water supply is not only controlled by precipitation (amount, frequency, and intensity) but also by other factors, including evaporation (which is increased by higher-than-normal heat and winds), transpiration, temperature, soil moisture, and human use.

Utah specifically is a dry landscape and is among one of the driest states in the country, receiving on average approximately 13 inches of precipitation per year (Utah Hazard Mitigation Plan, 2019).

o LOCATION

Duchesne County is subject to drought events due to its partial location in the semi-arid region of Utah. The county is represented by portions of two of the seven different climate divisions in Utah, which are referred to as the Uinta Basin and Northern Mountains divisions (see following figure). The Uinta Basin region often experiences drought, but the portion of the Northern Mountains division that is located in Duchesne County primarily consists of the Uinta Mountains, which have no real dry season with warm-to-hot summers and cold, snowy winters (Climate of Utah, 2009). Drought events affect the county, incorporated cities, and unincorporated communities.

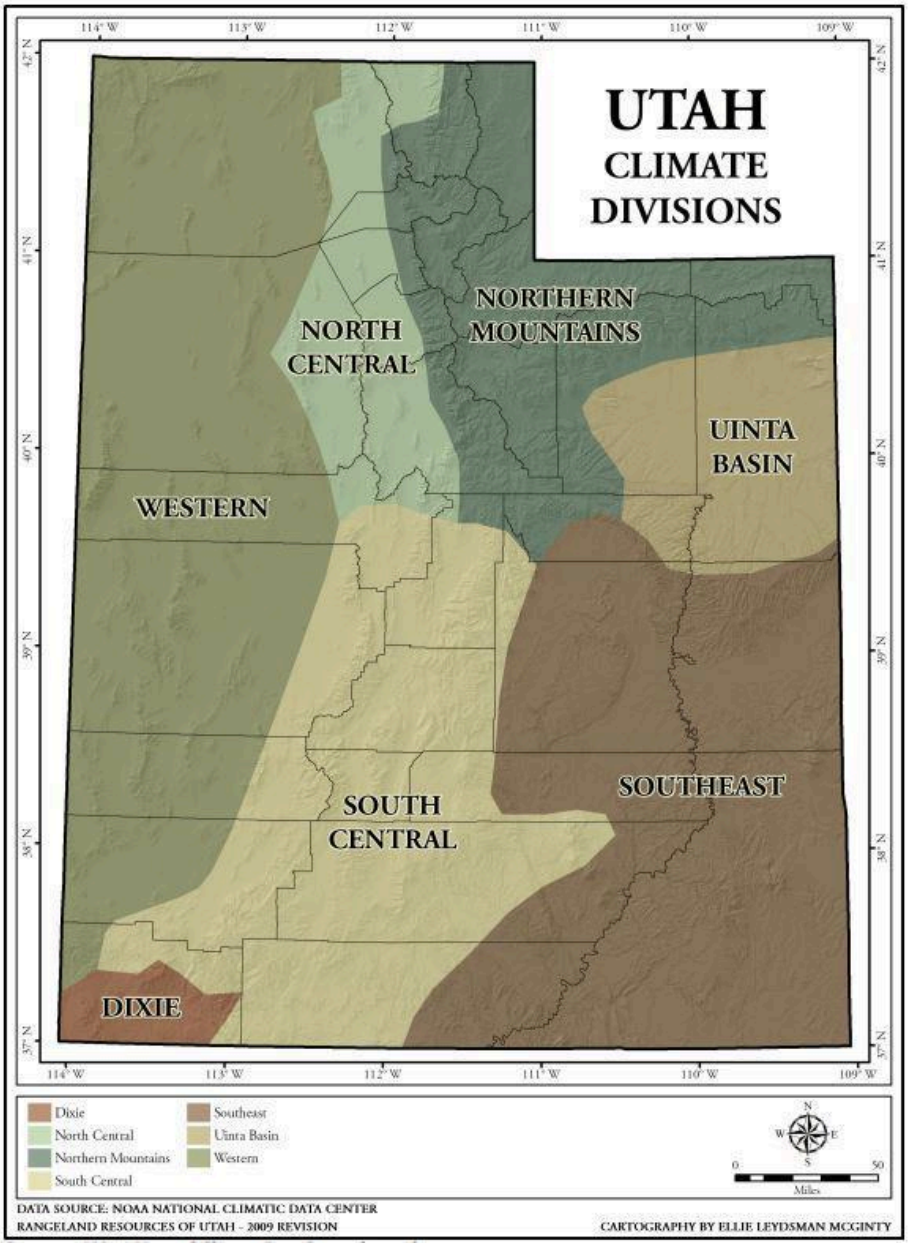


Figure 7-1. Utah Climate Divisions

o EXTENT

The following figure displays the precipitation conditions for the United States using the Palmer Drought Severity Index, which is taken from the National Weather Service (NWS). The Palmer Drought Severity Index (PDSI) is a means of quantifying drought in terms of prolonged and abnormal moisture deficiency or excess. This index indicates general conditions and not local variations caused by isolated rain. The PDSI is an important climatological tool for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather. It can be used to help delineate disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential intensity of forest fires (NWS, 2024).

The PDSI expresses this comparison of moisture deficiency and moisture excess on a numerical scale that usually ranges from positive five to negative five. Positive values reflect excess moisture supplies, while negative values indicate moisture demands in excess of supplies.

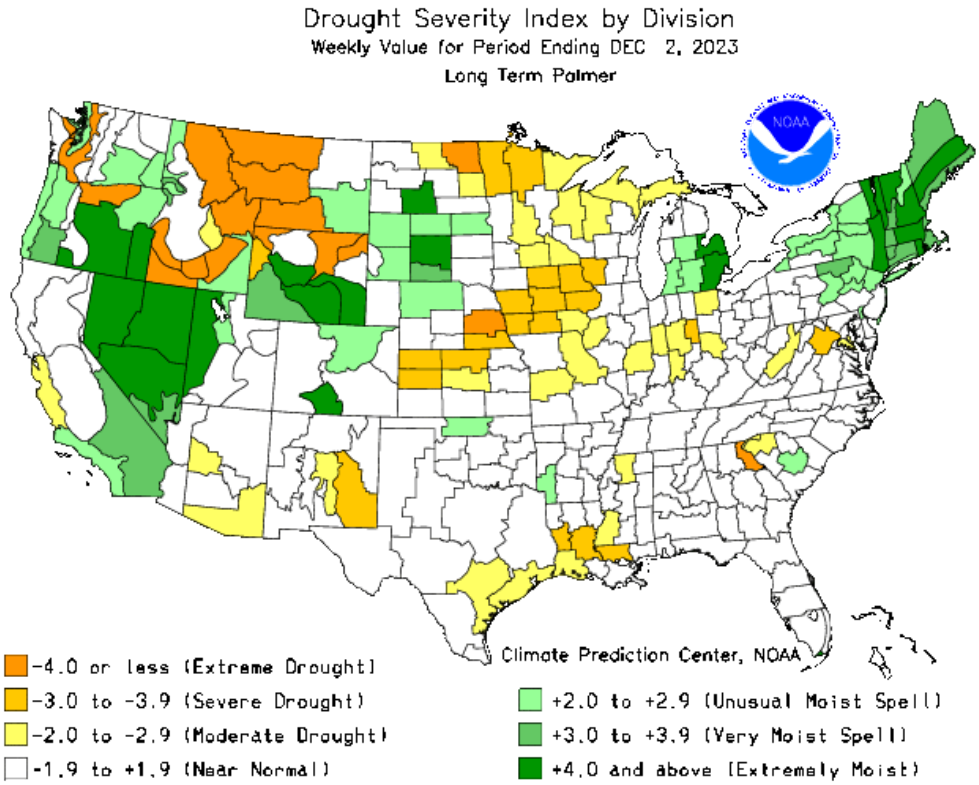


Figure 7-2. U.S. Drought Severity Index

The National Drought Mitigation Center also rates drought throughout the nation by intensity using a D0 (Abnormally Dry) to D4 (Exceptional Drought) scale, as seen in the map of Utah below. The southeastern region of Duchesne County is currently abnormally dry (NDMC, 2024b).

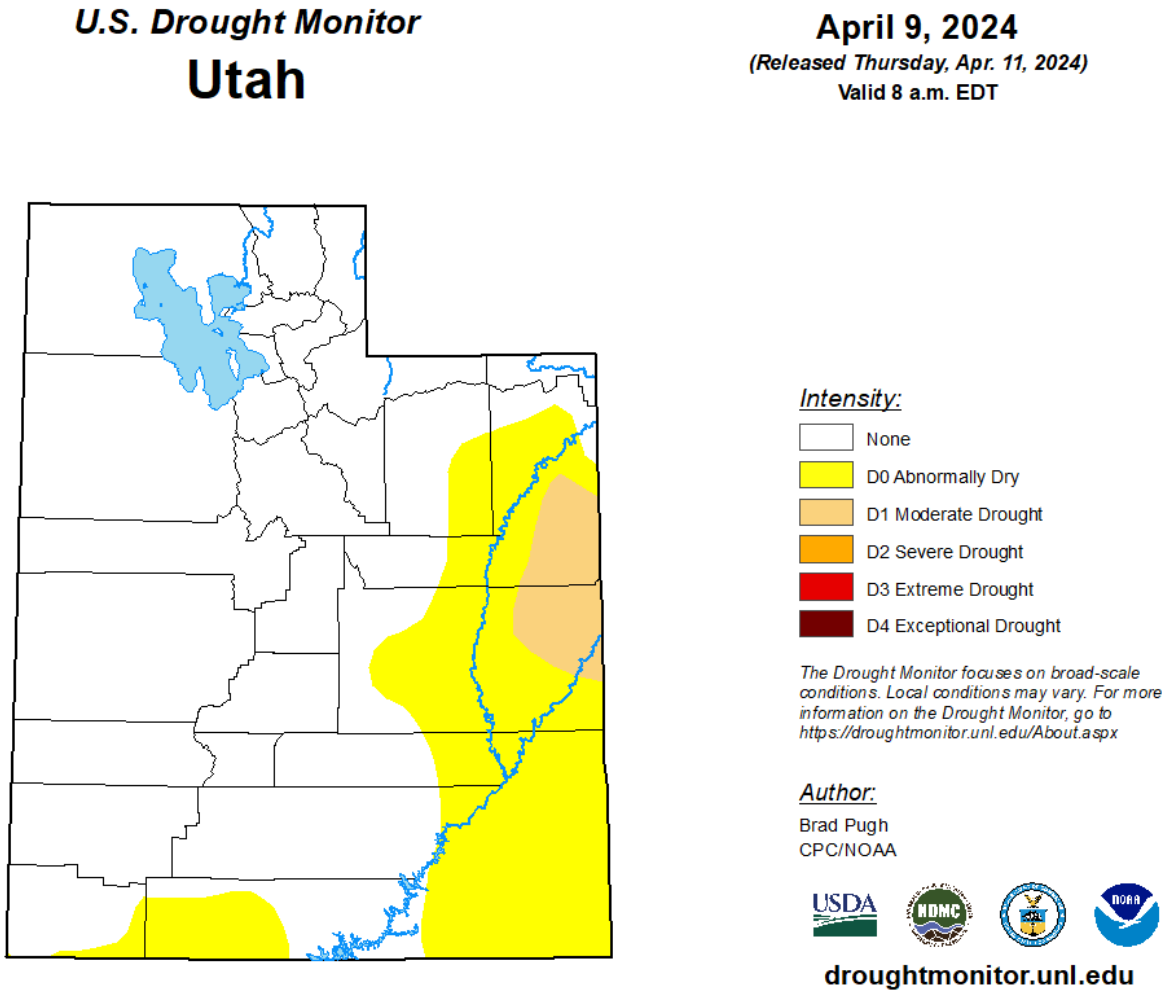


Figure 7-3. U.S. Drought Monitor Utah

The Standardized Precipitation Index (SPI) is a probability index that considers only precipitation. The SPI is based on the standardized probability of recording a given amount of precipitation in a specific area. The index is negative for drought and positive for wet conditions. The index becomes more positive or negative as conditions become more severe. The 1-month SPI for North America in March of 2024 can be seen below (NCEI, 2024).

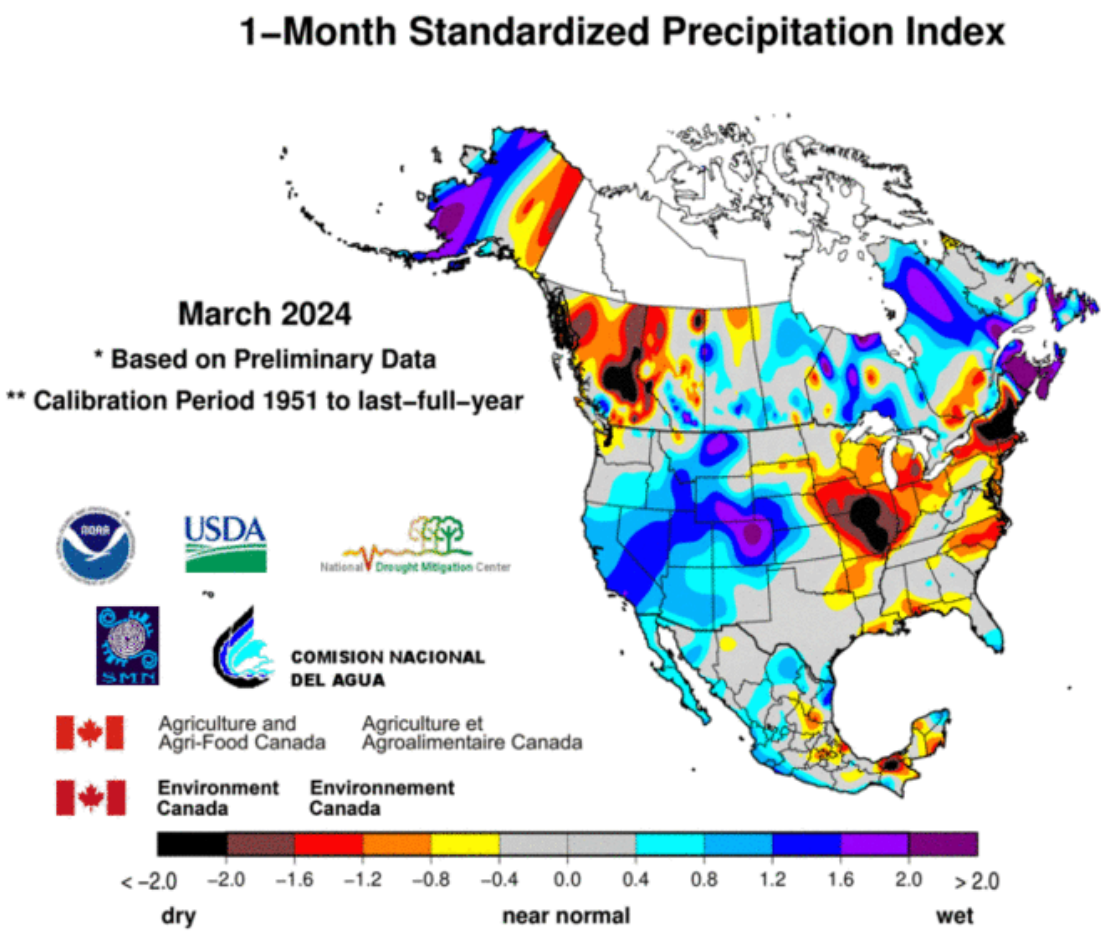


Figure 7-4. 1-Month Standardized Precipitation Index

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Droughts are common occurrences in Duchesne County. There have been several multi-year droughts in Utah since 1898, which are listed below (Utah Hazard Mitigation Plan, 2019). Utah has been in a prolonged drought since 1987 until recently in 2023.

- 1898–1905
- 1933–1943
- 1950–1966
- 1971–1977
- 1987–2023

Duchesne County has historically experienced prolonged drought events followed by nearly equally prolonged periods of no drought until about 2012 when droughts began occurring closer together (RGJ, 2024). The southeastern region of the county is currently abnormally dry, while the rest of the county has no drought or notable dryness (Drought, 2024). The list below notes the periods of drought in Duchesne County since 2000 (RGJ, 2024).

- August 2000–October 2000
- July 2001–November 2001
- February 2002–March 2005
- March 2007–April 2008
- January 2010–June 2010
- January 2012–April 2016
- July 2016–September 2016
- July 2017–September 2017
- November 2017–February 2019
- October 2019–March 2020
- May 2020–May 2023

An extended drought is likely to occur again in the future. According to Neighborhoods at Risk, Duchesne County is expected to experience 4 more days that reach above 95°F by 2049 (2024). As annual temperatures continue to increase and dry conditions remain consistent, more frequent and lengthy droughts are likely to occur. In fact, Duchesne County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NOAA, 2022).

o IMPACTS & LOSS ESTIMATES

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by drought, as presented in the table below.

Table 7-1. Impacts of Drought by Jurisdiction

Jurisdiction	Impacted by Drought	Experienced Exceptional Drought Since 2010	Potential Impacts of Drought
Duchesne County	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
City of Duchesne	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
City of Myton	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
City of Roosevelt	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment,

Jurisdiction	Impacted by Drought	Experienced Exceptional Drought Since 2010	Potential Impacts of Drought
			increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
Town of Altamont	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
Town of Tabiona	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages

Drought is agriculture's most expensive, frequent, and widespread form of natural disaster. Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services.

Impacts are commonly referred to as direct or indirect. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of direct impacts. The consequences of these impacts illustrate indirect impacts. For example, a reduction in crop, rangeland, and forest productivity may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues because of reduced expenditures, increased crime, foreclosures on bank loans to farmers and businesses, migration, and disaster relief programs. The impacts of drought can be categorized as economic, environmental, or social.

Many economic impacts occur in agricultural and related sectors because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. In fact, the EWG reported $12,417 in total indemnities in the county for crops lost to heat (1995–2022). Droughts also bring increased problems with insects and diseases to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls, and loss of tax revenue for local, state, and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy, and other products increase as supplies are reduced. In some cases, local shortages of certain goods result in the need to import these goods from outside the stricken region.

Table 7-2. Drought: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
80.8 events per year	N/A	N/A	N/A	$1,891	$1,891	86.6	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
80.8 events per year	N/A	N/A	N/A	$11,388	$11,388	92.7	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
73.5 events per year	N/A	N/A	N/A	$1,005	$1,005	84.4	Relatively Low
Census Tract 940501: City of Roosevelt							
72.5 events per year	N/A	N/A	N/A	$78	$78	76.0	Very Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

▪ Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People particularly susceptible to drought are farmers who rely on crop revenue, people living in poverty, and those with chronic illnesses, such as asthma.

Table 7-3. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native

Americans, the majority of whom are low income. Some may rely heavily on the land to sustain them, which can become difficult during times of drought and limited access to water.

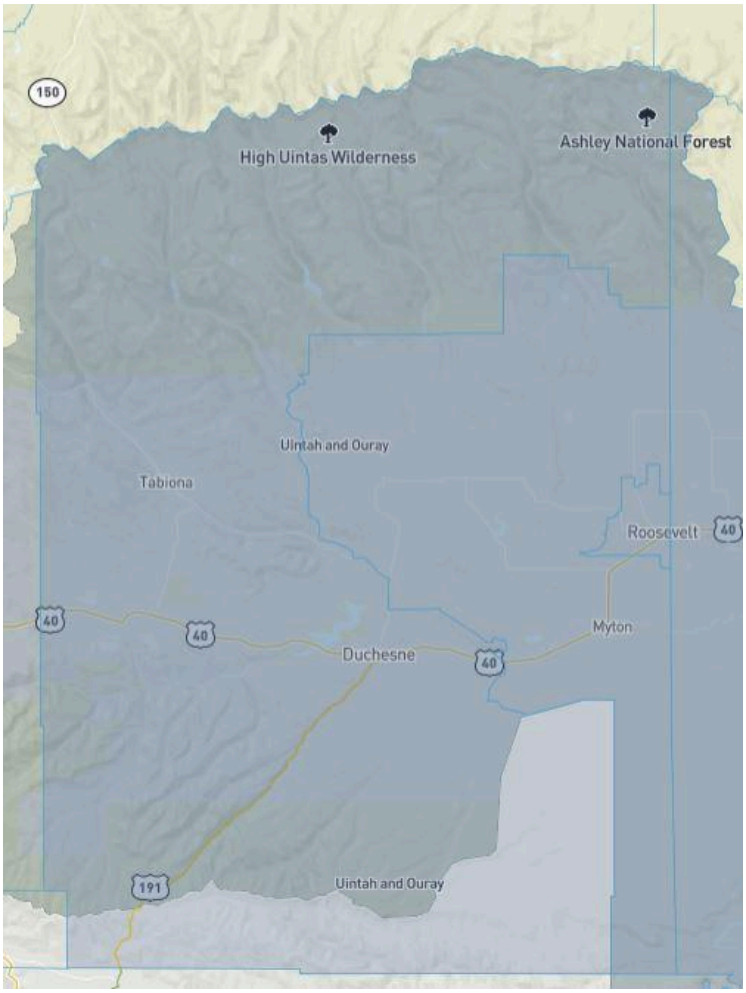
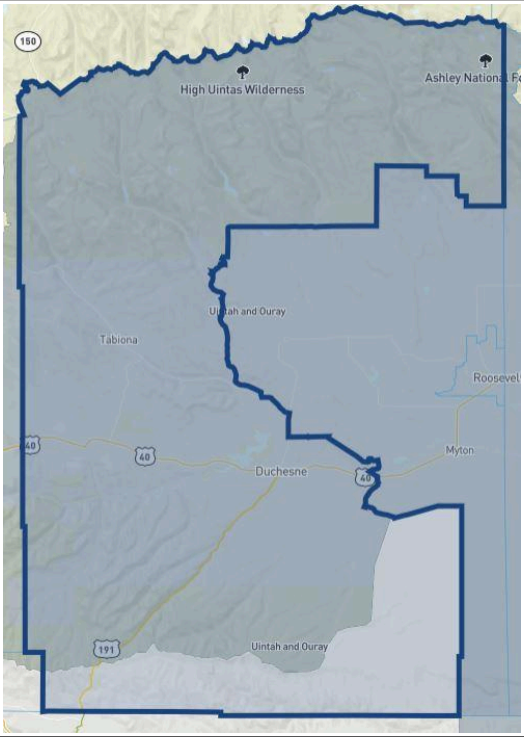


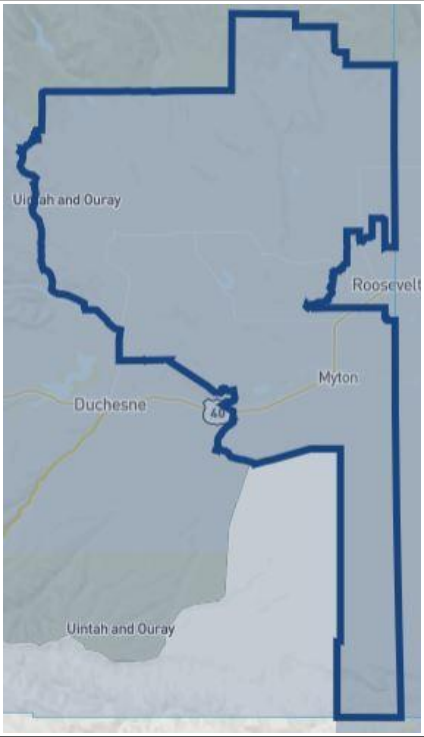
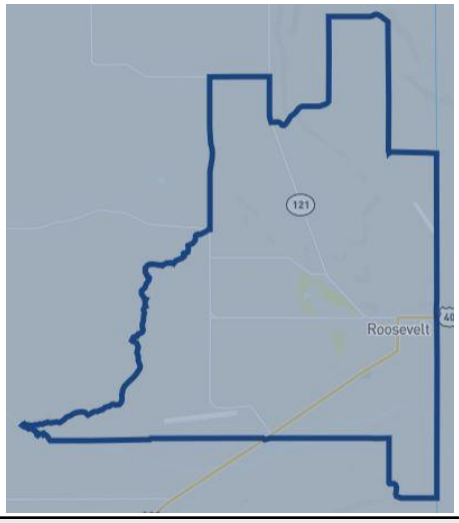
Figure 7-5. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 7-4. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Drought places high demands on the water supply and sometimes even electrical power supplies that can lead to blackouts or brownouts when accompanied by high heat. The following table lists types of critical facilities that could be negatively affected by power outages or limited water supply, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 7-5. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is no impact based on current development trends on either current or future development.

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century (UCAR, 2024).

Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors.

▪ Effects of Climate Change on Probability of Future Events

Table 7-6. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Duchesne County is expected to experience 4 more days that reach above 95°F (from 3 days to 7 days per year).
	By 2049, Duchesne County is expected to have a 3°F increase (from 41°F to 43°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 7-7. Drought: Overall National Risk Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
87.3	Relatively Low	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
93.0	Relatively Low	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
84.6	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
77.1	Very Low	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● EARTHQUAKE

o HAZARD DESCRIPTION

Potential Probability		Low
Potential Consequence		Medium
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona; refer to earthquake quaternary faults map	
Seasonal Pattern or Conditions	Can occur at any time	
Duration	Event duration is short, but the recovery may be long term	
Analysis Used	USGS, UGS, GIS data, SMS Tsunami Warning, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS	

The U.S. Geological Survey (USGS) defines earthquake as “ground shaking caused by the sudden release of accumulated strain by an abrupt shift of rock along a fracture in the Earth or by volcanic or magmatic activity, or other sudden stress changes in the Earth.” The hazards associated with earthquake are essentially secondary to ground shaking (also called seismic waves), which may cause buildings to collapse; displacement or cracking of the earth’s surface; flooding as a result of damage to dams or levees; and fires from ruptured gas lines, downed power lines, and other sources. Earthquakes cause both vertical and horizontal ground shaking, which varies both in amplitude (the amount of displacement of the seismic waves) and frequency (the number of seismic waves per unit time), usually lasting less than thirty seconds.

o LOCATION

This hazard may affect every community in Duchesne County, including the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona. However, the only quaternary faults in Duchesne County are located on the Towanta Flat near Mountain Home and south of Duchesne and Myton, parallel with US 40. A map of these quaternary faults can be seen below (USGS, 2024).

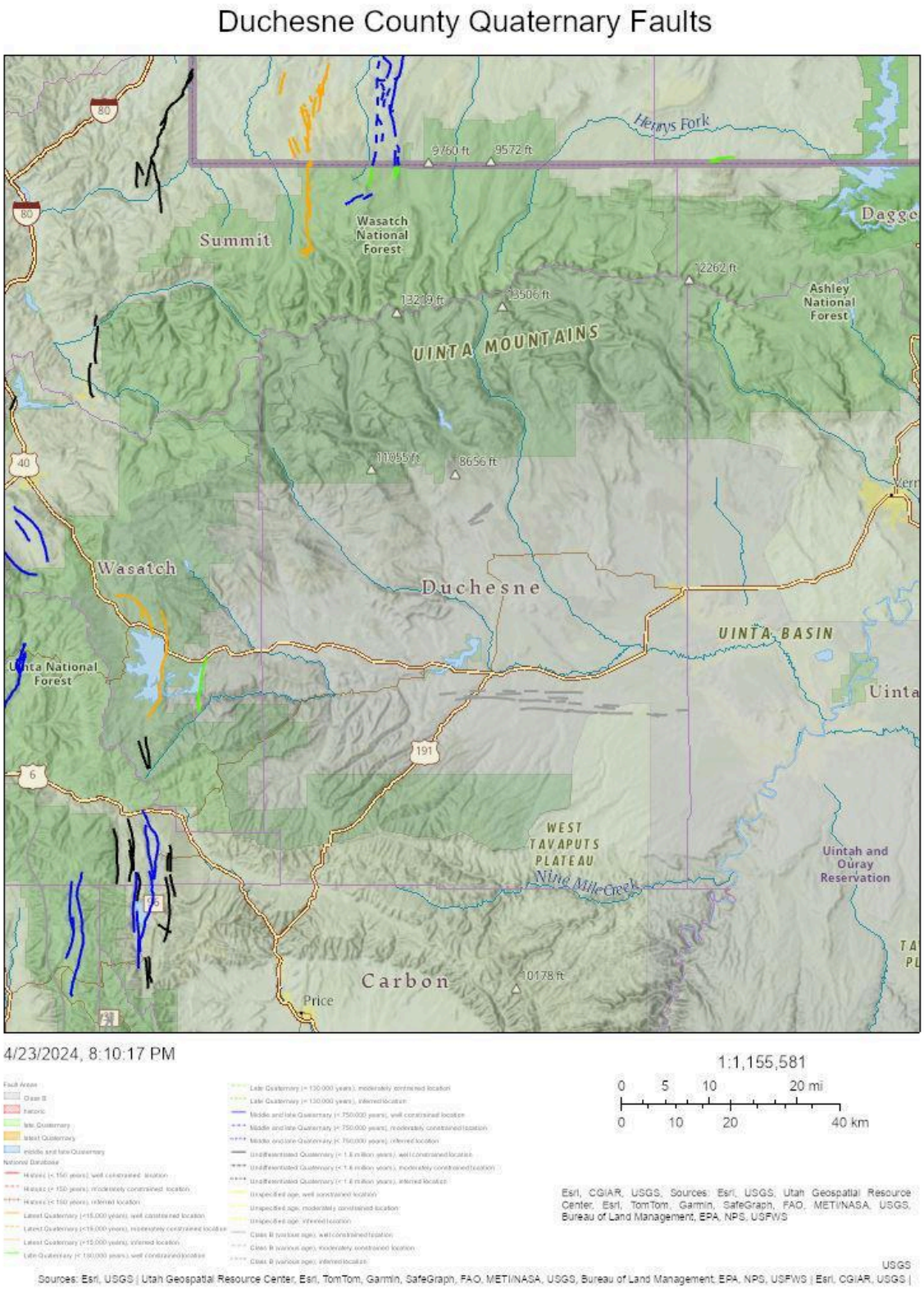


Figure 8-1. Duchesne County Quaternary Faults

o EXTENT

Earthquakes are measured both in terms of their inherent "magnitude" and in terms of their local "intensity."

The magnitude of an earthquake is essentially a relative estimate of the total amount of seismic energy released and may be expressed using the familiar "Richter scale" or using the "moment magnitude scale" now favored by most technical authorities. On either scale, significant damage can be expected from earthquakes with a magnitude of about 5.0 or higher. What determines the amount of damage that might occur in any given location, however, is not the magnitude of the earthquake but the intensity at that particular place. Earthquake intensity decreases with distance from the earthquake's "epicenter" (its focal point) but also depends on local geological features, such as depth of sediment and bedrock layers.

Intensity is most commonly expressed using the "Modified Mercalli Intensity Scale" (MMI). Mercalli intensity is assigned based on eyewitness accounts. More quantitatively, intensity may be measured in terms of "peak ground acceleration" (PGA) expressed relative to the acceleration of gravity (g) and determined by seismographic instruments.

While Mercalli and PGA intensities are arrived at differently, they correlate reasonably well. While the locations most susceptible to earthquakes are known, there is little ability to predict an earthquake in the short term.

The following table correlates the MMI intensity with the Richter scale and effects of ground shaking:

Category	Effects	Richter Scale (approximate)
I. Instrumental	Not felt	1-2
II. Just perceptible	Felt by only a few people, especially on upper floors of tall buildings	3
III. Slight	Felt by people lying down, seated on a hard surface, or in the upper stories of tall buildings	3.5
IV. Perceptible	Felt indoors by many, by few outside; dishes and windows rattle	4
V. Rather strong	Generally felt by everyone; sleeping people may be awakened	4.5
VI. Strong	Trees sway, chandeliers swing, bells ring, some damage from falling objects	5
VII. Very strong	General alarm; walls and plaster crack	5.5
VIII. Destructive	Felt in moving vehicles; chimneys collapse; poorly constructed buildings seriously damaged	6
IX. Ruinous	Some houses collapse; pipes break	6.5
X. Disastrous	Obvious ground cracks; railroad tracks bent; some landslides on steep hillsides	7
XI. Very disastrous	Few buildings survive; bridges damaged or destroyed; all services interrupted (electrical, water, sewage, railroad); severe landslides	7.5
XII. Catastrophic	Total destruction; objects thrown into the air; river courses and topography altered	8

Figure 8-2. Modified Mercalli Scale vs. Richter Scale (SMS Tsunami Warning, 2024)

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The majority of Duchesne County is in the lowest earthquake risk zone in Utah, Zone 1, according to the Utah State Building Code seismic zone map, with a small portion of the western region in Zone 2B (UGS, 1987; U.S. Seismic Zones, 1997). Duchesne County experiences relatively few earthquakes, with most earthquakes in Duchesne County occurring at a magnitude of 4.0 or lower. Due to the low magnitude of these earthquakes, there is very little recordable damage, and they are rarely noticeable by residents within this rural and sparsely populated region.

The USGS keeps a record of earthquakes throughout the world in their Earthquake Catalog. The following table lists all earthquakes felt in Duchesne County since 1980 with a magnitude of 3.0 or higher. The USGS also records all mining explosions and quarry blasts in their database, which usually register as a 3.5 magnitude or lower and account for over half of the "felt earthquakes" in the county (USGS, 2024). These blasts are not included in the table below.

Table 8-1. Felt Earthquakes with Magnitude 3.5+ in Duchesne County, UT

Date	Location	Magnitude	MMI Rating (as felt in Duchesne County)
03/05/1987	12 km N of Tabiona, UT	3.5	N/A
06/02/1987	20 km ENE of Samak, UT	3.1	N/A
04/09/1989	21 km WNW of Tabiona, UT	3.1	N/A
02/05/1998	7 km N of Helper, UT	3.8	N/A
03/07/2000	7 km N of Helper, UT	4.2	N/A
05/25/2016	15 km NNE of Tabiona, UT	4.0	III
03/18/2020	5 km NNE of Magna, UT	5.7	IV
06/09/2021	17 km E of Independence, UT	3.7	III
Source: USGS, 2024			

Low magnitude earthquakes of 4.0 or lower are expected to continue at the current trend. Higher magnitude earthquakes in Duchesne County that cause significant damage are unlikely, but possible. Climate change currently has no known impact on earthquakes and is unlikely to contribute to earthquakes in Duchesne County.

o IMPACTS & LOSS ESTIMATES

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by earthquakes, as presented in the table below.

Table 8-2. Impacts of Earthquake by Jurisdiction

Jurisdiction	May be Impacted by Earthquakes	Experienced Earthquake with Magnitude 3.0+	Potential Impacts of Earthquakes
Duchesne County	Yes	Yes	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
City of Duchesne	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines,

Jurisdiction	May be Impacted by Earthquakes	Experienced Earthquake with Magnitude 3.0+	Potential Impacts of Earthquakes
			stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
City of Myton	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
City of Roosevelt	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
Town of Altamont	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
Town of Tabiona	Yes	Yes	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses

Earthquakes are capable of catastrophic consequences, especially in urban areas. Worldwide, earthquakes have been known to cost thousands of lives and enormous economic and social losses. In minor earthquakes, damage may be done only to household goods, merchandise, and other building contents, and people are occasionally injured or killed by falling objects. More violent earthquakes may cause the full or partial collapse of buildings, bridges and overpasses, and other structures. Fires due to broken gas lines, downed power lines, and other sources are common following an earthquake and often account for much of the damage. Economic losses arise from destruction of structures and infrastructure, interruption of business activity, and innumerable other sources. Utilities may be lost for long periods of time and all modes of transportation may be disrupted. Emergency Services, including medical, may be both disabled and overwhelmed. In addition to broken gas lines, other hazardous materials may be released.

Table 8-3. Earthquake: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
0.105% chance per year	0.0	$4,832	$62,185	N/A	$67,018	75.1	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0.092% chance per year	0.0	$9,861	$69,761	N/A	$79,622	76.4	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0.135% chance per year	0.0	$2,514	$20,769	N/A	$23,283	63.2	Relatively Low
Census Tract 940501: City of Roosevelt							
0.132% chance per year	0.0	$1,551	$13,969	N/A	$15,520	56.1	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

▪ Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People living in structures that are not up to current earthquake code, particularly older structures, are more likely to be damaged in an earthquake. Additionally, those who are unable to seek protection during an earthquake or transport themselves to a safe location after an earthquake may be at further risk.

Table 8-4. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately recover after an earthquake.

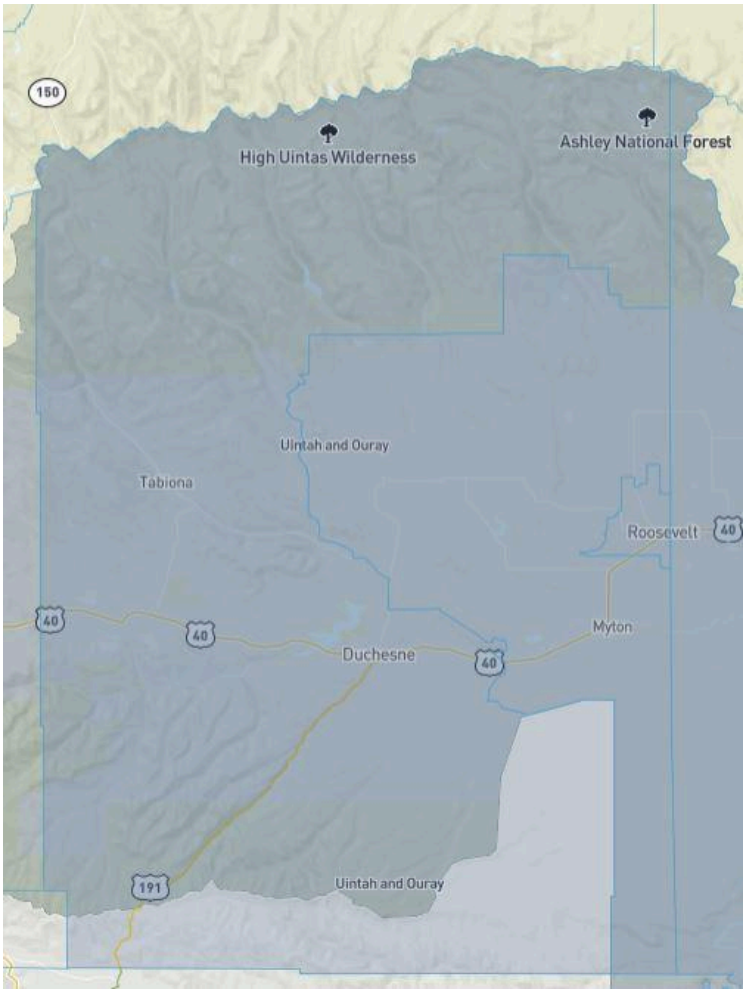
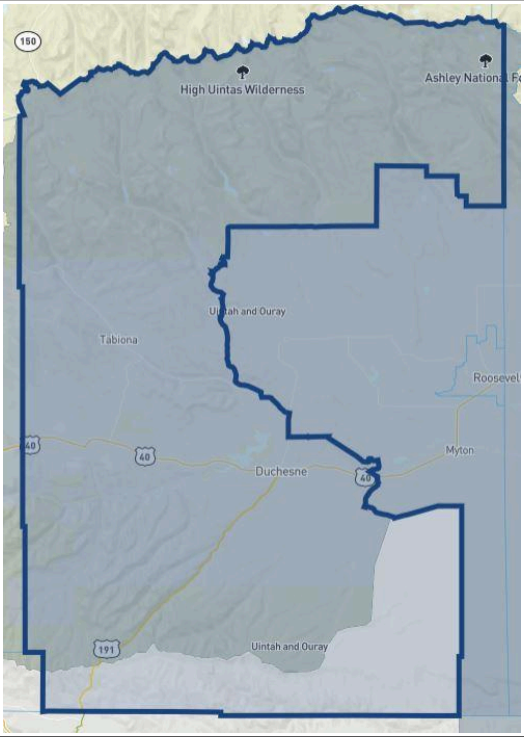


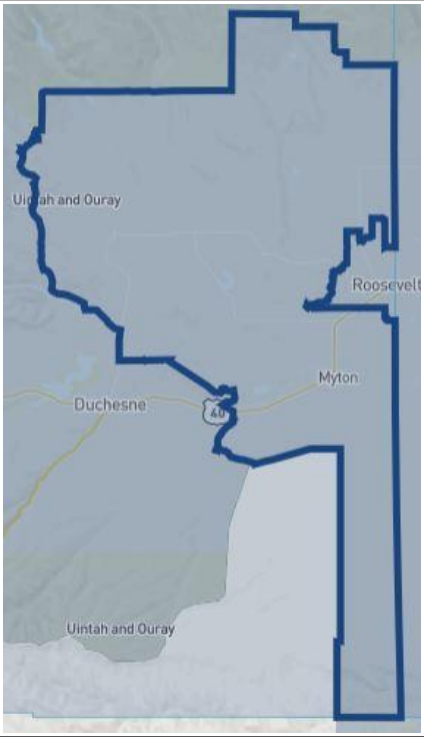
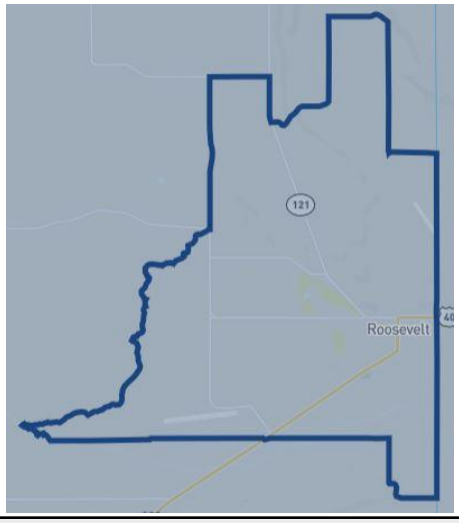
Figure 8-3. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 8-5. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Earthquakes may cause significant damage to critical facilities, including power outages from downed power lines or damaged power plant facilities. The following table lists types of critical facilities that could be negatively affected by earthquakes, which could delay emergency response and access to life-saving medical equipment.

Table 8-6. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

No data exists demonstrating the impact of earthquakes on future development in Duchesne County. However, past earthquakes have been shown to impact zoning regulations and building codes requiring developers to build structures more resistant to seismic activity.

▪ Probabilistic 100-Year Earthquake—Magnitude 5

Based on HAZUS 6.1, the probabilistic 5.0 magnitude earthquake 100-year return period. Duchesne County can anticipate damages listed in the tables below.

Direct Earthquake Damage

Building Damage

Hazus estimates that about 19 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

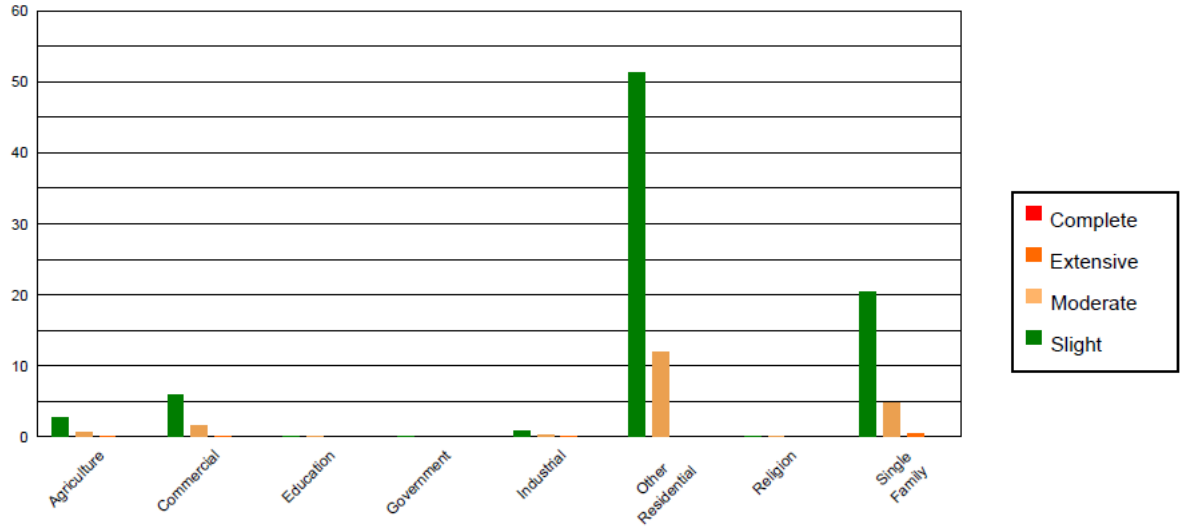


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	522.48	4.80	2.75	3.37	0.71	3.70	0.06	8.17	0.00	0.00
Commercial	1224.43	11.25	5.96	7.31	1.51	7.83	0.10	14.47	0.00	0.00
Education	18.84	0.17	0.13	0.15	0.04	0.18	0.00	0.34	0.00	0.00
Government	16.92	0.16	0.06	0.08	0.01	0.07	0.00	0.09	0.00	0.00
Industrial	111.79	1.03	0.87	1.07	0.31	1.62	0.03	4.07	0.00	0.00
Other Residential	3074.79	28.25	51.27	62.88	11.94	61.95	0.00	0.45	0.00	0.00
Religion	12.91	0.12	0.07	0.09	0.02	0.10	0.00	0.17	0.00	0.00
Single Family	5900.33	54.22	20.43	25.06	4.73	24.55	0.50	72.23	0.00	0.00
Total	**10,882**		**82**		**19**		**1**		**0**	

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

▪ Effects of Climate Change on Probability of Future Events

Climate change currently has no known impact on earthquakes and is unlikely to contribute to future earthquakes in Duchesne County.

o FEMA NRI SCORE

Table 8-7. Earthquake: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
77.4	Relatively Low	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
77.7	Relatively Low	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
65.0	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
64.0	Relatively Low	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

• LANDSLIDE

o HAZARD DESCRIPTION

Potential Probability		Low
Potential Consequence		Low
Location	Along southern flank of Uinta Mountains, especially near outcroppings of Bishop Conglomerate formation; along US-191, US-40, SR-87, SR-35, and burn scar areas	
Seasonal Pattern or Conditions	Runoff or heavy rain	
Duration	Events may last minutes to hours to months	
Analysis Used	UDOT, NOAA, UGS, USGS, 2019 Utah Hazard Mitigation Plan, Utah State University, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund	

The term “landslide” encompasses several types of occurrences (including mudslides) in which slope-forming materials, such as rock and soil, move downward under the influence of gravity. Such downward movement may occur as the result of an increase in the weight of slope-forming materials, an increase in the gradient (angle) of the slope, a decrease in the forces resisting downward motion (friction or material strength), or a combination of these factors. Factors that may trigger a landslide include weather-related events, such as heavy rainfall (one of the most common contributors), erosion, and freeze-thaw weakening of geologic structures; human causes, such as excavation and mining, deforestation, and vibration from explosions or other source; and geologic causes, such as earthquake and shearing or fissuring. The speed of descent ranges from sudden and rapid to an almost imperceptibly slow creep where effects are only observable over a period of months or years.

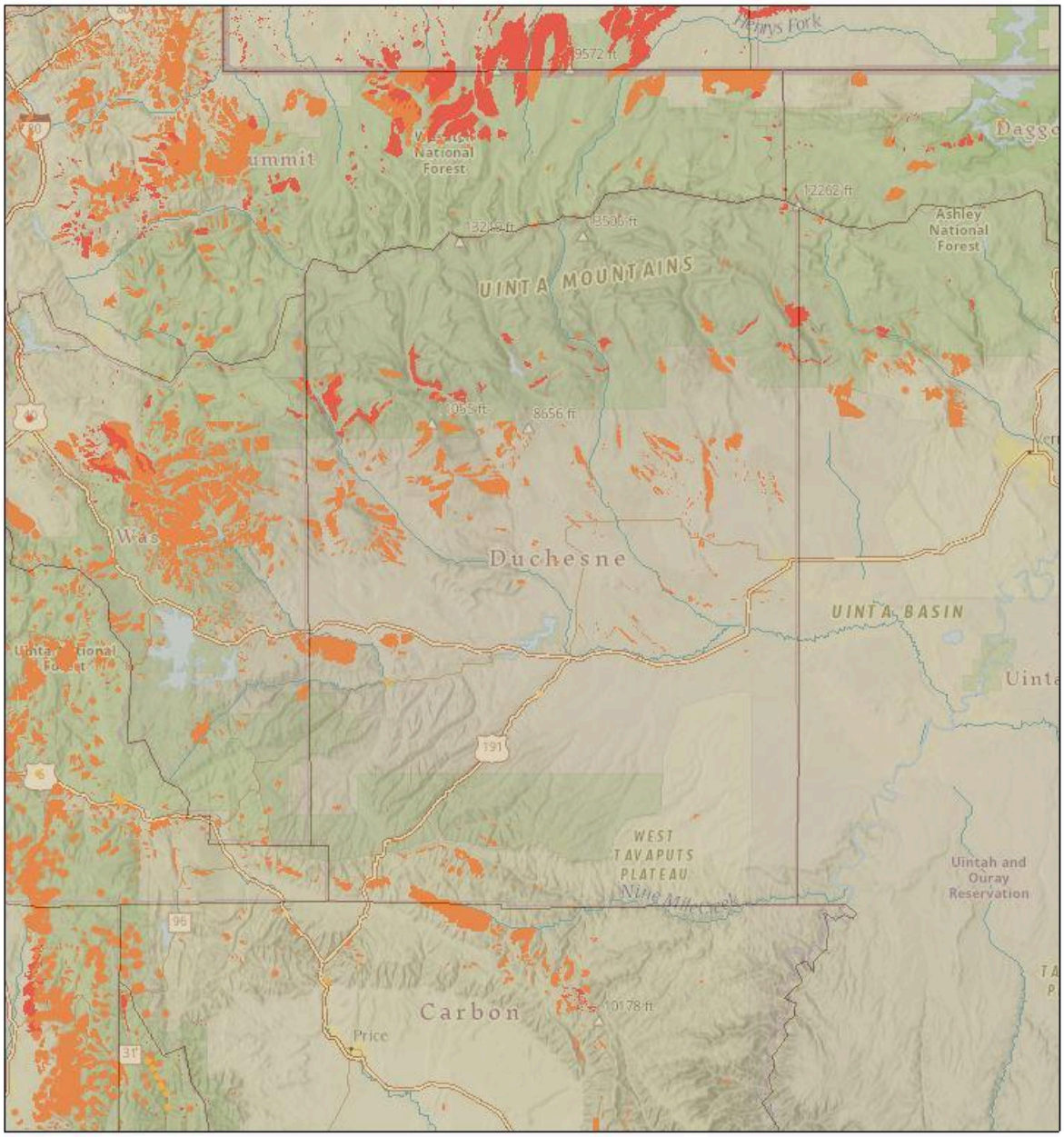
o LOCATION

Landslides are most common along the southern flank of the Uinta Mountains in areas adjacent to the Oligocene Bishop Conglomerate formation (Kowallis, 2005). The Bishop Conglomerate is a bedrock layer that extends across the Uinta Mountains and goes into Wyoming and Colorado. It consists of loosely cemented boulders, cobbly conglomerate, and pebbly sandstone (USGS, 2009). There are many outcroppings of the Bishop Conglomerate that are exposed along the slopes of the Uinta Mountains with weak Mesozoic shales and mudstones underneath. This leads to a perfect opportunity for landslides to develop, especially when the slopes become steep and moisture conditions increase (Kowallis, 2005).

Spring run-off or heavy rain periods may cause expansion of soils, such as clay and large rock. This is mainly a problem on US-191, US-40, SR-87, and SR-35 and is the responsibility of the Utah Department of Transportation (UDOT) to manage. However, routes that are affected can cause traffic and travel time delays.

The map below shows the likely and probable landslide locations within Duchesne County. There are several areas, namely along upper Fork Road, Rock Creek Road on the east side of Upper Stillwater Reservoir, Lake Basin, Currant Creek Mountain, Slide Canyon, above Tabiona and Hanna, along the flanks of Dry Mountain, west of Browns Draw Reservoir, Uintah Canyon Road, and along White Rock River, that could pose a potential risk to recreational visitors (hikers, etc.), local roads, and some primary residences due to landslides.

Duchesne County Landslides



4/24/2024, 10:22:52 AM

1:1,155,581

0 5 10 20 mi

0 10 20 40 km

USA Counties Generalized Boundaries - USA Counties - Generalized

US_Landslide_point_v2

- Confident consequential landslide at this location (5)
- Likely landslide at or near this location (3)
- Probable landslide in the area (2)
- Possible landslide in the area (1)

US_Landslide_poly_v2

- Confident consequential landslide at this location (5)
- Likely landslide at or near this location (3)

Esri, CGIAR, USGS, Sources: Esri, USGS, Utah Geospatial Resource Center, Esri, TomTom, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, USFWS

ArcGIS Web AppBuilder

Esri, U.S. Department of Commerce, Census Bureau, U.S. Department of Commerce (DOC), National Oceanic and Atmospheric Administration (NOAA), National Ocean Service (NOS), National

Figure 9-1. Duchesne County Probable Landslide Locations (USGS, 2024)

As stated in the previous regional plan, there are approximately 253 residential structures within Duchesne County located on approximately 82,560 acres of historically active landslides. The potential threat to roads and utilities is shown in the following table.

Table 9-1. Potential Landslide Threat to Roads and Utilities

Transportation	
Name	**Miles**
Local Neighborhood/City Roads	95.95
State Route 87	0.268
State Route 40	0.448
Utilities	
Name	**Miles**
KV-138	1.929 miles
Power Lines	9.27 miles
Natural Gas	1.62 miles

o EXTENT

Factors that influence landslides are soil type and steepness of slope. Soil type is a key indicator for landslide potential and is used by geologists and geotechnical engineers to determine soil stability for construction standards. Past movements are also a good indicator of where movements might possibly exist.

The following map from Utah State University depicts landslide susceptibility in parts of Uintah County, Duchesne County, and Daggett County. Landslide susceptibility in the Uinta Basin is classified within the categories of High, Moderate, Low, and Very Low, as seen below (USU, 2013).

- *High Susceptibility*: Areas of existing shallow and deep landslides are shown as red on the map. Slope and geologic unit were not included as criteria in this category.
- *Moderate Susceptibility*: Areas that have slopes prone to landslides based on observed landslide slope angles are shown as orange on the map. The category includes slopes greater than 12% (7 deg.) to greater than 32% (18 deg.), depending on the geologic unit present.
- *Low Susceptibility*: Areas that have slopes that may produce landslides are shown as yellow on the map. This category includes slopes from 9–12% (5–7 deg.) as the lower threshold ranging to 23–32% (13–18 deg.), for the upper threshold depending on the geologic unit present.
- *Very Low Susceptibility*: Areas that are unlikely to produce landslides are not assigned any particular color, but generally show up as tan on the map. This category includes slopes less than 9% (5 deg.) to less than 12% (7 deg.), depending on the geologic unit.

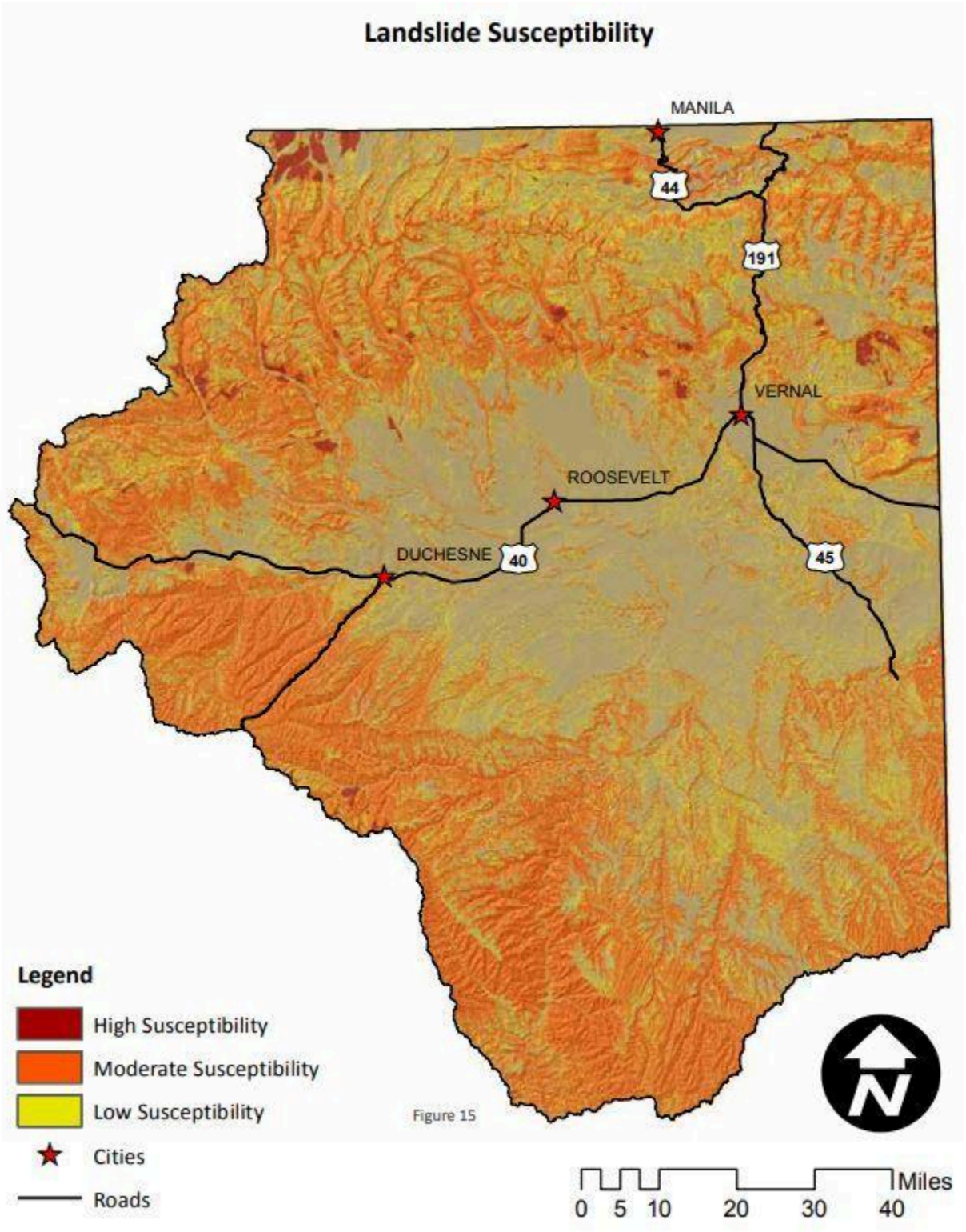


Figure 9-2. Landslide Susceptibility in the Uinta Basin (USU, 2013)

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Historically, many of the past landslides in the county occurred in the northern mountainous region of Duchesne County. Generally, these landslides develop in well-defined, localized areas. Previous landslide areas will most likely be the location of future landslides. Additionally, several small-scale rockslides and landslides occur annually in Duchesne County, usually due to heavy rain and flash flooding. These rockslides are often classified as debris flows, in which moving water carries mud, rocks, and other debris over the affected areas. The following table shows seven rockslide, mudslide, landslide, or debris flow events in the county between 2000–2023.

Table 9-2. Rockslide/Mudslide/Landslide Events in Duchesne County, UT (2000–2023)

Location Within County	Date	Description
Tabiona	07/13/2011	Flash flood washed out a large section of SR-35 near Tabiona, creating a crater 30 feet deep and 40 feet across where the road once was. Two vehicles drove into the crater and one 15-year-old passenger was killed.
Fruitland	09/12/2013	Heavy rain caused multiple mudslides on US-191, trapping several motorists for hours
Duchesne	07/31/2021	Heavy rain resulted in debris flow through Strawberry Pinnacles and Promised Land Resort areas
Fruitland	08/01/2021	Heavy rain caused debris flow across a road in Timber Canyon
Fruitland	08/01/2022	Flash flooding and debris flow originated off Dollar Ridge Fire burn scar and passed through Strawberry Pinnacles area
Fruitland	03/15/2023	Precipitation combined with snowmelt caused debris flow and mudslide over US-191
Utah Railway Junction	09/03/2023	Heavy rain resulted in multiple mudslides and debris flows across US-191
Source: NOAA Storm Events Database, 2000–2023		

Landslides are influenced by weather and climate events, such as drought, severe weather, wildfire, and flooding, which are expected to increase in severity with climate change. According to Neighborhoods at Risk, Duchesne County is expected to experience four more days that reach above 95°F by 2049 with an increase in average annual temperature of 3°F. Additionally, the county is expected to experience 0.4 more days of heavy precipitation per year by 2049 (from 1.7 days to 2 days per year) with a 0.9” increase (from 19.7” to 20.5”) in average annual precipitation (2024). The planning area should anticipate potential for heightened landslide risk because of climate change and changing weather patterns. The planning area is subject to severe storms and weather on an annual basis, with monsoon rains regularly triggering flash flooding or debris flow events. Where severe storm events are expected to increase in frequency and intensity, landslides are likewise expected to become more frequent. Events such as wildfire and drought

can change the landscape of an area as vegetation is damaged or lost with these events. These changes can make landscapes vulnerable to landslides and debris flows.

On September 12, 2013, mudslides trapped about 12 vehicles on SR-191 in Indian Canyon due to heavy precipitation in the area. Motorists were trapped for several hours until UDOT could clear a lane. Another mudslide on SR-191 deposited four feet of mud across a 100-foot stretch of road. No one was injured (Salt Lake Tribune, 2013).

o IMPACTS & LOSS ESTIMATES

Duchesne County and the jurisdictions of Duchesne, Altamont, and Tabiona may be impacted by landslides, as presented in the table below. The cities of Myton and Roosevelt are not located near high terrain or landslide risk zones and are at minimal risk of landslides.

Table 9-3. Impacts of Landslide by Jurisdiction

Jurisdiction	Impacted by Landslides	Potential Impacts of Landslides
Duchesne County	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
City of Duchesne	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
City of Myton	No	No impacts likely
City of Roosevelt	No	No impacts likely
Town of Altamont	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
Town of Tabiona	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses

Some of the many direct and indirect impacts of landslides are:

- Human and animal deaths and injuries and resulting productivity losses
- Damage or destruction of structures
- Destruction or blockage of roadways and resulting transportation interruption
- Loss of or reduced land usage
- Loss of industrial, agricultural, and forest productivity
- Reduced property values in areas threatened by landslide
- Loss of tourist revenues and recreational opportunities
- Damaged or destroyed infrastructure and utilities

- Damming or alteration of the course of streams and resulting flooding
- Reduced water quality

Duchesne County has seen one death related to landslide near Tabiona when a flash flood washed out a culvert and took out a large 30-foot-deep and 40-foot-wide section of SR 35, killing a 15-year-old girl who was riding as a passenger in a vehicle traveling on the road. Two others were injured during this incident (Deseret News, 2011).

There is only limited information on the direct and indirect economic costs of geologic hazards in the U.S., such as landslides. However, it is estimated that landslides in the U.S. cause between $1.7 and $3.4 billion in damages each year (Utah Hazard Mitigation Plan, 2019).

Losses due to landslide events are generally tied to the repair of roadways or the removal of debris on roadways. These roads are maintained by UDOT. Limited course of mitigation may occur because it is not economically feasible for UDOT to spend tax dollars to rebuild a new road route or remove the large facing walls of rock and soil.

Based upon figures provided by the Duchesne County Assessor's Office in 2012, the market value of residential structures at risk to potential landslides was estimated to be $20,240,000. The potential loss to roads and utilities is shown in the table below.

Table 9-4. Potential Landslide Losses to Roads and Utilities

Transportation	
Name	**Estimated Cost**
Local Neighborhood/City Roads	$191,900,000
State Route 87	$646,818
State Route 40	$1,081,248
Utilities	
Name	**Estimated Cost**
KV-138	$93,132
Power Lines	$447,555
Natural Gas	$391,051
Note: Costs are in 2012 dollars.	

The Expected Annual Loss scores from the National Risk Index can be seen below.

Table 9-5. Landslide: Expected Annual Loss for Duchesne County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County							
0.2 events per year	0.01	$91,695	$35,041	N/A	$126,736	99.7	Very High
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County							
0 events per year	0.0	$4,970	$1,137	N/A	$6,107	93.2	Relatively High

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County							
0 events per year	0.0	$4,558	$685	N/A	$5,243	91.6	Relatively High
Census Tract 940501: City of Roosevelt							
0 events per year	0.0	$2,370	$575	N/A	$2,946	83.5	Relatively Moderate

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

▪ Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People who are unable to seek immediate protection during a landslide or transport themselves to a safe location after a landslide may be at further risk.

Table 9-6. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately recover after a landslide.

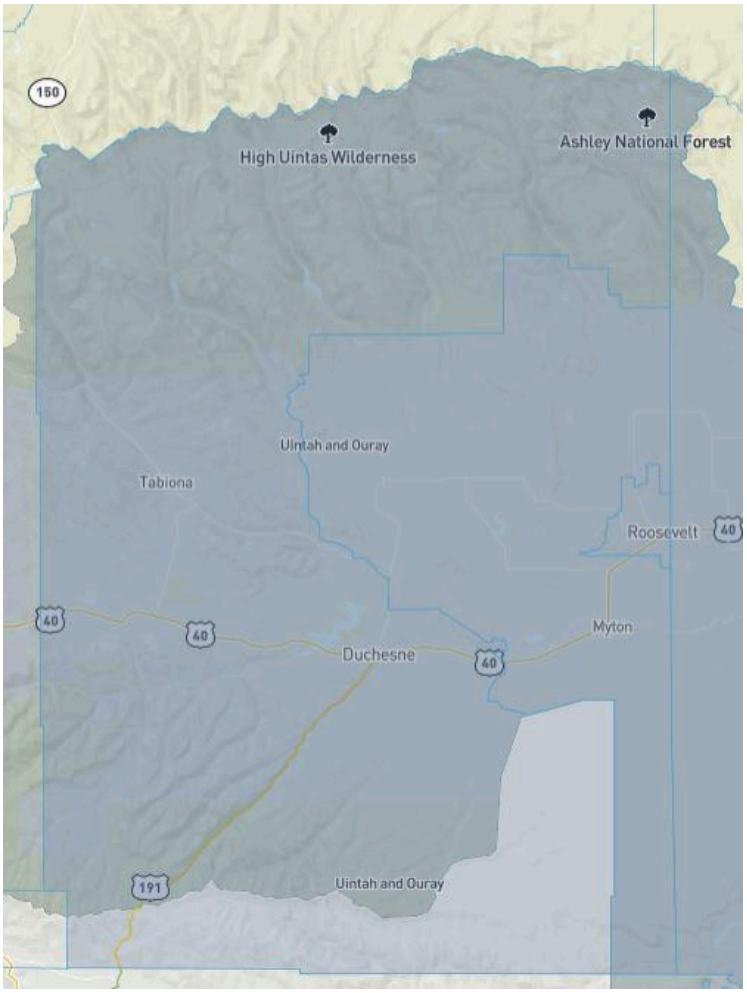
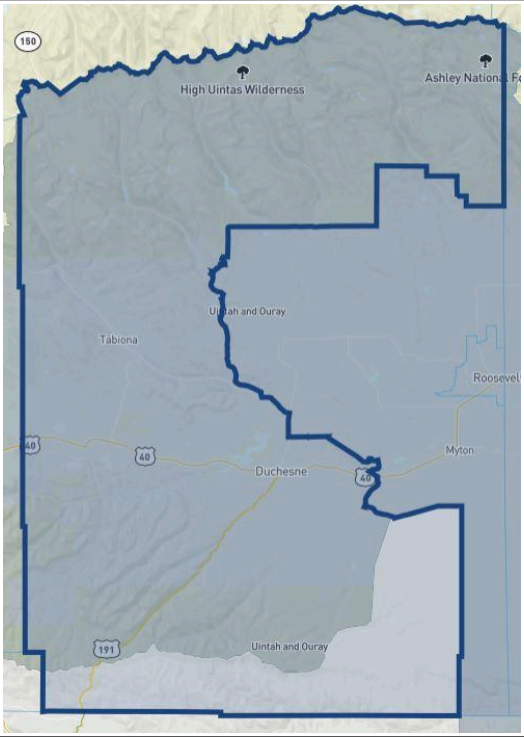


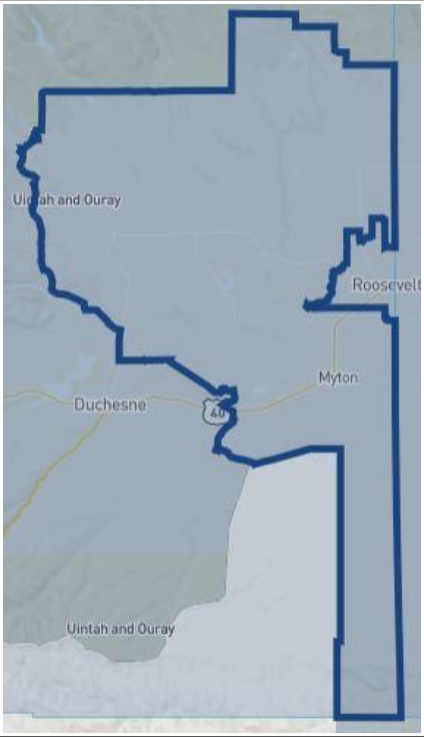
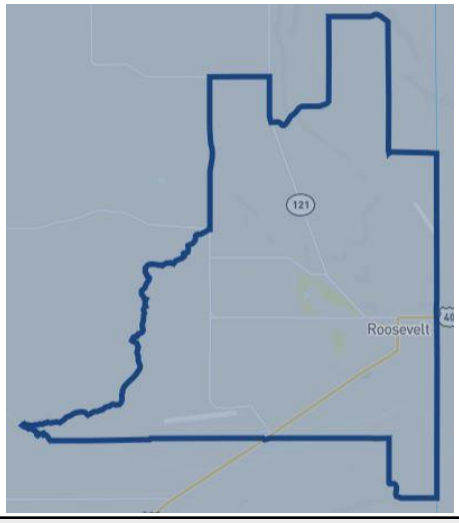
Figure 9-3. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 9-7. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Landslides may cause significant damage to critical facilities and could take out power or communication lines. The following table lists types of critical facilities that could be negatively affected by landslides, which could delay emergency response and access to life-saving medical equipment.

Table 9-8. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is no impact based on current development trends on either current or future development.

o CLIMATE CHANGE IMPLICATIONS

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. This can make the ground more unstable and at risk for increased landslides. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 9-9. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	Increasing annual precipitation can lead to unstable ground and contribute to landslides.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 9-10. Landslide: Overall National Risk Index Score for Duchesne County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940300: City of Duchesne, Town of Tabiona, and Unincorporated Duchesne County			
99.8	Very High	Relatively High	Relatively Low
Census Tract 940600: City of Myton, Town of Altamont, and Unincorporated Duchesne County			
94.2	Relatively High	Relatively High	Relatively Low
Census Tract 940502: City of Roosevelt and Unincorporated Duchesne County			
92.5	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 940501: City of Roosevelt			
89.8	Relatively Moderate	Very High	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

PROBLEM SOILS

HAZARD DESCRIPTION

Problem soils, such as expansive, compressible, and collapsible soils, can cause extensive damage to structures and foundations. Land subsidence, earth fissures, and radon gas are a few of the effects of problem soils and rock. Problem soils also prevent or limit successful crop production because the land is not fertile or productive, and there is a possibility of erosion hazard when cultivated.

Expansive soils and land subsidence are of most concern to the communities of Duchesne County, so they are broken down further in the following *Related Hazards* section.

RELATED HAZARDS

Expansive Soils

Hazard Description

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona	
Seasonal Pattern or Conditions	Year-round event	
Duration	Ongoing variable	
Analysis Used	UGS, 2019 Utah Hazard Mitigation Plan, Science Direct, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk	

Expansive soil and rock consist of high clay content that swells when wet and shrinks when dry (UGS, 2024). Expansive clay is prone to large volume changes when affected by water. In drier seasons, soils experience shrinkage, often causing deep cracks in the ground, which are called vertisols. These soils are considered to be one of the more problematic soils because they can cause damage to various structures, especially lightweight civil structures such as sidewalks and driveways, due to the shifting soils beneath the structures (Science Direct, 2024).

Soils consisting of coarse-grained particles (e.g., cobbles, pebbles, and sands) can also be expansive depending on the percentage and type of clay minerals present in the soil's fine content. The primary elements present in clays are silicone, aluminum, and oxygen, although other elements such as hydrogen, sodium, calcium, magnesium, and sulphur may also be present. Common clay minerals that are prone to swelling include smectite, bentonite, montmorillonite, vermiculite, and chlorite (Science Direct, 2024).

• Location

Expansive soils as a hazard is site-specific, meaning that each incorporated jurisdiction will have its own vulnerability level. Every jurisdiction, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona, may be affected by expansive soils, although limited data currently exists on specific locations.

• Extent

Expansive soils have a swelling potential that depends on the mineral composition of the soil and the in situ moisture content and density. Soil permeability also affects the rate of swelling. According to Atterberg limits, which are useful in predicting soil behavior, the degree of expansion of a soil can be classified as seen in the table below (Science Direct, 2024).

Table 10-1. Degree of Expansion

Soil Properties	Low	Medium	High	Very High
Liquid Limit	20–25	35–50	50–70	70–90
Plasticity Index	< 12	12–23	23–32	> 32
Shrinkage Index	< 15	15–30	30–60	> 60
Free Swell Percentage	< 50	50–100	100–200	> 200
Source: Science Direct, 2024				

Expansive soils can also be classified in terms of linear extensibility percent (LEP), which ranges from low to very high. LEP is the linear expression of the volume difference of natural soil fabric at 1/3 bar or 1/10 bar water content and oven dryness, as reported as a percent change for the whole soil (Canadian County, 2013). The following table shows the LEP classifications.

Table 10-2. Linear Extensibility Percent (LEP) Classifications

Expansion Potential	Linear Extensibility Percent
Very High	> 9%
High	6%–9%
Moderate	3%–6%
Low	< 3%
Water	0%
Source: Canadian County, 2013	

• Historical Frequency & Probability of Future Occurrence

Due to lack of data, there is no way to predict the likely frequency of expansive soil impacts. As of the time of this plan's development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as the county's infrastructure ages, especially dated water and sewer lines, it becomes more susceptible to damage from expansive soils. A prolonged period of drought could also significantly speed and intensify infrastructure deterioration.

• *Impacts & Loss Estimates*

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by expansive soils, as presented in the table below.

Table 10-3. Impacts of Expansive Soils by Jurisdiction

Jurisdiction	May Be Impacted by Expansive Soils	Potential Impacts of Expansive Soils
Duchesne County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Duchesne	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Myton	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Roosevelt	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Altamont	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Tabiona	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Structural damage to lightweight structures, such as sidewalks, driveways, and roadways, is most common due to expansive soils. Lifting of buildings, damage to basements, building settlement, and cracks in walls and ceilings are other problems related to the continual shrinking and swelling of soils. Damage may occur to pipelines and other public utilities, as well. Lateral movement of foundations and retaining walls is a likely impact due to pressure exerted on vertical walls from shifting soils. This can also lead to loss of residual shear strength (Science Direct, 2024).

Damaged pavements may result in high maintenance and replacement costs, along with increased legal and financial liability from pavement separation and gaps causing possible trip hazards. Future maintenance may disrupt business activities, resulting in increased costs or loss of revenue. While problem soils have caused significant infrastructure damage and economic impact, there have been no deaths recorded in Utah due to problem soils directly (Utah Hazard Mitigation Plan, 2019).

Due to the nature of expansive soils, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by expansive soils.

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an incident may be at further risk.

Table 10-4. Vulnerable Populations in Duchesne County, UT

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and whose communities lack robust infrastructure and adequate funding for repairs.

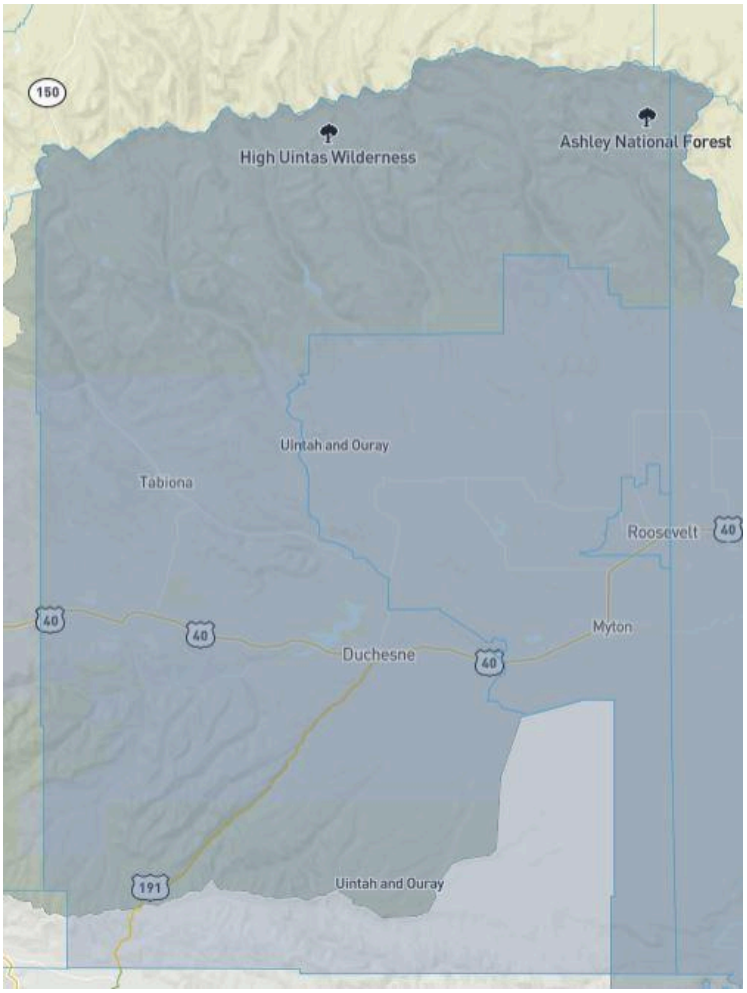
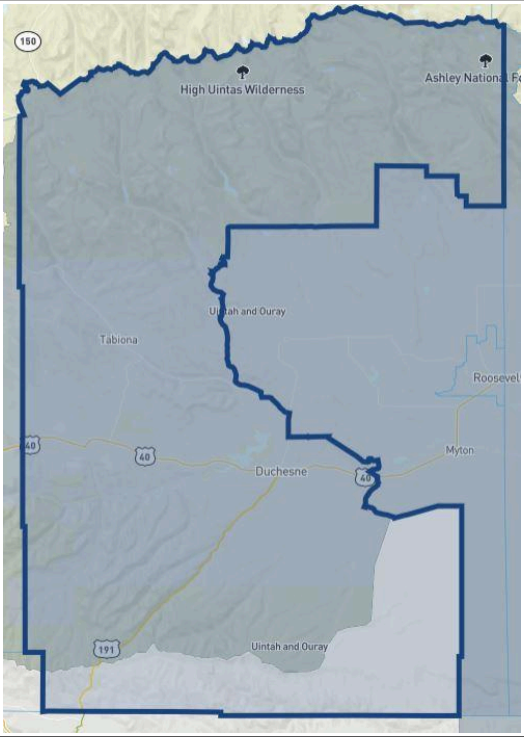


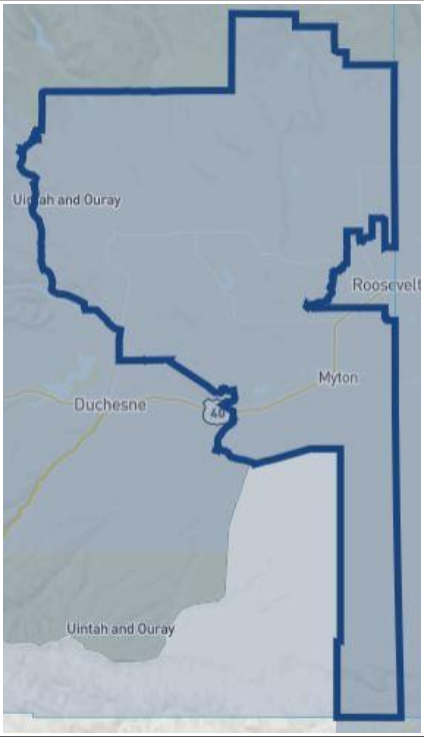
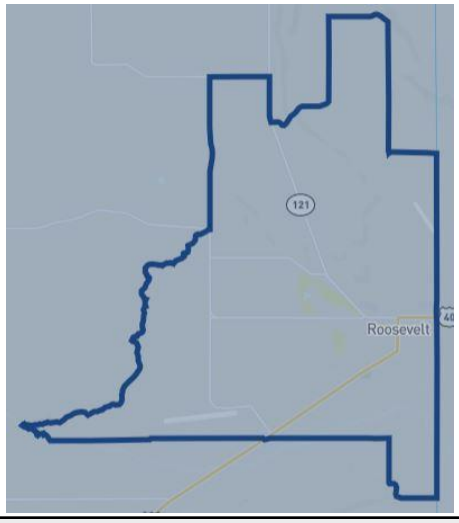
Figure 10-1. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 10-5. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
***10%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Problem soils could cause significant damage to critical facilities depending on location. The following table lists types of critical facilities that could be negatively affected by problem soils, which could delay emergency response and access to life-saving medical equipment.

Table 10-6. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

Effects of Climate Change on Probability of Future Events

Table 10-7. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Duchesne County is expected to experience 0.4 more days of heavy precipitation per year (from 1.7 days to 2 days per year).
	By 2049, Duchesne County is expected to have a 0.9" increase (from 19.7" to 20.5") in average annual precipitation.
	Increasing annual precipitation can lead to unstable ground and contribute to additional soil swelling.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

FEMA does not evaluate expansive soils as part of its National Risk Index.

▪ Land Subsidence

● *Hazard Description*

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona	
Seasonal Pattern or Conditions	Year-round event	
Duration	Ongoing variable	
Analysis Used	UGS, USGS, NOAA, 2019 Utah Hazard Mitigation Plan, Water Education Foundation, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk	

Land subsidence is the sinking or settling of the Earth's surface caused by groundwater depletion and/or underground mine subsidence or collapse. Earth fissures may result from subsidence, which are permanent, linear tension cracks in the ground that extend upward from the groundwater table (UGS, 2024). Primary causes of subsidence include groundwater withdrawals, drainage of organic soils, underground mining, and natural compaction or collapse (e.g., sinkholes). Natural hazards like earthquakes and erosion can cause subsidence, as well (USGS, 2019). The photo to the right depicts an earth fissure from land subsidence and groundwater withdrawal in Enoch, Utah (UGS, 2011).



● *Location*

Every jurisdiction, including Duchesne, Myton, Roosevelt, Altamont, and Tabiona, may be affected by expansive soils, although limited data currently exists on specific locations.

- ***Extent***

The NOAA National Geodetic Survey maintains a network of GPS receivers throughout the country, called a Continuously Operating Reference Station (CORS). This can track height changes at local stations to monitor subsidence. Areas without a CORS can measure subsidence from satellite radar, temporary GPS receivers, repeated surveys of geodetic leveling, or installations of ground and water sensors (NOAA, 2024).

Extensometers are another way to measure subsidence and aquifer compaction by measuring the amount of compaction between the well anchor and the ground level. Extensometers are deep wells of up to 3000 feet below the ground surface. The following figure depicts a diagram of a borehole extensometer (Harris-Galveston, 2024).

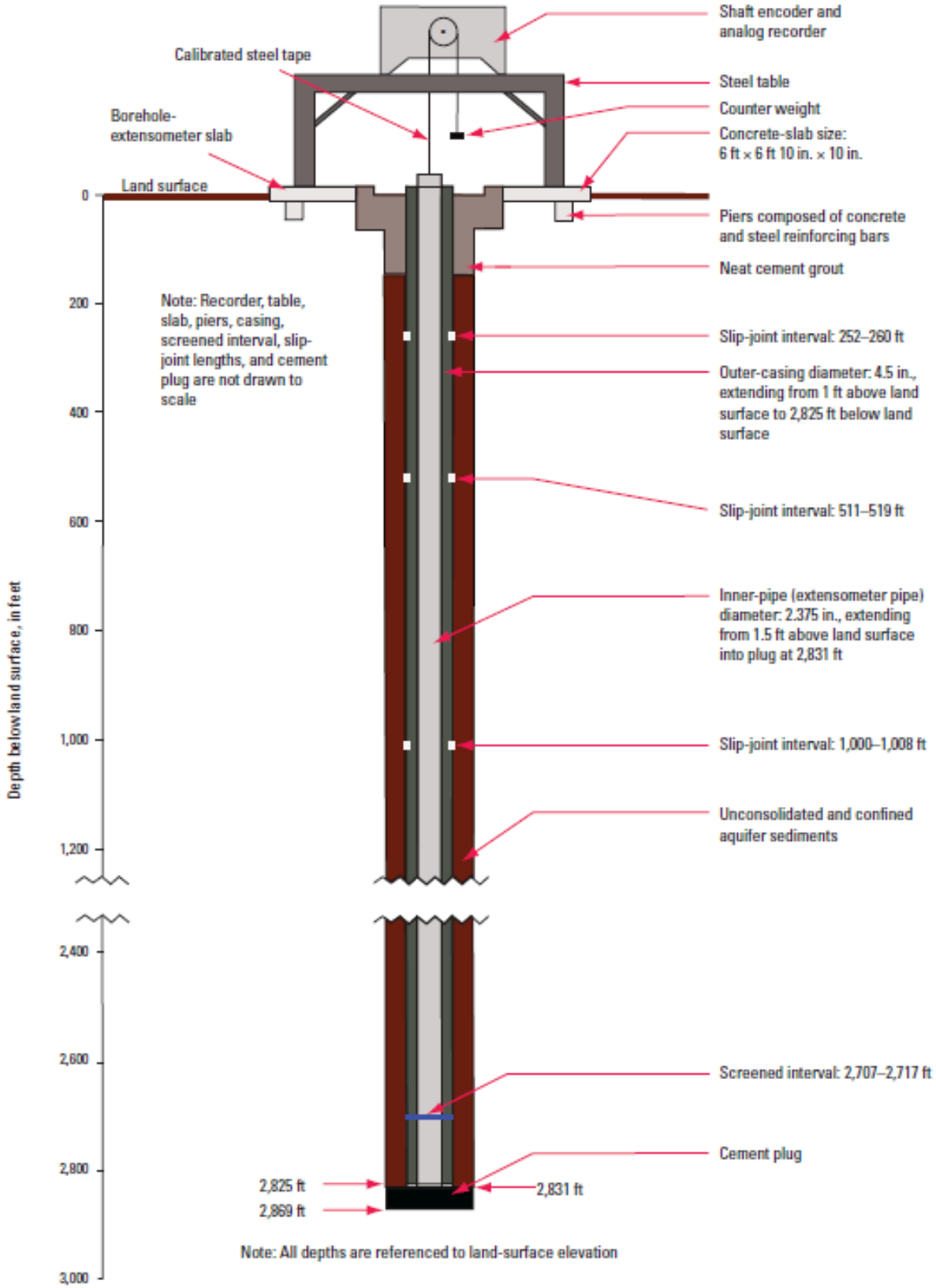

Shaft encoder and analog recorder
Calibrated steel tape
Steel table
Counter weight
Borehole-extensometer slab
Concrete-slab size: 6 ft × 6 ft 10 in. × 10 in.
Land surface
0
Piers composed of concrete and steel reinforcing bars
Neat cement grout
200
Note: Recorder, table, slab, piers, casing, screened interval, slip-joint lengths, and cement plug are not drawn to scale
Slip-joint interval: 252–260 ft
Outer-casing diameter: 4.5 in., extending from 1 ft above land surface to 2,825 ft below land surface
400
Slip-joint interval: 511–519 ft
600
Inner-pipe (extensometer pipe) diameter: 2.375 in., extending from 1.5 ft above land surface into plug at 2,831 ft
800
1,000
Slip-joint interval: 1,000–1,008 ft
Unconsolidated and confined aquifer sediments
1,200
2,400
2,600
Screened interval: 2,707–2,717 ft
2,800
Cement plug
2,825 ft
2,831 ft
2,869 ft
3,000
Depth below land surface, in feet
Note: All depths are referenced to land-surface elevation

Figure 10-3. Borehole Extensometer Diagram

• Historical Frequency & Probability of Future Occurrence

As of the time of this plan's development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as more water is pumped from the ground and prolonged periods of drought continue, land subsidence in Duchesne County will only worsen. Damage from subsidence may occur more frequently as the county's infrastructure ages.

• Impacts & Loss Estimates

Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona may be impacted by land subsidence, as presented in the table below.

Table 10-8. Impacts of Land Subsidence by Jurisdiction

Jurisdiction	May Be Impacted by Land Subsidence	Potential Impacts of Land Subsidence
Duchesne County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Duchesne	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Myton	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Roosevelt	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Altamont	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
Town of Tabiona	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Land subsidence may damage buildings, civil structures, aqueducts, well casings, bridges, and highways. Flooding events can increase or intensify as the land sinks. This can also impact sewer lines, water lines, and storm drainage. Drought can magnify impacts as more groundwater is extracted from aquifers, causing the ground to compact and cave in on itself (Water Education, 2024).

Due to the nature of land subsidence, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by subsidence.

Vulnerable Populations

There are many vulnerable populations in Duchesne County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an earth fissure or sinkhole opens up may be at further risk.

Table 10-9. Vulnerable Populations in Duchesne County

Vulnerability Category	Number	Percent
Families in poverty	558	11.2%
People with disabilities	2,695	13.8%
People over 65 years	2,440	12.3%
Difficulty with English	157	0.9%
Households with no car	301	4.7%
Mobile homes	826	12.8%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2024		

As demonstrated in blue in the following map, Duchesne County as a whole is considered disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and whose communities lack robust infrastructure and adequate funding for repairs.

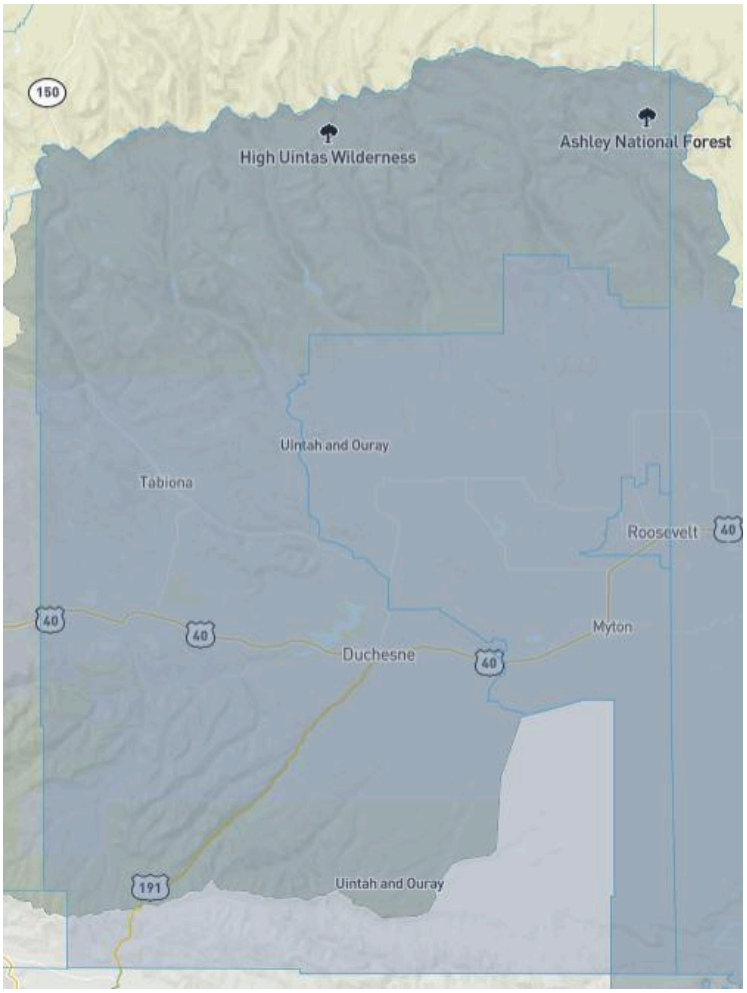
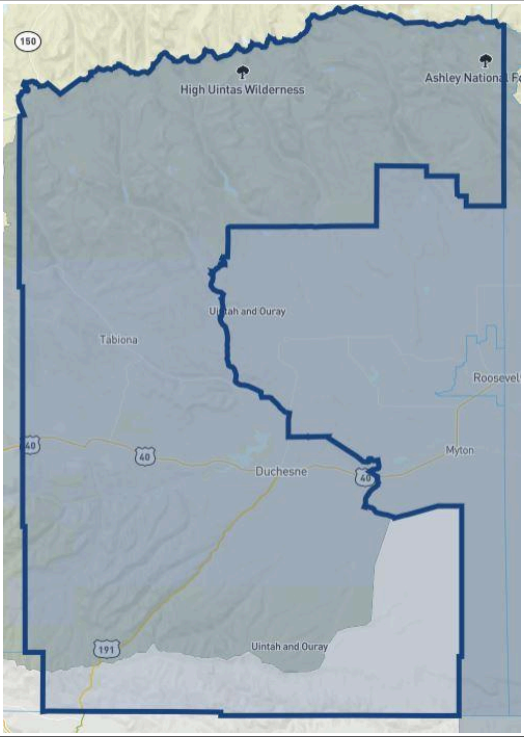


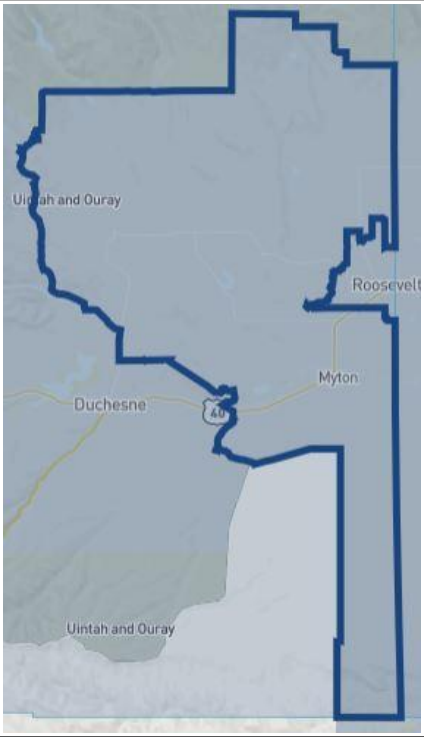
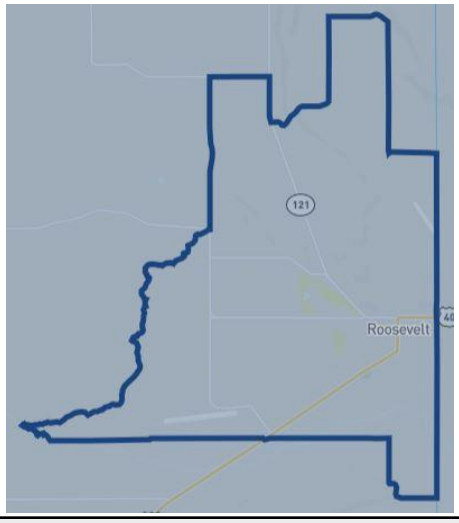
Figure 10-4. Map of Disadvantaged Communities in Duchesne County

The following table details the three completely disadvantaged census tracts in Duchesne County along with the specific burdens and disadvantages each census tract experiences.

Table 10-10. Disadvantaged Communities in Duchesne County

DUCHESNE COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49013940300	4,523	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Climate Change, Energy, Legacy Pollution		
***97th** % (above 90th percentile)*	*Fatalities and injuries resulting from natural hazards each year*	
***93rd** % (above 90th percentile)*	*Average annual energy costs divided by household income*	
YES	*Presence of one or more abandoned mine land within the tract*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940600	7,278	YES

DUCHESNE COUNTY, UT		
		
CENSUS TRACT BURDENS: Legacy Pollution, Workforce Development		
YES	*Presence of one or more abandoned mine land within the tract*	
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49013940500	8,347	YES
		
CENSUS TRACT BURDENS: Workforce Development		
10% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)		

Problem soils could cause significant damage to critical facilities depending on location. For example, if a sinkhole opened up under or near a hospital or fire station, the impact to the community could become detrimental. The following table lists types of critical facilities that could be negatively affected by land subsidence, which could delay emergency response and access to life-saving medical equipment.

Table 10-11. Critical Facility Types in Duchesne County

Critical Facility Type	Location
Urgent Care Facility	Duchesne
2 Hospitals	Roosevelt
Dialysis Center	Roosevelt
3 Pharmacies	Roosevelt
2 Pharmacies	Duchesne
3 Nursing Homes	Roosevelt
Fire Station	Roosevelt
Fire Station	Neola
Fire Station	Myton
2 Fire Stations	Duchesne
Fire Station	Altamont
Fire Station	Tabiona
Fire Station	Fruitland
Fire Station	Near Hanna
Power Plant	North of Neola
Local Law Enforcement	Duchesne
Local Law Enforcement	Roosevelt
Solid Waste Landfill Facility	West of Roosevelt
Solid Waste Landfill Facility	North of Duchesne
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Duchesne County, 3,719 people are beneficiaries of Medicare, and 719 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

Effects of Climate Change on Probability of Future Events

Table 10-12. Climate Projections for Duchesne County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Duchesne County is expected to experience 4 more days that reach above 95°F (from 3 days to 7 days per year).
	By 2049, Duchesne County is expected to have a 3°F increase (from 41°F to 43°F) in average annual temperatures.
	Increasing annual temperatures and prolonged periods of frequent drought can contribute to land subsidence as more groundwater is drained.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

FEMA does not evaluate land subsidence as part of its National Risk Index.

• CAPABILITY ASSESSMENT

o JURISDICTIONAL CAPABILITY ASSESSMENT

▪ Duchesne County

Table 11-1. Duchesne County Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Duchesne County Emergency Management	2024 Hazard Mitigation Plan; Community Emergency Response Team (CERT) Program; EOP	X			CERT: Educates community about disaster preparedness and how to respond to local hazards
Duchesne County Community Development	2022 General Plan & Resource Management Plan; Land Use Code; 2017 Transportation Master Plan; 2020 Duchesne County Trails Master Plan; Landownership/Parcel Maps; Flood Damage Prevention Map; Duchesne County 100-year Floodplain Map; FIRMs	X			General Plan: No hazard section, but includes resource info and goals about building codes, land use, recreation/tourism, agriculture, public safety, transportation and infrastructure, environmentally sensitive areas, natural resources, noxious weeds, wildfire, floodplain risk areas, and stormwater. Recognizes need for mitigating development in hazardous areas. FIRM: Shows floodplain zones and inundation areas
Duchesne County GIS	Road Maps; Zoning Map; Parcel Maps	X			Duchesne County Parcel Viewer: Shows individual parcels within the county and includes subdivision and zoning district info

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Duchesne County Building Department	Building Codes; Building Permits; Zoning Ordinance; Subdivision Ordinance	X			Building Codes: Includes construction and subdivision codes

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

- ***Opportunities for Plan Integration***

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Duchesne County Local Emergency Planning Committee (LEPC), Duchesne County department heads, and the incorporated cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. The Duchesne County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Duchesne County will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets the first Wednesday of every month at 5pm.

Table 11-2. Duchesne County Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants. The county will also anticipate that the time and cost of maintaining the hazard mitigation plan will be significantly higher than in previous updates due to increased planning requirements by FEMA. Funds to support the cost match for updating this plan will need to be strategically determined.

Table 11-3. Duchesne County Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and

Legal and Regulatory Capability	
	Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	No
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	Yes
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Duchesne County will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-4. Duchesne County Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Community Development
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Community Development
Personnel skilled or trained in GIS applications	Yes	Full Time	Duchesne County GIS
Emergency manager	Yes	Full Time	Duchesne County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant

writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-5. Duchesne County National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Community Development
Who is your jurisdiction's floodplain administrator? (department/position)	Mike Hyde
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	Yes

Expansion, Implementation, and Improvement: Continue to manage the county's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification. Floodplain mapping for the entire county is limited and needs to be completed.

▪ City of Duchesne

Table 11-6. City of Duchesne Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
City of Duchesne	2022 General Plan; City Ordinances; Duchesne County Zoning	X			Chapter 4 references zoning ordinances and land use. Chapter 9 details infrastructure including storm drainage.

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

• *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Duchesne County Local

Emergency Planning Committee (LEPC), Duchesne County department heads, and the incorporated cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. The Duchesne County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Duchesne will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every first and third Tuesday of each month.

Table 11-7. City of Duchesne Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-8. City of Duchesne Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Duchesne will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-9. City of Duchesne Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Commission
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Commission
Personnel skilled or trained in GIS applications	Yes	Full Time	Duchesne County GIS
Emergency manager	Yes	Full Time	Duchesne County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-10. City of Duchesne National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Planning & Zoning Commission
Who is your jurisdiction's floodplain administrator? (department/position)	?
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	Yes

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

▪ City of Myton

Table 11-11. City of Myton Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
City of Myton	2006 General Plan; City Code; Building Permits; Road Map	X			General Plan: No hazard section, but includes existing and future land use overview, acknowledges sensitive lands and environmental conditions, and identifies critical facilities and infrastructure that could be affected during hazardous events

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

• *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Duchesne County Local Emergency Planning Committee (LEPC), Duchesne County department heads, and the incorporated cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. The Duchesne County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Myton will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets the first Tuesday of every month at 6:30pm.

Table 11-12. City of Myton Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-13. City of Myton Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	No
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Myton will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-14. City of Myton Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Department
Personnel skilled or trained in GIS applications	Yes	Full Time	Duchesne County GIS
Emergency manager	Yes	Full Time	Duchesne County Emergency Management

Administrative and Technical Capability			
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-15. City of Myton National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Building Department
Who is your jurisdiction's floodplain administrator? (department/position)	Planner
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	Yes

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

▪ City of Roosevelt

Table 11-16. City of Roosevelt Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
City of Roosevelt	General Plan; Land Use Ordinances; Zoning Map; 2019 Master Plan; Site Plan	X			General Plan: No hazard section, but includes existing and future land use overview, economic development plan, transportation master plan, storm drain master plan, and capital improvement plan. Also identifies critical facilities and infrastructure that

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
					could be affected during hazardous events
City of Roosevelt Building Department	Building Permits; Main Street Revitalization Plans	X			Details building codes and best practices to withstand certain natural hazards

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

- ***Opportunities for Plan Integration***

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Duchesne County Local Emergency Planning Committee (LEPC), Duchesne County department heads, and the incorporated cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. The Duchesne County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Roosevelt will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets the first Wednesday of every month at 5pm.

Table 11-17. City of Roosevelt Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-18. City of Roosevelt Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?

Legal and Regulatory Capability	
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	Yes
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Roosevelt will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-19. City of Roosevelt Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Commission
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Commission
Personnel skilled or trained in GIS applications	Yes	Full Time	Duchesne County GIS
Emergency manager	Yes	Full Time	Duchesne County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-20. City of Roosevelt National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Planning & Zoning Commission
Who is your jurisdiction's floodplain administrator? (department/position)	NA
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

▪ Town of Altamont

Table 11-21. Town of Altamont Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Town of Altamont	General Plan	X			

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

● *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Duchesne County Local Emergency Planning Committee (LEPC), Duchesne County department heads, and the incorporated cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. The Duchesne County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Altamont will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans.

Table 11-22. Town of Altamont Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**

Fiscal Capability	
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-23. Town of Altamont Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Altamont will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-24. Town of Altamont Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning

Administrative and Technical Capability			
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning
Personnel skilled or trained in GIS applications	Yes	Full Time	Duchesne County GIS
Emergency manager	Yes	Full Time	Duchesne County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-25. Town of Altamont National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Planning & Zoning
Who is your jurisdiction's floodplain administrator? (department/position)	NA
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

▪ Town of Tabiona

Table 11-26. Town of Tabiona Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Town of Tabiona	2018 General Plan; Future Land Use Map; Zoning Map; Suitability	X			General Plan: No hazard section, but includes existing and future land use

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
	& Hazards Map; City Ordinances				overview, acknowledges sensitive lands and environmental conditions, and identifies critical facilities and infrastructure that could be affected during hazardous events

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

- ***Opportunities for Plan Integration***

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Duchesne County Local Emergency Planning Committee (LEPC), Duchesne County department heads, and the incorporated cities of Duchesne, Myton, Roosevelt and the towns of Altamont and Tabiona. The Duchesne County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Tabiona will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets on an as-needed basis.

Table 11-27. Town of Tabiona Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-28. Town of Tabiona Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and

Legal and Regulatory Capability	
	Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Tabiona will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-29. Town of Tabiona Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning Commission
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Planning Commission
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning Commission
Personnel skilled or trained in GIS applications	Yes	Full Time	Duchesne County GIS
Emergency manager	Yes	Full Time	Duchesne County Emergency Management
Grant writers	Yes	N/A	Each department is responsible for writing their own grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-30. Town of Tabiona National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Planning Commission
Who is your jurisdiction's floodplain administrator? (department/position)	NA
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	No
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

o BUILDING CODES

Updating and adopting new building codes, as well as addressing the effectiveness of these codes, can be one of the best ways to conduct mitigation. When properly designed and constructed, many buildings can withstand the impacts of high winds, earthquakes, floods, snow loads, or a tornado. The communities in Duchesne County are working with various versions of the International Codes published by the International Code Council, Inc. (ICC). These codes include:

- 2015 International Residential Code
- 2018 International Building Code
- 2018 International Mechanical Code
- 2018 International Plumbing Code
- 2018 International Fuel Gas Code
- 2018 International Energy Conservation Code
- 2018 International Fire Code
- 2018 International Existing Building Code
- 2006 edition of the Utah Wildland Urban Interface Code

Additionally, Duchesne County enforces the 2020 National Electrical Code and the 2005 edition of the NFPA 225 Model Manufactured Home Installation Standard, both issued by the National Fire Protection Association. Ground snow loads are found by entering specific locations into the 2018 Utah Ground Snow Load Map.

The cities of Duchesne, Myton, Roosevelt and towns of Altamont and Tabiona all follow the above International Codes.

▪ Code Administration

Enforcement of code standards is very important to hazard mitigation. Adequate inspections are needed during the course of construction to ensure that the builder understands and implements the requirements. The Building Code Effectiveness Grading Schedule (BCEGS) is a national program used by the insurance industry to determine how well new construction is protected from wind, earthquake, and other non-flood hazards. It is similar to the CRS program and the fire insurance rating scheme: building permit programs are reviewed and scored. A class 1 community is the highest rating, and a class 10 community is the most basic rating.

Training of code officials is also very important for code enforcement. Training of code officials and inspectors is a large part of the BCEGS rating for a community. Courses are offered through the building code associations to help local officials understand standards that apply to seismic, wind, and flood hazards.

The table below lists building code adoptions in use within Duchesne County.

Table 11-31. Building Code Adoptions in Duchesne County

	Building Code Residential	Building Code Commercial
Duchesne County	IRC 2015	IBC 2018
Duchesne	IRC 2010	IBC 2010
Myton	Not specified; default to Duchesne County code usage	Not specified; default to Duchesne County code usage
Roosevelt	IRC 2012	IBC 2012
Altamont	Not specified; default to Duchesne County code usage	Not specified; default to Duchesne County code usage
Tabiona	IRC 2021	IBC 2021

o PUBLIC SAFETY AGENCIES

▪ Fire Protection

The Utah Fire Marshal lists seven fire departments in Duchesne County, which include Duchesne Fire Department, Roosevelt Fire Department, Myton Fire Department, Tabiona-Hanna Fire Department, Altamont Fire Department, Neola Fire Department, and Fruitland Volunteer Fire Department (2020). Four of these are city fire departments and three are county department. Duchesne County's Fire Warden, who is Nathan Robinson, coordinates the efforts of these fire departments. Many of the firefighters in the county are volunteer firefighters, but there are also several structural and wildland certified firefighters in Duchesne County (Duchesne County, 2024). Duchesne, Roosevelt, Myton, Tabiona, Hanna, Altamont, Neola, and Fruitland all have fire departments with rescue capabilities for accidents on highways.

When needed, Duchesne County also has access to fire crews and resources from the U.S. Forest Service, BLM, National Park Service, U.S. Fish and Wildlife Service, and the U.S. Bureau of Indian Affairs. The state of Utah trains and provides hand crews and engine crews, as well.

▪ Healthcare Facilities

Duchesne County has one primary hospital and several health clinics. Uintah Basin Medical Center in Roosevelt is an independently owned 24/7 critical access hospital that provides comprehensive healthcare services, including dialysis, obstetrics, emergency care, surgery, lab and radiology services, cancer care and infusion services, and more (Uintah Basin Healthcare, 2024). Uintah Basin Healthcare has several clinics and offices, including locations in Roosevelt, Duchesne, Altamont, Tabiona, Manila, and Vernal. The 35-bed hospital has been open since 1944.

Additionally, the Uintah-Ouray Service Unit is a health center in Fort Duchesne, Uintah County that services the Ute tribes of the Uintah and Ouray Indian Reservation. The health center provides ambulatory services, general medical services, surgical follow-up, pediatrics, optometry, prenatal, and postpartum care. They also partner frequently with Uintah Basin Medical Center and Ashley Valley Medical Center to provide care (IHS, 2024).

▪ Emergency Services

Duchesne County Emergency Management is located in Duchesne, Utah and is under the direction of Michael Lefler, who is the county's Emergency Manager.

EMS for the county are dispatched from the Duchesne County Sheriff's Office Dispatch Center in Duchesne. EMTs are volunteers and are all certified by the state of Utah, Bureau of EMS. Additional ambulance services are provided by Ashley Regional Medical Center, Uintah Basin Healthcare, and Ute Indian Tribe EMS.

Several air ambulance and helicopter transport/rescue companies service the Duchesne County area, including, but not limited to, Air Ambulance World, Classic Air Medical, Angel MedFlight, Intermountain Life Flight, and the Utah Department of Public Safety Aero Bureau.

▪ Law Enforcement & Public Safety

The Utah Department of Public Safety (DPS) includes one participating law enforcement agency in Duchesne County, which is the Duchesne County Sheriff's Office. The Sheriff's Office is located at 21554 W 9000 S in Duchesne, UT. The Duchesne County Sheriff is Travis L. Tucker. The Sheriff's Office provides law enforcement throughout the county where other primary law enforcement agencies do not exist. There are also BLM-administered lands, U.S. Forest Service lands, SITLA lands, tribal lands, two National Monuments, one National Forest, and two State Parks in the county that each have their own attendant law enforcement authorities in addition to the county sheriff.

Roosevelt Police Department is located at 255 S State Street in Roosevelt. Mark J. Watkins is Chief of Police.

The Highway Patrol Office for the county is located at 641 E 300 S Suite 300 in Vernal, UT. This office services the entire Uintah Basin Region of Daggett, Duchesne, and Uintah Counties.

o LAND USE PLANNING & CHANGES IN DEVELOPMENT AND FUTURE DEVELOPMENT

This section of the Duchesne County Hazard Mitigation Plan Annex examines the relationship between the county's General Plan, Land Use or Zoning Ordinances, and the AHMP. Incorporating hazard

mitigation practices into land use planning is extremely important as future developments are planned and constructed. Through proper planning within the individual jurisdictions, risk to property owners can be reduced and future disaster related economic losses avoided. Land Use and Mitigation Planning Integration are seen as critical components of the mitigation program in Duchesne County.

Duchesne County's General Plan was last revised and adopted in 2022. The plan should be reviewed and updated to address condition changes within the county and the economy.

Duchesne County's Land Use can be found in the General Plan & Resource Management Plan on page 24, which was last updated in 2022. The map provides a comprehensive, legal, and strategic basis for implementing zoning changes and land use code updates that the county may want to pursue in the immediate term. It will also provide the basis for future decisions regarding individual rezone requests for years to come. The end goal is to produce a sustainable, well-balanced development pattern for the future. To develop the Future Land Use Map, citizens, planning bodies, and decision makers assessed current zoning, as compared to what exists on the ground now, and envisioned how the county will develop into the future, taking into consideration and balancing many variables, including existing community values, hazard risks, and other concerns. The latest update represents the vision for how the county will develop over the next 20–30 years.

The hazard risk assessment (see *Chapter 2 Hazard Risk Summary*) took into consideration changes in development and future development trends based on planning and zoning maps and documents. The following tables highlight those sections of the assessment:

Hazard Event	**Changes in Development and Hazard Vulnerability (High, Medium, Low)**	**Vulnerability Factor** (Adjust Impact Factor to Change Scores)	**Multiplied by Weighting Factor (1)**
Extreme Heat	Low		
Lightning	Low	1	1
Hail	Low	1	1
Tornado	Low	1	1
Straight-line Wind	Low	1	1
Extreme Cold	Low	1	1
Winter Storm	Low	1	1
Avalanche	Medium	2	2
Wildfire	Medium	2	2
River or Stream Flood	Medium	2	2
Flash Flood	Medium	2	2
Dam Failure	Low	1	1
Drought	Low	1	1
Earthquake	Medium	2	2
Landslide	Low	1	1
Expansive Soils	Low	1	1
Land Subsidence	Low	1	1

Hazard Event	Changes in Development and Hazard Vulnerability (High, Medium, Low)	Vulnerability Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Changes in Development Factor—Changes in development since the previous plan was approved (if this is an update) or in the past five years (if this is a new plan) have increased or decreased the community's vulnerability/exposure to this hazard. **[Weighted Factor: 1]**			
High—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)			
Medium—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)			
Low—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)			
No Vulnerability—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)			

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Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Extreme Heat	Low	1	1
Lightning	Low	1	1
Hail	Low	1	1
Tornado	Low	1	1
Straight-line Wind	Low	1	1
Extreme Cold	Low	1	1
Winter Storm	Medium	2	2
Avalanche	Medium	2	2
Wildfire	Medium	2	2
River or Stream Flood	Medium	2	2
Flash Flood	Low	1	1
Dam Failure	Low	1	1
Drought	Medium	2	2
Earthquake	Low	1	1
Landslide	Low	1	1
Expansive Soils	Low	1	1
Land Subsidence	Low	1	1
Future Development Factor—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard. **[Weighted Factor: 1]**			

Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
High—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)			
Medium—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)			
Low—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)			
No Impact—Future development trends will not increase the impact/consequence of this hazard, and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)			

▪ City of Duchesne

The city of Duchesne updated their General Plan in 2022. The plan establishes how Duchesne "welcomes economic diversification and growth, encourages the development of recreation and tourism and promotes an atmosphere where community values and friendly, small-town character can thrive" (Duchesne General Plan, 2022). It describes the city's plans and goals for transportation, public services, public safety, moderate income housing, community promotion and economic development, recreation, parks, aesthetics, historic preservation, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, climate, history, socioeconomic drivers, and demographics of the area. However, it is recommended that the city of Duchesne include an update to their General Plan in which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

▪ City of Myton

The city of Myton updated their General Plan in 2006. The plan describes how Myton "strives for orderly growth and development. Mutually beneficial partnerships with area agencies and jurisdictions are sought to elevate the quality of life for its citizens. Growth is welcome and would be a positive addition to the current diverse population" (Myton General Plan, 2006). It describes the city's plans and goals for transportation, public services, public safety, Native American lands, community infrastructure, heritage and culture, historic preservation, community design, and land use. However, it is recommended that the city of Myton include an update to their General Plan in which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

▪ City of Roosevelt

The city of Roosevelt updated their General Plan in 2019. The plan establishes how the citizens of Roosevelt "will be economically friendly to business, industry, and promote the entrepreneurial spirit by providing essential services that create a safe environment for all citizens to raise their families, worship, enjoy recreational opportunities, and serve in the community" (Roosevelt General Plan, 2019). It describes the city's plans and goals for transportation, public services, public safety, community

promotion and economic development, recreation, parks, aesthetics, historic preservation, infrastructure, water and sewer management, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, history, and demographics of the area. However, it is recommended that the city of Roosevelt include an update to their General Plan in which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

▪ Town of Altamont

The town of Altamont updated their General Plan in [insert]. The plan establishes how Altamont will "[insert quote from vision or mission statement]" (Altamont General Plan, date). It describes the town's plans and goals for transportation, public services, public safety, moderate income housing, community promotion and economic development, recreation, parks, aesthetics, historic preservation, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, climate, history, socioeconomic drivers, and demographics of the area. However, it is recommended that the town of Altamont include an update to their General Plan in which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

▪ Town of Tabiona

The town of Tabiona updated their General Plan in 2018. The plan establishes how Tabiona "is a close-knit rural community that believes in preserving the beauty and history of town for future generations, all while trying to grow in a fair and responsible way" (Tabiona General Plan, 2018). It describes the town's plans and goals for transportation, public facilities, moderate income housing, community promotion and economic development, recreation, parks, aesthetics, historic preservation and rehabilitation, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, climate, history, socioeconomic drivers, and demographics of the area. However, it is recommended that the town of Tabiona include an update to their General Plan in which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

o NFIP CONTINUITY STRATEGY

Duchesne County participates in the National Flood Insurance Program (NFIP) as do the cities of Duchesne, Myton, and Roosevelt and the towns of Altamont and Tabiona. Duchesne County's participation in the National Flood Insurance Program began on March 31, 2017. The city of Duchesne began its participation in the regular phase of the NFIP on February 4, 1988. The city of Myton began on February 4, 1988. Roosevelt, Altamont, and Tabiona do not participate, although floodplain maps are available for each of these jurisdictions on Duchesne County's website.

Duchesne County has no communities within the 100-year floodplain hazard area that are not participating in the NFIP. Duchesne County has no communities under suspension or revocation of participation in the NFIP.

Table 11-32. NFIP Participation in Duchesne County

NFIP Participation Category	Duchesne County	City of Duchesne	City of Myton
FIRM Date	03/31/2017	02/04/1988	02/04/1988
Participating in CRS (Class)	N/A	N/A	N/A
Number of NFIP Policies	13	1	5

NFIP Participation Category	Duchesne County	City of Duchesne	City of Myton
Total Coverage	$682,000	$350,000	$842,000
Total Written Premium + FPF	4,178	2,091	2,777
Are FIRMs Digital or Paper?	Digital	Digital	Digital
Repetitive Loss Properties	0	0	0
Severe Repetitive Loss Properties	0	0	0
Source: FEMA Repetitive Losses/BCX Claims Utah, 2023			

Specific NFIP and floodplain related activities include:

- Duchesne County continues to offer one-on-one advice to property owners on how to protect property and has staff available to make site visits to property owners regarding flooding and drainage issues on private property.

PART III: MITIGATION STRATEGY

● CHANGES IN PRIORITY

o CHANGES IN PRIORITY

Mitigation priorities have not significantly changed for either Duchesne County or the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona since the update of the last plan. For the 2024 plan update, mitigation goals for Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona were significantly updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations. The plan also underwent a complete rewrite to better align with new local mitigation plan requirements.

Also, for past mitigation projects identified in previous iterations of the plan, a *2024 Status Update and Changes in Priority* section was included for each past action. A description of the update and changes in priority were included, if appropriate and applicable.

● MITIGATION STRATEGIES

o MITIGATION ACTION PLAN

The action plan helps to prioritize mitigation initiatives according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The action plan also provides the framework for how the proposed projects and initiatives will be implemented and administered over the next five years.

▪ Mitigation Strategy/Goals

The planning team reviewed the existing mitigation goals for Duchesne County and the jurisdictions of Duchesne, Myton, Roosevelt, Altamont, and Tabiona were updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations.

Goal 1. Protection of life before, during, and after the occurrence of a disaster and reducing the impact of damage where problems cannot be eliminated.

Goal 2. Protection of emergency response capabilities (critical infrastructure)

Goal 3. Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social and economic needs.

Goal 4. Protection of natural resources and the environment, when considering mitigation measures.

Goal 5. Promoting public awareness through education of community hazards and mitigation measures.

Goal 6. Preserving and/or restoring natural features that provide mitigation such as floodplains.

Goal 7. Provide a basis for funding of projects outlined as hazard mitigation strategies.

Goal 8. Establish a framework and database for the jurisdictions to use to apply for aid.

▪ Mitigation Strategy/Action Timeline Parameters

While the preference is to provide definitive project completion dates, this is not possible for every mitigation strategy/action. Therefore, the parameters for the timeline (Projected Completion Date) are as follows:

- **Short-term**—To be completed in 1 to 5 years
- **Long-term**—To be completed in greater than 5 years
- **Ongoing**—Currently being implemented under existing programs but without a definite completion date

▪ Mitigation Strategy/Action Benefit Parameters

Benefit ratings are defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.
- **Medium**—Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low**—Long-term benefits of the project are difficult to quantify in the short term.

Mitigation Strategy/Action Estimated Cost Parameters

While the preference is to provide definitive costs (dollar figures) for each mitigation strategy/action, this is not possible for every mitigation strategy/action. Therefore, the estimated costs for the mitigation initiatives identified in this plan are identified as high, medium, or low, using the following ranges:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (e.g., bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Mitigation Strategy/Action Prioritization Process

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was conducted. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

The priorities are defined as follows:

- **High**—A project that addressed numerous goals or hazards, has benefits that exceed cost, has funding secured or is an ongoing project, and meets eligibility requirements for the HMGP or BRIC grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium**—A project that addressed multiple goals and hazards, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, BRIC, or other grant programs. The project can be completed in the short term once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low**—A project that will address few or no goals, mitigate the risk of one or few hazards, has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or BRIC grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or HMA programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define “benefits” according to parameters that meet the goals and objectives of this plan.

o MITIGATION PROJECTS

Listed below are the goals and objectives developed by the mitigation plan and the priority projects that were developed to address the risks posed. Included in the list are a rough estimate of cost and an anticipated period for further investigation, project development, and implementation.

Participating jurisdictions agreed upon 19 mitigation actions that apply to the county and all or some participating jurisdictions These shared actions, some of which address all hazards, help to meet the following FEMA requirement: “Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? Does the plan include one or more action(s) per jurisdiction for each hazard identified within the risk assessment?”

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▪ New Mitigation Projects

● *Duchesne County New Projects*

Mitigation Project: Wildland fire fuel mitigation in areas identified in current CWPP						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Duchesne County, City of Duchesne, City of Myton, City of Roosevelt, Town of Altamont, Town of Tabiona	Duchesne County Emergency Management and local fire departments	State Forestry Department	High	Ongoing	Medium
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2,3, and 4		Wildfire		High		Duchesne County general funds, SHGP, HMGP and BRIC
Action/Implementation Plan and Project Description:						
Enhancing defensible space in areas identified within the current CWPP						

- ***City of Roosevelt New Projects***

Mitigation Project: Flood mitigiation by enhancing flow capacity of Cottonwood Creek						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	City of Roosevelt	City of Roosevelt	Duchesne County	High	Long-term	High estimated cost
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Flood (Flash and riverine)		High		Duchesne County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						
Expand flow capacity of Cottonwood Creek in Roosevelt to provide more flow capacity in the drainageway.						

▪ Ongoing Mitigation Projects

- ***Duchesne County Ongoing Projects***

Mitigation Project: Educate local elected officials about dam Emergency Action Plans each time new officials take office.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Educate local elected officials about dam Emergency Action Plans each time new officials take office.						
2020	Duchesne County, City of Duchesne, City of Myton, City of Roosevelt, Town of Altamont, Town of Tabiona	Duchesne County Emergency Management	NA	Medium	Ongoing	Low

Applicable Goal(s)	Hazard(s) Mitigated	Benefit Analysis (Low, Medium, High)	Potential Funding Source(s)
Goal 1, 4 and 5	Dam Failure	Medium	Duchesne County general funds

Action/Implementation Plan and Project Description:

Mitigation Project: Obtain and retain updated Emergency Action Plans for dams with inundation areas within the County.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County, City of Duchesne, City of Myton, City of Roosevelt, Town of Altamont, Town of Tabiona	Duchesne County Emergency Management	Central Utah EM Water	High	Ongoing	Low

Mitigation Project: Obtain and retain updated Emergency Action Plans for dams with inundation areas within the County.			
Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
Goal 1, 2 and 3	Dam Failure	High	Duchesne County general funds
Action/Implementation Plan and Project Description:			

Mitigation Project: Make citizens aware of programs whereby they can apply for funding to install new wheel lines that improve water use efficiency.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County	Duchesne County Emergency Management	NA	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 4 and 5		Drought		Medium		NRCS & Salinity Control Program
Action/Implementation Plan and Project Description:						

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Mitigation Project: Promote awareness of the local earthquake hazard by participating in the Utah Shake Out.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County	Duchesne County Emergency Management	NA	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2 and 3		Earthquake		Medium		Duchesne County general funds, HMGP and BRIC
Action/Implementation Plan and Project Description:						

Mitigation Project: Perform a seismic assessment of select county critical facilities.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County	Duchesne County Emergency Management	Public Works	Medium	Ongoing	Medium
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Perform a seismic assessment of select county critical facilities.			
Goal 1, 4 and 5	Earthquake	Medium	Duchesne County general funds, HMGP and BRIC
Action/Implementation Plan and Project Description:			

Mitigation Project: Follow-up with FEMA in regards to the County's request for a county-wide floodplain mapping study.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County, City of Duchesne, City of Myton, City of Roosevelt, Town of Altamont, Town of Tabiona	Duchesne County Emergency Management	FEMA	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2 and 3		Flood (Flash and Riverine)		Hugh		Duchesne County general funds
Action/Implementation Plan and Project Description:						
Continued follow up with FEMA to ensure mapping is updated countywide						

Mitigation Project: Implement storm drainage plans for new development in areas of Duchesne County that are susceptible to flooding due to storm runoff.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County	Duchesne County Emergency Management	NA	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3, 4 and 5		Flash Flood		Medium		Duchesne County general funds, private developers
Action/Implementation Plan and Project Description:						

Mitigation Project: Prior to allowing new development in historic landslide areas, require developers to perform a geotechnical landslide hazard study.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County, City of Duchesne, City of Myton, City of Roosevelt, Town of Altamont, Town of Tabiona	Duchesne County Emergency Management	Private investors	Medium	Ongoing	Low

Mitigation Project: Prior to allowing new development in historic landslide areas, require developers to perform a geotechnical landslide hazard study.			
Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
Goal 1, 4 and 5	Landslide	Medium	Duchesne County general funds, private investors
Action/Implementation Plan and Project Description:			

Mitigation Project: Enforce Wildland Urban Interface code requirements on all new construction through the building permit process.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County, City of Duchesne, City of Myton, City of Roosevelt, Town of Altamont, Town of Tabiona	Duchesne County Emergency Management	Local Fire departments	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 4 and 5		Wildfire		Medium		Duchesne County general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Provide wildfire education and training for citizens at a booth at the Duchesne County Fair.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Duchesne County, City of Duchesne, City of Myton, City of Roosevelt, Town of Altamont, Town of Tabiona	Duchesne County Emergency Management	Local Fire departments	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3, and 4		Dam Failure		High		Duchesne County general funds
Action/Implementation Plan and Project Description:						

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- ***City of Duchesne Ongoing Projects***

Mitigation Project: Update/revise City zoning ordinances, specifically in relation to the flood hazard.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Update/revise City zoning ordinances, specifically in relation to the flood hazard.						
2024	City of Duchesne	City Public Works	Duchesne County Emergency Management	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2 and 4		Flood (Flash and Riverine)		High		Duchesne County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

- ***City of Myton Ongoing Projects***

Mitigation Project: Implement water conservation plans.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	City of Myton	City Planning Commission	Duchesne County Emergency Management	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Drought		High		Myton City general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Enforce rate policies that encourage water conservation.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	City of Myton	City Planning Commission	NA	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Drought		Medium		Myton City general funds,
Action/Implementation Plan and Project Description:						

Mitigation Project: Update/revise City zoning ordinances, specifically in relation to the flood hazard.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	City of Myton	City Planning Commission	NA	Medium	Ongoing	Medium
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Update/revise City zoning ordinances, specifically in relation to the flood hazard.			
Goal 1, 2, 3 and 4	Flood (Flash and Riveren)	High	Myton City general funds
Action/Implementation Plan and Project Description:			

- ***City of Roosevelt Ongoing Projects***

Mitigation Project: Encourage water conservation by the public through promotions in City media (newsletter, Facebook page, etc.)						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	City of Roosevelt	City Planning Commission	Duchesne County Emergency Management	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Drought		Hugh		Roosevelt general fund
Action/Implementation Plan and Project Description:						

- ***Town of Altamont Ongoing Projects***

Mitigation Project: Enforce rate policies that encourage water conservation.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Town of Altamont	City Planning Commission	NA	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2,3 4, and 5		Drought		High		Altamont general fund
Action/Implementation Plan and Project Description:						

Mitigation Project: Update the Town's zoning ordinances.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2020	Town of Altamont	City Planning Commission	NA	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Update the Town's zoning ordinances.			
Goal 1, 2,3 4, and 5	Flood (Flash and Riverene)	High	Altamont general fund
Action/Implementation Plan and Project Description:			

Applicable Goal(s)	Hazard(s) Mitigated	Benefit Analysis (Low, Medium, High)	Potential Funding Source(s)
			Duchesne County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:			

APPENDIX

APPENDIX A: REFERENCES

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ANNEX C

Uintah County, Utah Annex

2024 Uintah Basin Region

Multi-Jurisdictional All Hazard Mitigation Plan

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PART I: COMMUNITY PROFILE

• UINTAH COUNTY PROFILE

o LOCATION

Uintah County is located on the east side of Utah, with its eastern border adjoining the western border of Colorado. The county is centered in the Uinta Basin, which was once formed by a prehistoric lake called Uinta Lake. The county borders eight other counties. It is bordered on the north by Daggett County; on the northeast by Moffat County, CO; on the east by Rio Blanco County, CO; on the southeast by Garfield County, CO; on the south by Grand County; on the southwest by Emery County; and on the west by Carbon County and Duchesne County. Total area of the county is 4,501 square miles, of which 22 square miles is water (U.S. Census QuickFacts, 2022). It is the sixth largest county by area in Utah.

o TOPOGRAPHY & VEGETATION

Uintah County is in the semi-arid region of eastern Utah. The county is positioned in the center of the Uinta Basin. The northern rim of the basin is formed by the Uinta Mountains, the western rim by the Wasatch Mountains, and the southern rim by the Book Cliffs (Uintah Basin, 2006). The county's terrain generally slopes to the south and the west, with its highest points on the crests of the Uinta Mountains. The Uinta Mountains run east to west along the northern border of the county. The highest crest in the range is around 12,276 feet. Vernal has an elevation of 5,328 feet, Naples has an elevation of 5,230 feet, and Ballard has an elevation of 5,049 feet. The elevation range within the county is from nearly 12,300 feet in the Uinta Mountains to 4,630 feet along the Green River in the central to southwestern parts of the county (Uintah County Topographic Map, 2024).

The Uinta Mountains are the highest mountain range in the contiguous United States with no modern glaciers. Lush mountain forests cover the lower parts of the range while rock and permafrost dominate the upper elevations. Lodgepole pine, subalpine fir, Engelmann spruce, Douglas-fir, and quaking aspen are common tree species growing in the mountains. Many species of grasses, shrubs, and forbs can also be found there. Uintah County has an abundance of lakes and reservoirs, especially in the basins between the summits and ridgelines of the Uintas. The Green River flows southwestward through the central region of the county and into the southwest corner where it forms the border between Duchesne County and Uintah County. The Duchesne River, White River, and Willow Creek all flow into the Green River in the central region of the county.

Ashley Valley is home to the cities of Vernal and Naples. The valley is fertile land with Ashley Creek flowing southeast along the northeast borders of the cities. Several canals flow through the area, as well. In the south of the county exists rugged, barren canyonland that contains most of Dinosaur National Monument, including the quarry (Uintah Basin, 2006). The Book Cliffs and Roan Cliffs in the south are small desert mountains and cliffs with little civilization around them.

o NATURAL RESOURCES

Uintah County is the largest producer of natural gas in the state of Utah as of January 2024 with a lifetime production of 6,223,677,249 MCF. The county produced 176,390,473 MCF of natural gas in 2023. It is also the second largest producer of oil in Utah with a lifetime production of 408,649,984 barrels (Utah DNR, 2024). Coal, phosphate, gilsonite, copper, gold, and silver are also mined in Uintah County. Other

natural resources that are regularly utilized in Uintah County are timber, agriculture, ranching, and outdoor recreation (Uintah County General Plan, 2005, amended 2012).

o CLIMATE

The climate in Uintah County is primarily semi-arid, with occasional severe cold in the winter. The elevation throughout the Uintah Basin is relatively similar, so the climate remains consistent from city to city. However, the climate in the upper elevations of the Uinta Mountains and Wasatch Mountains is often colder with increased snowfall.

In the summer, the average daily temperature in Vernal is 71.4°F, with the warmest month of each year typically being July (NOWData, 2024). In the winter, the average daily temperature is 22.3°F in Vernal, and the coldest month is typically January (NOWData, 2024).

Average annual precipitation is approximately 7.99 inches in Vernal (NOWData, 2024). Precipitation averages are similar throughout the county. The wettest month in Vernal is September, and the driest month is June. The growing season is usually four months long. The table below outlines monthly average maximum and minimum temperatures and average precipitation and snowfall at Vernal.

Table 1-1. Vernal Monthly Climate Summary

Vernal, UT												
Average Maximum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
28.3	37.2	52.7	62.2	72.3	84.6	91.5	87.7	77.8	62.0	46.5	30.4	59.3
Average Minimum Temperature (°F)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
7.8	15.0	26.4	33.0	41.7	50.8	58.4	55.2	46.3	34.4	23.0	11.0	32.3
Average Total Precipitation (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
0.5	0.47	0.69	0.66	0.86	0.4	0.47	0.59	1.22	1.02	0.47	0.61	7.99
Average Total Snowfall (in.)												
Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Annual
5.2	3.6	2.2	0.4	0.0	0.0	0.0	0.0	0.0	0.3	1.3	5.4	18.5
Source: NOWData, 2024; Western Regional Climate Center, 2010												

o LAND OWNERSHIP, LAND USE, & FUTURE DEVELOPMENT

Over 70% of the land in Uintah County is public land (Uintah County General Plan, 2005, amended 2012), and about 15% of the land is privately owned (Uintah County Land Use Plan, 2010, amended 2011). The Uintah County Land Use Plan states that "typically, only private lands are used for development. This means that the future residential, commercial, and industrial land use needs of the county must be met through the limited supply of privately owned land." Uintah County has approximately 696,258 acres of undeveloped private land. With current population growth projections, the county should have more than enough land to meet these growth needs.

The figure below shows the land ownership statistics for Uintah County, as taken from the Headwaters Economic Profile System:

Land Ownership

	Uintah County, UT
Total Acres	2,882,592
Private Lands	507,201
Conservation Easement	1,513
Federal Lands	1,677,915
Forest Service	269,113
BLM	1,347,482
National Park Service	52,578
Military	0
Other Federal	8,742
State Lands	271,255
State Trust Lands*	238,571
Other State	32,684
Tribal Lands	426,229
City, County, Other	0
Percent of Total	
Private Lands	17.6%
Conservation Easement	0.1%
Federal Lands	58.2%
Forest Service	9.3%
BLM	46.7%
National Park Service	1.8%
Military	0.0%
Other Federal	0.3%
State Lands	9.4%
State Trust Lands*	8.3%
Other State	1.1%
Tribal Lands	14.8%
City, County, Other	0.0%

Figure 1-1. Land Ownership in Uintah County

According to the USDA Census of Agriculture, Uintah County had 1,114 farms covering 1,824,700 acres in 2017 (USDA, 2022). 47,696 acres of this land is harvested cropland, and 65,306 acres is irrigated land. The primary crops grown in the county include alfalfa, yellow corn, and mixed forage, which is specifically used for livestock grazing (Uintah County Resource Management Plan, 2017). A large portion of land in the county is used for grazing, including much of the public land.

Only 15% of the lands within Uintah County are privately owned. Private lands are typically used for new development, which means that future residential, commercial, and industrial land use needs in the county must be met through the limited supply of privately owned land. The table below shows the total number of acres of undeveloped private land in the county (Land Use Plan, 2010, amended 2011).

Table 1-2. Undeveloped Private Land in Uintah County

Region	Number of Acres
Uintah County (total)	696,258
Ashley Valley	52,985
West Side	716,042
Source: Uintah County Land Use Plan, 2010, amended 2011	

There is currently enough undeveloped private land to meet the demand of future population growth in Uintah County. According to the Governors Office and Envision Utah, Utah develops at a rate of about 3.2 people per acre. Uintah County is expected to reach a population of 51,300 by 2060, which means approximately 4,630 acres will need to be developed to meet this population demand (Land Use Plan,

2010, amended 2011). The table below also details the future land use demands for public health and safety, parks and recreation, and economic activities.

Table 1-3. Uintah County Future Land Use Demands

Growth Demand	Land Use Guidance
Drinking Water Source Protection	No additional acres needed
Wastewater Treatment Facilities	No additional acres needed
Landfill Sites	No additional acres needed
Floodplain Protection	Low density residential development recommended; buildings must 1+ foot above 100 year flood elevation
Parks and Recreation	Maintain current 9 acres of park per 1,000 people; set aside land for parks as new development occurs
Economic (Commercial, Industrial, Oil & Gas)	Set aside thousands of acres for future development
Source: Uintah County Land Use Plan, 2010, amended 2011	

o HISTORY

Uintah County was originally inhabited by dinosaurs during the Jurassic period, as evidenced by the many bones and fossilized prints left in the region. Prehistorically, the Archaic peoples (8000–1000 BC) and Fremont peoples (AD 1–1301) inhabited portions of the Uinta Basin. Remnants of the Fremont culture can still be found today in the county in the form of petroglyphs and pictographs. In early recorded history, the Ute people dwelt in the area. In 1776, Fathers Dominguez and Escalante traveled through the Uinta Basin in search of a land route to Monterey, California, mapping large parts of the region that had never been mapped or documented before (National Park Service, 2021). Fur trappers and traders moved through the basin in search of pelts in the 1820s and 1830s.

In 1861, Brigham Young sent a small party to the Uinta Basin to explore new areas for settlement. However, they determined that the basin was “one vast contiguity of waste and measurably valueless” (Uintah County History, 2024) and decided not to settle there. Also in 1861, President Abraham Lincoln created the Uintah and Ouray Indian Reservation for the relocation of Indians living throughout Utah and Colorado at the time. The Uncompahgre Reservation was created in the 1880s in the southern portion of the county. Gilsonite was discovered in parts of the county and on the eastern portion of the Uintah and Uncompahgre reservations around 1888, which pressured the federal government to remove 7,000 acres from the Uintah Reservation so miners could legally mine gilsonite. The boundaries of Uintah County changed several times after 1892 and were revised and set for the last time in 1919.

o POPULATION & DEMOGRAPHICS

The demographics and population of an area are important to understand what the impacts of a natural hazard may be on communities now and in the future. In 2022, Uintah County had a population of 35,951 (U.S. Census QuickFacts, 2022). This is an increase of 1.02% from the population taken during the 2020 Census, which was 35,588. From decennial census to decennial census, the population in Uintah County has been steadily trending up since its inception in 1880. However, the population has decreased a number of times from year to year, with the most recent declines occurring in 2010 (-0.37%), 2016 (-4.04%), 2017 (-2.86%), and 2020 (-0.32%).

The population trends for Uintah County and the three cities in the county are shown in the table below.

Table 1-4. Uintah County Population Trends

County Location	2010	2020	Percent Change 2010–2020
Entire County	32,588	35,620	9.3%
Vernal	9,089	10,079	10.9%
Naples	1,755	2,282	30.0%
Ballard	801	1,130	41.1%
Source: U.S. Census Bureau, 2010, 2020			

Between 2010 and 2020, the county as a whole increased in population by 9.3%, although there were periods of decline within that time. Vernal, Naples, and Ballard all substantially increased in population, as well, with 10.9%, 30%, and 41.1% increases respectively.

Of the total population in the county, 49.3% are female (U.S. Census QuickFacts, 2022). 32.1% of the total population are under 18 years of age, and 11.3% are 65 years and older. The median age in 2020 was 31.1 years. 2.7% of residents were foreign born. The population is mainly homogenous with 90.8% of county residents listed as white. The county's racial and ethnic distribution is listed in the table below. Only the six most common ethnicities in the county are included, and some members of the population may identify as more than one race.

Table 1-5. Uintah County Racial and Ethnic Distribution

Race	Percent of Population
White	90.8%
Black or African American	0.8%
American Indian and Alaska Native	8.4%
Asian	1.3%
Native Hawaiian and Other Pacific Islander	1.5%
Hispanic or Latino	8.8%
Source: U.S. Census Bureau, 2020; American Community Survey, 2022	

o HOUSING

In 2018–2022, there were 11,547 households in Uintah County. The average household size was 3.08 people. 85.9% of residents who are one year or older are living in the same house now that they were a year ago (U.S. Census QuickFacts, 2022).

In July 2022, Uintah County had a total of 13,689 housing units, 15.6% of which were vacant (U.S. Census QuickFacts, 2022). An estimated 40.5% of occupied housing units were built since the year 2000. Of the total occupied housing units, 76.8% were single-unit structures, 12.9% were multi-unit structures, and 10.3% were mobile homes or another type of unit (American Community Survey, 2022). The median value of owner-occupied housing units in the county was $253,100 in 2022. Uintah County has a homeownership rate of 74.5%, which is higher than the national average of 64.6% (Data USA, 2023). Median gross rent was $797 from 2018 to 2022 (U.S. Census QuickFacts, 2022). An estimated 2.3% of households did not have telephone service, and 3.1% had no vehicles available (American Community Survey, 2022).

o ECONOMY

An estimated 60.4% of the population 16 years or older in Uintah County is in the civilian labor force (15,023 people). An estimated 76% of the people employed in 2022 were private wage and salary workers; 20.2% were federal, state, or local government; and 3.7% were self-employed (U.S. Census QuickFacts, 2022). The Retail Trade (2,423 people); Mining, Quarrying, & Oil & Gas Extraction (1,600 people); and Health Care & Social Assistance (1,532 people) industries currently hold the highest number of employees of any other industry in the county (Data USA, 2023). The most common job groups, regardless of industry, are Sales & Related Occupations (1,587 people); Office & Administrative Support (1,516 people); and Construction & Extraction (1,164 people).

The adjusted unemployment rate is 3.4% for Uintah County as of February 2024 compared to the state of Utah unemployment rate of 2.8% and the United States unemployment rate of 3.9% for the same period (Utah Department of Workforce Services, 2024).

The median household income in 2022 in Uintah County was $67,983. An estimated 76.1% of households received earnings, and 19.9% received retirement income. 26.7% of households received Social Security (American Community Survey, 2022). In 2022, 446 people in the county received Supplemental Security Income (SSI), including 47 people who were 65 years or older (SSA, 2022). These income sources are not mutually exclusive; that is, some households received income from more than one source. The poverty rate in the county is 12.2% (U.S. Census QuickFacts, 2022).

o EDUCATION

The total school enrollment from kindergarten to 12th grade in Uintah County was 8,579 students in 2022 (American Community Survey, 2022). Nursery school and preschool enrollment was 529. Uintah School District is the only public school district in the county, with 11 in-person schools and two online schools (Uintah School District, 2024). A charter school called Terra Academy in Vernal serves 650 students in grades K–12 (Terra Academy, 2024). The county also has two private schools for students in preschool through eighth grade. Uintah Basin Christian Academy is a Christian-based private school in Vernal that serves just over 100 students (UBCA, 2024). White House Academy in Vernal emphasizes God and patriotism in their curriculum and has class sizes of about 16 students per class (White House Academy, 2024).

College or graduate school enrollment for residents in the county was 1,109 in 2022 (American Community Survey, 2022). There are two colleges with locations in Uintah County: Uintah Basin Technical College and Utah State University Uintah Basin. Uintah Basin Technical College enrolled 4,566 total students during 2022, which includes secondary (high school) and adult students (these students may reside in Duchesne County, Uintah County, or another county). The college offers 42 certificate programs and has two campuses in Roosevelt and Vernal (UBTech, 2024). Utah State University has a campus in the Uintah Basin region with two locations in Roosevelt and Vernal. As of January 2023, USU Uintah Basin enrolled over 700 higher education students in a number of associate programs, bachelor’s programs, master’s programs, certificate programs, and professional licensures (USU Uintah Basin, 2024). Additionally, USU has an extension location in Vernal where it offers research-based community education, resources, and programs in several topics (e.g., agriculture, business, food, health, home, finance, and 4-H and youth) to the community (USU Extension, 2024).

o BRIDGES

The following table provides a list of all 50 Uintah County bridge locations, lengths, years constructed, and daily traffic counts, taken from the National Bridge Inventory.

Table 1-6. Uintah County Bridges

Location	Length (ft)	Year Built	Average Daily Traffic Count
2 mi. N of Buck Canyon	21.9	2006	20
9750 N 1500 E St	9	1950	158
4.5 mi. NE of Neola	10.3	1992	139
1 mi. S of Whiterocks	18.6	1955	740
15.5 mi. N of Buck Canyon	21.9	2006	100
10 mi. NW of Vernal	18.5	1995	189
3.5 mi. SW of Lapoint	7.8	1952	1551
12 mi. NW of Vernal	24.2	2003	500
1.5 mi. E of Naples	38.1	2004	32
2500 N 3500 W St	8.7	1970	3448
2620 N 2500 W St	6.9	1987	983
2000 N 2500 W St	16.8	1987	500
1250 W 2000 N St	14.4	1960	500
1520 W 750 N St	8.6	2009	630
680 W 2500 S St	10.7	1995	100
1000 N 500 E St	32.3	1995	1488
0.5 mi. E of Randlett	34.3	1982	2049
S of Fort Duchesne	40.3	2006	360
4 mi. E of Randlett	11.9	1953	2049
11.5 mi. SE of Ouray	19.5	1995	600
10 mi. NE of Vernal	6.7	1950	63
4.5 mi. NW of Jensen	18.4	1979	252
4 mi. N of Jensen	7	1985	124
2 mi. NE of Jensen	7	1992	189
2.5 mi. SW of Jensen	27.4	2003	60
12.5 mi. SE of Ouray	39.6	2004	526
7 mi. N of Bonanza	9.1	1982	160
14 mi. S of Bonanza	23.6	1969	160
5.5 mi. S of Buck Canyon Rd Junction	14.1	1987	10
4.5 mi. S Buck Canyon Rd Junction	12.5	1972	26
4 mi. S Buck Canyon Rd Junction	11	1975	13
12.5 mi. S Buck Canyon Rd Junction	12.2	1975	13
13 mi. S Buck Canyon Rd Junction	12.4	1975	5

Location	Length (ft)	Year Built	Average Daily Traffic Count
13.5 mi. S Buck Canyon Rd Junction	12.4	1972	13
5 mi. S of Bonanza	65.4	2009	500
1300 S 1500 W St	10.7	2008	100
2000 W 450 S	16	2010	2475
1550 E 500 N St	43.8	2009	1378
10 mi. S of Bonanza	61.7	2010	500
4.5 mi. S of Ft Duchesne	25	2010	2049
2.5 mi. SE of Roosevelt	24.9	2010	286
1320 N 500 W St	32.8	2013	139
1600 N 1500 W St	32.8	2013	102
33.11 mi. S of Ouray	8.1	2012	63
30.76 mi. S of Ouray	6.7	2012	63
35.69 mi. S of Ouray	6.7	2012	63
40.31 mi. S of Ouray	6.7	2012	63
39.59 mi. S of Ouray	6.7	2012	63
38.58 mi. S of Ouray	6.7	2012	63
3.5 mi. SW of SR-88	21.5	2013	1000
Source: National Bridge Inventory, 2024			

o COUNTY FACILITIES/CRITICAL INFRASTRUCTURE

The following table lists important facilities in Uintah County:

Table 1-7. Uintah County Critical Facilities/Infrastructure

Classification	Total
Hospitals/Medical Clinics[1]	5
Schools[2]	14
Emergency Operations Centers	2
Law Enforcement Facilities[3]	3
Fire Stations	6
Critical County and City Facilities[4]	15
Essential Utilities[5]	21
Major Roadways[6]	5

Notes:

[1] 1 hospital and 4 clinics

[2] 10 public schools and 4 private schools

[3] Police stations in Naples & Vernal, Sherriff's office in Vernal

[4] County Building, Public Safety Building, Vernal City Building, Naples City Building, Ballard City Building, Road Department Building, Animal Service Building, Tri County Health Building, Uintah Care Center, Western Park Fairgrounds, Uintah Conference Center, Golden Age Living Center, 8th District Courthouse, Youth Detention Center, and Vernal Regional Airport

[5] 3 Emergency Radio Stations, Strata, Ashley Valley Water Treatment Plant, Ashley Valley Wastewater Treatment Plant, 4 RMP substation facilities and transmission lines, Moon Lake Electric Facilities and transmission lines, Tridell La Pointe Water, Dominion natural gas, 5 major pipelines (Williams, Mid America, Marathon, Chevron, & Kinder Morgan); Simplot (phosphate mine), American Gilsonite mine, Deseret Power powerplant and transmission lines

[6] Hwy 40, SR-191, SR-88, SR-45, SR-121

o CULTURAL & HISTORICAL SITES

Sites in Uintah County listed on the National Register of Historic Places can be found in the table below.

Table 1-8. Historic Places in Uintah County

Site	Address	Nearest City/Location
Bank of Vernal	3 W Main St.	Vernal
Carter Road	Ashley National Forest	Ashley National Forest
Cockleburr Wash Petroglyphs	Address Restricted	Jensen
Lewis Curry House	189 S Vernal Ave.	Vernal

Site	Address	Nearest City/Location
Desolation Canyon	Along Green River in western Uintah County	Green River
Earl Douglass Workshop-Laboratory	US 40	Dinosaur National Monument
Fenn-Bullock House	388 W 100 N	Vernal
Gibson-Sowards House	3110 N 250 W	Vernal
Little Brush Creek Petroglyphs	Address Restricted	Vernal
Manfred and Ethel Martin House	163 N Vernal Ave.	Vernal
McConkie Ranch Petroglyphs	SE of Dry Fork	Vernal
Josie Bassett Morris Ranch Complex	US 40	Dinosaur National Monument
Quarry Visitor Center	US 40	Dinosaur National Monument
William and Emily Siddoway House	1055 N Vernal Ave.	Vernal
Francis “Frank” and Eunice Smith House	1847 N 3000 W	Vernal
St. Paul’s Episcopal Church and Lodge	226 W Main St.	Vernal
Vernal Tithing Office	NW corner of 500 W 200 S	Vernal
Washington School—Vernal LDS Relief Society Hall	270 N 500 W	Vernal
Whiterocks Village Site	Address Restricted	Whiterocks
Source: National Register of Historic Places, 2024		

PART II: RISK ASSESSMENT

● HAZARD RISK SUMMARY

Risk assessment is the process of measuring the potential loss of life, personal injury, economic injury, and property damage resulting from natural hazards. It allows emergency management personnel to establish early response priorities by identifying potential hazards and vulnerable assets. The process focuses on the following elements:

- Hazard identification—Use all available information to determine what types of disasters may affect a jurisdiction, how often they can occur, and their potential severity.
- Vulnerability identification—Determine the impact of natural hazard events on the people, property, environment, economy, and lands of the region.
- Cost evaluation—Estimate the cost of potential damage or cost that can be avoided by mitigation.

The risk assessment for this hazard mitigation plan update evaluates the risk of natural hazards prevalent in the planning area and meets requirements of the DMA (44 CFR, Section 201.6(c)(2)).

o IDENTIFIED HAZARDS

There are countless hazards that pose a threat to human life, health, and well-being, and no attempt is made here to compile an exhaustive list. Those that are addressed in disaster planning are generally categorized as “natural” or “technological” (sometimes “manmade”). The FEMA website contains a thorough discussion and list of hazards in the section entitled “National Risk Index for Natural Hazards” (FEMA, 2022). Some hazards are a threat to all geographic areas while others (e.g., flooding) are more limited in their extent. Studies were conducted to determine which hazards are of concern in Uintah County.

Uintah County hazards were identified and their frequency of occurrence evaluated using a number of resources, including:

- 2019 Uintah Basin Region 5 Hazard Mitigation Plan
- 2005 Uintah County General Plan, amended 2012
- 2017 Uintah County Resource Management Plan
- 2010 Land Use Plan, amended 2011
- Hazard planning documents developed by state, federal, and private agencies
- NOAA weather data from the past 74 years
- Data from the United States Geological Survey (USGS) and the Utah State Geological Survey (UGS)

Hazards that have been identified as significant in this county and that will be considered in this plan are listed below:

Natural Hazards

- Severe Summer Weather
    - Extreme Heat
    - Lightning
    - Hail
    - Tornado
    - Straight-line Wind
- Severe Winter Weather

    - Extreme Cold
    - Winter Storm
    - Avalanche
- Wildfire
- Flood
    - River or Stream Flood
    - Flash Flood
    - Dam Failure
- Drought

Geological Hazards

- Earthquake
- Landslide
- Problem Soils
    - Expansive Soils
    - Land Subsidence

Per FEMA's mandate to address all natural hazards, the following natural hazards were not included because these hazards do not directly impact Uintah County or the cities of Ballard, Naples, and Vernal due to geographic location:

- Hurricane
- Sea Level Rise
- Storm Surge
- Tsunami
- Volcanic Eruption

HAZARD PROFILE

The risk assessments in the following chapters describe the risks associated with each identified hazard of concern. The following sections were used to describe each hazard and communicate each respective level of risk:

- **Hazard Description**—Each hazard profile contains a description of the general definition and causes of the hazard. It may also include background information for understanding the context of the hazard within Uintah County.
- **Location**—The location or region in Uintah County where each hazard may occur is described.
- **Extent**—The strength or magnitude of each hazard is defined, usually through a form of measurement, such as a formula, scale, chart, or graph.
- **Historical Frequency & Probability of Future Occurrence**—This section identifies past hazard events of note that have occurred in Uintah County. It also includes the likelihood of each hazard occurring again if available.
- **Impacts & Loss Estimates**—The potential impacts of each hazard on the county are discussed. This section also outlines the potential economic/monetary loss from a hazard event, in addition to loss of property, structures, facilities, systems, livestock, and life. An assessment of affected vulnerable populations and changes in development is included.
- **Climate Change Implications**—The effects of climate change on the probability of future events and severity of impacts for each hazard are assessed.

- **FEMA NRI Score**—The hazard-specific FEMA National Risk Index scores for each natural hazard are included.
- **Related Hazards**—The hazard profiles that fall under a greater hazard category can be found within this section.

RISK ASSESSMENT METHODOLOGY

Each hazard included in this plan was assessed and ranked based on a pre-defined hazard risk methodology consistent with FEMA's mitigation plan requirements. Information from the hazard profiles and input from subject matter experts were used to inform the hazard risk assessment process. The following is a description of the key factors.

Probability/Likelihood of Occurrence

The probability of occurrence of a hazard is indicated by a probability factor based on the likelihood of annual occurrence:

- **High**—Significant hazard event is likely to occur annually (Probability Factor = 3)
- **Medium**—Significant hazard event is likely to occur within 25 years (Probability Factor = 2)
- **Low**—Significant hazard event is likely to occur within 100 years (Probability Factor = 1)
- **Unlikely**—There is little to no probability of significant occurrence, or the recurrence interval is greater than every 100 years (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area.

Extent

Extent was assessed in two categories: extent/intensity and catastrophic potential of the hazard. Numerical impact factors were assigned as follows:

Extent/Intensity—Extent is defined as the range of anticipated intensities of the identified hazards. Extent is most commonly expressed using various scientific scales, such as the Enhanced Fujita scale.

- **High**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a high-intensity incident (Extent Factor = 3)
- **Medium**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a medium-intensity incident (Extent Factor = 2)
- **Low**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of a low-intensity incident (Extent Factor = 1)
- **Unlikely**—Historical and/or probabilistic models/studies for this hazard indicate the possibility of little to no intensity (Extent Factor = 0)

Catastrophic—The potential that an occurrence of this hazard could be catastrophic.

- **High**—High potential that this hazard could be catastrophic (Extent Factor = 3)
- **Medium**—Medium potential that this hazard could be catastrophic (Extent Factor = 2)
- **Low**—Low potential that this hazard could be catastrophic (Extent Factor = 1)
- **Unlikely**—Virtually no potential that this hazard could be catastrophic (Extent Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Extent/Intensity* and its potential to be *Catastrophic*.

▪ Vulnerability

Vulnerabilities were assessed in three categories: population exposure, property exposure, and exposure based on changes in development. Numerical impact factors were assigned as follows:

People—Values were assigned based on the percentage of the total population exposed to the hazard event.

- **High**—30% or more of the population is exposed to this hazard (Vulnerability Factor = 3)
- **Medium**—15% to 29% of the population is exposed to this hazard (Vulnerability Factor = 2)
- **Low**—14% or less of the population is exposed to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the population is exposed to this hazard (Vulnerability Factor = 0)

Property Exposed—Values were assigned based on the percentage of the total property value exposed to the hazard event.

- **High**—25% or more of the total assessed property value is exposed to the hazard (Vulnerability Factor = 3)
- **Medium**—10% to 24% of the total assessed property value is exposed to the hazard (Vulnerability Factor = 2)
- **Low**—9% or less of the total assessed property value is exposed to the hazard (Vulnerability Factor = 1)
- **No Vulnerability**—None of the total assessed property value is exposed to the hazard (Vulnerability Factor = 0)

Changes in Development—Changes in development since the previous plan was approved have increased or decreased the community's vulnerability/exposure to this hazard.

- **High**—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)
- **Medium**—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)
- **Low**—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)
- **No Vulnerability**—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *People*, and a weighting factor of 1 was assigned for *Property Exposed* and *Changes in Development*.

▪ Impact

Hazard impacts were assessed in eight categories: population and life/safety, underserved/equity, property damages, economic, environmental, essential operations, future development, and climate change. Numerical impact factors were assigned as follows:

Population and Life/Safety—Values were assigned based on (1) best available historical and probabilistic data for individuals who are vulnerable to the hazard event and (2) the likelihood to experience adverse impacts in the event of its occurrence.

- **High—**Populations exposed to this hazard are likely to experience significant adverse impacts (Impact Factor = 3)
- **Medium**—Populations exposed to this hazard are likely to experience some adverse impacts (Impact Factor = 2)
- **Low**—Populations exposed to this hazard are likely to experience minimal adverse impacts (Impact Factor = 1)
- **No Impact**—Populations exposed to this hazard are not likely to experience significant adverse impacts (Impact Factor = 0)

Underserved/Equity—Values were (1) assigned based on best available data for underserved populations vulnerable to the hazard event and (2) are likely to experience adverse/disproportionate impacts from the hazard incident resulting in greater disparity in equity.

- **High**—Underserved populations exposed to this hazard are likely to experience significant adverse/disproportionate impacts (Impact Factor = 3)
- **Medium**—Underserved populations exposed to this hazard are likely to experience some adverse/disproportionate impacts (Impact Factor = 2)
- **Low**—Underserved populations exposed to this hazard are likely to experience minimal adverse/disproportionate impacts (Impact Factor = 1)
- **No Impact**—Underserved populations exposed to this hazard are not likely to experience significant adverse/disproportionate impacts (Impact Factor = 0)

Property Damages—Values were assigned based on the expected total property damages incurred from a hazard incident. It is important to note that values represent estimates of the loss from a major incident based on historical data or probabilistic models/studies.

- **High**—More than $5,000,000 in property damages is expected from a single major hazard event, or damages are expected to occur to 15% or more of the property value within the jurisdiction (Impact Factor = 3)
- **Medium**—More than $500,000 but less than $5,000,000 in property damages is expected from a single major hazard event, or expected damages are expected to more than 5%, but less than 15% of the property value within the jurisdiction (Impact Factor = 2)
- **Low**—Less than $500,000 in property damages is expected from a single major hazard event, or less than 5% of the property value within the jurisdiction (Impact Factor = 1)
- **No Impact**—Little to no property damage is expected from a single major hazard event (Impact Factor = 0)

Economic—An estimation of the impact, expressed in terms of dollars, on the local economy is based on a loss of business revenue, crops, worker wages, and local tax revenues or on the impact on the local gross domestic product (GDP).

- **High**—Total economic impact is likely to be greater than $10,000,000 (Impact Factor = 3)
- **Medium**—Total economic impact is likely to be greater than $100,000 but less than or equal to $10,000,000 (Impact Factor = 2)
- **Low**—Total economic impact is not likely to be greater than $100,000 (Impact Factor = 1)
- **No Impact**—Virtually no significant economic impact (Impact Factor = 0)

Environmental Factor—Environmental impact from a major hazard event requiring outside resources and support; and/or repair, clean-up, restoration, and/or preservation work.

- **High**—Environmental impact from a single major hazard event is likely to be significant, requiring extensive outside resources and support; and/or repair, clean-up, restoration, and/or preservation work (Impact Factor = 3)
- **Medium**—Environmental impact from a single major hazard event is likely to be localized, requiring some outside resources and support; and/or repair, clean-up, restoration, or preservation work (Impact Factor = 2)
- **Low**—Environmental impact from a single major hazard event is likely to be minimal, requiring little to no outside resources and support, and/or minimal repair, clean-up, restoration, or preservation work (Impact Factor = 1)
- **No Impact**—No environmental impacts from a single major hazard event is likely (Impact Factor = 0)

Essential Operations Factor—Impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event.

- **High**—Significant impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 3)
- **Medium**—Some impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 2)
- **Low**—Minimal impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 1)
- **No Impact**—No impact on the ability of the jurisdiction to meet the essential day-to-day operational demands and needs of the community from a single major hazard event (Impact Factor = 0)

Future Development—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard.

- **High**—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)
- **Medium**—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)
- **Low**—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)
- **No Impact**—Future development trends will not increase the impact/consequence of this hazard and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)

Climate Change—The potential that climate change will increase the risk of this hazard (e.g., type, location, and range of anticipated intensities of the identified hazard and impacts).

- **High**—Climate change trends will significantly increase the risk of this hazard and its impacts (Impact Factor = 3)
- **Medium**—Climate change trends will increase the risk of this hazard and its impacts, but not significantly (Impact Factor = 2)
- **Low**—Climate change trends will minimally increase the risk of this hazard and its impacts (Impact Factor = 1)

- **No Impact**—Climate change trends will not increase the risk of this hazard and its impacts (Impact Factor = 0)

Each category was assigned a weighting factor to reflect its significance, consistent with those typically used for measuring the benefits of hazard mitigation actions: a weighting factor of 3 was assigned for *Population and Life Safety* and *Underserved/Equity*, and a weighting factor of 2 was assigned for *Property Damages*. In addition, a weighting factor of 1 was assigned for *Economic*, *Environmental*, *Essential Operations*, *Future Development*, and *Climate Change*.

o FEMA NRI RISK SCORES

The National Risk Index (NRI) is a dataset and online tool to help illustrate the United States communities most at risk for 18 natural hazards: avalanche, coastal flooding, cold wave, drought, earthquake, hail, heat wave, hurricane, ice storm, landslide, lightning, riverine flooding, strong wind, tornado, tsunami, volcanic activity, wildfire, and winter weather. Because not all hazards are applicable to Uintah County, only those hazards with a defined risk to the county are included.

The National Risk Index leverages available source data for Expected Annual Loss due to these 18 hazard types, and Social Vulnerability and Community Resilience to develop a baseline relative risk measurement for each United States county and census tract (National Risk Index, 2023d). These measurements are calculated using average past conditions, but they cannot be used to predict future outcomes for a community. The National Risk Index is intended to fill gaps in available data and analyses to better inform federal, state, local, tribal, and territorial decision makers as they develop risk reduction strategies.

▪ Social Vulnerability

Social Vulnerability measures the susceptibility of social groups to the adverse impacts of natural hazards, including disproportionate death, injury, loss, or disruption of livelihood.

Table 2-1. Social Vulnerability for Uintah County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Social Vulnerability Score	Rating
940201	City of Ballard and Unincorporated Uintah County	81.5	Very High
968201	City of Naples and Unincorporated Uintah County	30.9	Relatively Low
968302	Unincorporated Uintah County	33.2	Relatively Low
968301	City of Vernal and Unincorporated Uintah County	59.6	Relatively Moderate
968401	City of Vernal	71.4	Relatively High
968403	City of Vernal and Unincorporated Uintah County	80.5	Very High
968404	City of Vernal and City of Naples	42.5	Relatively Moderate
968202	Unincorporated Uintah County	58.3	Relatively Moderate
Social Vulnerability is measured using the Social Vulnerability Index (SoVI) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2023e; 2023f			

▪ Community Resilience

Community Resilience measures a community's ability to prepare for anticipated natural hazards, adapt to changing conditions, and withstand and recover rapidly from disruptions.

Table 2-2. Community Resilience for Uintah County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Community Resilience Score	Rating
940201	City of Ballard and Unincorporated Uintah County	24.8	Relatively Low
968201	City of Naples and Unincorporated Uintah County	24.8	Relatively Low
968302	Unincorporated Uintah County	24.8	Relatively Low
968301	City of Vernal and Unincorporated Uintah County	24.8	Relatively Low
968401	City of Vernal	24.8	Relatively Low
968403	City of Vernal and Unincorporated Uintah County	24.8	Relatively Low
968404	City of Vernal and City of Naples	24.8	Relatively Low
968202	Unincorporated Uintah County	24.8	Relatively Low
Community Resilience is measured using the Baseline Resilience Indicators for Communities (HVRI BRIC) published by the University of South Carolina's Hazards and Vulnerability Research Institute (HVRI). Source: National Risk Index, 2023b; 2023e			

▪ Expected Annual Loss

The table below shows the overall Expected Annual Loss score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *Impacts & Loss Estimates*.

Table 2-3. Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Census Tract	Communities in Census Tract	Expected Annual Loss Score	Rating
940201	City of Ballard and Unincorporated Uintah County	24.24	Very Low
968201	City of Naples and Unincorporated Uintah County	26.09	Relatively Low
968302	Unincorporated Uintah County	24.43	Very Low
968301	City of Vernal and Unincorporated Uintah County	12.33	Very Low
968401	City of Vernal	10.12	Very Low
968403	City of Vernal and Unincorporated Uintah County	4.42	Very Low
968404	City of Vernal and City of Naples	6.39	Very Low
968202	Unincorporated Uintah County	3.71	Very Low
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure × Annualized Frequency × Historic Loss Ratio). Source: National Risk Index, 2023d; 2023e			

▪ Overall NRI Score

The table below shows the overall FEMA National Risk Index Score for the entire county based on all natural hazards. Hazard-specific scores are included in each hazard chapter under *FEMA NRI Score*.

Table 2-4. Overall National Risk Index Score for Uintah County, UT

Census Tract	Communities in Census Tract	FEMA National Risk Index Score	Rating
940201	City of Ballard and Unincorporated Uintah County	35.73	Relatively Low
968201	City of Naples and Unincorporated Uintah County	23.82	Very Low
968302	Unincorporated Uintah County	22.7	Very Low
968301	City of Vernal and Unincorporated Uintah County	15.47	Very Low
968401	City of Vernal	14.97	Very Low
968403	City of Vernal and Unincorporated Uintah County	8.49	Very Low
968404	City of Vernal and City of Naples	6.57	Very Low
968202	Unincorporated Uintah County	5.07	Very Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2023c; 2023e			

o OVERALL RISK SCORES

The following table represents the new overall risk scores for Uintah County based on the described methodology. Following a data-driven quantitative assessment, the planning team utilized subject matter knowledge and expertise and further refined the scores.

Double click the Microsoft Excel icon below to access the full assessment and tool (this is only accessible when utilizing the Microsoft Word version of the plan).

- **Uintah County**

Table 2-5. 2024 Hazard Risk Scores for Uintah County

	Probability	Consequence				Total Risk	
Hazard Event	Probability Factor	Sum of Weighted Extent Factors	Sum of Weighted Vulnerability Facto	Sum of Weighted Impact Factors	Consequence Score	Total Risk Score (Probability x Consequence)	
Flash Flood	2	6	8	25	39	41	M
Wildfire	3	6	9	24	39	57	H
Winter Storm	3	6	11	22	39	57	H
River or Stream Flood	1	6	6	13	25	15	L
Drought	3	6	7	25	38	56	H
Extreme Heat	2	6	12	23	41	42	M
Staright-line Wind	2	6	6	11	23	26	L
Extreme Cold	3	12	11	26	49	70	H
Lightning	1	18	12	31	61	33	L
Hail	1	6	9	19	34	20	L
Landslide	1	6	6	13	25	15	L
Exansive Soild	1	6	6	13	25	15	L
Land Subsidence	1	12	9	24	45	25	L
Avalance	2	12	14	28	54	54	H
Earthquake	1	6	6	10	22	14	L
Dam Failure	1	9	12	24	45	25	L
Tornado	1	9	9	23	41	23	L

Table 2-6. Hazard Risk Scores Legend

Probability Factor		Sum of Weighted Extent Factors		Sum of Weighted Vulnerability Factors		Sum of Weighted Impact Factors		Consequence Score			
1	Low (L)	0–6	Low (L)	0–6	Low (L)	0–12	Low (L)	0–25	Low (L)	0–24	Low (L)
2	Medium (M)	7–12	Medium (M)	7–12	Medium (M)	13–26	Medium (M)	26–50	Medium (M)	25–49	Medium (M)
3	High (H)	13–18	High (H)	13–18	High (H)	27–39	High (H)	51–75	High (H)	50–100	High (H)

The **Legend—specifically the assignment of low, medium, and high—provides an additional means to qualitatively assess the probability factor, sum of weighted factors, and the total risk scores for each hazard.*

*The **Consequence Score** represents the sum of the Extent, Vulnerability, and Impact Factors.*

*The **Total Risk Score** is a measure of Probability and Consequence.*

SEVERE SUMMER WEATHER

HAZARD DESCRIPTION

Severe summer weather includes those hazards that are typically found during the spring, summer, and early fall season of the year in Uintah County. Severe summer weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. Included in this category are extreme heat, lightning, hail, tornado, and straight-line wind. Each hazard is examined independently; however, it is recognized that these hazards typically occur together.

RELATED HAZARDS

Extreme Heat

Hazard Description

Potential Probability	High
Potential Consequence	Medium
Location	Countywide, including Ballard, Naples, and Vernal
Seasonal Pattern or Conditions	Late spring, summer, and early fall
Duration	Events may last hours to days
Analysis Used	NOAA, NWS, Western Regional Climate Center, NCEI, EWG, Neighborhoods at Risk, National Risk Index, Headwaters Economics, U.S. Census, Climate and Economic Justice Screening Tool, Resilience Analysis and Planning Tool, HHS, UCAR

The term “extreme heat,” sometimes called “heat wave,” is to some extent a relative one describing a period when weather conditions include temperatures and humidity significantly higher than those usual for a particular geographic area.

Location

Due to the dry, semi-arid climate of Uintah County in desert Utah, the entire county may be affected by extreme heat, including the jurisdictions of Ballard, Naples, and Vernal.

Extent

The National Weather Service (NWS) issues alerts to the public based on its Heat Index (HI), which takes both temperature and humidity into account. The NWS will initiate alert procedures when the HI is expected to exceed 105°–110°F (depending on local climate) for at least two consecutive days (NWS, 2024).

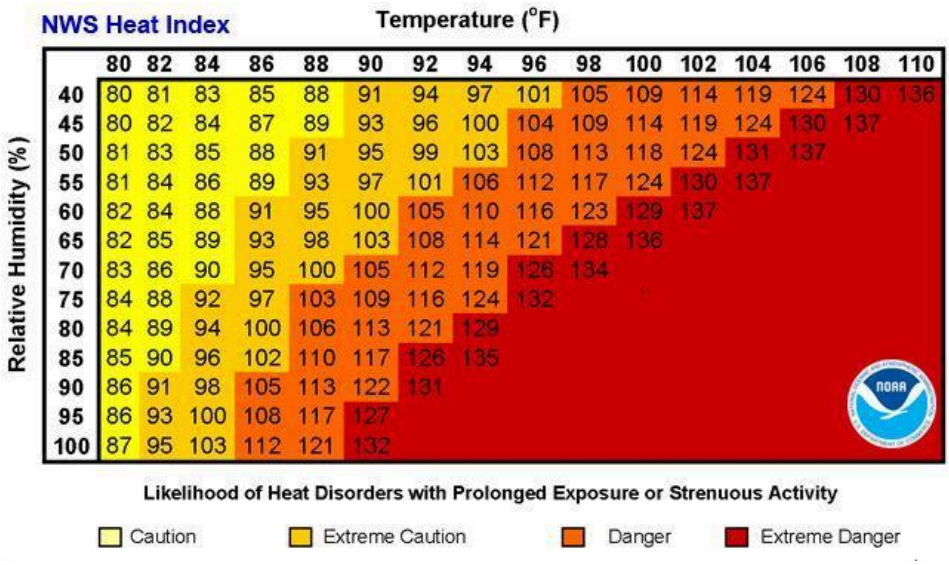


Figure 3-1. NOAA National Weather Service Heat Index (NWS, 2024)

- ***Historical Frequency & Probability of Future Occurrence***

According to NWS available data, the record high temperature in the city of Vernal, Utah is 106°F in June 1919 (NOWData, 2024). July is historically the hottest month of the year in Uintah County, with an average temperature of 71.1°F in Vernal (NOWData, 2024). The average high in Vernal in July is 89.4°F (Western Regional Climate Center, 2024). Vernal has had two instances of extreme heat of 105°F or higher since 1900. Vernal was the only city in Uintah County analyzed for extreme heat events over 105°F due to it being the only city with recorded NWS data. Ballard and Naples may experience extreme heat events, but specific data is limited and incomplete. However, Fort Duchesne, Ouray, Jensen, and Dinosaur National Monument have extensive data records and experience similar average summer temperatures to Vernal with slightly higher temperature maximums. Between these four locations, 59 instances of extreme heat of 105°F or higher were recorded. The highest recorded temperature by the National Weather Service in Uintah County was documented in Dinosaur National Monument Quarry Area in July 2002 at 110°F. This area experiences the highest number of extreme heat days in Uintah County (NOWData, 2024).

According to Neighborhoods at Risk, Uintah County is expected to experience 13 more days that reach above 95°F by 2049. As annual temperatures continue to increase, more extreme heat events are likely to occur. In fact, Uintah County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by extreme heat, as presented in the table below.

Table 3-1. Impacts of Extreme Heat by Jurisdiction

Jurisdiction	Impacted by Heat Events (95–104°F) Within Last 25 Years	Impacted by Extreme Heat Events (105+°F) Within Last 25 Years	Potential Impacts of Extreme Heat
Uintah County	Yes	Yes	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Ballard	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Naples	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Vernal	Yes	No	Sunstroke, heat exhaustion, heat cramps, death, loss of crops/vegetation/livestock, wildfires, utility losses, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

The primary impact of extreme heat is on human health, with disorders such as sunstroke, heat exhaustion, and heat cramps. There are also undoubtedly indirect and chronic health effects from extreme heat, the magnitude of which are difficult or impossible to estimate. Environmental effects can include loss of wildlife and vegetation and increased probability of wildfires.

Power outages may occur during times of extreme heat. Large electrical panels and motors used in water production may also be negatively affected by extreme heat. Economic impacts result from such factors as increased energy prices and loss of business as people avoid leaving their homes to escape the heat. Agricultural losses can also occur. During the years 1995–2022, the EWG reported $30,967 in crop insurance indemnities due to heat in Uintah County (EWG, 2022). The magnitude of these and other, more indirect impacts is, again, difficult to assess, but for severe heat waves, the economic impact has been estimated to be significant.

Table 3-2. Heat Wave: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0.2 events per year	0.0	$40,805	$190	$482	$41,476	82.5	Relatively High
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0.2 events per year	0.0	$36,147	$149	$177	$36,473	80.1	Relatively High
Census Tract 968302: Unincorporated Uintah County							
0.1 events per year	0.0	$32,067	$106	$41	$32,214	77.6	Relatively High
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0.3 events per year	0.0	$44,882	$175	$36	$44,093	83.6	Relatively High
Census Tract 968401: City of Vernal							
0.3 events per year	0.0	$26,599	$167	$5	$26,771	74.0	Relatively Moderate
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0.3 events per year	0.0	$27,474	$133	$15	$27,622	74.6	Relatively Moderate
Census Tract 968404: City of Vernal and City of Naples							
0.3 events per year	0.0	$26,668	$108	$11	$26,807	74.1	Relatively Moderate
Census Tract 968202: Unincorporated Uintah County							
0.3 events per year	0.0	$26,443	$68	$31	$26,542	73.9	Relatively Moderate

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People particularly susceptible to extreme heat are the elderly, small children, and persons with chronic illnesses.

Table 3-3. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%

Vulnerability Category	Number	Percent
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to effectively stay cool during extreme heat events.

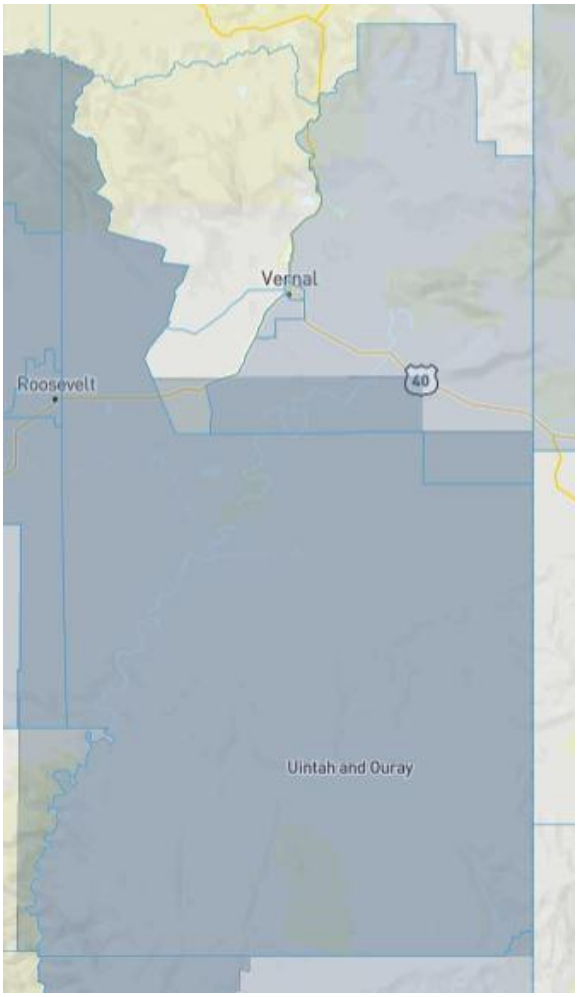
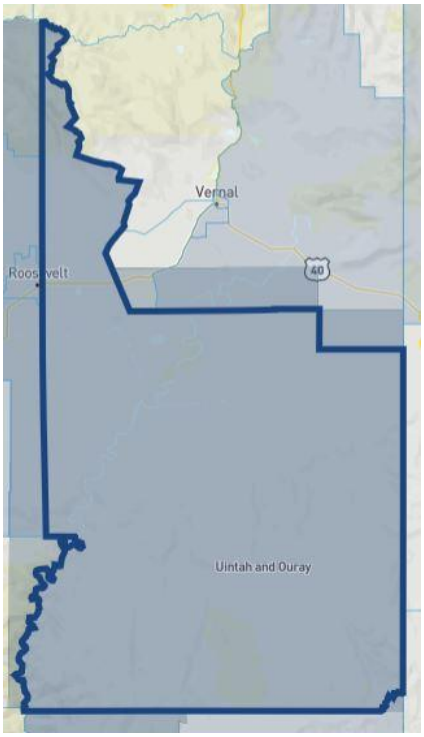
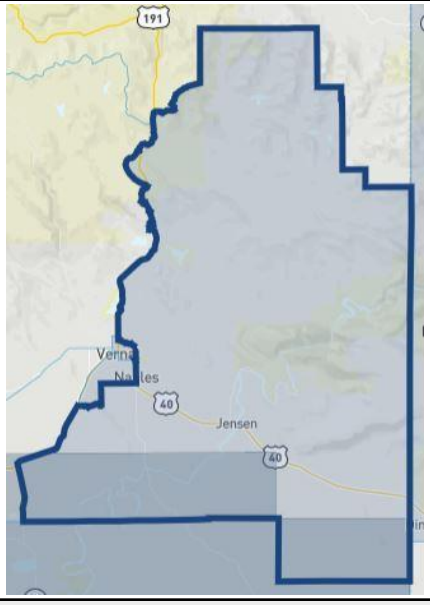


Figure 3-2. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 3-4. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
***94th** % (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
***92nd** % (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
***20%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES

UINTAH COUNTY, UT	
	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Extreme heat places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-5. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks

Critical Facility Type	Location
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme temperatures. Places prone to high heat are expected to become even drier and hotter over the following century (UCAR, 2024). Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors. According to Neighborhoods at Risk, extremely hot days are the leading cause of weather-related fatalities in the U.S. and contribute to economic stress as the need for and cost of air conditioning rises.

Effects of Climate Change on Probability of Future Events

Table 3-6. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Uintah County is expected to experience 13 more days that reach above 95°F (from 16 days to 29 days per year).
	By 2049, Uintah County is expected to have a 3°F increase (from 46°F to 49°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 3-7. Heat Wave: Overall National Risk Index Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
86.21	Relatively High	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
76.99	Relatively Moderate	Relatively Low	Relatively Low

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 968302: Unincorporated Uintah County			
75.05	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
84.2	Relatively High	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
77.24	Relatively Moderate	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
79.31	Relatively High	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
72.95	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
75.11	Relatively Moderate	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Lightning

● *Hazard Description*

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Ballard, Naples, and Vernal	
Seasonal Pattern or Conditions	Late spring, summer, and early fall	
Duration	Storms that produce lightning may last hours to days	
Analysis Used	NOAA, NWS, Vaisala, NCEI, NFPA, NIFC, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

Lightning is defined by the NWS as “a visible electrical discharge produced by a thunderstorm. The discharge may occur within or between clouds, between the cloud and air, between a cloud and the ground, or between the ground and a cloud.” A lightning discharge may be over five miles in length, generate temperatures upwards of 50,000°F, and carry 50,000 volts of electrical potential. Lightning is most often associated with thunderstorm clouds, but lightning can strike as far as five to 10 miles from a storm. Thunder is caused by the rapid expansion of air heated by a lightning strike. Cloud-to-ground lightning strikes occur with much less frequency in the northwestern U.S. than in other parts of the country.

● *Location*

This hazard can affect the entire county and the state of Utah, but the risk to the county is relatively low. The jurisdictions of Ballard, Naples, and Vernal may experience lightning, as well.

- ***Extent***

A lightning flash is created by a transfer of significant charge between two charged objects. Lightning discharges can occur inter-cloud, cloud-to-cloud, cloud-to-air, and cloud-to-ground. Cloud-to-ground (CG) lightning has the greatest risk to society. A CG stroke can kill, destroy equipment, start fires, and disturb power delivery systems.

Lightning is commonly measured using the Lightning Activity Level (LAL), which is a scale that describes the frequency of lightning strikes in a specific area (NWS, 2024).

Lightning Activity Level (LAL)	
Is a scale which describes lightning activity. Values are labeled 1-6:	
LAL 1	No thunderstorms
LAL 2	Isolated thunderstorms. Light rain will occasionally reach the ground. Lightning is very infrequent, 1 to 5 cloud to ground strikes in a five minute period.
LAL 3	Widely scattered thunderstorms. Light to moderate rain will reach the ground. Lightning is infrequent, 6 to 10 cloud to ground strikes in a 5 minute period.
LAL 4	Scattered thunderstorms. Moderate rain is commonly produced Lightning is frequent, 11 to 15 cloud to ground strikes in a 5 minute period.
LAL 5	Numerous thunderstorms. Rainfall is moderate to heavy. Lightning is frequent and intense, greater then 15 cloud to ground strikes in a 5 minute period.
LAL 6	Dry lightning (same as LAL 3 but without rain). This type of lightning has the potential for extreme fire activity and is normally highlighted in fire weather forecasts with a Red Flag Warning.

Figure 3-3. NWS Lightning Activity Level

- ***Historical Frequency & Probability of Future Occurrence***

Lightning is common in Utah, with an average of 1,040,446 lightning strikes per year in the state from 2015 to 2019 (Vaisala, 2020). However, this average is much less compared to other states, such as those in the Midwest and Southeast. For example, Florida received an average of 13,989,300 strikes per year within the same time period.

The Storm Events Database records two significant lightning events in Uintah County, both in Ballard, as seen in the table below.

Table 3-8. Significant Lightning Events in Uintah County, UT

Location Within County	Date	Fatalities/ Injuries	Property Damage	Description
Ballard	05/29/2000	0	$10,000	Lightning blew out transmitter at radio station
Ballard	05/05/2005	0	$3,000	Lightning struck power substation, knocking out power in Ballard and damaging some electronics and computers
Source: Storm Events Database, 2024				

Significant lightning strikes causing significant damage and/or injuries or fatalities are likely to occur again within the next 10 years and could occur anywhere in the county or in the cities of Ballard, Naples, or Vernal. Damage-causing lightning is more likely in Vernal than in other parts of the county due to Vernal's higher population. Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in Uintah County. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

- ***Impacts & Loss Estimates***

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by lightning, as presented in the table below.

Table 3-9. Impacts of Lightning by Jurisdiction

Jurisdiction	Impacted by Lightning	Experienced Significant Lightning Strike with $1,000+ in Damage Since 2000	Fatalities Due to Lightning	Potential Impacts of Lightning
Uintah County	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
City of Ballard	Yes	Yes	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities
City of Naples	Yes	No	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities

Jurisdiction	Impacted by Lightning	Experienced Significant Lightning Strike with $1,000+ in Damage Since 2000	Fatalities Due to Lightning	Potential Impacts of Lightning
City of Vernal	Yes	No	0	Burns, nerve damage, cardiac effects, hearing loss, trauma, mental disorders, death, wildfires, property damage, loss of utilities

Lightning is the second most deadly weather phenomenon in the U.S., being second only to floods. On average, 20 to 50 deaths per year are attributed to lightning nationally, and in Utah the average is less than one per year. The last death in Utah due to lightning was in 2016, with six total deaths in Utah since 2008 (NWS, 2024). However, there have been no recorded deaths in Uintah County due to lightning. Despite the enormous energy carried by lightning, only about 10% of strikes are fatal (NWS, 2024). Injuries include central nervous system damage, burns, cardiac effects, hearing loss, and trauma. The effects of central nervous system injuries tend to be long-lasting and severe, leading to such disorders as depression, alcoholism, chronic fatigue, and in some cases suicide. Lightning also strikes structures, causing fires and damaging electrical equipment. Wildland fires are often initiated by lightning strikes as are petroleum storage tank fires. About one third of all power outages are lightning-related.

The magnitude of economic losses is difficult to estimate. Between 2007 to 2011, $451 million in property damage was reported due to fires caused by lightning strikes in the U.S. (NFPA, 2013). The state of Utah experienced 408 fires caused by lightning strikes in 2023 alone (NIFC, 2023).

Table 3-10. Lightning: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
19.8 events per year	0.0	$24,784	$139	N/A	$24,924	91.0	Relatively High
Census Tract 968201: City of Naples and Unincorporated Uintah County							
12 events per year	0.0	$20,239	$104	N/A	$20,344	87.0	Relatively High
Census Tract 968302: Unincorporated Uintah County							
21.3 events per year	0.0	$20,844	$86	N/A	$20,930	87.6	Relatively High
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
9.5 events per year	0.0	$23,629	$108	N/A	$23,738	90.1	Relatively High
Census Tract 968401: City of Vernal							
7.5 events per year	0.0	$11,407	$84	N/A	$11,491	71.8	Relatively Moderate
Census Tract 968403: City of Vernal and Unincorporated Uintah County							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
9.8 events per year	0.0	$13,950	$79	N/A	$14,028	77.7	Relatively High
Census Tract 968404: City of Vernal and City of Naples							
9.6 events per year	0.0	$14,536	$649	$1	$14,606	78.8	Relatively High
Census Tract 968202: Unincorporated Uintah County							
9.7 events per year	0.0	$13,819	$42	N/A	$13,861	77.3	Relatively High
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. Any community, whether vulnerable or not, may experience lightning. However, those with inadequate living conditions or shelter may be more vulnerable to a strike.

Table 3-11. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during thunderstorms and/or lightning.

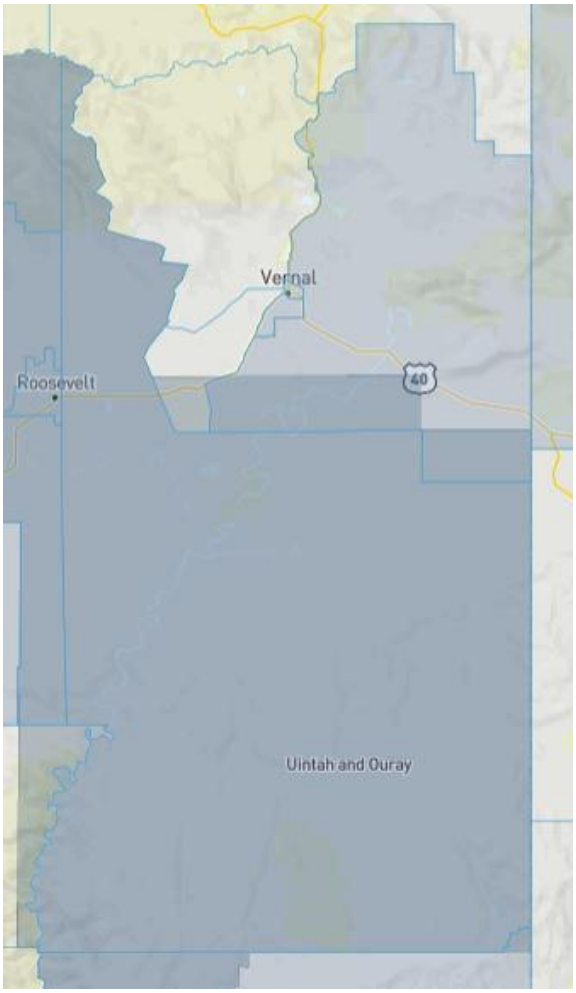
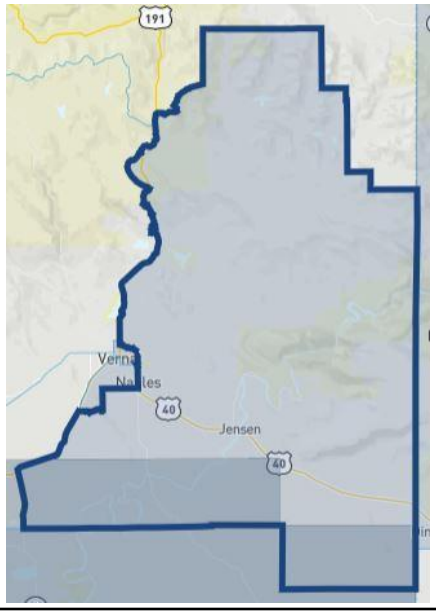


Figure 3-4. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 3-12. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Lightning strikes may lead to power outages depending on the location of the strike and amount of damage inflicted. The following table lists types of critical facilities that could be negatively affected by power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment. Any damage to any of these locations due to lightning could delay critical resources to those in need.

Table 3-13. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). An uptick in lightning strikes could lead to more frequent and severe lightning damage.

Effects of Climate Change on Probability of Future Events

Lightning events typically coincide with thunderstorms, which bring precipitation. However, unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an increase in thunderstorms—and therefore lightning events—is not currently likely (NCEI, 2022). Future lightning trends are predicted to remain consistent in the next 20 years in Uintah County, although precipitation may increase slightly. However, as global warming continues, thunderstorms with lightning may increase in the coming decades.

Table 3-14. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Lightning Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of lightning may increase.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 3-15. Lightning: Overall National Risk Index Score for Uintah County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
94.44	Very High	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
83.45	Relatively High	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
84.53	Relatively High	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
91.06	Relatively High	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
77.41	Relatively High	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
84.25	Relatively High	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
77.54	Relatively High	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
79.33	Relatively High	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Hail

● *Hazard Description*

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Ballard, Naples, and Vernal	
Seasonal Pattern or Conditions	Late spring, summer, and early fall	
Duration	Hailstorms may last hours to days	
Analysis Used	NOAA, NWS, Weather on the Web, III, TORRO, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

The NWS definition of hail is “showery precipitation in the form of irregular pellets or balls of ice more than 5 mm in diameter, falling from a cumulonimbus cloud. Its size can vary from the defined minimum, a little over a quarter of an inch, up to 4.5 inches or larger.” Severe hail is defined as being 0.75 inches or more in diameter. The largest hailstones are formed in supercell thunderstorms because of their sustained updrafts and long duration.

● *Location*

Uintah County can experience hailstorms countywide, including the jurisdictions of Ballard, Naples, and Vernal.

● *Extent*

The TORRO Hailstorm Intensity Scale was developed by Jonathan Webb to measure and categorize hailstorms (TORRO, 2024). It extends from H0 (hard hail, no damage) to H10 (super hailstorm, extensive structural damage, risk of severe/fatal injuries) with its increments of intensity or damage potential related to hail size (distribution and maximum), texture, numbers, fall speed, speed of storm translation, and strength of the accompanying wind. The scale could be modified depending on factors such as building materials and types (e.g., whether roofing tiles are predominantly slate, shingle, or concrete). See the scale in the figure below (TORRO, 2024).

Scale	Intensity category	Typical hail diameter (mm)*	Probable kinetic energy J m^{-2}	Typical damage impacts
H0	Hard hail	5	0-20	No damage
H1	Potentially damaging	5-15	>20	Slight general damage to plants, crops
H2	Significant	10-20	>100	Significant damage to fruit, crops, vegetation
H3	Severe	20-30	>300	Severe damage to fruit and crops, damage to glass and plastic structures, paint and wood scored
H4	Severe	25-40	>500	Widespread glass damage, vehicle bodywork damage
H5	Destructive	30-50	>800	Wholesale destruction of glass, damage to tiled roofs, significant risk of injuries
H6	Destructive	40-60		Bodywork of grounded aircraft dented, brick walls pitted
H7	Destructive	50-75		Severe roof damage, risk of serious injuries
H8	Destructive	60-90		(Severest recorded in the British Isles) Severe damage to aircraft bodywork
H9	Super Hailstorms	75-100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open
H10	Super Hailstorms	>100		Extensive structural damage. Risk of severe or even fatal injuries to persons caught in the open

Figure 3-5. TORRO Hailstorm Intensity Scale

Hail is considered severe when reaching a size of 0.75 inches in diameter or greater. The following figure shows different hail sizes with a description for comparison (TORRO, 2024).

Size code	Maximum diameter (mm)	Description
0	5-9	Pea
1	10-15	Mothball
2	16-20	Marble, grape
3	21-30	Walnut
4	31-40	Pigeon's egg > squash ball
5	41-50	Golf ball > Pullet's egg
6	51-60	Hen's egg
7	61-75	Tennis ball > cricket ball
8	76-90	Large orange > soft ball
9	91-100	Grapefruit
10	>100	Melon

Figure 3-6. TORRO Hail Size and Diameter

As demonstrated below, the National Weather Service also defines the local threat of severe hail for specified areas based on the likelihood that severe hail will occur combined with the anticipated size or diameter of the largest hailstones (NWS, 2024).

Severe Hail Threat Level	Threat Level Descriptions
Extreme	**"An Extreme Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a moderate likelihood or greater (16% probability or greater) of severe hail, with storms capable of baseball to softball sized stones. *See diameter description below.* AND/OR...a high likelihood or greater (26% probability or greater) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.* AND/OR...a very high likelihood (36% or greater) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
High	**"A High Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a low likelihood (6% to 15% probability) of severe hail with storms capable of baseball to softball sized stones. *See diameter description below.* AND/OR...a moderate likelihood (16% to 25% probability) of very large hail (golf ball to baseball sized hail stones). *See diameter description below.* AND/OR...a high likelihood (26% to 35% probability) of large hail (nickel to golf ball sized hail stones). *See diameter description below.*
Moderate	**"A Moderate Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of baseball to softball sized stones. *See description below.* AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See description below.* AND/OR...a moderate likelihood (16% to 25% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
Low	**"A Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of golf ball to baseball sized hail stones. *See diameter description below.* AND/OR...a low likelihood (6% to 15% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.*
Very Low	**" A Very Low Threat to Life and Property from Severe Hail."** Within 12 miles of a location, a very low likelihood (2% to 5% probability) of severe hail, with storms capable of nickel to golf ball sized hail stones. *See diameter description below.* AND/OR...a low likelihood or greater (6% or greater) of small hail (less than 3/4 inch). *See diameter description below.*
Non-Threatening	**" No Discernable Threat to Life and Property from Severe Hail."** Within 12 miles of a location, environmental conditions do not support the occurrence of severe hail.

Note: To be considered severe, hail stones must be at least 3/4 inch in diameter.

Figure 3-7. Severe Hail Threat Level

- ***Historical Frequency & Probability of Future Occurrence***

In the 10-year period from 1986 to 1995, the NWS recorded severe hail in Utah on 101 occasions, while in the same time period, severe hail was recorded in Colorado nearly 1,400 times (Weather on the Web, 2024).

Hail has been recorded throughout the county and in the cities of Naples and Vernal. The Storm Events Database has recorded 28 instances of severe hail in Uintah County since 1959. The hailstones from these events range in size from 0.75 inches to 1.75 inches. Five of these hail events occurred in Vernal, two in Naples, and 21 in unincorporated Uintah County (Storm Events Database, 2024).

Hail is likely to occur again in the future in any part of the county, including Ballard, Naples, and Vernal. Although many parts of the United States are experiencing increased precipitation, Utah has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades.

- ***Impacts & Loss Estimates***

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by hail, as presented in the table below.

Table 3-16. Impacts of Hail by Jurisdiction

Jurisdiction	Impacted by Hail	Experienced Significant Hail Damage ($1,000+) Since 2000	Fatalities Due to Hail	Potential Impacts of Hail
Uintah County	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
City of Ballard	Yes	No	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
City of Naples	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation
City of Vernal	Yes	Yes	0	Injury, death, crop/livestock losses, property damage, automobile accidents, road closures, damage to vegetation

Deaths and injuries due to hail have occurred but are rare. Most impacts are economic, but hailstorms can also cause utility failure through damage to critical infrastructure. Hailstorms may also lead to car accidents and road closures.

Economic loss can be extensive, especially to agriculturally based economies. Hail is very damaging to crops. Severe hail may also cause extensive property damage, including damage to vehicle paint and bodywork, glass, shingles and roofs, plastic surfaces, etc. Through the Storm Events Database, Uintah County has reported five severe hail events that resulted in $230,000 worth of property damage total, as seen in the table below. Hail-related insured losses averaged between $8 billion to $14 billion each year in the years 2000–2019 in the U.S. (III, 2024).

Table 3-17. Property Damage in Uintah County

Location Within County	Date	Property Damage ($)	Description
Naples	09/03/1999	$40,000	1.75-inch hail broke windows and vehicle windshields and damaged roof shingles

Location Within County	Date	Property Damage ($)	Description
Jensen	06/21/2009	$20,000	1.75-inch hail damaged vehicles and camper trailers along Hwy 40 southeast of Jensen
Naples	08/06/2009	$100,000	1.75-inch hail decimated gardens and crops, dented cars, broke windows, and damaged roofs and siding
Maeser, Vernal	09/17/2013	$30,000	1.75-inch hail flattened gardens, dented cars, and broke windows
Maeser	05/16/2014	$20,000	1.5-inch hail damaged vehicles
Source: Storm Events Database, 2024			

Table 3-18. Hail: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0.1 events per year	0.0	$506	$1,008	$268	$1,781	82.5	Relatively High
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0.1 events per year	0.0	$438	$793	$89	$1,320	80.1	Relatively High
Census Tract 968302: Unincorporated Uintah County							
0.1 events per year	0.0	$431	$630	$28	$1,090	77.6	Relatively High
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0.1 events per year	0.0	$538	$916	$19	$1,473	83.6	Relatively High
Census Tract 968401: City of Vernal							
0.1 events per year	0.0	$326	$872	$3	$1,201	74.0	Relatively Moderate
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0.1 events per year	0.0	$337	$698	$8	$1,043	74.6	Relatively Moderate
Census Tract 968404: City of Vernal and City of Naples							
0.1 events per year	0.0	$327	$566	$6	$899	74.1	Relatively Moderate
Census Tract 968202: Unincorporated Uintah County							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
0.1 events per year	0.0	$324	$355	$16	$696	73.9	Relatively Moderate

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to hailstorms.

Table 3-19. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%

Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during hailstorms.

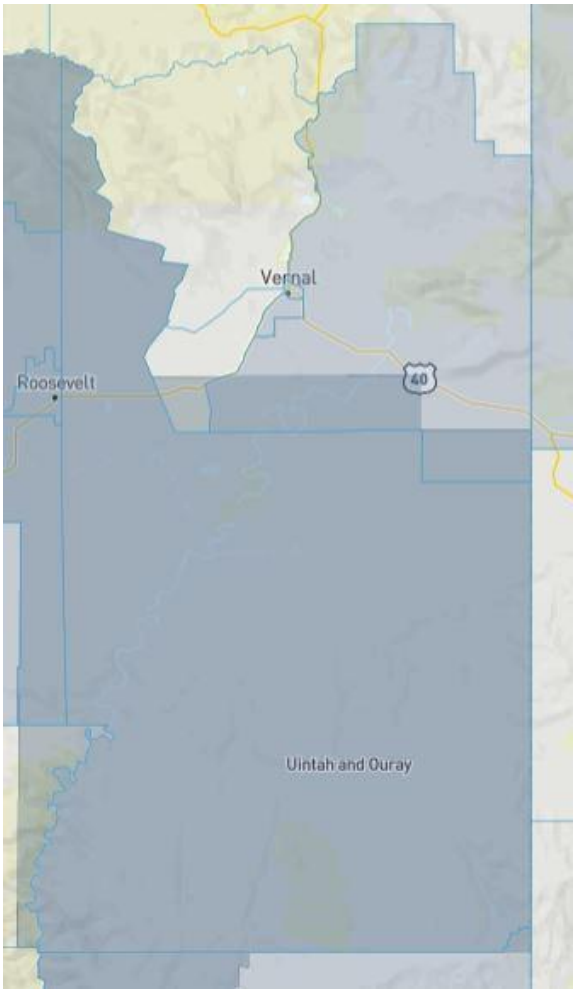
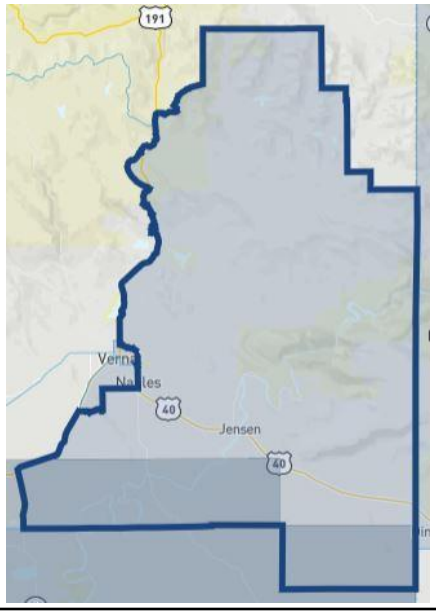


Figure 3-8. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 3-20. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Severe hailstorms may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from hailstorms or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-21. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

● *Climate Change Implications*

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop (USGS, 2023). Although many parts of the United States are experiencing increased precipitation, Utah as a whole has not yet experienced an upward trend in the frequency of precipitation events, so an increase in hailstorms is not currently likely. However, as global warming continues, hailstorms may increase in the coming decades, and a slight increase in precipitation is expected in Uintah County within 25 years.

Table 3-22. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Hail Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	If increased participation leads to additional thunderstorms, the risk of hail may increase.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

Table 3-23. Hail: Overall National Risk Index Score for Uintah County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
55.81	Relatively High	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
44.86	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
42.55	Relatively Moderate	Relatively Low	Very Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
50.1	Relatively High	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
48.39	Relatively Moderate	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
47.46	Relatively High	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
41.02	Relatively Moderate	Relatively Moderate	Very Low
Census Tract 968202: Unincorporated Uintah County			
39.42	Relatively Moderate	Relatively Moderate	Very Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Tornado

● *Hazard Description*

Potential Probability		Low

Potential Consequence		Low
Location	Countywide, including Ballard, Naples, and Vernal	
Seasonal Pattern or Conditions	Spring, summer, and early fall	
Duration	Tornadoes may last seconds to hours	
Analysis Used	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

The NWS describes a tornado as "a violently rotating column of air, usually pendant to a cumulonimbus, with circulation reaching the ground. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. On a local scale, it is the most destructive of all atmospheric phenomena" (NWS, 2024g). Like hail, most tornadoes are spawned by supercell thunderstorms. They usually last only a few minutes, although some have lasted more than an hour and traveled several miles.

- ***Location***

Although the risk is low, a tornado event is possible anywhere in the county, including in the jurisdictions of Ballard, Naples, and Vernal.

- ***Extent***

Wind speeds within tornadoes are estimated based on the damage caused and expressed using the Enhanced Fujita (EF) Scale.

Table 3-24. Enhanced Fujita (EF) Scale for Estimation of Tornado Wind Speeds

EF Scale	Class	Windspeed (mph)	Windspeed (km/h)	Description
EF0	Weak	65–85	105–137	Gale
EF1	Weak	86–110	138–177	Weak
EF2	Strong	111–135	178–217	Strong
EF3	Strong	136–165	218–266	Severe
EF4	Violent	166–200	267–322	Devastating
EF5	Violent	> 200	> 322	Incredible
Source: NOAA, 2024				

- ***Historical Frequency & Probability of Future Occurrence***

Tornado occurrence in Uintah County is relatively low. The Storm Events Database records eight tornadoes in the county since 1950, as seen in the table below. The cities of Vernal and Naples have seen two tornadoes each, but the city of Ballard has not experienced any tornadoes.

Table 3-25. Tornado Events in Uintah County, UT

Location Within County	Date	EF Scale	Property Damage	Description
Vernal, UT	06/01/1955	N/A	$2,500	A tornado touched down just northwest of Uintah High School.
Lapoint, UT	05/29/1988	EF0	$3,000	A tornado damaged a roof, chimney, and utility pole in Lapoint.
Naples, UT	03/23/1990	EF0	$500	A funnel cloud touched down briefly in Naples, taking the roof off a shed and blowing it into a trailer home.
Uintah and Ouray Reservation, near Ouray National Wildlife Refuge	05/05/1993	EF0	$0	A cold core funnel cloud briefly became a tornado and touched down for a few minutes in a rural region of the county.
Naples, UT	09/03/1999	EF1	$700,000	A tornado traveled four miles in the Naples area and damaged or destroyed several mobile homes, houses, garages, and sheds. Power poles and trees were downed or pulled out of the ground. A horse trailer was slammed against a structure. Gardens and hay pastures were leveled. Debris was thrown up to a quarter mile away. One person was injured.
Pelican Lake, UT	08/06/2009	EF0	$40,000	A tornado traveled over Pelican Lake and tore up trees and flipped over a trailer at a camp on the shore of the lake.
Vernal, UT	08/06/2009	EF0	$1,000	A tornado traveled between houses in Vernal, breaking off tree limbs and damaged sheds.
Matt Warner Reservoir, UT	06/16/2015	EF0	$0	A tornado touched down west of Matt Warner Reservoir in northwestern Uintah County and traveled for about a mile over open country.
Source: Storm Events Database, 2024				

Future tornadoes are possible and likely, but significant damage is improbable. However, according to Neighborhoods at Risk, Uintah County is expected to experience an increase in average annual temperature of 3°F by 2049, which could prompt the formation of additional tornadoes in the fall and

winter with the increased warm air (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

• *Impacts & Loss Estimates*

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by tornadoes, as presented in the table below.

Table 3-26. Impacts of Tornado by Jurisdiction

Jurisdiction	May Be Impacted by Tornado	Experienced Significant Tornado Damage ($1,000+) Since 2000	Fatalities Due to Tornadoes	Potential Impacts of Tornadoes
Uintah County	Yes	Yes	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
City of Ballard	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
City of Naples	Yes	No	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services
City of Vernal	Yes	Yes	0	Injury, death, property damage, loss of utilities, crop/vegetation/livestock losses, car accidents, road closures, fallen trees, risk to emergency services

Loss of utilities (primarily due to fallen trees and wind damage) is common following tornadoes, and depending on circumstances, communities might be deprived of almost any kind of goods and services including food, water, and medical care. Agriculturally, crop and livestock loss are also possible.

The Storm Events Database records $747,000 in total property damage from tornadoes in Uintah County since 1950. See the table under *Historical Frequency & Probability of Future Occurrence* for specific events and descriptions. Most property damage from tornadoes has come from damage to trees, sheds, roofs, mobile homes, and utility poles.

Table 3-27. Tornado: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
0.1 events per year	0.0	$3,910	$2,792	$147	$6,849	82.5	Relatively High
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0 events per year	0.0	$4,106	$2,594	$20	$6,719	80.1	Relatively High
Census Tract 968302: Unincorporated Uintah County							
0 events per year	0.0	$4,480	$2,148	$8	$6,636	77.6	Relatively High
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0 events per year	0.0	$5,595	$3,119	$3	$8,718	83.6	Relatively High
Census Tract 968401: City of Vernal							
0 events per year	0.0	$3,391	$2,972	$0	$6,364	74.0	Relatively Moderate
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0 events per year	0.0	$3,503	$2,379	$1	$5,883	74.6	Relatively Moderate
Census Tract 968404: City of Vernal and City of Naples							
0 events per year	0.0	$3,402	$1,929	$1	$5,332	74.1	Relatively Moderate
Census Tract 968202: Unincorporated Uintah County							
0 events per year	0.0	$3,310	$1,185	$4	$4,499	73.9	Relatively Moderate

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to tornadoes.

Table 3-28. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%

Vulnerability Category	Number	Percent
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during tornadoes.

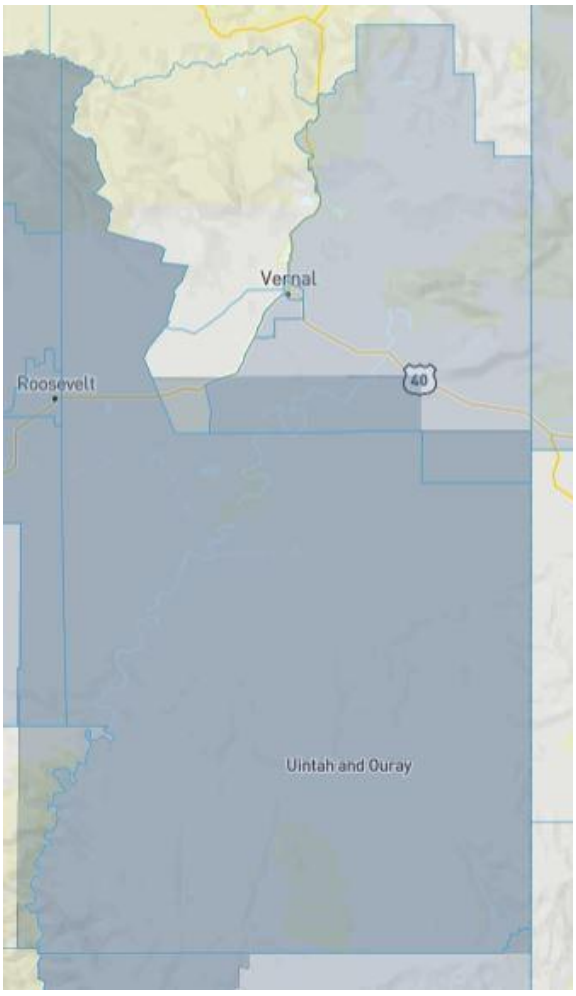
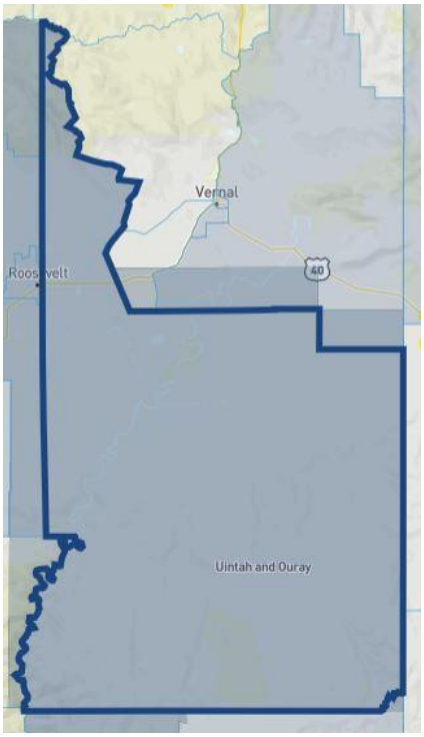
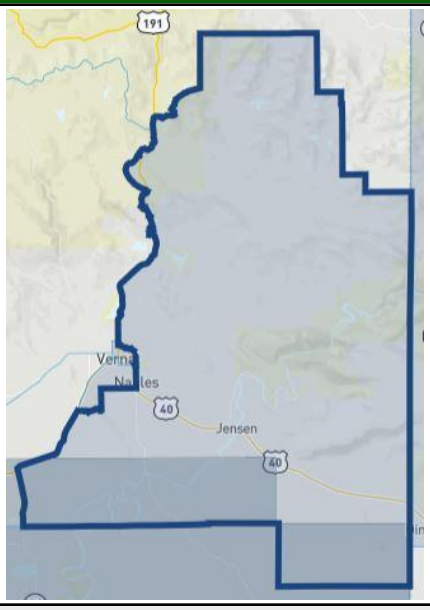


Figure 3-9. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 3-29. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES

UINTAH COUNTY, UT	
	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

A tornado may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from a tornado or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-30. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks

Critical Facility Type	Location
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe tornadoes (USGS, 2023).

Effects of Climate Change on Probability of Future Events

Table 3-31. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Tornado Projections	By 2049, Uintah County is expected to experience 13 more days that reach above 95°F (from 16 days to 29 days per year).
	By 2049, Uintah County is expected to have a 3°F increase (from 46°F to 49°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent tornadoes in the fall and winter due to the increased warm air.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 3-32. Tornado: Overall National Risk Index for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
23.29	Very Low	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
16.12	Very Low	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
13.32	Very Low	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
24.04	Very Low	Relatively Moderate	Relatively Low

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 968401: City of Vernal			
20.57	Very Low	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
20.64	Very Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
13.97	Very Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
13.32	Very Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Straight-line Wind

● *Hazard Description*

Potential Probability		Medium
Potential Consequence		Low
Location	Countywide, including Ballard, Naples, and Vernal	
Seasonal Pattern or Conditions	All seasons	
Duration	Events may last hours to days	
Analysis Used	NOAA, NWS, National Risk Index, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, USGS	

The term “straight-line wind” is used to describe any wind not associated with rotation, particularly tornadoes. Of concern is high wind, defined by the NWS as “sustained wind speeds of 40 mph or greater, lasting for one hour or longer, or winds of 58 mph or greater for any duration.” Like tornadoes, strong, straight-line winds are generated by thunderstorms, and they can cause similar damage. Straight-line wind speeds can approach 150 mph, equivalent to those in an EF3 tornado. Additionally, derechos—which are widespread, long-lived, straight-line windstorms—may occur in Uintah County, although less common.

● *Location*

Straight-line wind events affect the entire county, including the jurisdictions of Ballard, Naples, and Vernal.

● *Extent*

The Beaufort Wind Scale explains different wind speeds based on how they would affect land conditions and sea conditions (NOAA, 2024).

Table 3-33. Beaufort Wind Scale

Force	Wind (Knots)	WMO Classification	Appearance of Wind Effects on Land
0	Less than 1	Calm	Calm, smoke rises vertically
1	1–3	Light Air	Smoke drift indicates wind direction, still wind vanes
2	4–6	Light Breeze	Wind felt on face, leaves rustle, vanes begin to move
3	7–10	Gentle Breeze	Leaves and small twigs constantly moving, light flags extended
4	11–16	Moderate Breeze	Dust, leaves, and loose paper lifted, small tree branches move
5	17–21	Fresh Breeze	Small trees in leaf begin to sway
6	22–27	Strong Breeze	Larger tree branches moving, whistling in wires
7	28–33	Near Gale	Whole trees moving, resistance felt walking against wind
8	34–40	Gale	Twigs breaking off trees, generally impedes progress
9	41–47	Strong Gale	Slight structural damage occurs, slate blows off roofs
10	48–55	Storm	Seldom experienced on land, trees broken or uprooted, "considerable structural damage"
11	56–63	Violent Storm	
12	64+	Hurricane	
Source: NOAA, 2024			

- ***Historical Frequency & Probability of Future Occurrence***

High straight-line wind events are frequent in Uintah County, including in the cities of Ballard, Naples, and Vernal. Parts of southeastern Uintah County recently experienced a derecho in June 2020. According to the Storm Events Database, there have been 28 reported high wind, strong wind, or thunderstorm wind events 40 mph or greater in Uintah County between 2010–2024, as seen in the table below. Four of these high wind events occurred in Vernal. The majority of the high wind events in the county occur in the Eastern Uinta Basin.

Table 3-34. High Wind Events in Uintah County, UT

Location Within County	Date	Wind Speed (kts.)
Leeton	07/28/2010	53 kts.
Little Bonanza	06/30/2011	52 kts.
Vernal	09/27/2014	56 kts.
Naples	09/27/2014	58 kts.
Eastern Uinta Basin	03/05/2017	56 kts.
Eastern Uinta Basin	06/12/2017	61 kts.
Eastern Uinta Basin	04/02/2018	61 kts.
Eastern Uinta Basin	04/12/2018	56 kts.
Jensen	07/28/2018	50 kts.
Vernal	08/22/2018	51 kts.
Eastern Uinta Basin	06/06/2020	53 kts.
Eastern Uinta Basin	06/06/2020	57 kts.
Dragon	06/06/2020	59 kts.
Dragon	06/06/2020	63 kts.
Ouray	06/06/2020	57 kts.
Jensen	06/06/2020	64 kts.
Vernal	07/23/2020	51 kts.
Eastern Uinta Basin	09/08/2020	56 kts.

Location Within County	Date	Wind Speed (kts.)
Eastern Uinta Mountains	11/07/2020	67 kts.
Eastern Uinta Basin	03/29/2021	55 kts.
Eastern Uinta Basin	04/05/2022	53 kts.
Tavaputs Plateau	05/03/2022	67 kts.
Eastern Uinta Basin	05/19/2022	50 kts.
Eastern Uinta Basin	05/27/2022	50 kts.
Tavaputs Plateau	08/28/2022	55 kts.
Eastern Uinta Mountains	02/15/2023	68 kts.
Maeser	07/26/2023	51 kts.
Vernal	07/26/2023	59 kts.
Source: Storm Events Database, 2024		

Future significant straight-line wind events are likely to occur multiple times each year throughout the entire county, including in Ballard, Naples, and Vernal. According to Neighborhoods at Risk, Uintah County is expected to experience an increase in average annual temperature of 3°F by 2049, which could influence the variability of regional and seasonal winds in Utah as carbon dioxide levels increase (2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by straight-line wind, as presented in the table below.

Table 3-35. Impacts of Straight-Line Wind by Jurisdiction

Jurisdiction	Impacted by Straight-Line Wind	Experienced Significant Straight-Line Wind Damage ($1,000+) Since 2000	Potential Impacts of Straight-Line Wind
Uintah County	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
City of Ballard	Yes	No	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
City of Naples	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities
City of Vernal	Yes	Yes	Injury from flying objects, death, automobile accidents, property damage, aircraft accidents, crop/vegetation/livestock losses, road closures, fallen trees, loss of utilities

The impacts of straight-line winds are virtually the same as those from tornadoes with similar wind speeds. The damage is distinguishable from that of a tornado only in that the debris is generally deposited in nearly parallel rows. Downbursts are particularly hazardous to aircraft in flight.

Since 2000 there has been $56,700 in reported losses due to high wind, thunderstorm wind, and strong wind damage in Uintah County (Storm Events Database, 2024). Though losses aren't regularly reported, it is known that they occur because of the frequency and magnitude of high wind events.

Table 3-36. Strong Wind: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0.2 events per year	0.0	$3,992	$794	$5	$4,791	38.2	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0.1 events per year	0.0	$3,503	$621	$2	$4,126	35.9	Relatively Low
Census Tract 968302: Unincorporated Uintah County							
0.1 events per year	0.0	$3,328	$477	$0	$3,806	34.7	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0.1 events per year	0.0	$4,155	$693	$0	$4,849	38.4	Relatively Low
Census Tract 968401: City of Vernal							
0.1 events per year	0.0	$2,519	$660	$0	$3,719	32.1	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0.1 events per year	0.0	$2,602	$529	$0	$3,130	31.9	Relatively Low
Census Tract 968404: City of Vernal and City of Naples							
0.1 events per year	0.0	$2,527	$428	$0	$2,956	31.1	Relatively Low
Census Tract 968202: Unincorporated Uintah County							
0.1 events per year	0.0	$2,507	$269	$0	$2,776	30.3	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions or shelter or those who cannot move to shelter quickly enough may be more vulnerable to severe straight-line wind conditions.

Table 3-37. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during straight-line wind events.

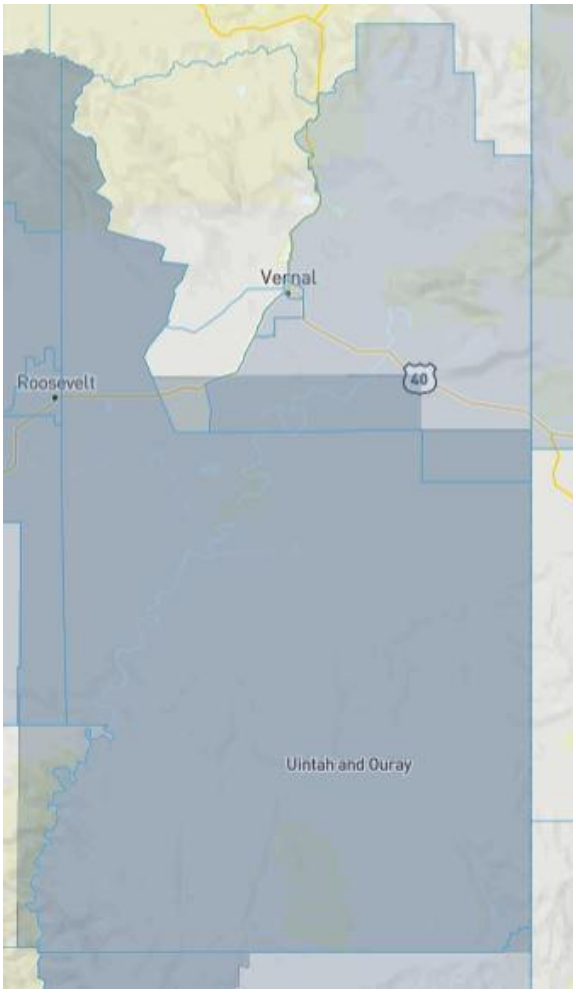
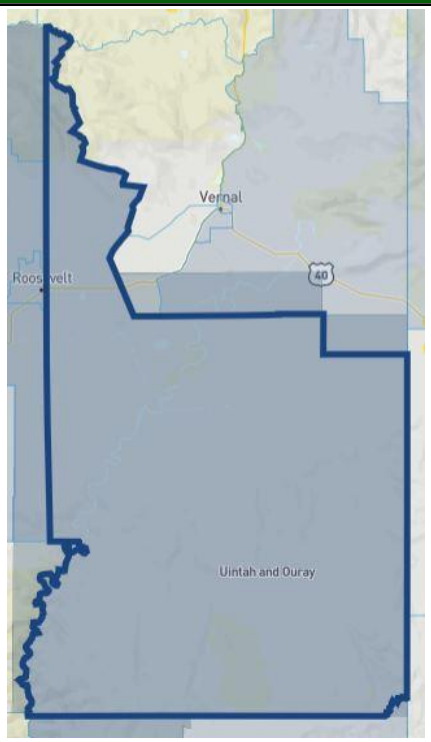
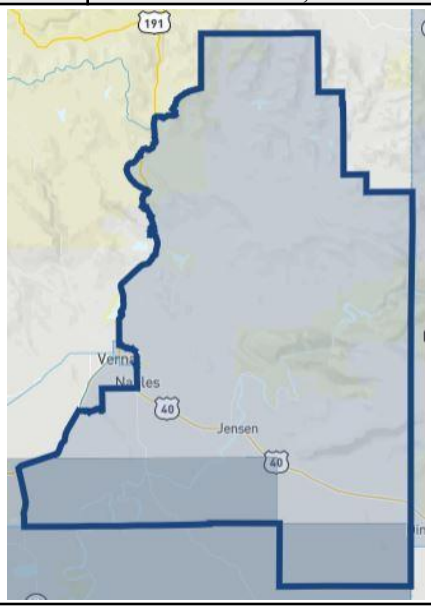


Figure 3-10. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 3-38. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Straight-line wind may cause significant damage to critical facilities in the county and could even bring down power lines, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from straight-line wind or power outages, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 3-39. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

With increasing global surface temperatures, the potential for storm intensity will likely increase. As more water vapor is evaporated into the atmosphere, it becomes fuel for more powerful storms to develop, which could produce more frequent and severe straight-line wind events and even derechos (USGS, 2023). However, there are still many questions and factors yet to be resolved about wind with some studies suggesting climate change may even reduce wind speeds. Uncertainty remains high as it relates to climate change and its impact on this hazard. Further analysis and studies need to be conducted, specifically for this region.

Effects of Climate Change on Probability of Future Events

Table 3-40. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Wind Projections	By 2049, Uintah County is expected to experience 13 more days that reach above 95°F (from 16 days to 29 days per year).
	By 2049, Uintah County is expected to have a 3°F increase (from 46°F to 49°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent straight-line wind events as more powerful storms develop.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

Table 3-41. Strong Wind: Overall National Risk Index Score for Uintah County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
43.06	Relatively Low	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
33.48	Relatively Low	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
32.47	Relatively Low	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
39.86	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
34.43	Relatively Low	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
35.51	Relatively Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
30.03	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
30.83	Relatively Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

SEVERE WINTER WEATHER

HAZARD DESCRIPTION

Severe winter weather includes extreme cold, winter storm, and avalanche. Severe winter weather can and does affect the entire county, and all critical facilities are susceptible to severe weather. It should be noted that straight-line wind is also associated with severe winter storms, commonly referred to as blizzard conditions, where snow is driven by wind-caused drifting.

RELATED HAZARDS

Extreme Cold

Hazard Description

Potential Probability	High
Potential Consequence	Medium
Location	Countywide, including Ballard, Naples, and Vernal
Seasonal Pattern or Conditions	Winter
Duration	Events may last hours to days
Analysis Used	NOAA, NWS, Public Health Post, National Risk Index, Neighborhoods at Risk, EWG, NCEI, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

“Extreme cold” is another of the terms describing hazards that must be defined relative to what is considered normal in a given locale. What might be considered extreme cold varies considerably in the state of Utah where normal winter temperatures in the south are appreciably more moderate than those in the north. Very cold temperatures become a particular hazard when accompanied by winds of 10 mph or greater. As with extreme heat, extreme cold is of greatest concern when the condition persists for an extended period of time.

Location

Extreme cold temperatures affect the entire county, including the jurisdictions of Ballard, Naples, and Vernal.

Extent

The NWS has developed a formula for calculating wind chill based on temperature and wind speed and issues wind chill advisories in this region when the wind chill temperature is predicted to be -10°F or less with winds of 10 mph or higher for one hour or more. Wind chill warnings are issued when wind chill temperature will be -20°F or less with winds of 10 mph or higher for one hour or more (see the figure below).

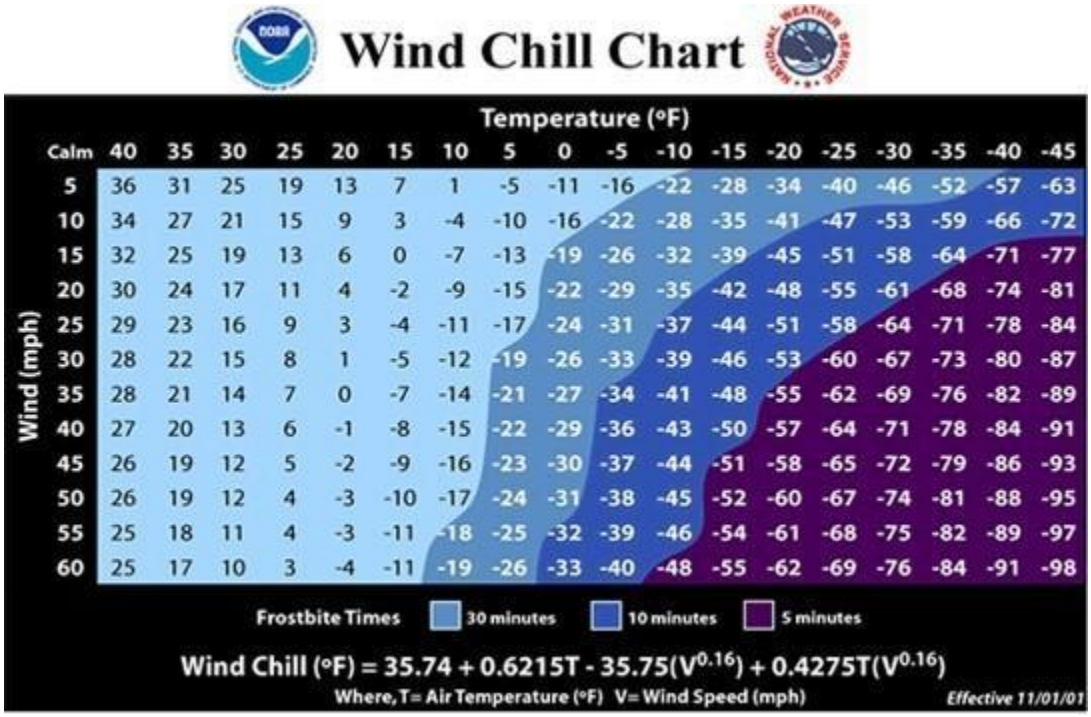


Figure 4-1. National Weather Service Wind Chill Chart

- ***Historical Frequency & Probability of Future Occurrence***

According to NWS available data, the record low temperature in the city of Vernal is -38°F, which was recorded multiple times in January 1937, January 1952, and February 1989 (NOWData, 2024). January is historically the coldest month of the year in Uintah County with an average temperature of 17.2°F in Vernal (NOWData, 2024). Cold clusters are particularly damaging. Most recently in February 2023, Vernal, UT experienced 25 days of the month with a low of 10°F or less. There have been several months within the last few decades with over 28 days of extreme cold. During the 10-year period from 2013–2023, Vernal recorded a total of 477 extreme cold days of 10°F or less (NOWData, 2024). Vernal was the only city in Uintah County analyzed for extreme cold events of 10°F or less due to it being the only city with recorded NWS data. Ballard and Naples may experience extreme cold events, but specific data is limited and incomplete. However, Fort Duchesne, Ouray, Jensen, and Dinosaur National Monument have extensive data records and experience similar average winter temperatures to Vernal. Between these four locations, thousands of instances of extreme cold of 10°F or lower were recorded. The lowest recorded temperature by the National Weather Service in Uintah County was documented in Ouray, Utah in January 1979 at -43°F (NOWData, 2024).

Extreme cold temperatures are likely every year throughout the county, including in Ballard, Naples, and Vernal. However, since Uintah County is expected to experience an increase in average annual temperature of 3°F by 2049, extreme cold events may become less and less over the coming decades (Neighborhoods at Risk, 2024). Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NCEI, 2022).

- ***Impacts & Loss Estimates***

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by extreme cold, as presented in the table below.

Table 4-1. Impacts of Extreme Cold by Jurisdiction

Jurisdiction	Impacted by Extreme Cold Events (≤ 10°F) Within Last 100 Years	Potential Impacts of Extreme Cold
Uintah County	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Ballard	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Naples	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)
City of Vernal	Yes	Hypothermia, frostbite, death, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, increased maintenance to infrastructure, school closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.)

Health effects of exposure to extreme cold include hypothermia and frostbite, both of which can be life-threatening. Infants and the elderly are most susceptible. In the United States, approximately 1,300 deaths are attributed to hypothermia or cold exposure annually (Lane, 2018).

Extreme cold may cause loss of wildlife and vegetation and kill livestock and other domestic animals. Economic loss may result from flooding due to burst pipes, large demands on energy resources, and diminished business activity. River flooding may take place as a result of the formation of ice jams.

Extreme cold affects the individual, families, cities, and the county. Damage typically occurs to individual properties; however, city water systems are usually vulnerable to extreme cold. Repairs to water line freeze-ups and breaks typically require the roadways to be excavated, necessitating additional maintenance and repairs during the warmer months.

Extreme cold can cause death and injury especially to those working or stranded outside for prolonged periods. Economic loss is related to private individuals, businesses, and government agencies in heating homes and facilities. Additional losses can be expected to the livestock industry. During extreme cold periods the schools are closed to protect children traveling to and from school.

During the spring, summer, and fall, temperatures can drop low enough to produce frost. While such temperatures are not low enough to damage infrastructure or require extra heating costs, it can be devastating to crops. According to the EWG, $49,722 in crop indemnity payments were due to freeze and

frost in Uintah County for the period of 1995–2022. Extreme minimum temperatures can fall below freezing much of the fall, winter, and spring.

Table 4-2. Cold Wave: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0.1 events per year	0.0	$9,253	$12	$4,814	$14,078	82.7	Relatively Moderate
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0.1 events per year	0.0	$8,241	$10	$1,724	$9,975	78.0	Relatively Moderate
Census Tract 968302: Unincorporated Uintah County							
0.1 events per year	0.0	$8,591	$8	$628	$9,228	76.9	Relatively Moderate
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0.1 events per year	0.0	$9,864	$11	$348	$10,223	78.3	Relatively Moderate
Census Tract 968401: City of Vernal							
0.1 events per year	0.0	$5,979	$10	$48	$6,038	71.6	Relatively Moderate
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0.1 events per year	0.0	$6,175	$8	$142	$6,325	72.2	Relatively Moderate
Census Tract 968404: City of Vernal and City of Naples							
0.1 events per year	0.0	$5,999	$7	$102	$6,107	71.7	Relatively Moderate
Census Tract 968202: Unincorporated Uintah County							
0.1 events per year	0.0	$5,944	$4	$297	$6,245	72.0	Relatively Moderate

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions or shelter from the cold may be more vulnerable to extreme cold conditions. Additionally, those who cannot afford to sufficiently heat their homes may be at risk.

Table 4-3. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during extreme cold events or keep their homes sufficiently heated.

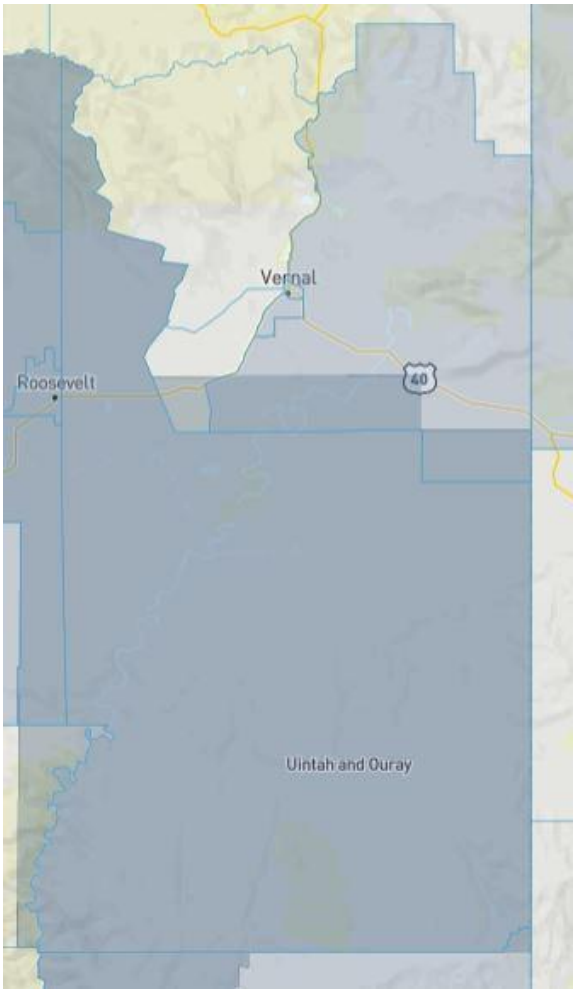
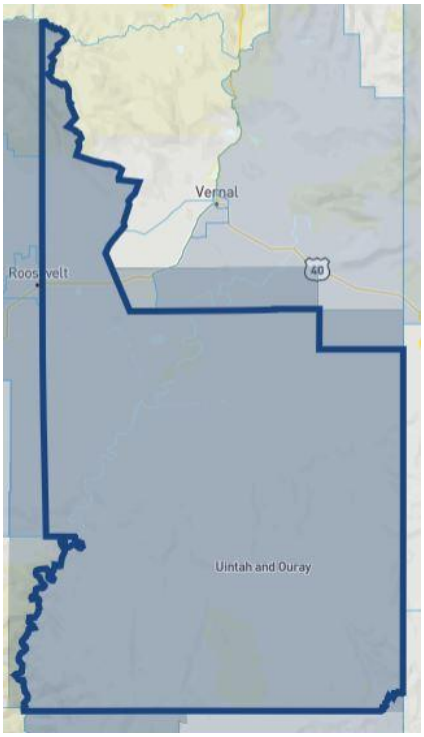
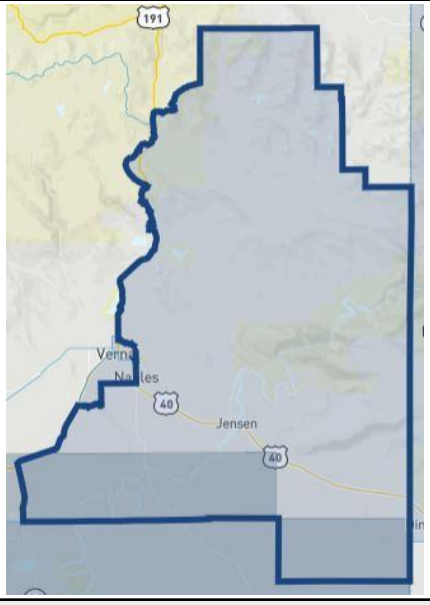


Figure 4-2. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 4-4. Disadvantaged Communities in Uintah County

<table>
<tr><th colspan="3">UINTAH COUNTY, UT</th></tr>
<tr><th colspan="3">CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT</th></tr>
<tr><th>CENSUS TRACT 2010 ID</th><th>CENSUS TRACT POPULATION</th><th>LOW INCOME TRACT?</th></tr>
<tr><td>49047940201</td><td>5,481</td><td>YES</td></tr>
<tr><td colspan="3"> 
</td></tr>
<tr><td colspan="3">CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development</td></tr>
<tr><td>94th % (above 90th percentile)</td><td colspan="2">Share of people who have been told they have asthma</td></tr>
<tr><td>YES</td><td colspan="2">Presence of one or more abandoned mine land within the tract</td></tr>
<tr><td>92nd % (above 90th percentile)</td><td colspan="2">Number of unemployed people as part of the labor force</td></tr>
<tr><td>20% (above 10%)</td><td colspan="2">Percent of people 25 years or older whose high school education is less than a high school diploma</td></tr>
<tr><th>CENSUS TRACT 2010 ID</th><th>CENSUS TRACT POPULATION</th><th>LOW INCOME TRACT?</th></tr>
<tr><td>49047968200</td><td>8,966</td><td>YES</td></tr>
</table>

UINTAH COUNTY, UT	
	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Extreme cold may cause significant damage to critical facilities in the county due to frozen or burst water lines. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups, which could delay emergency response.

Table 4-5. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett

Critical Facility Type	Location
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Extreme cold temperatures are likely to remain a common occurrence in Uintah County but may begin a slight downturn in frequency over the next century.

Effects of Climate Change on Probability of Future Events

Table 4-6. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Cold Projections	By 2049, Uintah County is expected to experience 13 more days that reach above 95°F (from 16 days to 29 days per year).
	By 2049, Uintah County is expected to have a 3°F increase (from 46°F to 49°F) in average annual temperatures.
	Increasing annual temperatures can contribute to less frequent extreme cold events.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 4-7. Cold Wave: Overall National Risk Index Score for Uintah County, UT

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
86.31	Relatively Moderate	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
76.56	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
75.78	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
79.83	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
74.27	Relatively Moderate	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
75.94	Relatively Moderate	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
71.44	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
73.31	Relatively Moderate	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Winter Storm

● *Hazard Description*

Potential Probability	High
Potential Consequence	High
Location	Countywide, including Ballard, Naples, and Vernal
Seasonal Pattern or Conditions	Winter
Duration	Storms may last hours to days
Analysis Used	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, NCEI, EWG, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund, Neighborhoods at Risk

The NWS describes winter storm as weather conditions that produce heavy snow or significant ice accumulations. For the purposes of this analysis, a severe winter storm is defined as any winter condition where the potential exists for a blizzard (winds >/= 35mph and falling/drifting snow frequently reduce visibility < ¼ mile, for two hours or more), heavy snowfall (six inches or more snowfall in 24 hours in the valleys; nine inches or more snowfall in 24 hours in the mountains), ice storm, and/or strong winds.

● *Location*

Severe winter storms are a risk countywide and occur frequently, including in the jurisdictions of Ballard, Naples, and Vernal.

● *Extent*

The magnitude or severity of a severe winter storm depends on several factors, including a region's climatological susceptibility to snowstorms, snowfall amounts, snowfall rates, wind speeds, temperatures, visibility, storm duration, topography, time of occurrence during the day and week (e.g., weekday versus weekend), and time of season. The NOAA produces the Regional Snowfall Index (RSI) for significant snowstorms that impact the eastern two thirds of the U.S., but Utah is not included in this scale. However,

the scale is still included below for reference and can be a useful tool for considering extent values of snowfall throughout the planning area (NCEI, 2024).

Category	RSI Value	Description
1	1-3	Notable
2	3-6	Significant
3	6-10	Major
4	10-18	Crippling
5	18.0+	Extreme

Figure 4-3. NCEI Regional Snowfall Index (RSI)

- ***Historical Frequency & Probability of Future Occurrence***

According to the Storm Events Database, Uintah County has had 246 instances of severe winter storm since 2010 (classified under "blizzard," "heavy snow," "winter storm," and "winter weather"). In the last five years (January 2019–December 2023), the county has experienced 78 winter storm events, many of which have occurred in the cities of Ballard, Naples, and Vernal. The Eastern Uinta Mountains and Tavaputs Plateau receive the most winter storms in the county.

Uintah County will continue to experience multiple winter storms every year throughout the county, including in Ballard, Naples, and Vernal. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in winter storms is not currently likely (NCEI, 2022). Future winter storm trends are predicted to remain consistent in the next 20 years in Uintah County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades.

- ***Impacts & Loss Estimates***

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by winter storms, as presented in the table below.

Table 4-8. Impacts of Winter Storm by Jurisdiction

Jurisdiction	Impacted by Winter Storms	Experienced Significant Winter Storm with $1,000+ in Damage Since 2010	Potential Impacts of Winter Storms
Uintah County	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services

Jurisdiction	Impacted by Winter Storms	Experienced Significant Winter Storm with $1,000+ in Damage Since 2010	Potential Impacts of Winter Storms
City of Ballard	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
City of Naples	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services
City of Vernal	Yes	Yes	Hypothermia, frostbite, death, low visibility, stranded vehicles/people, loss of crops/vegetation/livestock, burst pipes, flooding, utility losses, carbon monoxide poisoning, frozen water, structure collapse, structure fire, increased maintenance to infrastructure, school/business closures, economic losses (decreased tourism, increased energy costs, crop losses, etc.), risk to emergency services

The impacts of the very cold temperatures that may accompany a severe winter storm are discussed in the previous section. Other life-threatening impacts are numerous. Motorists may be stranded by road closures or may become trapped in their automobiles in heavy snow and/or low visibility conditions. Bad road conditions cause automobiles to go out of control. People can be trapped in homes or buildings for long periods of time without food, heat, and utilities. Those who are ill may be deprived of medical care by being stranded or through loss of utilities and lack of personnel at care facilities. Use of heaters in automobiles and buildings by those who are stranded may result in fires or carbon monoxide poisoning. Fires during winter storm conditions are a particular hazard because fire service response is hindered or prevented by road conditions and because water supplies may be frozen. Emergency Services may also not be available if telephone service is lost. People who attempt to walk to safety through winter storm conditions often become disoriented and lost. Downed power lines not only deprive the community of electricity for heat and light but pose an electrocution hazard. Death and injury may also occur if heavy snow accumulation causes roofs to collapse. There have been 41 fatalities in Utah from 1962–2018 due to winter storms. About 70% of these fatalities occur in automobiles, while 25% are a result of people caught out in the elements (Utah Hazard Mitigation Plan, 2019).

The total economic impact in Utah for a 24-hour statewide winter storm is $66.36 million, including $42.81 million in lost wages and salaries and overtime, $18.26 million in lost retail sales, $3.32 million in federal taxes, and $1.98 million for state and local taxes (Utah Hazard Mitigation Plan, 2019). Economic impacts arise from numerous sources, including hindered transportation of goods and services; flooding due to burst water pipes; forced closing of businesses; inability of employees to reach the workplace; damage to homes and structures, automobiles, and other belongings by downed trees and branches; loss of livestock and vegetation; and many others. Loss of crops is also common. The EWG reported $49,722 in crop indemnity payments due to freeze and frost in Uintah County for the period of 1995–2022.

Table 4-9. Winter Weather: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
4 events per year	0.0	$2,143	$1,424	$4	$3,571	69.7	Relatively Moderate
Census Tract 968201: City of Naples and Unincorporated Uintah County							
5.2 events per year	0.0	$1,822	$1,166	$1	$2,990	66.1	Relatively Moderate
Census Tract 968302: Unincorporated Uintah County							
8.1 events per year	0.0	$2,346	$1,184	$1	$3,531	69.5	Relatively Moderate
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
1.9 events per year	0.0	$2,133	$1,131	$0	$3,264	67.9	Relatively Moderate
Census Tract 968401: City of Vernal							
1.9 events per year	0.0	$1,293	$1,077	$0	$2,370	61.5	Relatively Moderate
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
1.9 events per year	0.0	$1,335	$862	$0	$2,197	59.9	Relatively Moderate
Census Tract 968404: City of Vernal and City of Naples							
1.9 events per year	0.0	$1,297	$699	$0	$1,996	58.0	Relatively Low
Census Tract 968202: Unincorporated Uintah County							
1.9 events per year	0.0	$1,285	$438	$0	$1,724	54.9	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Table 4-10. Ice Storm: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0 events per year	0.0	$1,003	$2,584	N/A	$3,587	59.5	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0 events per year	0.0	$888	$2,086	N/A	$2,973	55.2	Relatively Low
Census Tract 968302: Unincorporated Uintah County							
0 events per year	0.0	$857	$1,620	N/A	$2,477	50.9	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0 events per year	0.0	$1,070	$2,352	N/A	$3,422	58.4	Relatively Low
Census Tract 968401: City of Vernal							
0 events per year	0.0	$649	$2,240	N/A	$2,889	54.4	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0 events per year	0.0	$670	$1,793	N/A	$2,463	50.8	Relatively Low
Census Tract 968404: City of Vernal and City of Naples							
0 events per year	0.0	$651	$1,454	N/A	$2,105	47.2	Relatively Low
Census Tract 968202: Unincorporated Uintah County							
0 events per year	0.0	$645	$912	N/A	$1,557	39.7	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions or shelter from the cold and winter storms may be more vulnerable to winter conditions. Additionally, those who cannot afford to sufficiently heat their homes or transport themselves to a safe location may be at risk.

Table 4-11. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately shelter during winter storms or keep their homes sufficiently heated.

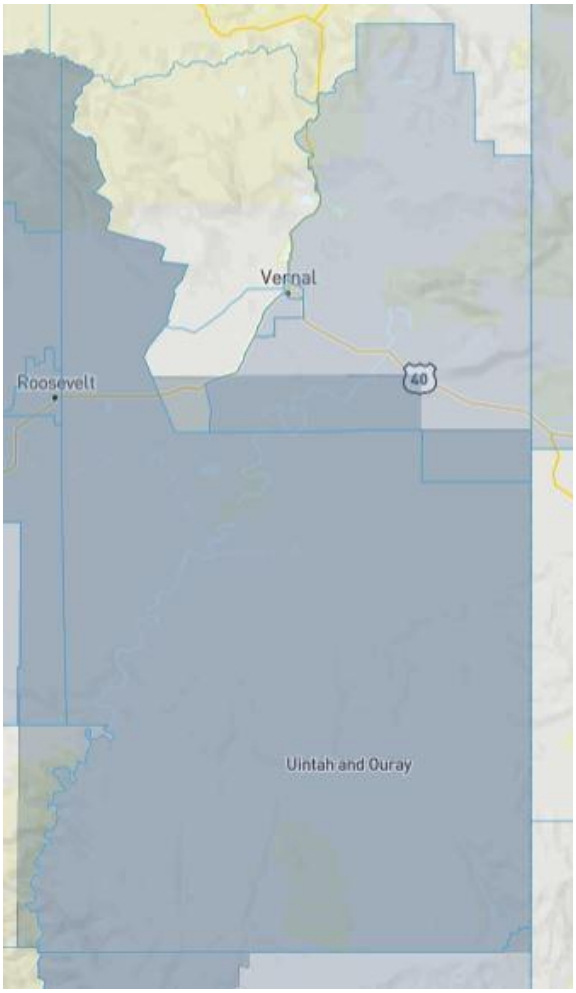
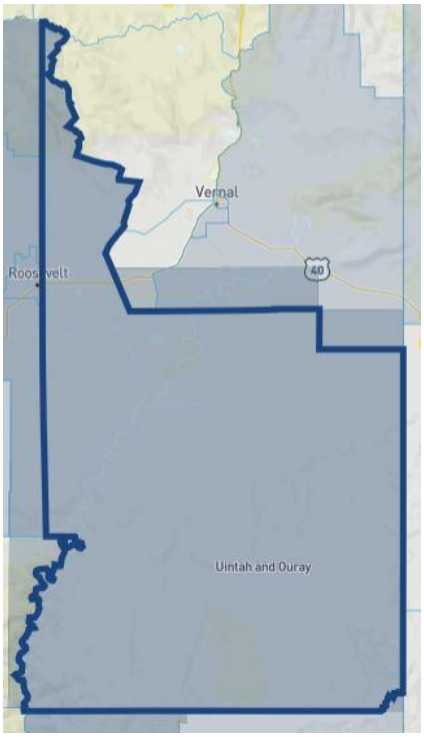
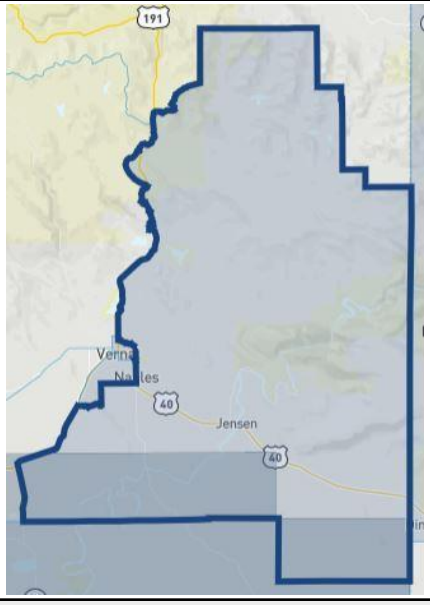


Figure 4-4. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 4-12. Disadvantaged Communities in Uintah County

<table>
<tr><th colspan="3">UINTAH COUNTY, UT</th></tr>
<tr><th colspan="3">CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT</th></tr>
<tr><th>CENSUS TRACT 2010 ID</th><th>CENSUS TRACT POPULATION</th><th>LOW INCOME TRACT?</th></tr>
<tr><td>49047940201</td><td>5,481</td><td>YES</td></tr>
<tr><td colspan="3"> 
</td></tr>
<tr><td colspan="3">CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development</td></tr>
<tr><td>94th % (above 90th percentile)</td><td colspan="2">Share of people who have been told they have asthma</td></tr>
<tr><td>YES</td><td colspan="2">Presence of one or more abandoned mine land within the tract</td></tr>
<tr><td>92nd % (above 90th percentile)</td><td colspan="2">Number of unemployed people as part of the labor force</td></tr>
<tr><td>20% (above 10%)</td><td colspan="2">Percent of people 25 years or older whose high school education is less than a high school diploma</td></tr>
<tr><th>CENSUS TRACT 2010 ID</th><th>CENSUS TRACT POPULATION</th><th>LOW INCOME TRACT?</th></tr>
<tr><td>49047968200</td><td>8,966</td><td>YES</td></tr>
</table>

UINTAH COUNTY, UT	
	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Winter storms may cause significant damage to critical facilities in the county due to frozen or burst water lines. High wind during winter storms may knock down power lines, as well, causing power outages. The following table lists types of critical facilities that could be negatively affected by damage from freeze-ups or power outages, which could delay emergency response and access to life-saving medical equipment.

Table 4-13. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples

Critical Facility Type	Location
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023).

Effects of Climate Change on Probability of Future Events

Table 4-14. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	Increased participation can lead to more frequent and severe winter storms.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 4-15. Winter Weather: Overall National Risk Index Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
75.36	Relatively Moderate	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
63.86	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
67.54	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
70.12	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
65.71	Relatively Moderate	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
65.85	Relatively Moderate	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
57.21	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
56.79	Relatively Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

Table 4-16. Ice Storm: Overall National Risk Index Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
66.17	Relatively Low	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
52.95	Relatively Low	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
48.84	Relatively Low	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
61.42	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
59.93	Relatively Low	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
58.19	Relatively Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
46.51	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
41.9	Relatively Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Avalanche

• *Hazard Description*

Potential Probability		Medium
Potential Consequence		High
Location	Uinta Mountains and any steep slopes that may accumulate snow	

Seasonal Pattern or Conditions	Winter
Duration	Events may last seconds to minutes; snowstorms that cause avalanches may last hours to days
Analysis Used	NOAA, NWS, 2019 Utah Hazard Mitigation Plan, North American Public Avalanche Danger Scale, Utah Avalanche Center, NCEI, Environmental Defense Fund, Neighborhoods at Risk

Snow avalanches are common in mountainous terrain where heavy snowfall accumulates on steep slopes. Avalanches generally occur on slopes between 30 and 45 degrees with 38 degrees being the "ideal" slope for development of avalanche conditions. They are often categorized as either "loose snow" or "slab" types. A loose snow avalanche is initiated when snow is dislodged at a point upslope and, in turn, dislodges more snow as it moves downward. Such avalanches usually grow wider and larger as they proceed but are usually somewhat limited in size. The generally more dangerous slab avalanche occurs when a cohesive mass of snow breaks free and moves downward, either as a single unit, or breaking into smaller pieces traveling together. Four factors combine to produce a slab avalanche: (1) a large mass of snow that is cohesive as a result of a single, large snowfall, or some physical change due to temperature, introduction of water content, or other factors; (2) some source of instability or weakness that forms a boundary capable of breaking free; (3) a surface, called a sliding layer, upon which the slab may easily slide; and (4) a triggering event, such as increased weight, strong vibration, wind, or a temperature increase, that overcomes the binding forces at, or further weakens the boundary of instability. It is estimated that around 90% of avalanches where victims are involved are triggered by their victims or those who accompany them.

Avalanches are comprised of three zones—the release zone where the mass breaks free and accelerates, the track where the mass travels downward at a relatively constant speed (often approaching 80 mph), and the runout zone where the mass slows and comes to rest. While the exact moment of an avalanche cannot be predicted, avalanche conditions are readily recognizable, and avalanches tend to recur on the same slopes year after year.

- ***Location***

Snow avalanches can occur anywhere in the county with mountains and/or slopes that accumulate with snow. However, the primary avalanche zone in Uintah County is the Uinta Mountains in the northern region (Utah Hazard Mitigation Plan, 2019).

- ***Extent***

The North American Public Avalanche Danger Scale is a tool used by avalanche forecasters throughout the U.S. to communicate the potential for avalanches to cause harm or injury to backcountry travelers.

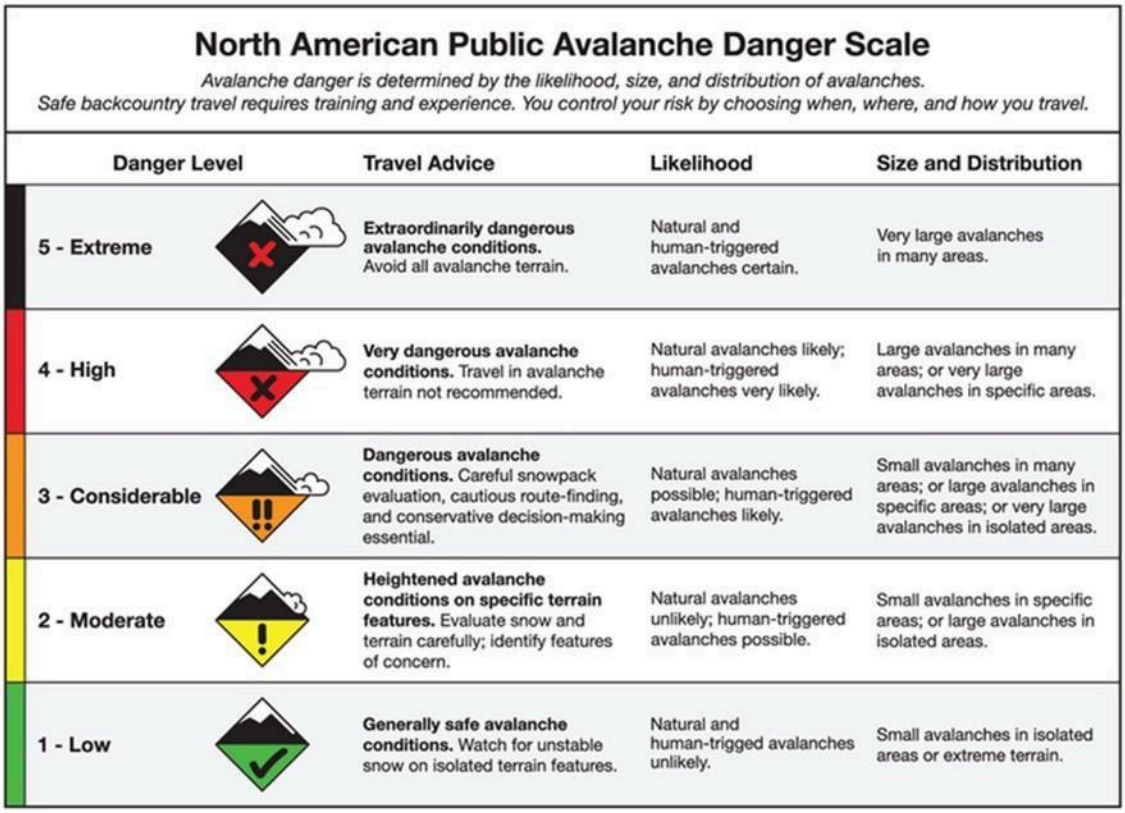


Figure 4-5. North American Public Avalanche Danger Scale

- ***Historical Frequency & Probability of Future Occurrence***

Avalanches occur often in Uintah County, primarily in the Uinta Mountains, but many go unreported and/or undetected. The Utah Avalanche Center records observations of avalanches throughout Utah, including in the Western Uinta Mountains. However, the eastern half of the Uintas in Uintah County is not tracked by the Utah Avalanche Center because this area is not a common recreation ground for backcountry users during the winter. No avalanches have been reported in the cities of Ballard, Naples, or Vernal.

Avalanches in the Uinta Mountains are likely to continue at the existing trend, but avalanches in the cities of Ballard, Naples, and Vernal would still be extremely unlikely in the future. Unlike many areas in the United States, Utah has not experienced an upward trend in the frequency of extreme precipitation events, so an overall increase in snowfall—and therefore avalanches— is not currently likely (NCEI, 2022). Future avalanche conditions are predicted to remain consistent in the next 20 years in Uintah County. However, as global warming continues and more water evaporates into the atmosphere, additional snowfall and precipitation may be seen in the coming decades, which could lead to an uptick in avalanches. Additionally, an increase in average temperatures during the winter could cause unstable avalanche conditions, thus triggering more frequent events.

• *Impacts & Loss Estimates*

Parts of unincorporated Uintah County may be impacted by avalanches, as presented in the table below. However, the cities of Ballard, Naples, and Vernal are not likely to be impacted by avalanches.

Table 4-17. Impacts of Avalanche by Jurisdiction

Jurisdiction	Impacted by Avalanches	Fatalities Due to Avalanches	Potential Impacts of Avalanches
Uintah County	Yes	0	Injury, trauma, hypoxia, suffocation, death, property damage, fallen trees/vegetation, rockslides, damage to power lines, road/railway closures, utility losses, rescue/recovery expenses, debris/snow removal expenses
City of Ballard	No	0	No impacts likely
City of Naples	No	0	No impacts likely
City of Vernal	No	0	No impacts likely

It is common for avalanche impacts to be somewhat limited. Because avalanches usually occur in remote areas, the most frequent victims are recreational users of the slopes on which they occur. Of those who die in avalanches, approximately one third of the deaths are a result of trauma while the remaining two thirds are from suffocation. Trauma may be the result of being carried into obstructions, such as boulders and trees, or over cliffs, or from rocks, trees, or large chunks of snow being carried downward at high speed. Avalanches may also damage or destroy structures, break power lines, block roadways and railroads, and damage trees and vegetation.

Visiting tourists and recreational users may be at an increased risk of triggering avalanches and/or being caught in one if they are not well-versed in the area and where common avalanche hot spots are located. It's important for visitors to stay informed about the risks of any recreational activity they participate in.

As with landslides, losses from snow avalanches come from damage to roadways and the resulting snow and debris removal costs. Additionally, if a rescue and/or recovery is necessary for any people caught in the avalanche, physical and monetary resources must go toward rescue helicopters, rescue crew, rescue equipment, additional transport, medical treatment, etc., which can add up to thousands of dollars.

The Expected Annual Loss score for Avalanche from the National Risk Index is not available due to limited avalanche data in Uintah County.

Vulnerable Populations

Because those typically affected by avalanches in Uintah County are often recreational users who ventured into avalanche terrain by choice, the vulnerable populations in the county are unlikely to be at risk from this hazard. Similarly, those who live in Uintah County's southern region, which is especially disadvantaged, are not at risk from avalanches due to the area's lack of avalanche terrain or mountains. No critical facilities in the county are located near avalanche terrain or potentially at risk of being damaged in an avalanche.

Changes in Development

There is no impact based on current development trends on either current or future development.

● *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), more snowfall during snowstorms is an expected effect of climate change. EDF further explains that a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additional heavy snow could create unstable avalanche conditions and lead to more frequent avalanches.

Effects of Climate Change on Probability of Future Occurrence

Table 4-18. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	Increased participation can lead to more unstable avalanche conditions and frequent avalanches.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

The Overall Risk Index score for Avalanche from the National Risk Index is not available due to limited avalanche data in Uintah County.

• WILDFIRE

o HAZARD DESCRIPTION

Potential Probability	High
Potential Consequence	High
Location	Countywide, including around Ballard, Naples, and Vernal; URWIN zones near the foothills and in forested areas; Deep Creek, Deep Creek Mini Ranches, Diamond Lakes, Diamond Rim, and Ouray
Seasonal Pattern or Conditions	Summer and fall months. Wildfire-prone areas are areas affected by drought and/or heavily overgrown and dry brush and debris. Lightning and human triggers cause wildfires.
Duration	Wildfires typically last days but can last months, depending on climate and fuel load as well as resources (financial, manpower) to extinguish the fire.
Analysis Used	U.S. Forest Service, National Climate Center, FEMA, AGRC, County Hazard Analysis Plans, 2019 Utah Hazard Mitigation Plan, NWCG, Utah Forestry, Fire & State Lands, local newspaper articles, Utah Fire Marshal, Wildfire Risk, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR

Wildfires—uncontrolled fires spreading through both naturally occurring and non-native vegetative fuel sources—are a significant hazard, often beginning unnoticed and spreading quickly while threatening any structures in its path. Wildfires can cover a large geographic area, can be ignited by natural or human sources, and are hard to predict. They help to maintain a healthy ecosystem and have been a natural and fundamental part of the world's forests and grasslands for millions of years. Fires cleanse and regenerate forests, giving new life to the soil and encouraging biodiversity. They are responsible for the evolution of many of the grasses, brushes, and tree species found in Utah (Utah Hazard Mitigation Plan, 2019).

Wildfires are classified as Wildland and Wildland-Urban Interface (WUI). Wildland fires occur in areas where development is essentially nonexistent except for roads, railroads, or power lines. WUI fires materialize in a geographical area where structures and other human development adjoins wildlands. A fireshed is an area that will adversely affect a community or high-value resource and/or asset if ignited (Utah Hazard Mitigation Plan, 2019).

o LOCATION

On average in Utah, years with more spring rainfall typically have higher wildfire incidents in the summer and fall after vegetation dries out and becomes combustible material. Hot temperatures, high winds, and dry conditions brought on by years of drought have caused high mortality rates in low elevation timber and shrubs, all contributing to prime fire conditions (Utah Hazard Mitigation Plan, 2019). Wildfires may occur in any part of Uintah County, including in or around the cities of Ballard, Naples, and Vernal. However, over half of the county's land is considered at low risk to wildfire. The most vulnerable areas with the highest level of risk are Deep Creek, Deep Creek Mini Ranches, Diamond Lakes, Diamond Rim, and Ouray (Uintah CWPP, 2018).

Uintah County sees an average of approximately nine inches of precipitation per year (NOWData, 2024). The central to southeastern parts of the county typically see lower precipitation averages due to its mostly semi-arid climate.

As documented in the previous regional plan, the following table identifies the roads and utilities within Uintah County at potential risk to wildfire.

Table 5-1. Roads and Utilities at Risk to Wildfire

Transportation	
Name	**Miles**
Local Neighborhood/City Roads	918.7
State Route 35	11.7
State Route 87	15.2
State Route 121	2.4
State Route 150	2.2
State Route 191	3.8
Utilities	
Name	**Description**
Maeser	Power Sub Station
Chevron Resources	Crude Oil Pipeline
Power Lines	108.3 miles
KV-12.5 or less	4.5 miles
KV-69	6.7 miles
KV-138	4 miles
Natural Gas	20.2 miles

o EXTENT

The National Wildfire Coordinating Group (NWCG) classifies fire sizes using the following standards (NWCG, 2024). These standard data values are included in the data table below.



Figure 5-1. NWCG Size Class of Fire

The State of Utah Division of Forestry, Fire, and State Lands provides five categories of wildfire risk, which are listed below:

- Extreme
- High
- Medium
- Low
- Very Low

These ratings cover all of Uintah County and are based on the type and density of vegetation in each area. Additional factors influencing wildfires, such as weather conditions, wind speed, and direction, are not considered in this risk assessment.

The Utah Wildfire Risk Explorer from the Utah Division of Forestry, Fire & State Lands maps the Burn Probability and Damage Potential for wildfire for every county in Utah. Burn Probability is the probability that a specific geographic location will experience a wildland fire during the specified time period of one year. Estimates were generated with the large-wildfire simulation system (Utah FFSL, 2024). The Burn Probability for Uintah County can be seen in the first map below. The upper Uinta Mountains have the greatest likelihood of wildfire, while the northern side of the mountains and the lower Uinta Basin have a decreased likelihood of wildfire.

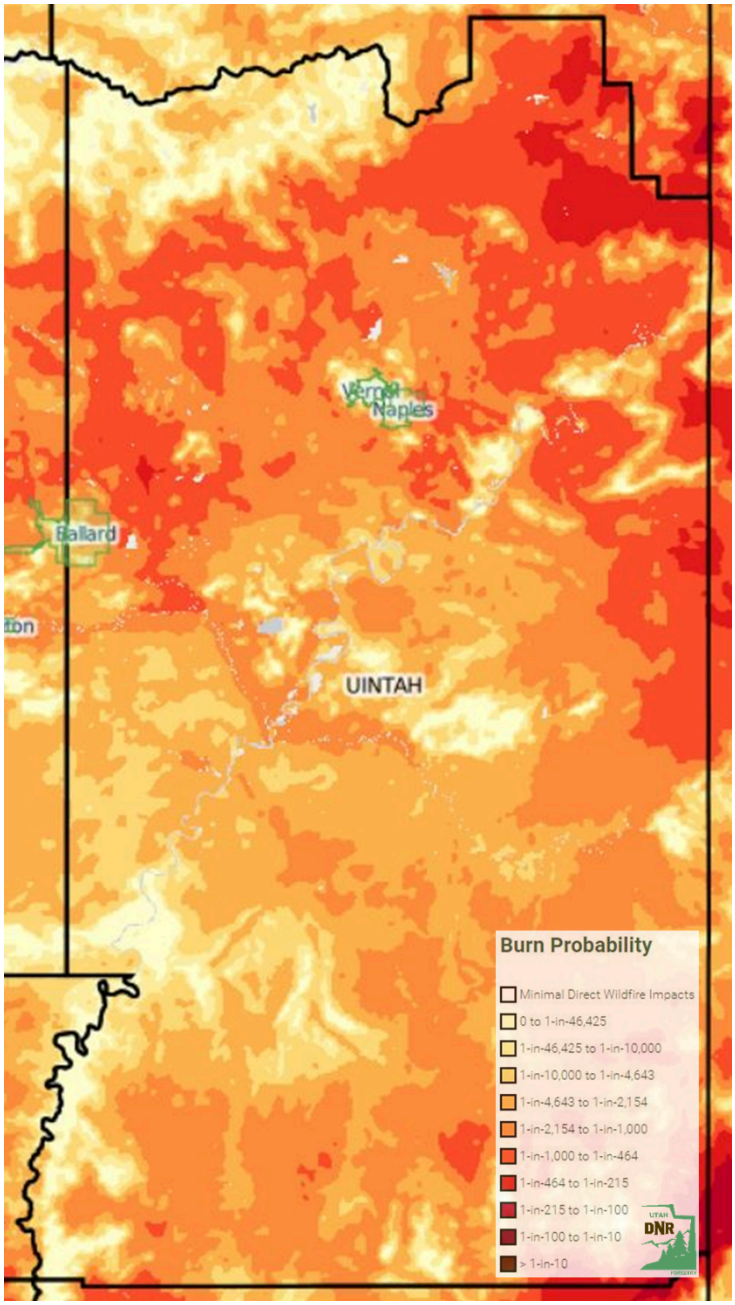


Figure 5-2. Uintah County Burn Probability

Damage Potential represents the potential consequences of fire to a home at a given location if a fire were to occur and if a home were located there. Damage Potential incorporates ember load and conditional risk to potential structures as a generalized measure of potential loss to homes (Utah FFSL, 2024). The Damage Potential for Uintah County can be seen in the second map below. Homes located in the higher elevations of Uintah County are most at risk to wildfire damage than those located in the lower elevations.

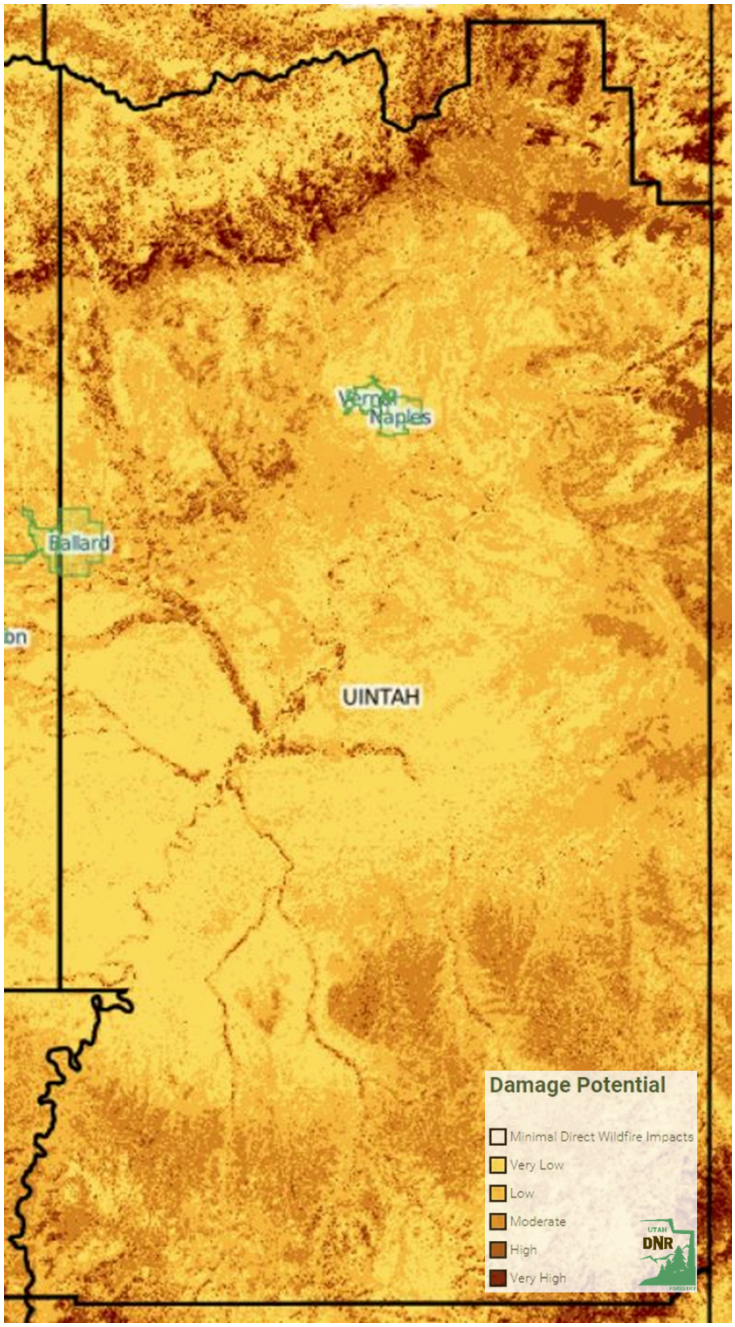


Figure 5-3. Uintah County Damage Potential

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

The state of Utah experienced 808 reported wildfires over 18,061 acres in 2023. This is a 16.1% decrease in total wildfires from 2022 and a 29.3% decrease in human-caused fires. The Uintah Basin Region experienced 99 reported wildfires (Utah FFSL, 2024). Between 1999 and 2008, Uintah County reported 415 fires (Uintah CWPP, 2018). One of the largest wildfires in Uintah County began on June 29, 2007 and

lasted for several days as it burned through 43,511 acres between Duchesne and Uintah Counties. The wildfire, called the Neola North Fire, began north of Neola in Ute tribal land in Duchesne County and spread eastward into Uintah County, resulting in three fatalities and the destruction of 12 homes (New York Times, 2007).

The 10 most significant fires in Uintah County over 100 acres since 2017 are listed in the table below.

Table 5-2. Significant Fires in Uintah County

Date Discovered	Wildfire Name	Location	Size in Acres	Cause	Buildings Destroyed
02/18/2018	Neola Field	Southwest of Whiterocks along Uintah-Duchesne border	7,170	Debris burning	0
05/12/2018	Dinosaur Visitor Center	North of Ballard	5,295	Power line	0
05/26/2018	Pine Ridge	Northwest of Dry Fork	521	Human-caused, campfire	0
07/25/2018	West Raven	East-central part of Duchesne County near Utah-Colorado border	310	Human-caused, unknown	0
08/08/2018	Monument 2	Monument Ridge in the Book Cliffs	209	Lightning	0
03/28/2021	North River	South of Ballard	1,751	Human-caused, unknown	0
06/20/2021	Horsecorn	Southwest corner of Duchesne County	832	Lightning	0
07/02/2021	Snake John	Near Utah-Colorado border, west of Dinosaur, CO	657	Lightning	0
09/27/2021	Stewart Lake	South of Jensen	291	Mowing equipment	0
04/23/2023	Red Bridge	Southwest of Randlett	463	Incendiary/arson	0
Source: Utah FFSL, 2017–2023					

The following table shows the number of fires and types of fires that occurred between 2010 and 2022 that fire departments in Avalon, Jensen, Lapoint/Tridell, Naples, and Vernal responded to, according to the Utah Fire Marshal.

Table 5-3. Uintah County Fires (2010–2022)

Year	Fire Incident Type	Number of Fires
Avalon		
2010	Structure Fires	1
	Vehicle Fires	0

Year	Fire Incident Type	Number of Fires
	Outside Fires	2
	All Other Fires	0
	Total Fires	**3**
2011	Structure Fires	2
	Vehicle Fires	0
	Outside Fires	5
	All Other Fires	0
	Total Fires	**7**
2012	Structure Fires	2
	Vehicle Fires	1
	Outside Fires	8
	All Other Fires	0
	Total Fires	**11**
2013	Structure Fires	2
	Vehicle Fires	4
	Outside Fires	4
	All Other Fires	2
	Total Fires	**12**
2014	Structure Fires	0
	Vehicle Fires	1
	Outside Fires	5
	All Other Fires	1
	Total Fires	**7**
2015	Structure Fires	2
	Vehicle Fires	1
	Outside Fires	1
	All Other Fires	0
	Total Fires	**4**
2016	Structure Fires	4
	Vehicle Fires	1
	Outside Fires	11
	All Other Fires	0
	Total Fires	**16**
2017	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	5
	All Other Fires	0
	Total Fires	**5**
2018	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	7
	All Other Fires	0
	Total Fires	**8**
2019	Structure Fires	0
	Vehicle Fires	2
	Outside Fires	8
	All Other Fires	0
	Total Fires	**10**
2020	Structure Fires	1
	Vehicle Fires	0

Year	Fire Incident Type	Number of Fires
	Outside Fires	3
	All Other Fires	0
	Total Fires	**4**
2021	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	4
	All Other Fires	0
	Total Fires	**5**
2022	Structure Fires	3
	Vehicle Fires	1
	Outside Fires	6
	All Other Fires	0
	Total Fires	**10**
Jensen		
2010	Structure Fires	4
	Vehicle Fires	1
	Outside Fires	8
	All Other Fires	0
	Total Fires	**13**
2011	Structure Fires	4
	Vehicle Fires	0
	Outside Fires	1
	All Other Fires	0
	Total Fires	**5**
2012	Structure Fires	5
	Vehicle Fires	3
	Outside Fires	11
	All Other Fires	0
	Total Fires	**19**
2013	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	0
	All Other Fires	0
	Total Fires	**1**
2014	Structure Fires	2
	Vehicle Fires	0
	Outside Fires	9
	All Other Fires	0
	Total Fires	**11**
2015	Structure Fires	4
	Vehicle Fires	1
	Outside Fires	7
	All Other Fires	0
	Total Fires	**12**
2016	Structure Fires	2
	Vehicle Fires	0
	Outside Fires	3
	All Other Fires	0
	Total Fires	**5**
2017	Structure Fires	3

Year	Fire Incident Type	Number of Fires
	Vehicle Fires	1
	Outside Fires	12
	All Other Fires	0
	Total Fires	**16**
2018	Structure Fires	0
	Vehicle Fires	1
	Outside Fires	10
	All Other Fires	0
	Total Fires	**11**
2019	Structure Fires	3
	Vehicle Fires	1
	Outside Fires	8
	All Other Fires	0
	Total Fires	**12**
2020	Structure Fires	3
	Vehicle Fires	2
	Outside Fires	11
	All Other Fires	0
	Total Fires	**16**
2021	Structure Fires	3
	Vehicle Fires	0
	Outside Fires	10
	All Other Fires	0
	Total Fires	**13**
2022	Structure Fires	0
	Vehicle Fires	1
	Outside Fires	4
	All Other Fires	0
	Total Fires	**5**
Lapoint/Tridell		
2010	Structure Fires	3
	Vehicle Fires	0
	Outside Fires	4
	All Other Fires	1
	Total Fires	**8**
2011	Structure Fires	5
	Vehicle Fires	2
	Outside Fires	6
	All Other Fires	2
	Total Fires	**15**
2012	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	5
	All Other Fires	1
	Total Fires	**6**
2013	Structure Fires	7
	Vehicle Fires	0
	Outside Fires	2
	All Other Fires	0
	Total Fires	**9**

Year	Fire Incident Type	Number of Fires
2014	Structure Fires	8
	Vehicle Fires	5
	Outside Fires	9
	All Other Fires	1
	Total Fires	**23**
2015	Structure Fires	7
	Vehicle Fires	2
	Outside Fires	10
	All Other Fires	1
	Total Fires	**20**
2016	Structure Fires	5
	Vehicle Fires	2
	Outside Fires	12
	All Other Fires	0
	Total Fires	**19**
2017	Structure Fires	7
	Vehicle Fires	2
	Outside Fires	9
	All Other Fires	0
	Total Fires	**18**
2018	Structure Fires	5
	Vehicle Fires	3
	Outside Fires	18
	All Other Fires	0
	Total Fires	**26**
2019	Structure Fires	2
	Vehicle Fires	5
	Outside Fires	17
	All Other Fires	0
	Total Fires	**24**
2020	Structure Fires	5
	Vehicle Fires	2
	Outside Fires	32
	All Other Fires	0
	Total Fires	**39**
2021	Structure Fires	4
	Vehicle Fires	5
	Outside Fires	18
	All Other Fires	0
	Total Fires	**27**
2022	Structure Fires	7
	Vehicle Fires	0
	Outside Fires	4
	All Other Fires	0
	Total Fires	**11**
Naples		
2010	Structure Fires	1
	Vehicle Fires	0
	Outside Fires	1
	All Other Fires	0

Year	Fire Incident Type	Number of Fires
	Total Fires	**2**
2011	Structure Fires	0
	Vehicle Fires	0
	Outside Fires	1
	All Other Fires	1
	Total Fires	**2**
2012	Structure Fires	N/A
	Vehicle Fires	N/A
	Outside Fires	N/A
	All Other Fires	N/A
	Total Fires	**N/A**
2013	Structure Fires	3
	Vehicle Fires	2
	Outside Fires	3
	All Other Fires	1
	Total Fires	**9**
2014	Structure Fires	5
	Vehicle Fires	4
	Outside Fires	2
	All Other Fires	0
	Total Fires	**11**
2015	Structure Fires	7
	Vehicle Fires	2
	Outside Fires	7
	All Other Fires	1
	Total Fires	**17**
2016	Structure Fires	3
	Vehicle Fires	2
	Outside Fires	3
	All Other Fires	0
	Total Fires	**8**
2017	Structure Fires	6
	Vehicle Fires	3
	Outside Fires	10
	All Other Fires	0
	Total Fires	**19**
2018	Structure Fires	2
	Vehicle Fires	2
	Outside Fires	8
	All Other Fires	0
	Total Fires	**12**
2019	Structure Fires	7
	Vehicle Fires	2
	Outside Fires	5
	All Other Fires	0
	Total Fires	**14**
2020	Structure Fires	7
	Vehicle Fires	5
	Outside Fires	9
	All Other Fires	0

Year	Fire Incident Type	Number of Fires
	Total Fires	**21**
2021	Structure Fires	4
	Vehicle Fires	0
	Outside Fires	9
	All Other Fires	0
	Total Fires	**13**
2022	Structure Fires	10
	Vehicle Fires	2
	Outside Fires	5
	All Other Fires	0
	Total Fires	**17**
	Vernal	
2010	Structure Fires	21
	Vehicle Fires	4
	Outside Fires	19
	All Other Fires	2
	Total Fires	**46**
2011	Structure Fires	20
	Vehicle Fires	8
	Outside Fires	14
	All Other Fires	0
	Total Fires	**42**
2012	Structure Fires	13
	Vehicle Fires	10
	Outside Fires	43
	All Other Fires	0
	Total Fires	**66**
2013	Structure Fires	17
	Vehicle Fires	9
	Outside Fires	19
	All Other Fires	1
	Total Fires	**46**
2014	Structure Fires	16
	Vehicle Fires	8
	Outside Fires	32
	All Other Fires	1
	Total Fires	**57**
2015	Structure Fires	5
	Vehicle Fires	10
	Outside Fires	24
	All Other Fires	1
	Total Fires	**40**
2016	Structure Fires	10
	Vehicle Fires	6
	Outside Fires	21
	All Other Fires	0
	Total Fires	**37**
2017	Structure Fires	14
	Vehicle Fires	13
	Outside Fires	38

Year	Fire Incident Type	Number of Fires
	All Other Fires	0
	Total Fires	**65**
2018	Structure Fires	8
	Vehicle Fires	7
	Outside Fires	24
	All Other Fires	1
	Total Fires	**40**
2019	Structure Fires	12
	Vehicle Fires	7
	Outside Fires	25
	All Other Fires	0
	Total Fires	**44**
2020	Structure Fires	22
	Vehicle Fires	10
	Outside Fires	42
	All Other Fires	1
	Total Fires	**75**
2021	Structure Fires	22
	Vehicle Fires	14
	Outside Fires	27
	All Other Fires	1
	Total Fires	**64**
2022	Structure Fires	29
	Vehicle Fires	7
	Outside Fires	24
	All Other Fires	0
	Total Fires	**60**
Source: Utah Fire Marshal, 2010–2022		

o IMPACTS & LOSS ESTIMATES

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by wildfire, as presented in the table below.

Table 5-4. Impacts of Wildfire by Jurisdiction

Jurisdiction	Impacted by Wildfire	Experienced Significant Wildfire with $1,000+ in Damage Since 2000	Fatalities Due to Wildfire	Potential Impacts of Wildfire
Uintah County	Yes	Yes	3	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses

Jurisdiction	Impacted by Wildfire	Experienced Significant Wildfire with $1,000+ in Damage Since 2000	Fatalities Due to Wildfire	Potential Impacts of Wildfire
City of Ballard	Yes	Yes	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
City of Naples	Yes	No	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses
City of Vernal	Yes	No	0	Injury, burns, smoke inhalation, death, property damage, crop/vegetation/livestock losses, road closures, firefighting expenses, loss of utilities, fallen trees, downed power lines, mass evacuations, risk to emergency services, economic losses

According to the 2019 Utah State Hazard Mitigation Plan, Uintah County has 14 schools, one hospital, and 15 emergency response facilities that are exposed to potential wildfires. The combined value of the residential buildings in Uintah County is $2,293,741,000, and the combined value of non-residential buildings is $540,599,000. The total building value is $2,834,340,000 (Utah Hazard Mitigation Plan, 2019). There are approximately 2,572 commercial entities in the county (Uintah CWPP, 2018).

Natural resources are also at risk to wildfire, including the 792,403 acres of forest assets. 7.8% of this forestry is considered sensitive or includes tree species that are intolerant or sensitive to fire damage. Drinking water supply may also be affected by wildfire (Uintah CWPP, 2018).

Fatalities from wildfire in Utah are relatively uncommon, with 22 recorded deaths since 1950. Four deaths have occurred in Uintah County due to wildfire, with one death from the Dinosaur National Monument Fire in 1950 and three deaths from the Neola North Fire in 2007 (Utah Hazard Mitigation Plan, 2019).

The potential losses to critical facilities in Uintah County due to wildfires are identified in the table below.

Table 5-5. Uintah County Potential Impacts from Wildfire

Facility	Impacted	Not Impacted	Description
Hospitals/Medical Clinics		X	
Schools	X		Eagle View Elementary and Lapoint Elementary are located on the outskirts of their

Facility	Impacted	Not Impacted	Description
			respective communities. Estimate of $10 million of damages.
EOC		X	
Police Stations		X	
Fire Stations		X	
County/City Facilities		X	
Homes	X		Approximately $100 million of damages
Crops	X		Uintah County has farms throughout the county that may be affected by wildland fire. Total loss may be millions of dollars.
Businesses	X		Uintah County has oilfields, farming, pipelines, and other commercial interests that may be affected by wildland fire. Total loss may be millions of dollars.

Table 5-6. Wildfire: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0.080% chance per year	0.0	$2,565	$61,934	$0	$64,499	92.6	Relatively Moderate
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0.077% chance per year	0.0	$993	$38,804	$0	$39,798	90.7	Relatively Moderate
Census Tract 968302: Unincorporated Uintah County							
0.150% chance per year	0.0	$3,043	$57,511	$0	$60,554	92.4	Relatively Moderate
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0.048% chance per year	0.0	$1,023	$15,469	$0	$16,491	86.7	Relatively Moderate
Census Tract 968401: City of Vernal							
0.008% chance per year	0.0	$39	$1,739	$0	$1,778	73.3	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0.067% chance per year	0.0	$81	$5,820	$0	$5,901	81.8	Relatively Low
Census Tract 968404: City of Vernal and City of Naples							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
0.007% chance per year	0.0	$8	$177	$0	$185	43.5	Very Low
Census Tract 968202: Unincorporated Uintah County							
0.063% chance per year	0.0	$854	$9,970	$0	$10,824	84.7	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

As documented in the previous regional plan, the following table identifies the roads and utilities within Uintah County at potential risk to wildfire.

Table 5-7. Cost of Roads and Utilities at Risk to Wildfire

Transportation	
Name	**Estimated Cost**
Local Neighborhood/City Roads	$1,837,400,000
State Route 35	$28,237,950
State Route 87	$36,685,200
State Route 121	$5,792,400
State Route 150	$5,309,700
State Route 191	$9,171,300
Utilities	
Name	**Estimated Cost**
Maeser	$10,000,000
Chevron Resources	$10,000,000
Power Lines	$5,228,724
KV-12.5 or less	$217,260
KV-69	$323,476
KV-138	$193,120
Natural Gas	$4,876,078
Note: Costs are in 2012 dollars.	

▪ Vulnerable Populations

Potentially vulnerable populations may experience difficulty preparing for and responding to wildfire. The table below lists the vulnerable populations in Uintah County that may be at greater risk during a wildfire.

Table 5-8. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a wildfire. This region is also extremely rural, making quick communication difficult in the event of an evacuation.

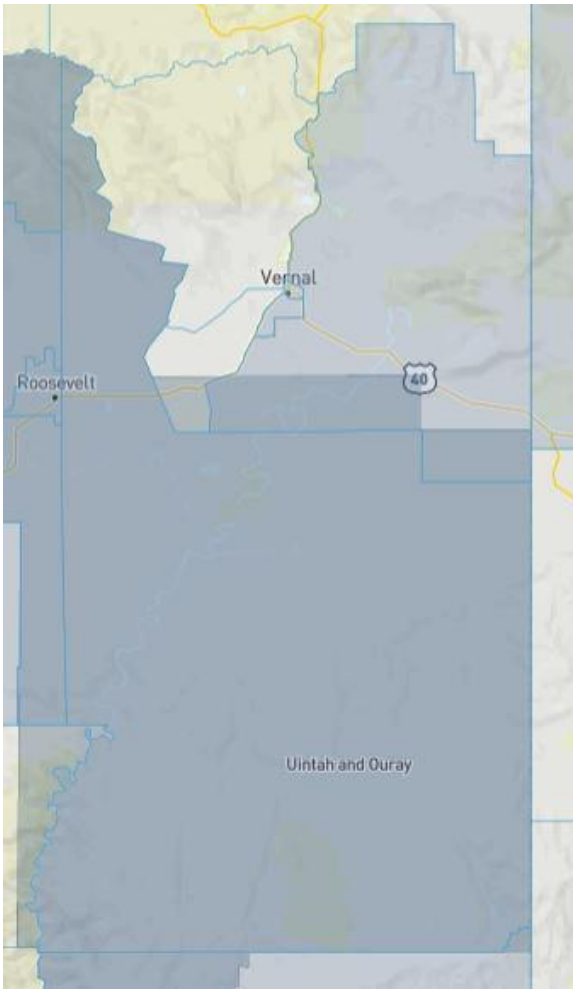
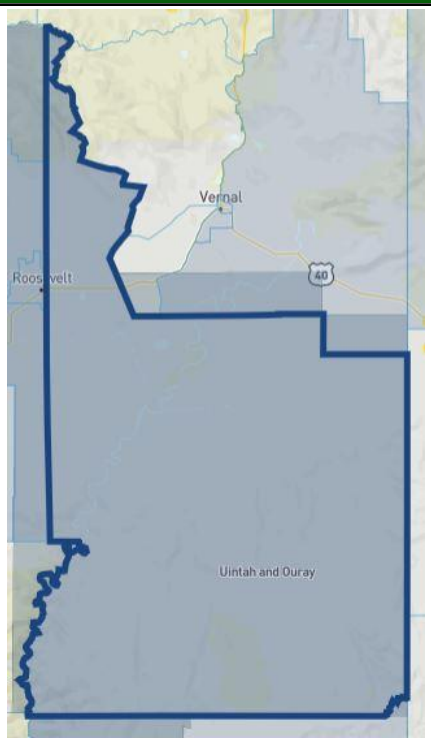
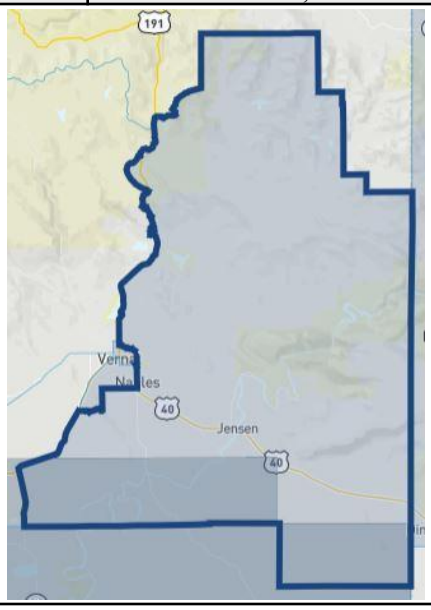


Figure 5-4. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 5-9. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Wildfire places high demands on electrical power supplies that can lead to blackouts or brownouts. The following table lists types of critical facilities that could be negatively affected by power outages during extreme heat, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 5-10. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of wildfire. As housing continues to encroach on WUI areas, more structures may become vulnerable to wildfire.

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought and heat, which can lead to more frequent and severe wildfires. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century, creating perfect dry conditions for wildfires (UCAR, 2023). Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, wildfires, and more intense urban heat island effects), compounding already existing stressors.

▪ Effects of Climate Change on Probability of Future Events

Table 5-11. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Uintah County is expected to experience 13 more days that reach above 95°F (from 16 days to 29 days per year).
	By 2049, Uintah County is expected to have a 3°F increase (from 46°F to 49°F) in average annual temperatures.
	Increasing annual temperatures can contribute to longer and more catastrophic wildfire seasons.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 5-12. Wildfire: Overall National Risk Index Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
93.71	Relatively Moderate	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
90.18	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
91.97	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
87.23	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
76.02	Relatively Low	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
83.25	Relatively Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
43.34	Very Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
85.19	Relatively Moderate	Relatively Moderate	Relatively Low

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

● FLOOD

o HAZARD DESCRIPTION

Flooding is defined by the National Weather Service (NWS) as "the inundation of normally dry areas as a result of increased water levels in an established water course." River flooding, the condition where the river rises to overflow its natural banks, may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams. In addition to these natural events, there are a number of factors controlled by human activity that may cause or contribute to flooding. These include dam failure (discussed below) and activities that increase the rate and amount of runoff, such as paving, reducing ground cover, and clearing forested areas. Flooding is a periodic event along most rivers, with the frequency depending on local conditions and controls, such as dams and levees. The land along rivers that is identified as being susceptible to flooding is called the floodplain.

Flooding is a dynamic natural process. Along rivers and streams, a cycle of erosion and deposition is continuously rearranging and rejuvenating the aquatic and terrestrial systems. Although many plants, animals, and insects have evolved to accommodate and take advantage of these ever-changing environments, property and infrastructure damage often occurs when people develop floodplains and natural processes are altered or ignored.

Flooding can also threaten life, safety, and health and often results in substantial damage to infrastructure, homes, and other property. The extent of damage caused by a flood depends on the topography, soils, and vegetation in an area, and the depth and duration of flooding, velocity of flow, rate of rise, and the amount and type of development in the floodplain.

o TYPES OF FLOODING

Flooding can occur in a number of ways, and many instances are not independent of each other and can occur simultaneously during a flood event. The types of flooding considered for this plan include:

- Heavy rainfall
- Urban stormwater overflow
- Rapid snowmelt
- Rising groundwater (generally in conjunction with heavy prolonged rainfall and saturated conditions)
- Riverine ice jams
- Flash floods
- Alluvial fan flooding
- Flooding from dam failure



o RELATED HAZARDS

▪ River or Stream Flood

● *Hazard Description*

Potential Probability		Low

Potential Consequence		High
Location	Along the Green River, Duchesne River, White River, Willow Creek, Whiterocks River, Uinta River, and Ashley Creek, and their respective tributaries	
Seasonal Pattern or Conditions	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer	
Duration	Flooding can last hours to days or even months	
Analysis Used	FIS, FIRM, GIS data, information from community residents, UGS, BasinNow, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund	

River flooding—the condition where the river rises to overflow its natural banks—may occur due to a number of causes, including prolonged, general rainfall, locally intense thunderstorms, snowmelt, and ice jams.

- ***Location***

Riverine flooding occurs in the low-lying areas of the county adjacent to streams and rivers, such as the Green River, Duchesne River, White River, Willow Creek, Whiterocks River, Uinta River, and Ashley Creek, and their tributaries. Erosion along rivers and streams can cause flooding during unusually wet years during spring snowmelt (UGS, 1987). Additionally, during high snowmelt years or high moisture conditions, the Green River can threaten bridges and lead to flooding. The photo to the right shows lowland flooding from high levels of the Green River during the spring of 2023.



*Figure STYLEREF 1 \s 6 SEQ Figure * ARABIC \s 1 2. Lowland Flooding from the Green River Near Jensen in May 2023 (BasinNow, 2023)*

Because of their locations near many streams and rivers, Vernal and Naples have a very high flood threat. The city of Vernal is the county seat and the largest community in the county and has a large floodplain zone around Ashley Creek.

Several roads in Uintah County are low water crossings that pass over creeks and are often inundated with water during high flow seasons. Peter Road, Chipeta Grove Road, Chipeta Creek Road, Hwy 88, and any

roads that cross rivers or streams are all subject to repeat flooding in Uintah County. Emergency repairs are frequently necessary to maintain passage over the roads.

- ***Extent***

The NFIP classifies floods through the use of recurrence intervals as seen in the chart below.

Flood Recurrence Interval	Chance of occurrence during any given year
5 year	20%
10 year	10%
50 year	2%
100 year	1%
500 year	0.20%

Figure 6-3. NFIP Flood Recurrence Intervals

The federal standard for floodplain management under the National Flood Insurance Plan (NFIP) is the "100-year floodplain." This area is chosen using historical data such that in any given year there is a 1% chance of a "base flood" (also known as "100-year flood" or "regulatory flood"). A base flood is one that covers or exceeds the 100-year floodplain. A "500-year floodplain" is an area with at least a .2% chance of flood occurrence in any given year (HUD Exchange, 2024).

The following maps, including the FIRM, show Naples and Vernal's flood zones with inundation areas along with additional inundation areas along Dry Fork.

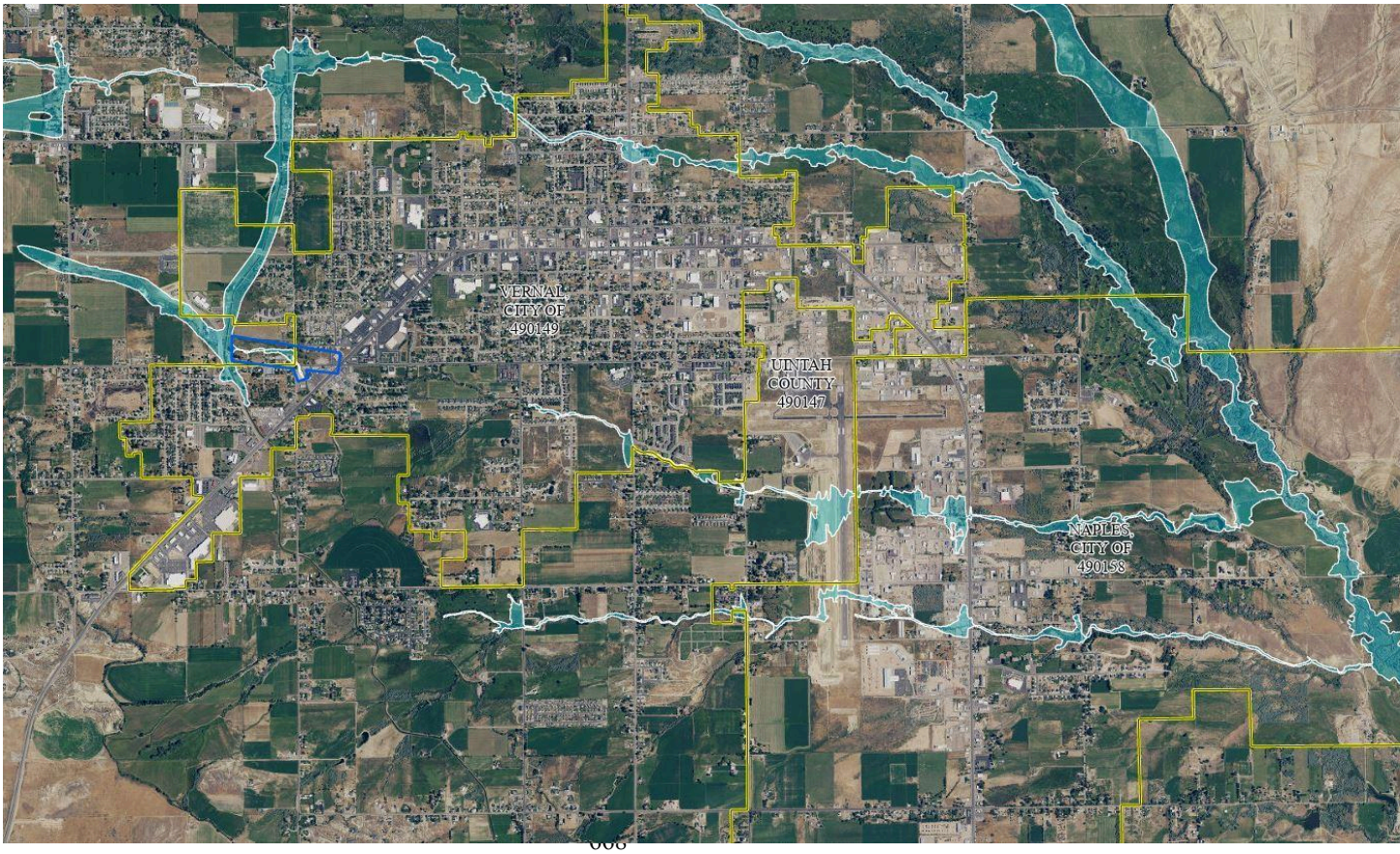


*Figure STYLEREF 1 \s 6 SEQ Figure * ARABIC \s 1 4. Cities of Naples and Vernal FIRM*

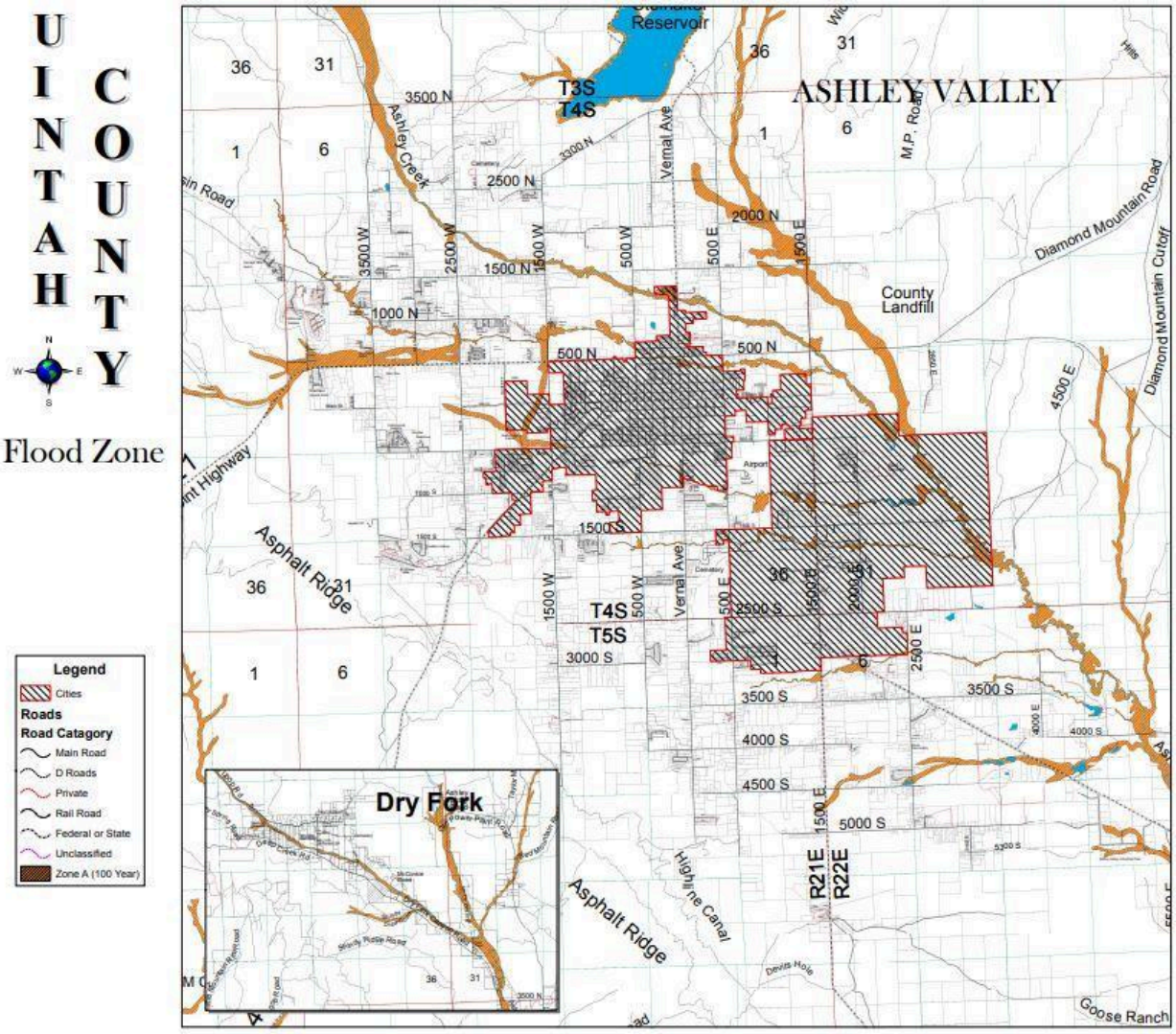


Figure 6-5. Ashley Valley Flood Zone Map

- ***Historical Frequency & Probability of Future Occurrence***

Changes in climate will likely increase the region's flood risk as the planning area experiences more extreme precipitation events triggering flash flooding, monsoons during late summer to early fall, and runoff from rain falling on snow events, common with warming temperatures.

Streams and rivers (Green River, Duchesne River, White River, Willow Creek, Whiterocks River, Uinta River, and Ashley Creek, and their respective tributaries) create a very high flood threat and increases the probability of future events. A large portion of Vernal and Naples is in a floodplain and subject to flooding from Ashley Creek.

The Storm Events Database from the NOAA lists eight river flood events in Uintah County between 2000–2023. Only one of these events affected Naples and Ballard, and none of them occurred in Vernal. The rest occurred in unincorporated Uintah County.

Table 6-1. River Flood Events in Uintah County, UT (2000–2023)

Location Within County	Date	Property Damage ($)	Cause
Eastern Uinta Basin (near Randlett and Ouray)	05/20/2005	N/A	Rapid spring snowmelt
Eastern Uinta Basin (along Ashley Creek and near Jensen), Eastern Uinta Mountains	05/21/2005	N/A	Rapid spring snowmelt
Eastern Uinta Basin (near Whiterocks)	05/23/2005	$50,000	Rapid spring snowmelt
Eastern Uinta Basin (near Randlett and Ouray)	06/01/2005	N/A	Rapid spring snowmelt
Jensen	06/01/2011	$50,000	Rapid spring snowmelt
Jensen	07/01/2011	$50,000	Continued record snowpack melt
Ballard	09/22/2016	$50,000	Heavy rain
Maeser	08/01/2021	$50,000	Monsoon, thunderstorms, heavy rain
Maeser	07/31/2021	N/A	Thunderstorms
Source: NOAA Storm Events Database, 2010–2023			

One particularly damaging flood occurred in June 2011 when heavy runoff from record snowpack kept rivers and creeks across Uintah County running at elevated to above bank conditions throughout the month. Lowland flooding caused damage to irrigation equipment and disrupted oil and gas drilling along the river. Some roads were waterlogged and closed for weeks. Several homes were flooded. Livestock and agricultural buildings and equipment were most affected by the flooding. A drinking water line had to be repaired, as well. The Green River was especially high, and one kayaker lost his life when his kayak overturned and he could not be rescued (Storm Events Database, 2024).

River flooding is likely to occur again in the future. According to Neighborhoods at Risk, Uintah County is expected to experience 0.1 more days of heavy precipitation per year by 2049 (from 0.5 days to 0.7 days per year). By 2049, Uintah County is also expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation. Heavy precipitation can lead to riverine flooding as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

● *Impacts & Loss Estimates*

The cities of Ballard, Naples, and Vernal and parts of unincorporated Uintah County may be impacted by river flooding, as presented in the table below. The city of Ballard is not as likely to be impacted by river flooding since it is not located near any large rivers, aside from two smaller creeks that run through the city’s boundaries. Naples and Vernal are equally vulnerable to river flooding due to their proximity to each other and to Ashley Creek and the Green River.

Table 6-2. Impacts of River Flood by Jurisdiction

Jurisdiction	Impacted by River Floods	Fatalities Due to River Floods	Potential Impacts of River Floods
Uintah County	Yes	1	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Ballard	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Naples	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Vernal	Yes	0	Injury, drowning, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Human death and injury sometimes occur as a result of river flooding but are not common. Uintah County has seen one death related to flooding of the Green River in June 2011 when a kayaker overturned on the river and could not be rescued. Human hazards during flooding include drowning, electrocution due to downed power lines, leaking gas lines, fires and explosions, hazardous chemicals, and displaced wildlife. Economic loss and disruption of social systems are often enormous. Floods may destroy or damage structures, furnishings, business assets including records, crops, livestock, roads, and highways. They often deprive large areas of electric service, potable water supplies, wastewater treatment, communications, and many other community services, including medical care, and may do so for long periods of time.

At least $250,000 in property damage has occurred since 2000 due to river flooding, as reported by the Storm Events Database, although actual damage over this time period is likely much higher.

Uintah County participates in the National Flood Insurance Program (NFIP). As of 2019, the county had a total premium of $44,773, 54 policies, and $12,477,500 in total coverage (Utah Hazard Mitigation Plan, 2019). The county has had 13 claims since becoming a participating community in 1975.

Table 6-3. Riverine Flooding: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0.7 events per year	0.0	$42,996	$980	$297	$44,273	76.3	Relatively Moderate
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0.7 events per year	0.0	$52,669	$1,356	$202	$54,228	79.2	Relatively Moderate
Census Tract 968302: Unincorporated Uintah County							
0.7 events per year	0.01	$84,784	$1,510	$35	$86,330	84.8	Relatively Moderate
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0.7 events per year	0.0	$16,095	$2,376	$3	$18,474	63.4	Relatively Low
Census Tract 968401: City of Vernal							
0.7 events per year	0.0	$18,294	$340	$3	$18,636	63.6	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0.7 events per year	0.0	$0	$0	$0	$0	25.3	Very Low
Census Tract 968404: City of Vernal and City of Naples							
0.7 events per year	0.0	$11,513	$649	$1	$12,162	57.4	Relatively Low
Census Tract 968202: Unincorporated Uintah County							
0.7 events per year	0.0	$3,514	$81	$17	$3,613	42.9	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to river flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-4. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a flood.

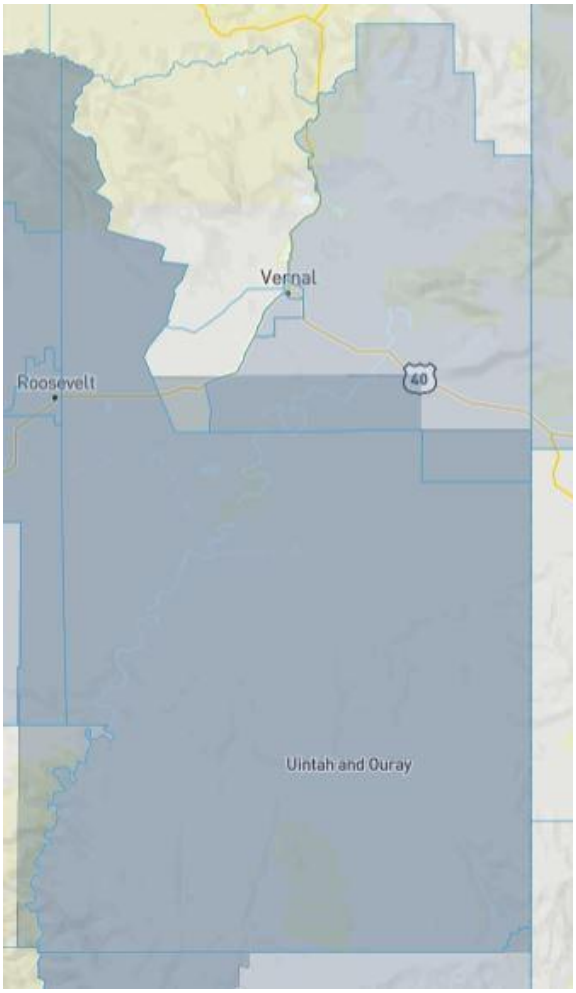
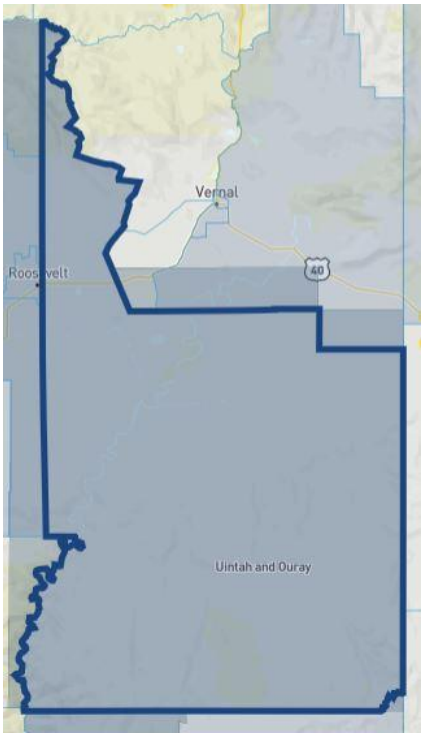
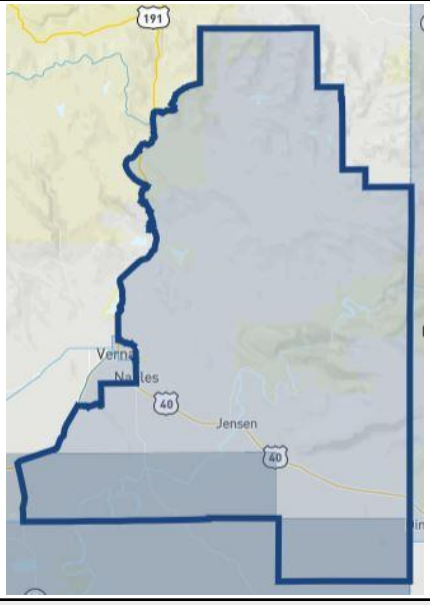


Figure 6-6. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 6-5. Disadvantaged Communities in Uintah County

<table>
<tr><th colspan="3">UINTAH COUNTY, UT</th></tr>
<tr><th colspan="3">CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT</th></tr>
<tr><th>CENSUS TRACT 2010 ID</th><th>CENSUS TRACT POPULATION</th><th>LOW INCOME TRACT?</th></tr>
<tr><td>49047940201</td><td>5,481</td><td>YES</td></tr>
<tr><td colspan="3"> 
</td></tr>
<tr><td colspan="3">CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development</td></tr>
<tr><td>94th % (above 90th percentile)</td><td colspan="2">Share of people who have been told they have asthma</td></tr>
<tr><td>YES</td><td colspan="2">Presence of one or more abandoned mine land within the tract</td></tr>
<tr><td>92nd % (above 90th percentile)</td><td colspan="2">Number of unemployed people as part of the labor force</td></tr>
<tr><td>20% (above 10%)</td><td colspan="2">Percent of people 25 years or older whose high school education is less than a high school diploma</td></tr>
<tr><th>CENSUS TRACT 2010 ID</th><th>CENSUS TRACT POPULATION</th><th>LOW INCOME TRACT?</th></tr>
<tr><td>49047968200</td><td>8,966</td><td>YES</td></tr>
</table>

UINTAH COUNTY, UT	
	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

River floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-6. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett

Critical Facility Type	Location
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of riverine flooding.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 6-7. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
Source: Neighborhoods at Risk, 2024	

• *FEMA NRI Score*

Table 6-8. Riverine Flooding: Overall National Risk Index Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
80.27	Relatively Moderate	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
77.54	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
83.46	Relatively Moderate	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
65.57	Relatively Low	Relatively Moderate	Relatively Low

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 968401: City of Vernal			
67.15	Relatively Low	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
25.35	Very Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
57.66	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
44.25	Relatively Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

▪ Flash Flood

● *Hazard Description*

Potential Probability		Medium
Potential Consequence		Medium
Location	Along the Green River, Duchesne River, White River, Willow Creek, Whiterocks River, Uinta River, and Ashley Creek, and their respective tributaries; surrounding riparian areas	
Seasonal Pattern or Conditions	Heavy snowfall runoff in spring and early summer; monsoonal thunderstorms and heavy rainfall in late summer	
Duration	Flooding can last hours to days or even months	
Analysis Used	FIS, FIRM, GIS data, information from community residents, UGS, HUD Exchange, NOAA, NWS, NFIP, 2019 Utah Hazard Mitigation Plan, local newspaper articles, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund	

Flash flood is defined by the NWS as "a rapid and extreme flow of high water into a normally dry area or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters." Flash floods differ from floods (discussed above in *River or Stream Flood*) in the rapidity with which they develop. River floods generally develop over a period of several days, providing more warning time and time for preparation and evacuation. Flash floods occur with little or no warning. They may occur during thunderstorms due to rapid runoff from steep terrain, from areas where the soil is already saturated, or in urban areas where vegetation has been removed and pavement has replaced exposed soil. Flash floods may also arise as the result of dam failure (discussed below).

- ***Location***

Flooding affects the majority of Utah due to heavy mountain precipitation and runoff. Consistent wildfires also exacerbate existing flood risks. Uintah County can experience changes in the geography of the landscape from sediment movement during flash floods (Utah Hazard Mitigation Plan, 2019). Swelling or shrinking rocks and soils due to summer thunderstorms can cause favorable conditions for flash flooding in Uintah County. Swelling or shrinking soils are found in the Mancos Shale, the Brushy Basin Member of the Morrison Formation, the Chinle Formation, and the Moenkopi Formation within the county (UGS, 1964).

Repeat flash flooding has occurred at Hwy 191, Red Cloud Loop Road in Vernal, 7500 East in Randlett, and many roads in Dry Fork Canyon. Future flooding is likely to occur in these areas again. The residential areas—including the Flake subdivision—of west Maeser have been subject to flash flooding in the past, as well.

Because of their locations near many streams and rivers, Vernal and Naples have a very high flood threat. Vernal is the county seat and the largest community in the county. As a result, the Ashley Valley Storm Water Master Plan was created, and flood control issues were identified and put into place for Ashley Creek. Over half of the community is in a floodplain. Although the majority of the land within Ashley Vally is open space or agricultural land, the Valley is growing rapidly and becoming increasingly urbanized. This affects storm water runoff patterns in the area, which necessitates the creation of the Storm Water Master Plan (Storm Water Master Plan, 2008).

- ***Extent***

Flash floods occur suddenly within six hours of intense rainfall from a thunderstorm or several thunderstorms. Flash floods are common amongst Uintah County’s creek beds, making these areas especially hazardous during rainfall.

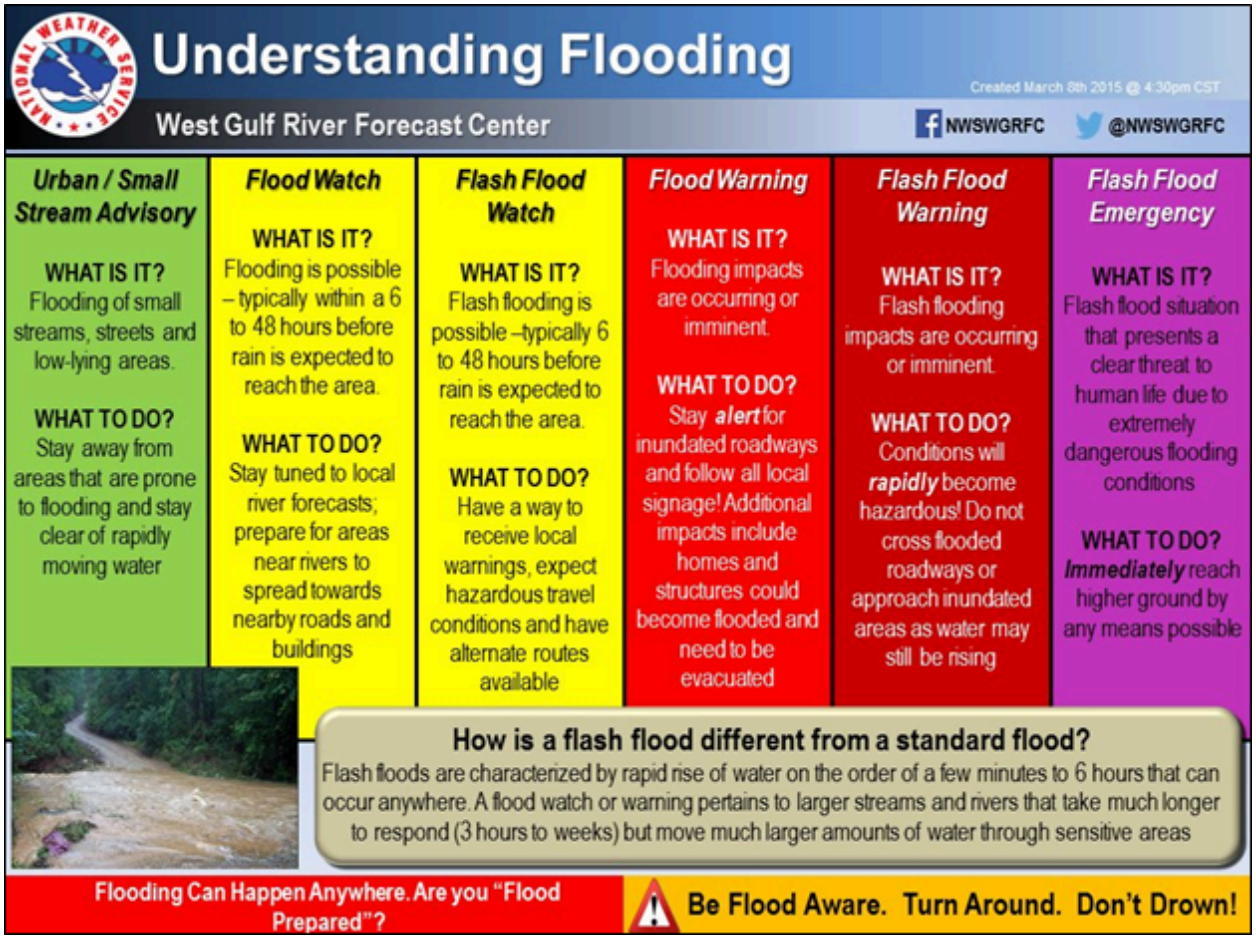


Figure 6-7. Understanding Flooding (NWS, 2015)

- ***Historical Frequency & Probability of Future Occurrence***

The Storm Events Database from the NOAA lists six flash flood events and one debris flow event in Uintah County between 2000–2023. Two of these flash flood events occurred in Vernal and the rest in unincorporated Uintah County. Maeser is especially prone to flash floods. The following table lists all flash flood and debris flow events since 2000.

Table 6-9. Flood Events in Uintah County, UT (2000–2023)

Location Within County	Date	Event Type	Property Damage ($)	Description
Vernal	07/27/2002	Flash Flood	N/A	Flash flood across Hwy 191
Eastern Uinta Mountains	08/09/2005	Debris Flow	$500	Heavy rain caused several mudslides and wiped out 200 feet of fence
Vernal, Naples, Maeser	08/07/2008	Flash Flood	$100,000	Heavy rain on south side of Uintas caused flash flooding across

Location Within County	Date	Event Type	Property Damage ($)	Description
				wide parts of Uintah County
Randlett	08/06/2009	Flash Flood	$12,000	Heavy rain resulted in several driveways and agricultural fields flooding
Dry Fork	09/17/2013	Flash Flood	N/A	Large hail and heavy rain caused flooding along Hwy 191
Maeser	08/19/2014	Flash Flood	$20,000	Heavy rain resulted in street flooding
Maeser	08/20/2014	Flash Flood	$20,000	Rapid rainfall runoff caused flooding in Maeser
Source: NOAA Storm Events Database, 2000–2023				

Flash flooding is likely to occur again in the future. According to Neighborhoods at Risk, Uintah County is expected to experience 0.1 more days of heavy precipitation per year by 2049 (from 0.5 days to 0.7 days per year). By 2049, Uintah County is also expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation. Heavy precipitation can lead to flash flooding as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation can contribute to sustained flooding.

- ***Impacts & Loss Estimates***

Any area in Uintah County along the Green River, Duchesne River, White River, Willow Creek, Whiterocks River, Uinta River, and Ashley Creek, and their respective tributaries or along any gullies and washes are at risk to flash flooding, including the jurisdictions of Ballard, Naples, and Vernal.

Table 6-10. Impacts of Flash Flood by Jurisdiction

Jurisdiction	Impacted by Flash Floods	Experienced Significant Flash Flood with $1,000+ in Damage Since 2010	Fatalities Due to Flash Floods	Potential Impacts of Flash Floods
Uintah County	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Ballard	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous

Jurisdiction	Impacted by Flash Floods	Experienced Significant Flash Flood with $1,000+ in Damage Since 2010	Fatalities Due to Flash Floods	Potential Impacts of Flash Floods
				chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Naples	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses
City of Vernal	Yes	Yes	0	Injury, drowning, blunt force trauma, death, structure fire, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, disruption to medical care, risk to emergency services, economic losses

Because flash floods develop so rapidly, people on foot or in automobiles may be stranded or may be swept away and injured or drowned. They are characterized by high velocity water flow and large amounts of debris, both of which cause damage to or destroy structures and other objects in their path.

At least $152,500 in property damage has occurred since 2000 due to flash flooding, as reported by the Storm Events Database, although actual damage over this time period is likely much higher.

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to flash flooding. Structures without foundations are more likely to be swept away or damaged in a flood. Additionally, those who are unable to transport themselves to a safe location may be at risk.

Table 6-11. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%

Vulnerability Category	Number	Percent
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2023). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a flood.

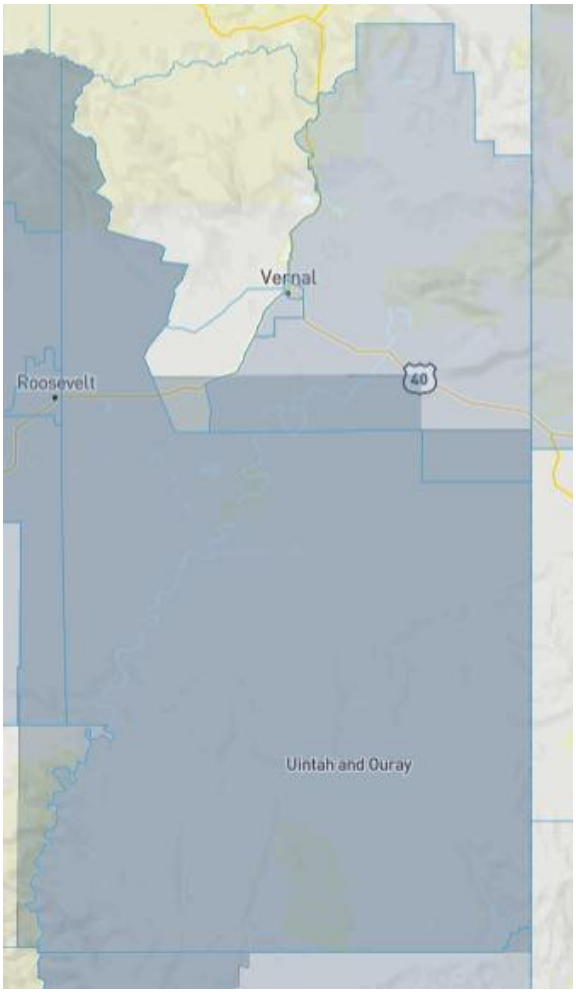
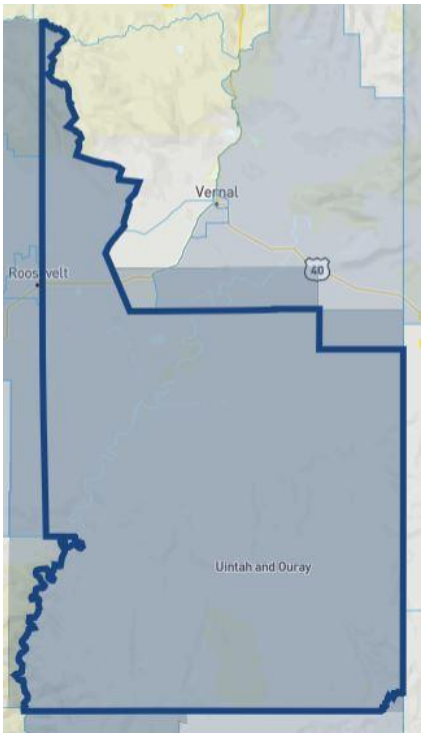
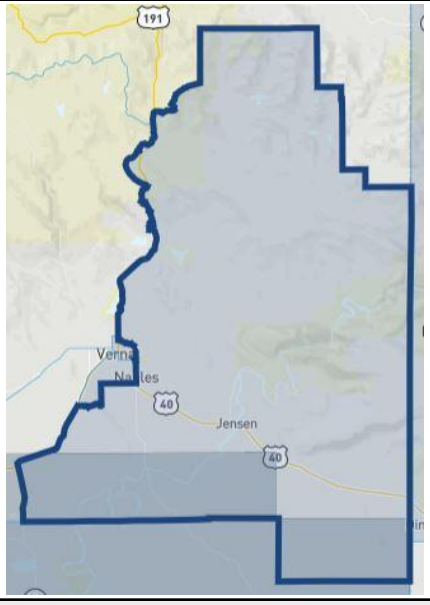


Figure 6-8. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 6-12. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
***94th** % (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
***92nd** % (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
***20%** (above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES

UINTAH COUNTY, UT	
	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Flash floods may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from floods, which could delay emergency response and access to life-saving medical equipment.

Table 6-13. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett

Critical Facility Type	Location
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of flash flooding.

● *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 6-14. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

FEMA does not evaluate flash flood as part of its National Risk Index.

▪ Dam Failure

● *Hazard Description*

Potential Probability		Low
Potential Consequence		Medium

Location	Dam locations are mainly located within three different regions with clusters of dams, including in and near Ballard, Naples, and Vernal.
Seasonal Pattern or Conditions	Rainy Day Failure happens primarily during heavy precipitation events and can have some warning time. Sunny Day Failure happens with no warning at all and can happen at any time.
Duration	Hours, days. Depends on spillway type and area, maximum cfs discharge, overflow or breach type, dam type. Refer to Dam Inventory for more information.
Analysis Used	FIS, Utah Division of Water Rights and Dam Safety, local input, 2019 Utah Hazard Mitigation Plan, National Inventory of Dams, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

Dam failure is the unintended release of impounded waters. Dams can fail for one or a combination of the following reasons:

- Overtopping caused by floods that exceed the capacity of the dam
- Deliberate acts of sabotage
- Structural failure of materials used in dam construction
- Poor design and/or construction methods
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams.
- Inadequate maintenance and upkeep

Failures may be categorized into two types: component failure of a structure that does not result in a significant reservoir release, and uncontrolled breach failure that leads to a significant release. With an uncontrolled breach failure of a manmade dam there is a sudden release of the impounded water, sometimes with little warning. The ensuing flood wave and flooding have enormous destructive power. The Dam Safety Program of the Utah Division of Water Rights is responsible for dam safety in Utah.

- ***Location***

Uintah County has a total of 360 dams throughout the county, with 14 high hazard and 12 moderate hazard dams that have the potential to cause significant loss to property and/or life in the event of a dam failure (Dam Safety, 2024). As listed in the table below, there are several communities in Uintah County that would potentially be affected by a dam breach if one occurred.

Table 6-15. Vulnerable Downstream Communities in Uintah County, UT

Dam Name	DWRi Hazard Rating	First Downstream Community	Distance in Miles
Red Fleet	High	Jensen	17
Steinaker	High	Vernal	3
Bottle Hollow	High	Fort Duchesne	1
Brough	High	None—drains to Green River	N/A
Bullock Draw	High	Gusher	5
Cottonwood	High	Gusher	5
East Park	High	None—drains to Green River	N/A
Flaming Gorge	High	Jensen	55
Lapoint	High	Lapoint	2

Dam Name	DWRi Hazard Rating	First Downstream Community	Distance in Miles
M&S Dam	High	None—drains onto uninhabited land, including agricultural	N/A
Montes Creek	High	Randlett	17
Oaks Park	High	None—drains to Green River	N/A
Paradise Park	High	Whiterocks	14
Red Wash	High	Lapoint	2
Whiterocks Lake	High	Whiterocks	31
Angus Ranch Ltd	Moderate	N/A	N/A
Ashley Twin Lakes	Moderate	Vernal	20
Blanchett Park	Moderate	Vernal	0
Calder (Zelph)	Moderate	None—drains to Green River	N/A
Raymond & Patricia Cook	Moderate	N/A	N/A
Crouse	Moderate	None—drains to Green River	N/A
Goose Lake (Upper)	Moderate	Vernal	20
Grover Dam	Moderate	N/A	N/A
Julius Park	Moderate	None—drains to Green River	N/A
Long Park (Uintah)	Moderate	Vernal	23
Simplot Phosphates Tailings Dam	Moderate	None—drains to Green River	N/A
Warner (Matt)	Moderate	None—drains to Green River	N/A
Source: Dam Safety, 2024			

The majority of dams in the county can be found within three clusters of dozens of dams. One cluster is in the region around Ballard, one is in the Ashley Valley region where Vernal and Naples are located, and one is in the upper northeast region of the county. All other dams are scattered throughout the county in various locations.

Uintah County could also be affected by failure of the Flaming Gorge high hazard dam in Daggett County, even though it is not located within Uintah County's boundaries.

- ***Extent***

Dams in Utah are classified according to hazard, size, and use. There are three hazard ratings used by the Dam Safety Program in Utah: high, moderate, and low. The hazard rating reflects proximity to people and property. High hazard dams are located where there are significant consequences downstream if the dam fails, such as loss of human life and significant property damage. Moderate hazard is typically defined as a dam whose failure will cause significant property destruction. Low hazard dams will cause minimal property destruction (Utah Hazard Mitigation Plan, 2019). As growth continues, homes are being built closer to dams, creating "hazard creep," which creates additional urgency to ensure dams meet safety standards and don't put lives and property at unnecessary risk (Dam Safety, 2024). The National Dam Safety Program breaks out these three hazard ratings even further using the following scale (FEMA, 2015).

Urgency of action	Characteristics and considerations	Potential actions
I – VERY HIGH URGENCY	CRITICALLY NEAR FAILURE: There is direct evidence that failure is in progress, and the dam is almost certain to fail during normal operations if action is not taken quickly. OR EXTREMELY HIGH RISK: Combination of life or economic consequences and likelihood of failure is very high with high confidence.	• Take immediate action to avoid failure. Communicate findings to potentially affected parties. • Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Initiate intensive management and situation reports.
II - HIGH URGENCY	RISK IS HIGH WITH HIGH CONFIDENCE, OR IT IS VERY HIGH WITH LOW TO MODERATE CONFIDENCE: The likelihood of failure from one of these occurrences, prior to taking some action, is too high to delay action.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Give high priority to heightened monitoring and evaluation. Expedite investigations and actions to support long-term risk reduction. • Expedite confirmation of classification.
III - MODERATE URGENCY	MODERATE TO HIGH RISK: Confidence in the risk estimates is generally at least moderate, but can include facilities with low confidence if there is a reasonable chance that risk estimates will be confirmed or potentially increase with further study.	• Implement IRRMs. • Ensure that the emergency action plan is current and functionally tested. • Conduct heightened monitoring and evaluation. Prioritize investigations and actions to support long-term risk reduction. • Prioritize confirmation of classification as appropriate.
IV – LOW TO MODERATE URGENCY	LOW TO MODERATE RISK: The risks are low to moderate with at least moderate confidence, or the risks are low with low confidence, and there is a potential for the risks to increase with further study.	• Ensure that routine risk management measures are in place. • Determine whether action can wait until after the next periodic review. • Before the next periodic review, take appropriate interim measures and schedule other actions as appropriate. • Give normal priority to investigations to validate classification, but do not plan for risk reduction measures at this time.
V – NO URGENCY	LOW RISK: The risks are low and are unlikely to change with additional investigations or studies.	• Continue routine dam safety risk management activities and normal operations and maintenance.

Figure 6-9. Joint Federal Risk Categories for Dam Failure

Of the 360 total dams in Uintah County, the Utah Division of Water Rights (DWRi) Dam Safety database identifies 14 high hazard dams in Uintah County (excluding inactive, planned, or under construction dams), as seen in the table below. A high hazard rating means there is a possibility of life being lost due to dam failure. 12 dams are listed as having a moderate hazard rating, meaning there would be significant downstream property loss if the dam were to fail. 295 dams have a low hazard rating, which means if a dam failure were to occur, there would be insignificant property loss; however, these dams should still be monitored. The remaining 39 dams do not have a hazard rating but are still listed in the database. The classification of a high hazard dam does not mean that the dam has a high probability of failure. Dam safety hazard classifications simply delineate the downstream consequences if a dam were to fail. Potential dam failure in Uintah County is rated as “possible.” If a dam were breached in the county, the cities identified in the table in the *Location* section above would be affected.

The National Inventory of Dams (NID) ranks dams as high, significant, or low. The NID lists 24 dams in Uintah County that have a rating of high or significant.

In addition to listing all dams from DWRi Dam Safety in Uintah County with a rating of high or moderate, the following table notes all 24 dams from the National Inventory of Dams (NID) that have a rating of high or significant.

Table 6-16. Dams in Uintah County, UT

	Dam Name	DWRi Hazard Rating	NID Hazard Rating
1	Red Fleet	High	High
2	Steinaker	High	High
3	Bottle Hollow	High	
4	Brough	High	High
5	Bullock Draw	High	High
6	Cottonwood	High	High
7	East Park	High	High
8	Lapoint	High	High
9	M&S Dam	High	High
10	Montes Creek	High	High
11	Oaks Park	High	High
12	Paradise Park	High	High
13	Red Wash	High	High
14	Whiterocks Lake	High	High
15	Angus Ranch Ltd	Moderate	Significant
16	Ashley Twin Lakes	Moderate	Significant
17	Blanchett Park	Moderate	
18	Calder (Zelph)	Moderate	Significant
19	Raymond & Patricia Cook	Moderate	Significant
20	Crouse	Moderate	Significant
21	Goose Lake (Upper)	Moderate	Significant
22	Grover Dam	Moderate	Significant
23	Julius Park	Moderate	Significant
24	Long Park (Uintah)	Moderate	Significant
25	Simplot Phosphates Tailings Dam	Moderate	Significant
26	Warner (Matt)	Moderate	Significant
Source: Dam Safety, 2024; NID, 2024			

Flaming Gorge is a high hazard dam located in Daggett County; however, the risk is region wide, and the first downstream community is Jensen, which is a census-designated place in Uintah County with 372 people and is 55 miles away. The dam was completed in 1964 and is owned by the Department of the Interior Bureau of Reclamation. The reservoir storage at spillway crest is 3,789,000 acre-feet, and the reservoir storage at dam crest is 4,003,000 acre-feet. The spillway type is a gated spillway, and the maximum dam breach flow is 999,000 cfs with a 0-square mile drainage basin area.

● *Historical Frequency & Probability of Future Occurrence*

Presently, there is no historical record of dam failure in Uintah County. However, dam failure could occur at any time without warning, so it's imperative to continue monitoring each dam in the county, especially those with high or moderate hazard ratings. The cities of Naples and Vernal are most at risk of a dam failure. The town of Ballard has minimal risk.

The risk of dam failure is not likely to increase so long as dams are maintained as they are required by law. However, according to Neighborhoods at Risk, Uintah County is expected to experience 0.1 more days of heavy precipitation per year by 2049 (from 0.5 days to 0.7 days per year). By 2049, Uintah County is also expected to have a 0.6" increase (from 12.6" to 13.2") in average annual precipitation. Heavy precipitation can lead to flooding as the ground fails to absorb the high volume of precipitation that falls in a short period, which has the potential to suddenly overwhelm a dam, especially if the dam is not carefully monitored and maintained.

● *Impacts & Loss Estimates*

The cities of Ballard, Naples, and Vernal and parts of unincorporated Uintah County may be impacted by dam failure, as presented in the table below.

Table 6-17. Impacts of Dam Failure by Jurisdiction

Jurisdiction	May Be Impacted by Dam Failure	Potential Impacts of Dam Failure
Uintah County	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
City of Ballard	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
City of Naples	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses
City of Vernal	Yes	Injury, drowning, blunt force trauma, death, downed power lines, displaced wildlife, hazardous chemicals release, leaking gas lines, property damage, flooding in residences and businesses, road closures, loss of crops/vegetation/livestock, loss of utilities, shortage of water storage, disruption to medical care, risk to emergency services, economic losses

High and moderate hazard dams have the potential to cause possible loss of human life (high hazard) or significant property damage (moderate hazard) if they were to fail and are therefore of most concern to

the county. However, due to strict regulations, frequent monitoring, and periodic inspection of these high and moderate hazard dams, the likelihood of a dam failure is low.

The severity of a dam failure depends on the area surrounding the dam or levee, the volume and velocity of water that breaches the structure, and the structures and population in the area. A dam failure will result in flooding of normally protected areas, primarily low-lying areas downstream of the dam, resulting in impacts similar to those seen that are within the normal floodplain. Impacts include damaged or destroyed essential utilities, homes, major roads, crops, and businesses. See the table below for specific potential losses associated with the dam failure hazard.

Table 6-18. Critical Facilities Potentially Impacted by Dam Failure

Dam	Potentially Impacted if Dam Failed										
	Hospitals / Medical Clinics	Schools	EOC	Police Station	Fire Station	County/ City Facilities	Essential Utilities	Major Roads/ Bridges	Homes	Crops	Businesses
Red Fleet							X	X	X	X	X
Steinaker							X	X	X	X	X
Flaming Gorge							X	X	X	X	X
Bottle Hollow							X		X		
Brough							X		X		
Bullock Draw							X				
Cottonwood							X		X		
East Park							X			X	
Lapoint							X			X	
M&S Dam							X			X	
Montes Creek							X			X	
Oaks Park							X			X	
Paradise Park							X			X	
Red Wash							X			X	
Whiterocks Lake							X			X	
Angus Ranch Ltd											
Ashley Twin Lakes							X			X	
Blanchett Park											
Calder (Zelph)							X			X	
Raymond & Patricia Cook											
Crouse							X			X	
Goose Lake (Upper)							X			X	

Dam	Potentially Impacted if Dam Failed										
	Hospitals / Medical Clinics	Schools	EOC	Police Station	Fire Station	County/ City Facilities	Essential Utilities	Major Roads/ Bridges	Homes	Crops	Businesses
Grover Dam											
Julius Park							X			X	
Long Park (Uintah)							X			X	
Simplot Phosphates Tailings Dam							X	X	X		X
Warner (Matt)							X		X		

The 2019 Utah State Hazard Mitigation Plan compiled the total potential dam inundation area for each county in Utah. For Uintah County, 233.28 square miles (out of 4,502.71 total square miles in the county) could potentially be affected by one or more dam failures. This is a percentage of 5.18%. The cities of Naples and Vernal have the most potential for significant loss of life and/or property. For the 100-year floodplain with no base flood elevation, Uintah County has 138,133 acres of mapped flood zone (Uintah County Resource Management Plan, 2017).

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People with inadequate living conditions, especially those who are homeless or live in mobile homes, may be more vulnerable to dam failure. Structures without foundations are more likely to be swept away or damaged in the event of a dam failure and the subsequent flash flood. Additionally, those who are unable to quickly transport themselves to a safe location may be at risk.

Table 6-19. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic

Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately respond to a dam failure.

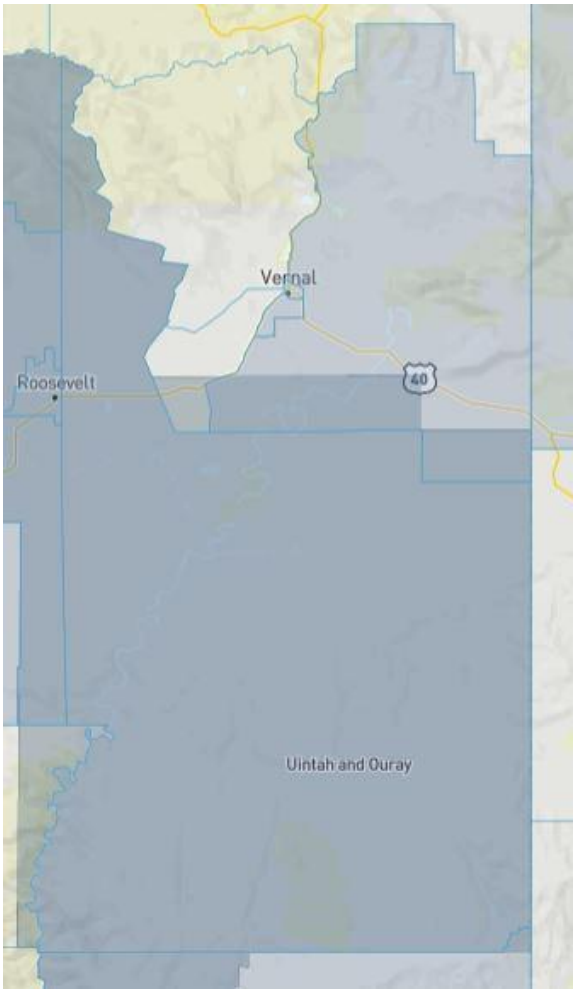
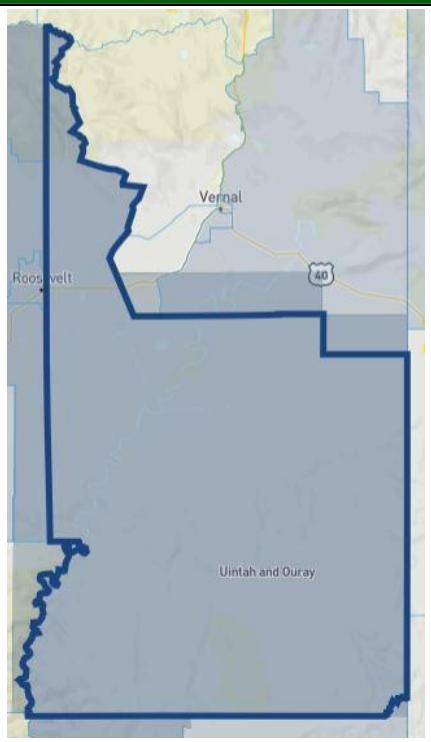
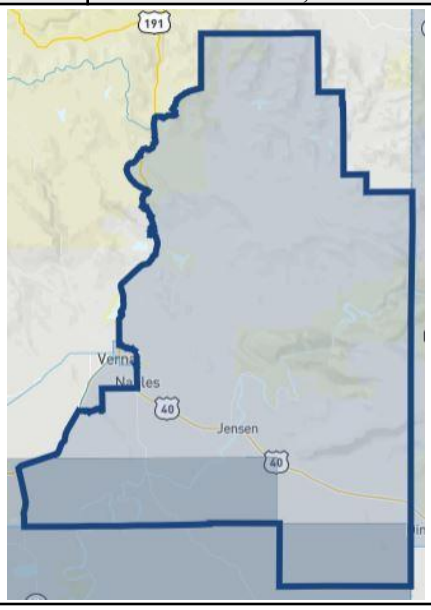


Figure 6-10. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 6-20. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Dam failure and subsequent flooding may cause significant damage to critical facilities in the county. The following table lists types of critical facilities that could be negatively affected by damage from dam failure, which could delay emergency response and access to life-saving medical equipment.

Table 6-21. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is low impact based on current development trends, meaning future development will minimally increase the impacts of dam failure.

• *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. Increasing annual precipitation contributes to sustained flooding and places more pressure on existing dams (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 6-22. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	Increasing annual precipitation can contribute to sustained flooding and threaten reservoir/lake capacities, which may place additional pressure on existing dams.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

FEMA does not evaluate dam failure as part of its National Risk Index.

• DROUGHT

o HAZARD DESCRIPTION

Potential Probability	High
Potential Consequence	Medium
Location	Countywide, including Ballard, Naples, and Vernal
Seasonal Pattern or Conditions	Generally summer and early fall
Duration	Drought events may last one month to several months to years
Analysis Used	National Drought Mitigation Center, NCEI, 2019 Utah Hazard Mitigation Plan, RGJ, NOAA, NWS, Utah Division of Water Resources, EWG, Neighborhoods at Risk, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, UCAR

Drought is an expected phase in the climactic cycle of almost any geographical region. Objective, quantitative definitions for drought exist but most authorities agree that, because of the many factors contributing to it and because its onset and relief are slow and indistinct, none is entirely satisfactory. According to the National Drought Mitigation Center, drought "originates from a deficiency of precipitation over an extended period of time, usually a season or more. This deficiency results in a water shortage for some activity, group, or environmental sector" (NDMC, 2023a). What is clear is that a condition perceived as "drought" in a given location is the result of a significant decrease in water supply relative to what is "normal" in that area.

It should be noted that water supply is not only controlled by precipitation (amount, frequency, and intensity) but also by other factors, including evaporation (which is increased by higher-than-normal heat and winds), transpiration, temperature, soil moisture, and human use.

Utah specifically is a dry landscape and is among one of the driest states in the country, receiving on average approximately 13 inches of precipitation per year (Utah Hazard Mitigation Plan, 2019).

o LOCATION

Uintah County is subject to drought events due to its partial location in the semi-arid region of Utah. The county is represented by portions of three of the seven different climate divisions in Utah, which are referred to as the Uinta Basin, Southeast, and Northern Mountains divisions (see following figure). The Uinta Basin and Southeast regions often experience drought, but the portion of the Northern Mountains division that is located in Uintah County primarily consists of the Uinta Mountains, which have no real dry season with warm-to-hot summers and cold, snowy winters (Climate of Utah, 2009). Drought events affect the county, incorporated cities, and unincorporated communities.

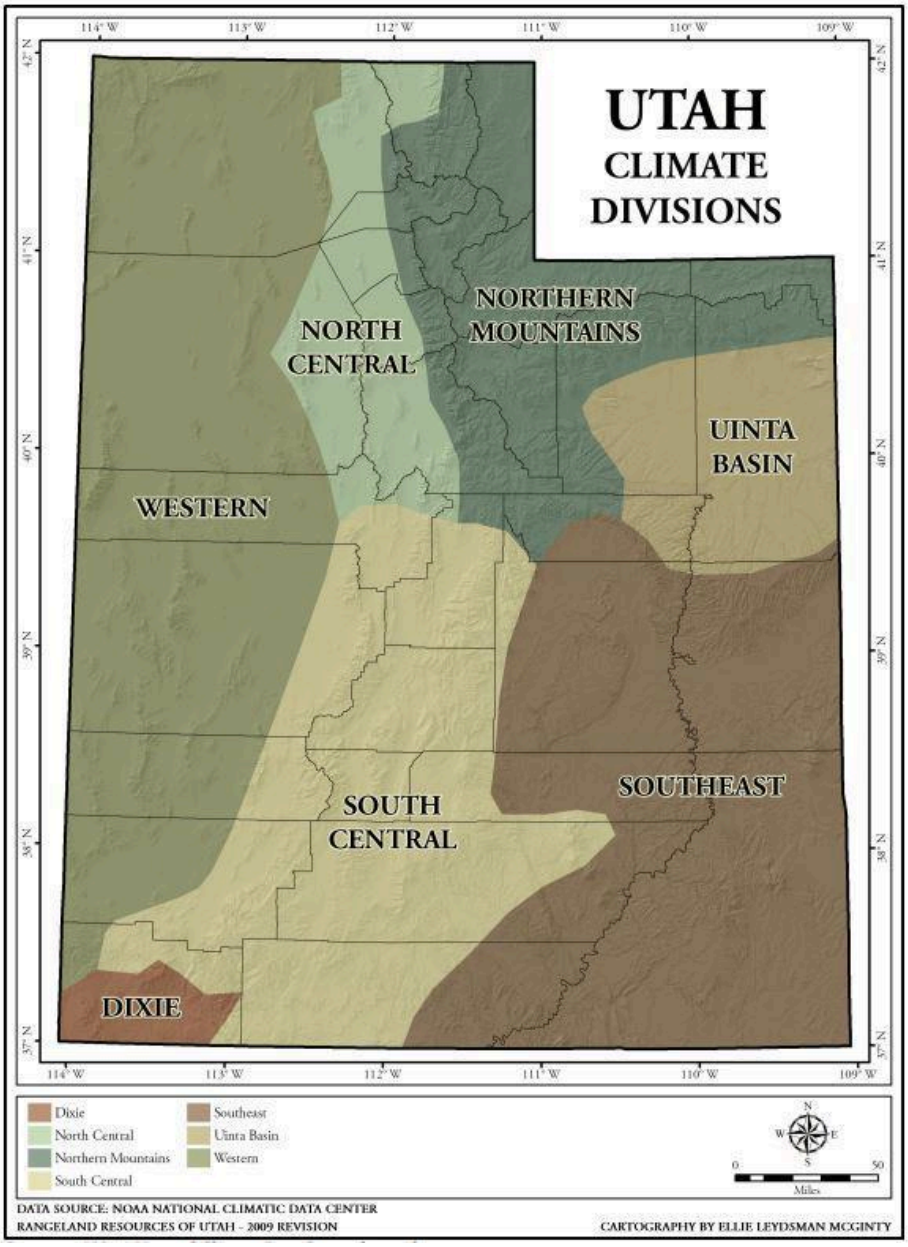


Figure 7-1. Utah Climate Divisions

o EXTENT

The following figure displays the precipitation conditions for the United States using the Palmer Drought Severity Index, which is taken from the National Weather Service (NWS). The Palmer Drought Severity Index (PDSI) is a means of quantifying drought in terms of prolonged and abnormal moisture deficiency or excess. This index indicates general conditions and not local variations caused by isolated rain. The PDSI is an important climatological tool for evaluating the scope, severity, and frequency of prolonged periods of abnormally dry or wet weather. It can be used to help delineate disaster areas and indicate the availability of irrigation water supplies, reservoir levels, range conditions, amount of stock water, and potential intensity of forest fires (NWS, 2024).

The PDSI expresses this comparison of moisture deficiency and moisture excess on a numerical scale that usually ranges from positive five to negative five. Positive values reflect excess moisture supplies, while negative values indicate moisture demands in excess of supplies.

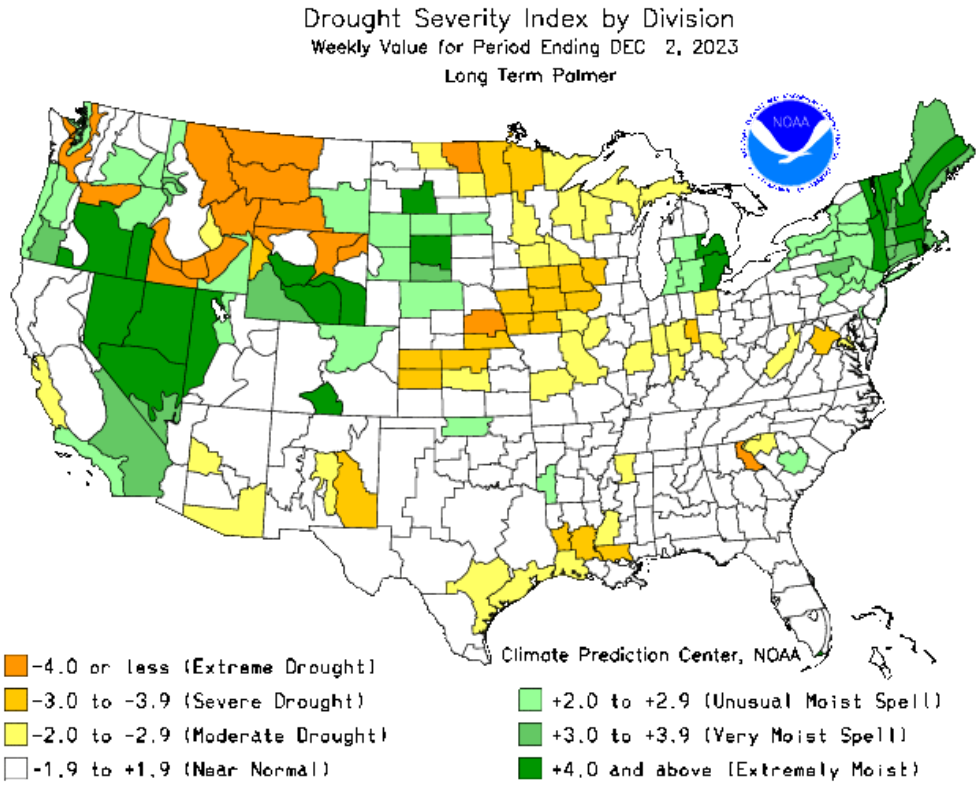


Figure 7-2. U.S. Drought Severity Index

The National Drought Mitigation Center also rates drought throughout the nation by intensity using a D0 (Abnormally Dry) to D4 (Exceptional Drought) scale, as seen in the map of Utah below. The majority of Uintah County is currently experiencing moderate drought or is abnormally dry (NDMC, 2024).

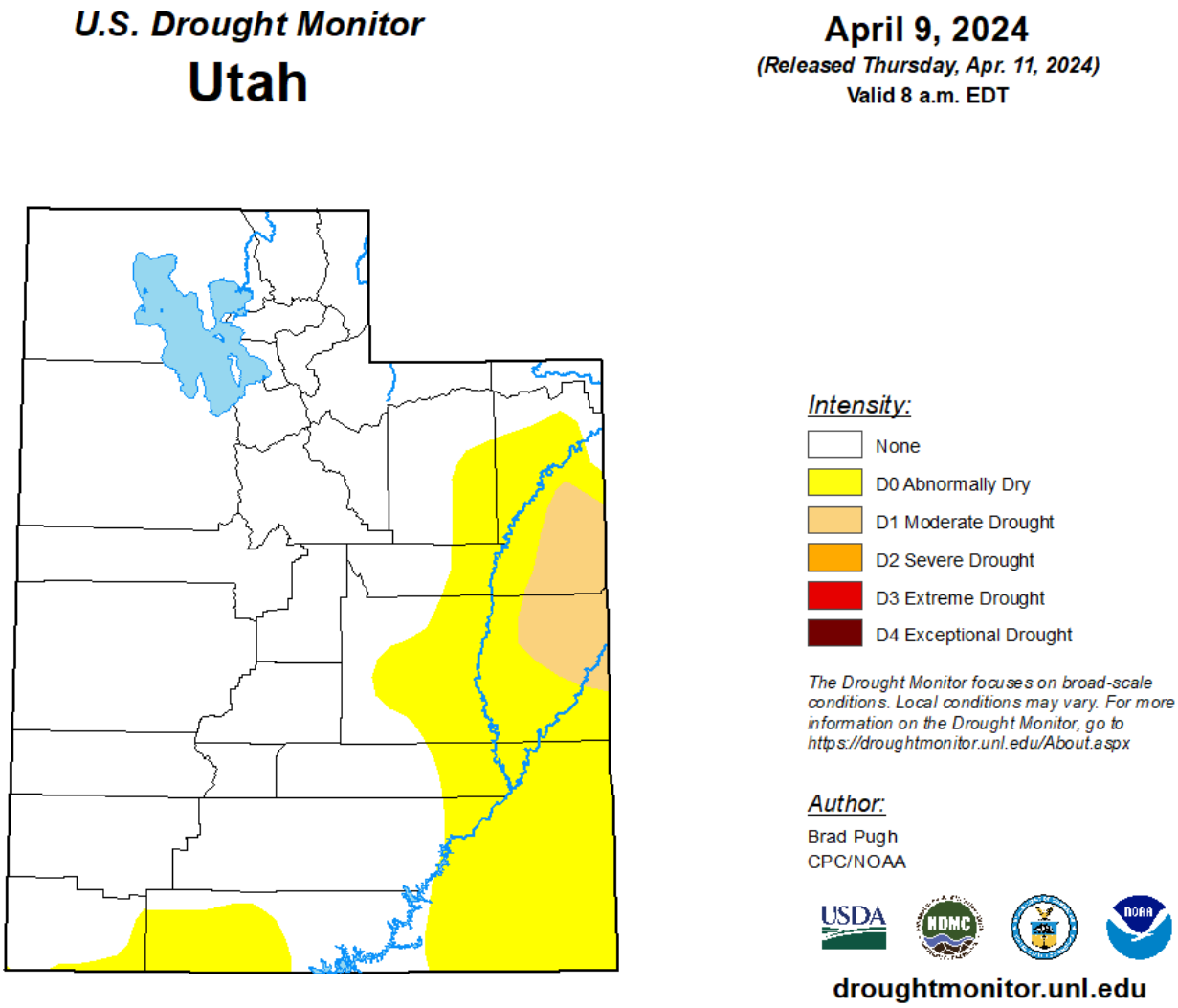


Figure 7-3. U.S. Drought Monitor Utah

The Standardized Precipitation Index (SPI) is a probability index that considers only precipitation. The SPI is based on the standardized probability of recording a given amount of precipitation in a specific area. The index is negative for drought and positive for wet conditions. The index becomes more positive or negative as conditions become more severe. The 1-month SPI for North America in March of 2024 can be seen below (NCEI, 2024).

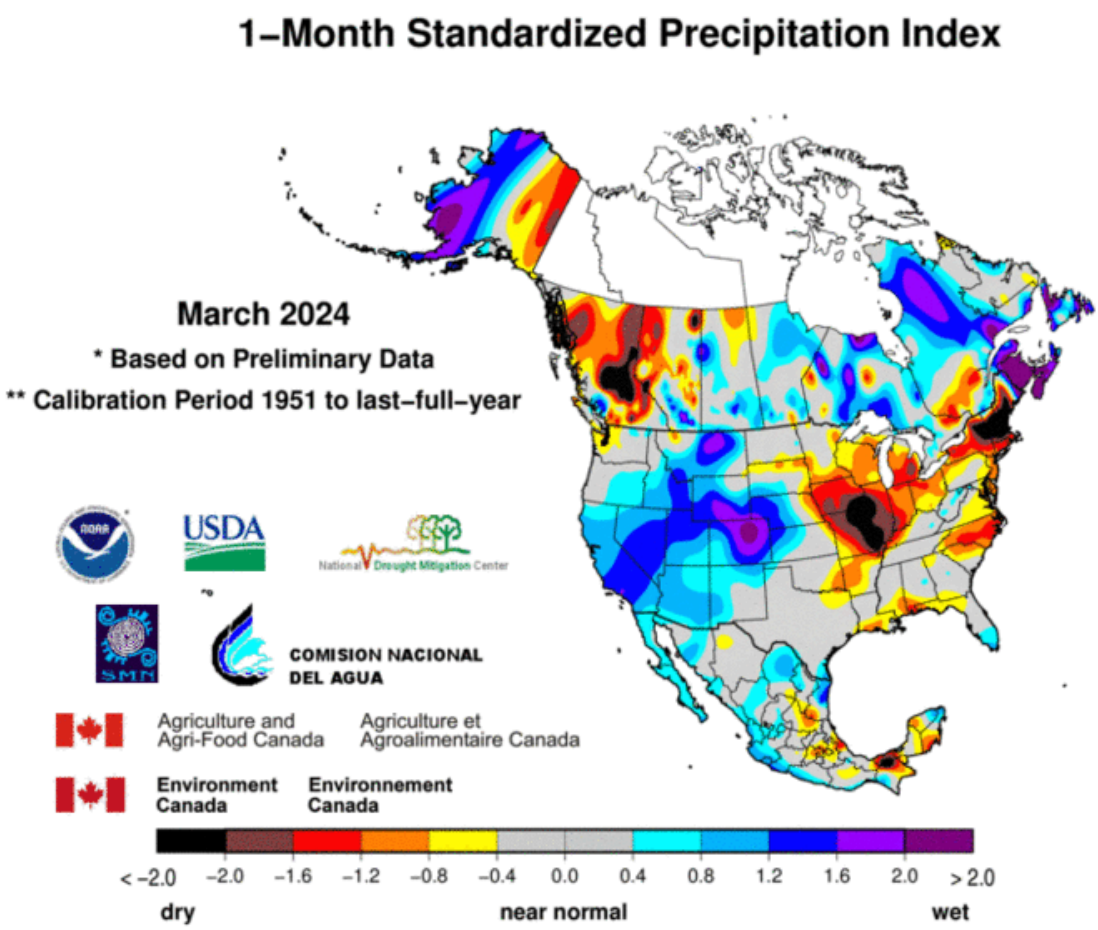


Figure 7-4. 1-Month Standardized Precipitation Index

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Droughts are common occurrences in Uintah County. There have been several multi-year droughts in Utah since 1898, which are listed below (Utah Hazard Mitigation Plan, 2019). Utah has been in a prolonged drought since 1987 until recently in 2023.

- 1898–1905
- 1933–1943
- 1950–1966
- 1971–1977
- 1987–2023

Uintah County has historically experienced prolonged drought events followed by nearly equally prolonged periods of no drought until about 2017 when droughts began occurring closer together (RGJ, 2023). The southeastern region of the county is currently in a state of moderate drought, while the central region has no drought but is abnormally dry (Drought, 2024). The list below notes the periods of drought in Uintah County since 2000 (RGJ, 2024).

- July 2000–October 2000
- February 2002–January 2006
- June 2006–September 2006
- December 2006–February 2008
- January 2012–December 2013
- April 2014–September 2014
- February 2015–May 2015
- July 2017–February 2019
- October 2019–March 2023
- October 2023–April 2024

An extended drought is likely to occur again in the future. According to Neighborhoods at Risk, Uintah County is expected to experience 13 more days that reach above 95°F by 2049 (2024). As annual temperatures continue to increase and dry conditions remain consistent, more frequent and lengthy droughts are likely to occur. In fact, Uintah County is expected to experience an increase in average annual temperature of 3°F by 2049. Temperatures in Utah have already risen more than 2.5°F since the early 20th century (NOAA, 2022).

o IMPACTS & LOSS ESTIMATES

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by drought, as presented in the table below.

Table 7-1. Impacts of Drought by Jurisdiction

Jurisdiction	Impacted by Drought	Experienced Exceptional Drought Since 2010	Potential Impacts of Drought
Uintah County	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
City of Ballard	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
City of Naples	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages
City of Vernal	Yes	Yes	Water shortages, reduced crop/rangeland/forest productivity, wildfire, livestock/wildlife losses, economic losses (reduced agriculture income, increased food prices, unemployment, increased energy costs, etc.), plant disease, infestation, decreased tourism, food shortages

Drought is agriculture's most expensive, frequent, and widespread form of natural disaster. Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to our ability to produce goods and provide services.

Impacts are commonly referred to as direct or indirect. Reduced crop, rangeland, and forest productivity; increased fire hazard; reduced water levels; increased livestock and wildlife mortality rates; and damage to wildlife and fish habitat are a few examples of direct impacts. The consequences of these impacts illustrate indirect impacts. For example, a reduction in crop, rangeland, and forest productivity may result in reduced income for farmers and agribusiness, increased prices for food and timber, unemployment, reduced tax revenues because of reduced expenditures, increased crime, foreclosures on bank loans to farmers and businesses, migration, and disaster relief programs. The impacts of drought can be categorized as economic, environmental, or social.

Many economic impacts occur in agricultural and related sectors because of the reliance of these sectors on surface and subsurface water supplies. In addition to obvious losses in yields in crop and livestock production, drought is associated with increases in insect infestations, plant disease, and wind erosion. In fact, the EWG reported $135,799 in total indemnities in the county for crops lost to heat (1995–2022). Droughts also bring increased problems with insects and diseases to forests and reduce growth. The incidence of forest and range fires increases substantially during extended droughts, which in turn places both human and wildlife populations at higher levels of risk.

Income loss is another indicator used in assessing the impacts of drought because so many sectors are affected. Reduced income for farmers has a ripple effect. Retailers and others who provide goods and services to farmers face reduced business. This leads to unemployment, increased credit risk for financial institutions, capital shortfalls, and loss of tax revenue for local, state, and federal government. Less discretionary income affects the recreation and tourism industries. Prices for food, energy, and other products increase as supplies are reduced. In some cases, local shortages of certain goods result in the need to import these goods from outside the stricken region.

Table 7-2. Drought: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
85.3 events per year	N/A	N/A	N/A	$9,775	$9,775	92.2	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County							
84 events per year	N/A	N/A	N/A	$5,585	$5,585	90.3	Relatively Low
Census Tract 968302: Unincorporated Uintah County							
78.3 events per year	N/A	N/A	N/A	$395	$395	81.2	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
78.6 events per year	N/A	N/A	N/A	$622	$622	82.7	Relatively Low
Census Tract 968401: City of Vernal							
78.6 events per year	N/A	N/A	N/A	$12	$12	72.0	Very Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
78.9 events per year	N/A	N/A	N/A	$130	$130	77.4	Very Low
Census Tract 968404: City of Vernal and City of Naples							
78.9 events per year	N/A	N/A	N/A	$165	$165	78.2	Very Low
Census Tract 968202: Unincorporated Uintah County							
80.5 events per year	N/A	N/A	N/A	$555	$555	82.3	Relatively Low
Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year. *Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.* *Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f*							

▪ Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People particularly susceptible to drought are farmers who rely on crop revenue, people living in poverty, and those with chronic illnesses, such as asthma.

Table 7-3. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of

whom are low income. Some may rely heavily on the land to sustain them, which can become difficult during times of drought and limited access to water.

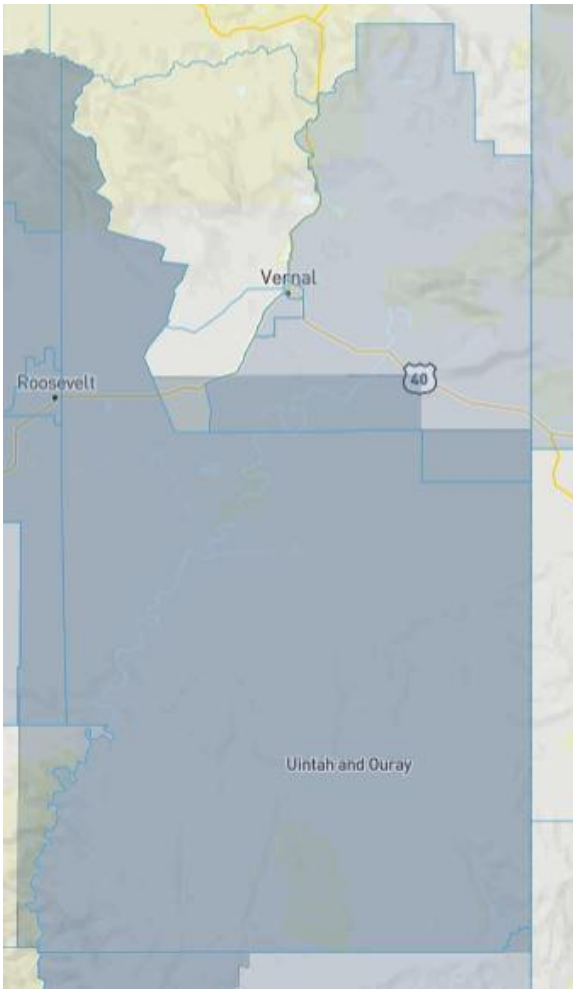
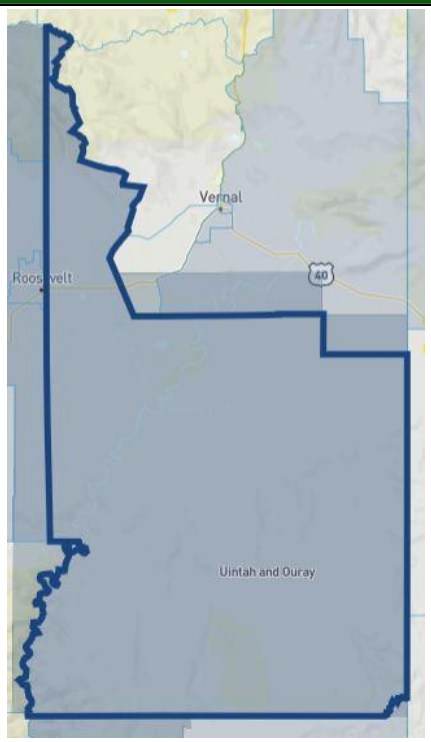
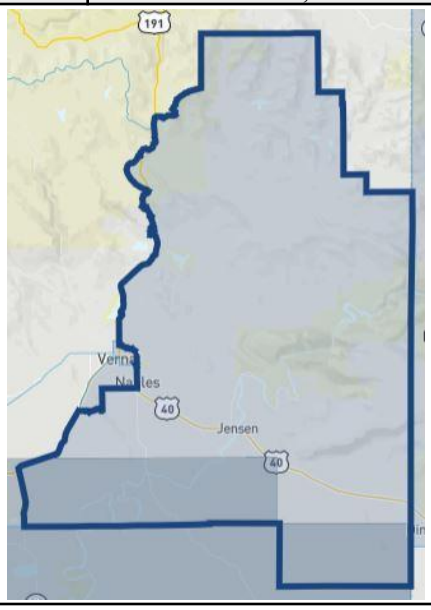


Figure 7-5. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 7-4. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	CENSUS TRACT POPULATION	LOW INCOME TRACT?
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Drought places high demands on the water supply and sometimes even electrical power supplies that can lead to blackouts or brownouts when accompanied by high heat. The following table lists types of critical facilities that could be negatively affected by power outages or limited water supply, including places like hospitals and dialysis centers that rely on power to operate life-saving equipment.

Table 7-5. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is no impact based on current development trends on either current or future development.

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

According to University Corporation for Atmospheric Research (UCAR), climate change is causing more extreme weather events, including more extreme drought. UCAR explains that warmer temperatures cause more evaporation, turning water into vapor in the air and causing drought in some areas of the world. Places prone to drought are expected to become even drier over the following century (UCAR, 2024).

Higher temperatures, increasing variation in precipitation patterns, and changes in lake levels are likely to increase the vulnerability of cities to extreme events (including flooding, drought, heat waves, and more intense urban heat island effects), compounding already existing stressors.

▪ Effects of Climate Change on Probability of Future Events

Table 7-6. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Uintah County is expected to experience 13 more days that reach above 95°F (from 16 days to 29 days per year).
	By 2049, Uintah County is expected to have a 3°F increase (from 46°F to 49°F) in average annual temperatures.
	Increasing annual temperatures can contribute to more frequent extreme heat events.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 7-7. Drought: Overall National Risk Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
93.06	Relatively Low	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
89.85	Relatively Low	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
80.62	Very Low	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
82.96	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
72.15	Very Low	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
78.28	Very Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
78.0	Very Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
82.51	Relatively Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

• EARTHQUAKE

o HAZARD DESCRIPTION

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Ballard, Naples, and Vernal; refer to earthquake quaternary faults map	
Seasonal Pattern or Conditions	Can occur at any time	
Duration	Event duration is short, but the recovery may be long term	
Analysis Used	USGS, UGS, GIS data, SMS Tsunami Warning, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS	

The U.S. Geological Survey (USGS) defines earthquake as “ground shaking caused by the sudden release of accumulated strain by an abrupt shift of rock along a fracture in the Earth or by volcanic or magmatic activity, or other sudden stress changes in the Earth.” The hazards associated with earthquake are essentially secondary to ground shaking (also called seismic waves), which may cause buildings to collapse; displacement or cracking of the earth’s surface; flooding as a result of damage to dams or levees; and fires from ruptured gas lines, downed power lines, and other sources. Earthquakes cause both vertical and horizontal ground shaking, which varies both in amplitude (the amount of displacement of the seismic waves) and frequency (the number of seismic waves per unit time), usually lasting less than thirty seconds.

o LOCATION

This hazard may affect every community in Uintah County, including the jurisdictions of Ballard, Naples, and Vernal. However, the only quaternary faults in Uintah County are part of the Diamond Gulch Fault system located in the northeastern tip of the county. These fault splays cross remote ranchland and do not appear to present any fault rupture risk to structures or the population. A map of these quaternary faults can be seen below (USGS, 2024).

Uintah County Quaternary Faults

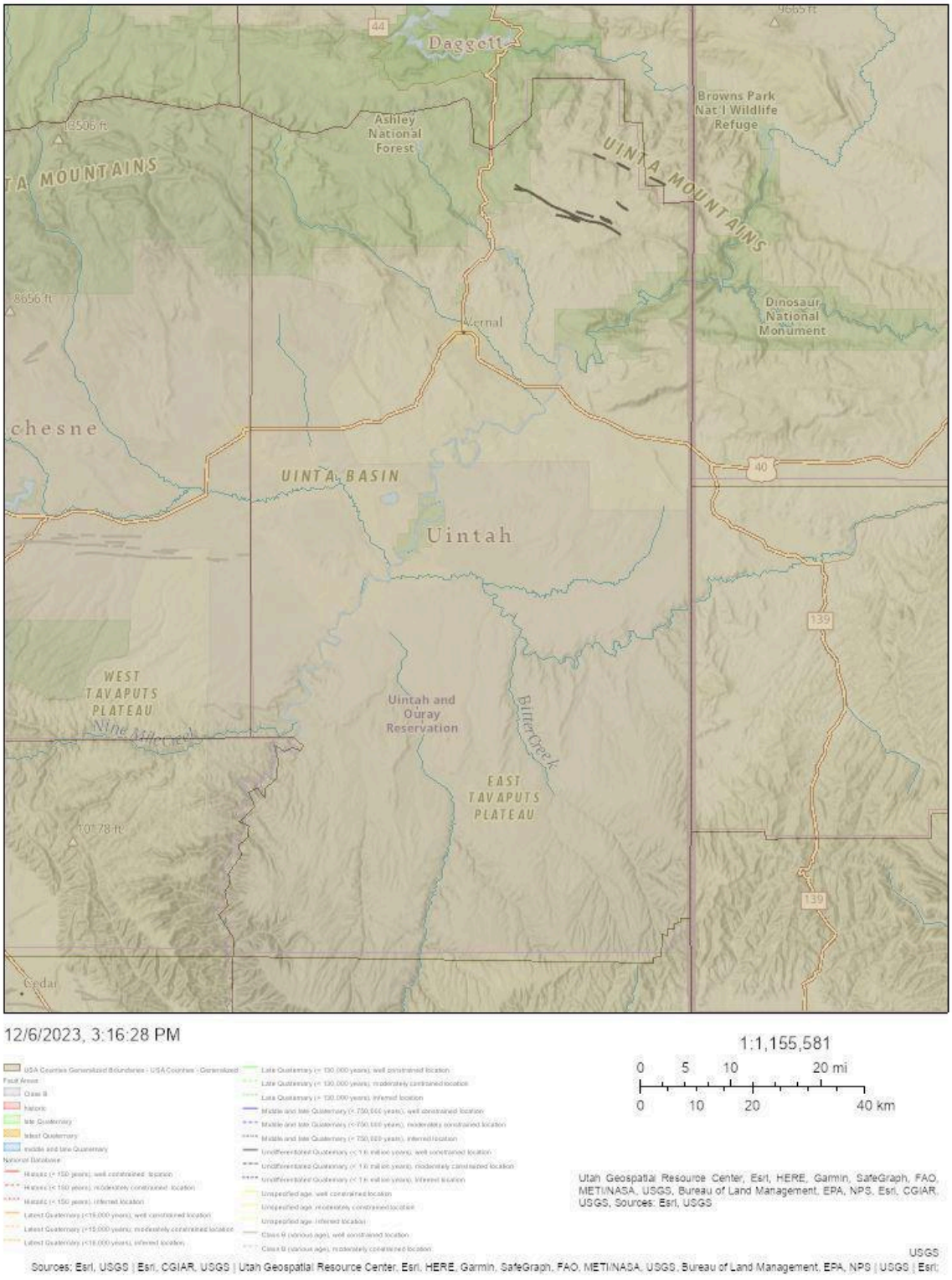


Figure 8-1. Uintah County Quaternary Faults

o EXTENT

Earthquakes are measured both in terms of their inherent "magnitude" and in terms of their local "intensity."

The magnitude of an earthquake is essentially a relative estimate of the total amount of seismic energy released and may be expressed using the familiar "Richter scale" or using the "moment magnitude scale" now favored by most technical authorities. On either scale, significant damage can be expected from earthquakes with a magnitude of about 5.0 or higher. What determines the amount of damage that might occur in any given location, however, is not the magnitude of the earthquake but the intensity at that particular place. Earthquake intensity decreases with distance from the earthquake's "epicenter" (its focal point) but also depends on local geological features, such as depth of sediment and bedrock layers.

Intensity is most commonly expressed using the "Modified Mercalli Intensity Scale" (MMI). Mercalli intensity is assigned based on eyewitness accounts. More quantitatively, intensity may be measured in terms of "peak ground acceleration" (PGA) expressed relative to the acceleration of gravity (g) and determined by seismographic instruments.

While Mercalli and PGA intensities are arrived at differently, they correlate reasonably well. While the locations most susceptible to earthquakes are known, there is little ability to predict an earthquake in the short term.

The following table correlates the MMI intensity with the Richter scale and effects of ground shaking:

Category	Effects	Richter Scale (approximate)
I. Instrumental	Not felt	1-2
II. Just perceptible	Felt by only a few people, especially on upper floors of tall buildings	3
III. Slight	Felt by people lying down, seated on a hard surface, or in the upper stories of tall buildings	3.5
IV. Perceptible	Felt indoors by many, by few outside; dishes and windows rattle	4
V. Rather strong	Generally felt by everyone; sleeping people may be awakened	4.5
VI. Strong	Trees sway, chandeliers swing, bells ring, some damage from falling objects	5
VII. Very strong	General alarm; walls and plaster crack	5.5
VIII. Destructive	Felt in moving vehicles; chimneys collapse; poorly constructed buildings seriously damaged	6
IX. Ruinous	Some houses collapse; pipes break	6.5
X. Disastrous	Obvious ground cracks; railroad tracks bent; some landslides on steep hillsides	7
XI. Very disastrous	Few buildings survive; bridges damaged or destroyed; all services interrupted (electrical, water, sewage, railroad); severe landslides	7.5
XII. Catastrophic	Total destruction; objects thrown into the air; river courses and topography altered	8

Figure 8-2. Modified Mercalli Scale vs. Richter Scale (SMS Tsunami Warning, 2024)

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Uintah County is in the lowest earthquake risk zone in Utah, zone 1, according to the Utah State Building Code seismic zone map (UGS, 1987). Uintah County experiences relatively few earthquakes, with most earthquakes in Uintah County occurring at a magnitude of 4.0 or lower. Due to the low magnitude of these earthquakes, there is very little recordable damage, and they are rarely noticeable by residents within this rural and sparsely populated region.

The USGS keeps a record of earthquakes throughout the world in their Earthquake Catalog. The following table lists all earthquakes felt in Uintah County since 1980 with a magnitude of 3.0 or higher. The USGS also records all mining explosions and quarry blasts in their database, which usually register as a 3.5 magnitude or lower and account for over half of the "felt earthquakes" in the county (USGS, 2024). These blasts are not included in the table below.

Table 8-1. Felt Earthquakes with Magnitude 3.5+ in Uintah County, UT

Date	Location	Magnitude	MMI Rating (as felt in Uintah County)
10/07/1985	5 km S of Maeser, UT	3.1	N/A
08/14/1988	13 km ESE of Castle Dale, UT	5.2	II–III
04/07/1990	28 km WNW of Bonanza, UT	4.0	N/A
03/02/1991	27 km SW of Jensen, UT	3.7	N/A
11/08/1991	17 km WNW of Bonanza, UT	3.7	N/A
09/30/1992	25 km NNE of Vernal, UT	3.0	N/A
03/20/1995	10 km NNW of Rangely, CO	4.5	IV
05/20/1995	Dinosaur, CO	4.1	N/A
06/20/2000	27 km SSE of Dutch John, UT	3.0	N/A
11/11/2000	14 km SE of Jensen, UT	3.6	N/A
04/15/2010	9 km NE of Randolph, UT	4.9	II–III
05/25/2016	15 km NNE of Tabiona, UT	4.0	II
04/22/2017	Rangely, CO	3.8	II
08/24/2018	43 km NW of Parachute, CO	4.1	II–III
03/18/2020	5 km NNE of Magna, UT	5.7	II
Source: USGS, 2024			

Low magnitude earthquakes of 4.0 or lower are expected to continue at the current trend. Higher magnitude earthquakes in Uintah County that cause significant damage are unlikely, but possible. Climate change currently has no known impact on earthquakes and is unlikely to contribute to earthquakes in Uintah County.

o IMPACTS & LOSS ESTIMATES

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by earthquakes, as presented in the table below.

Table 8-2. Impacts of Earthquake by Jurisdiction

Jurisdiction	May be Impacted by Earthquakes	Experienced Earthquake with Magnitude 3.0+	Potential Impacts of Earthquakes
Uintah County	Yes	Yes	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
City of Ballard	Yes	No	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
City of Naples	Yes	Yes	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses
City of Vernal	Yes	Yes	Injury, death, falling objects, property damage, building/bridge collapse, fallen trees/power lines, stranded/trapped vehicles/people, loss of utilities, fire, broken gas lines, dam failure, risk to emergency services, disruption in medical care, hazardous materials release, economic losses

Earthquakes are capable of catastrophic consequences, especially in urban areas. Worldwide, earthquakes have been known to cost thousands of lives and enormous economic and social losses. In minor earthquakes, damage may be done only to household goods, merchandise, and other building contents, and people are occasionally injured or killed by falling objects. More violent earthquakes may cause the full or partial collapse of buildings, bridges and overpasses, and other structures. Fires due to broken gas lines, downed power lines, and other sources are common following an earthquake and often account for much of the damage. Economic losses arise from destruction of structures and infrastructure, interruption of business activity, and innumerable other sources. Utilities may be lost for long periods of time and all modes of transportation may be disrupted. Emergency Services, including medical, may be both disabled and overwhelmed. In addition to broken gas lines, other hazardous materials may be released.

Table 8-3. Earthquake: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0.2 events per year	0.0	$40,805	$190	$482	$41,476	53.9	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County							

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
0.2 events per year	0.0	$36,147	$149	$177	$36,473	47.4	Very Low
Census Tract 968302: Unincorporated Uintah County							
0.1 events per year	0.0	$32,067	$106	$41	$32,214	36.6	Very Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0.3 events per year	0.0	$44,882	$175	$36	$44,093	50.6	Very Low
Census Tract 968401: City of Vernal							
0.3 events per year	0.0	$26,599	$167	$5	$26,771	73.0	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0.3 events per year	0.0	$27,474	$133	$15	$27,622	57.8	Relatively Low
Census Tract 968404: City of Vernal and City of Naples							
0.3 events per year	0.0	$26,668	$108	$11	$26,807	66.5	Relatively Low
Census Tract 968202: Unincorporated Uintah County							
0.3 events per year	0.0	$26,443	$68	$31	$26,542	31.8	Very Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

▪ Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People living in structures that are not up to current earthquake code, particularly older structures, are more likely to be damaged in an earthquake. Additionally, those who are unable to seek protection during an earthquake or transport themselves to a safe location after an earthquake may be at further risk.

Table 8-4. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%

Vulnerability Category	Number	Percent
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately recover after an earthquake.

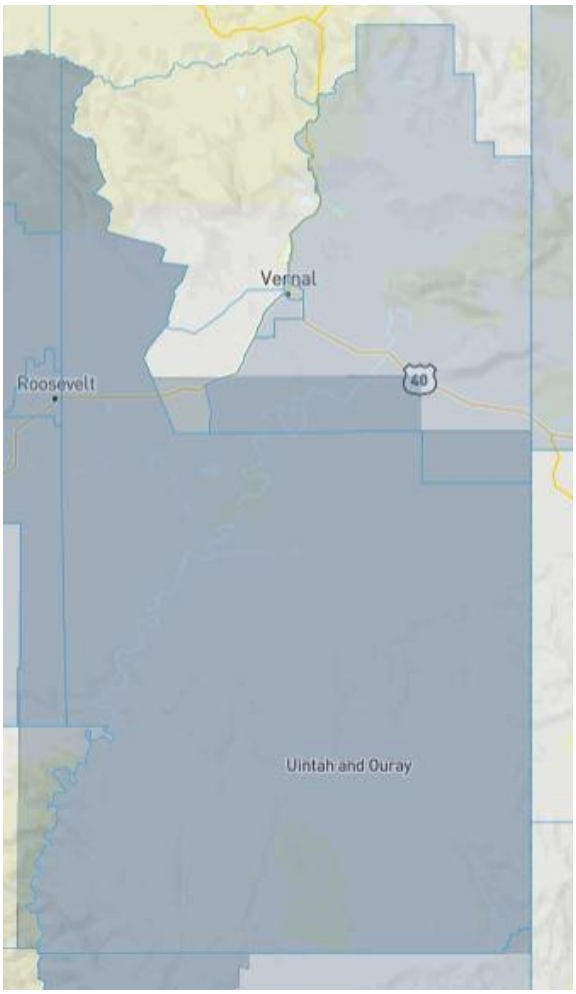


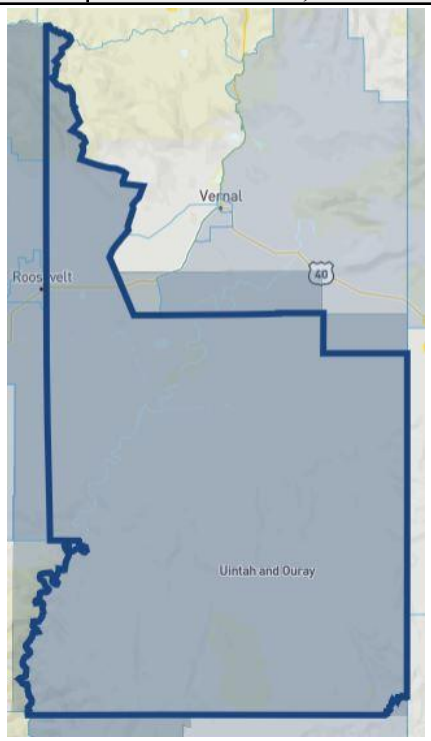
Figure 8-3. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 8-5. Disadvantaged Communities in Uintah County

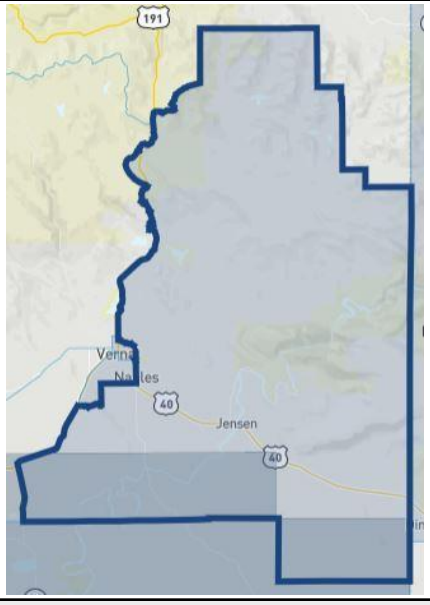
UINTAH COUNTY, UT
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT

UINTAH COUNTY, UT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES



CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development	
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*
YES	*Presence of one or more abandoned mine land within the tract*
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*

CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES

UINTAH COUNTY, UT	
	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Earthquakes may cause significant damage to critical facilities, including power outages from downed power lines or damaged power plant facilities. The following table lists types of critical facilities that could be negatively affected by earthquakes, which could delay emergency response and access to life-saving medical equipment.

Table 8-6. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks

Critical Facility Type	Location
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

No data exists demonstrating the impact of earthquakes on future development in Uintah County. However, past earthquakes have been shown to impact zoning regulations and building codes requiring developers to build structures more resistant to seismic activity.

▪ Probabilistic 100-Year Earthquake—Magnitude 5

Based on HAZUS 6.1, the probabilistic 5.0 magnitude earthquake 100-year return period. Uintah County can anticipate damages listed in the tables below.

Direct Earthquake Damage

Building Damage

Hazus estimates that about 7 buildings will be at least moderately damaged. This is over 0.00 % of the buildings in the region. There are an estimated 0 buildings that will be damaged beyond repair. The definition of the 'damage states' is provided in Volume 1: Chapter 5 of the Hazus technical manual. Table 3 below summarizes the expected damage by general occupancy for the buildings in the region. Table 4 below summarizes the expected damage by general building type.

Damage Categories by General Occupancy Type

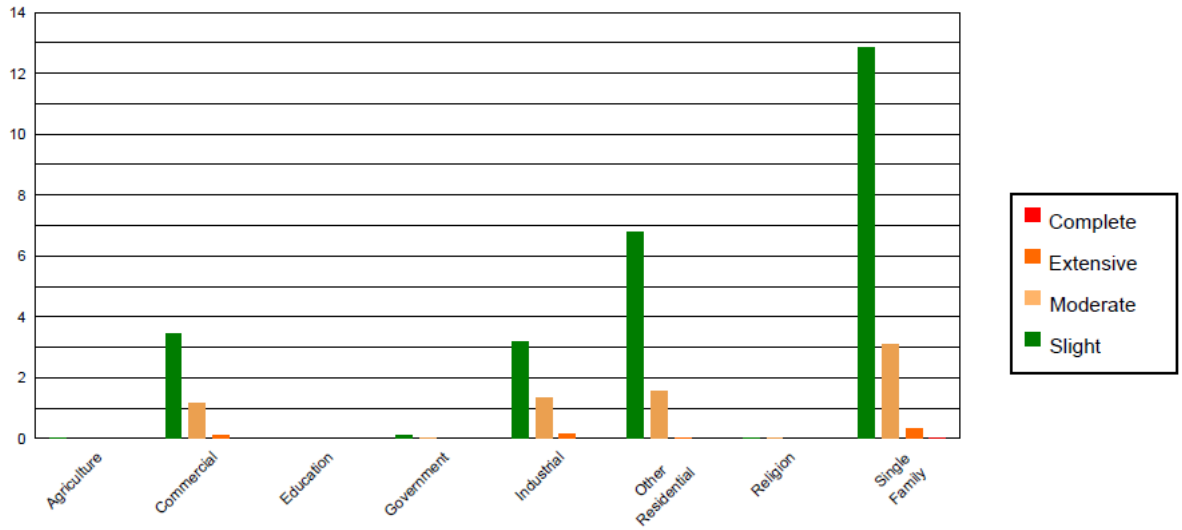


Table 3: Expected Building Damage by Occupancy

	None		Slight		Moderate		Extensive		Complete	
	Count	(%)	Count	(%)	Count	(%)	Count	(%)	Count	(%)
Agriculture	303.97	2.53	0.03	0.10	0.00	0.04	0.00	0.00	0.00	0.00
Commercial	634.27	5.29	3.45	13.09	1.16	16.25	0.12	18.30	0.00	0.00
Education	19.00	0.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Government	14.88	0.12	0.10	0.38	0.02	0.28	0.00	0.11	0.00	0.00
Industrial	423.36	3.53	3.17	12.03	1.32	18.44	0.15	23.36	0.00	0.00
Other Residential	1044.66	8.71	6.77	25.67	1.54	21.50	0.03	4.04	0.00	2.10
Religion	8.97	0.07	0.03	0.10	0.01	0.09	0.00	0.08	0.00	0.00
Single Family	9550.71	79.59	12.82	48.62	3.11	43.41	0.34	54.11	0.02	97.90
Total	**12,000**		**26**		**7**		**1**		**0**	

o CLIMATE CHANGE IMPLICATIONS

▪ Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

▪ Effects of Climate Change on Probability of Future Events

Climate change currently has no known impact on earthquakes and is unlikely to contribute to future earthquakes in Uintah County.

o FEMA NRI SCORE

Table 8-7. Earthquake: Overall National Risk Index Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
60.16	Relatively Low	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
45.5	Very Low	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
35.62	Very Low	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
53.26	Very Low	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
75.21	Relatively Low	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
63.37	Relatively Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
66.85	Relatively Low	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
34.93	Very Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

• LANDSLIDE

o HAZARD DESCRIPTION

Potential Probability	___ ___ ___	Low
Potential Consequence	___ ___ ___	Low
Location		Along southern flank of Uinta Mountains, especially near outcroppings of Bishop Conglomerate formation; along U.S. 191
Seasonal Pattern or Conditions		Runoff or heavy rain
Duration		Events may last minutes to hours to months
Analysis Used		UDOT, NOAA, UGS, USGS, 2019 Utah Hazard Mitigation Plan, Utah State University, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Environmental Defense Fund

The term “landslide” encompasses several types of occurrences (including mudslides) in which slope-forming materials, such as rock and soil, move downward under the influence of gravity. Such downward movement may occur as the result of an increase in the weight of slope-forming materials, an increase in the gradient (angle) of the slope, a decrease in the forces resisting downward motion (friction or material strength), or a combination of these factors. Factors that may trigger a landslide include weather-related events, such as heavy rainfall (one of the most common contributors), erosion, and freeze-thaw weakening of geologic structures; human causes, such as excavation and mining, deforestation, and vibration from explosions or other source; and geologic causes, such as earthquake and shearing or fissuring. The speed of descent ranges from sudden and rapid to an almost imperceptibly slow creep where effects are only observable over a period of months or years.

o LOCATION

Landslides are most common along the southern flank of the Uinta Mountains in areas adjacent to the Oligocene Bishop Conglomerate formation (Kowallis, 2005). The Bishop Conglomerate is a bedrock layer that extends across the Uinta Mountains and goes into Wyoming and Colorado. It consists of loosely cemented boulders, cobbly conglomerate, and pebbly sandstone (USGS, 2009). There are many outcroppings of the Bishop Conglomerate that are exposed along the slopes of the Uinta Mountains with weak Mesozoic shales and mudstones underneath. This leads to a perfect opportunity for landslides to develop, especially when the slopes become steep and moisture conditions increase. The following map shows the Bishop Conglomerate and landslide areas present in the Dry Fork and Ashley Valley region of the county (Kowallis, 2005).

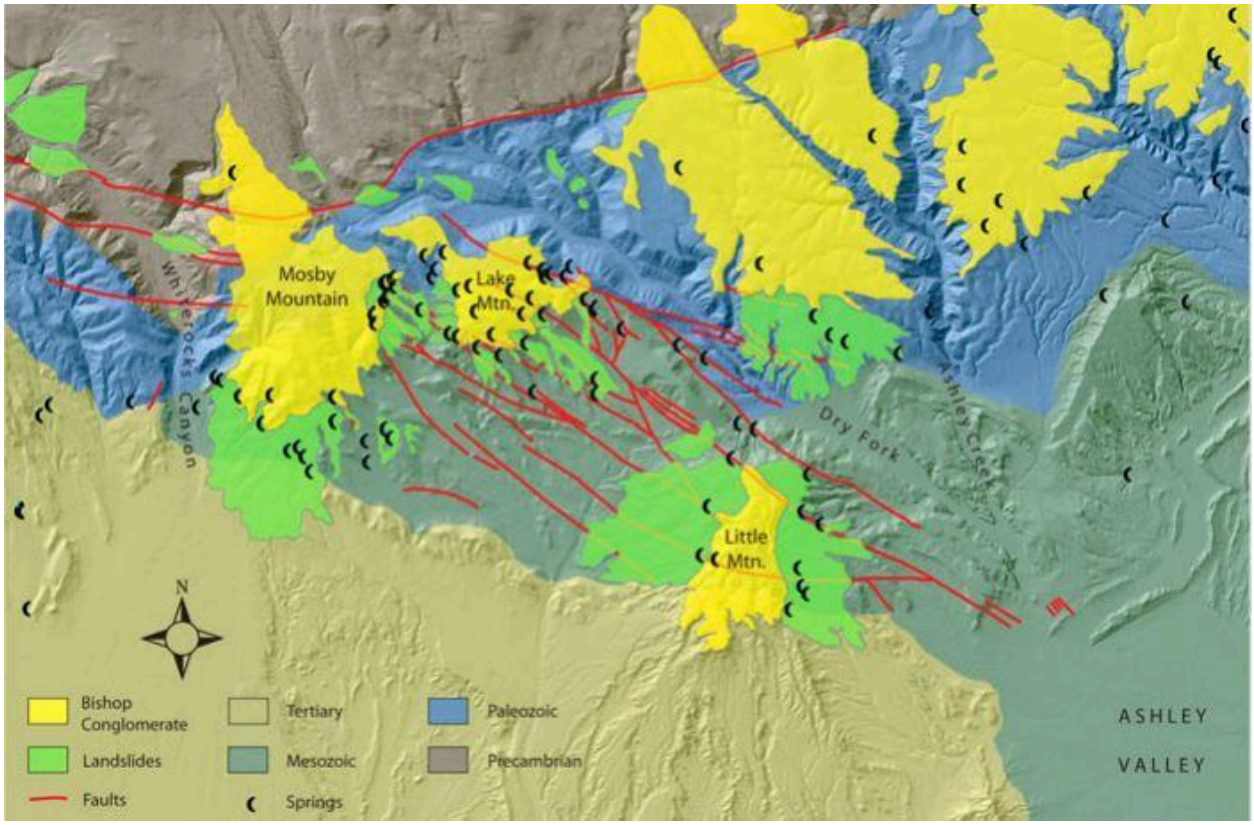


Figure 9-1. Generalized Bedrock Geologic Map with Landslide Areas in Uinta Mountains (Kowallis, 2005)

Spring run-off or heavy rain periods may cause expansion of soils, such as clay and large rock. This is mainly a problem on U.S. 191 and is the responsibility of the Utah Department of Transportation (UDOT) to manage. However, routes that are affected can cause traffic and travel time delays.

The map below shows the likely and probable landslide locations within Uintah County. There are several areas, namely Blue Mountain, Diamond Mountain, Dry Fork Canyon, and the Book Cliffs, that could pose a potential risk to recreational visitors (hikers, etc.), local roads, and some primary residences due to landslides.

Uintah County Landslides

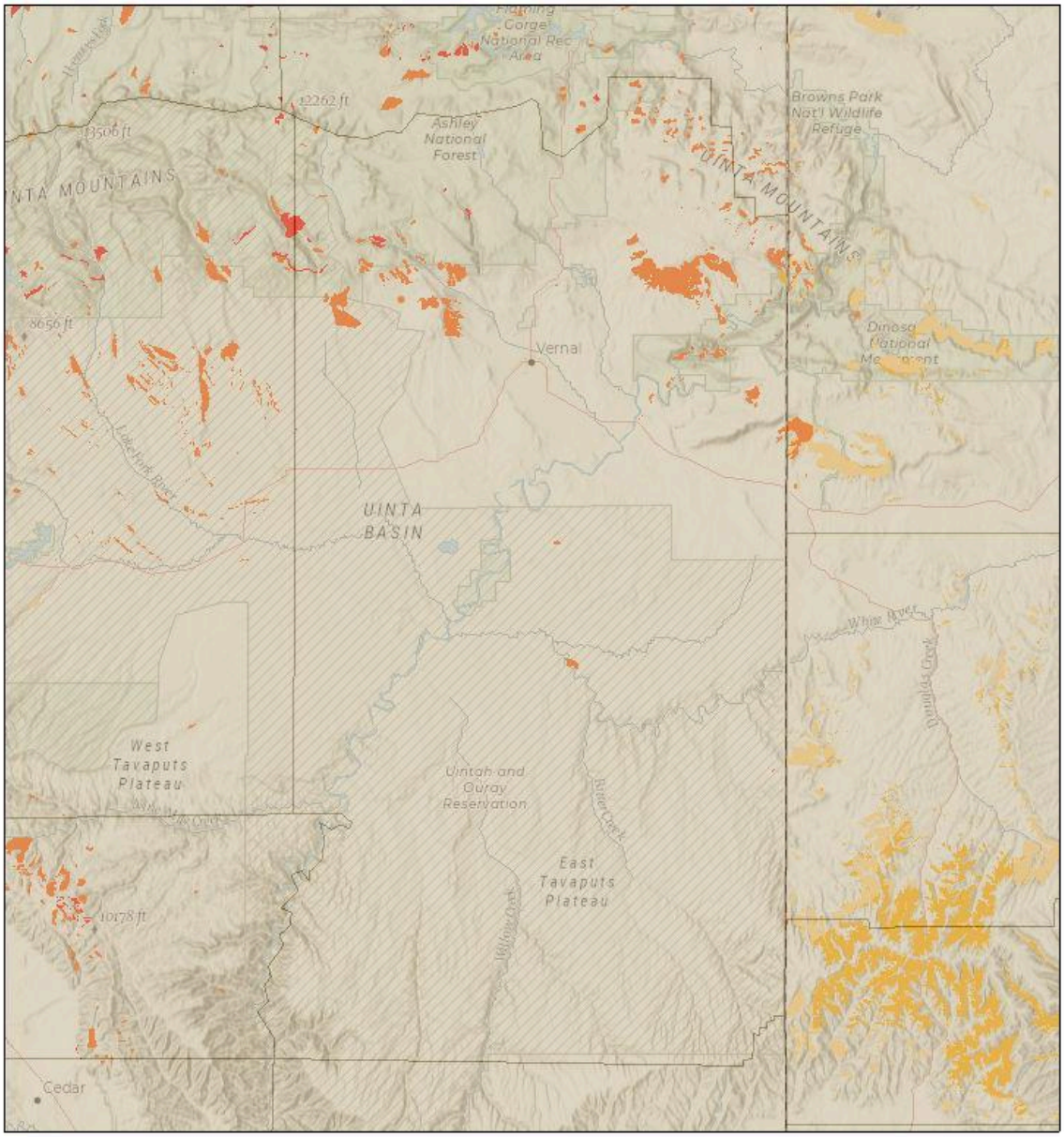


Figure 9-2. Uintah County Probable Landslide Locations (USGS, 2024)

As stated in the previous regional plan, there are approximately 66 residential structures within Uintah County located on approximately 20,983 acres of historically active landslides. The potential threat to roads and utilities is shown in the following table.

Table 9-1. Potential Landslide Threat to Roads and Utilities

Transportation	
Name	**Miles**
Local Neighborhood/City Roads	23
Utilities	
Name	**Miles**
Power Lines	1
Natural Gas	0.032

o EXTENT

Factors that influence landslides are soil type and steepness of slope. Soil type is a key indicator for landslide potential and is used by geologists and geotechnical engineers to determine soil stability for construction standards. Past movements are also a good indicator of where movements might possibly exist.

The following map from Utah State University depicts landslide susceptibility in parts of Uintah County, Duchesne County, and Daggett County. Landslide susceptibility in the Uinta Basin is classified within the categories of High, Moderate, Low, and Very Low, as seen below (USU, 2013).

- *High Susceptibility*: Areas of existing shallow and deep landslides are shown as red on the map. Slope and geologic unit were not included as criteria in this category.
- *Moderate Susceptibility*: Areas that have slopes prone to landslides based on observed landslide slope angles are shown as orange on the map. The category includes slopes greater than 12% (7 deg.) to greater than 32% (18 deg.), depending on the geologic unit present.
- *Low Susceptibility*: Areas that have slopes that may produce landslides are shown as yellow on the map. This category includes slopes from 9–12% (5–7 deg.) as the lower threshold ranging to 23–32% (13–18 deg.), for the upper threshold depending on the geologic unit present.
- *Very Low Susceptibility*: Areas that are unlikely to produce landslides are not assigned any particular color, but generally show up as tan on the map. This category includes slopes less than 9% (5 deg.) to less than 12% (7 deg.), depending on the geologic unit.

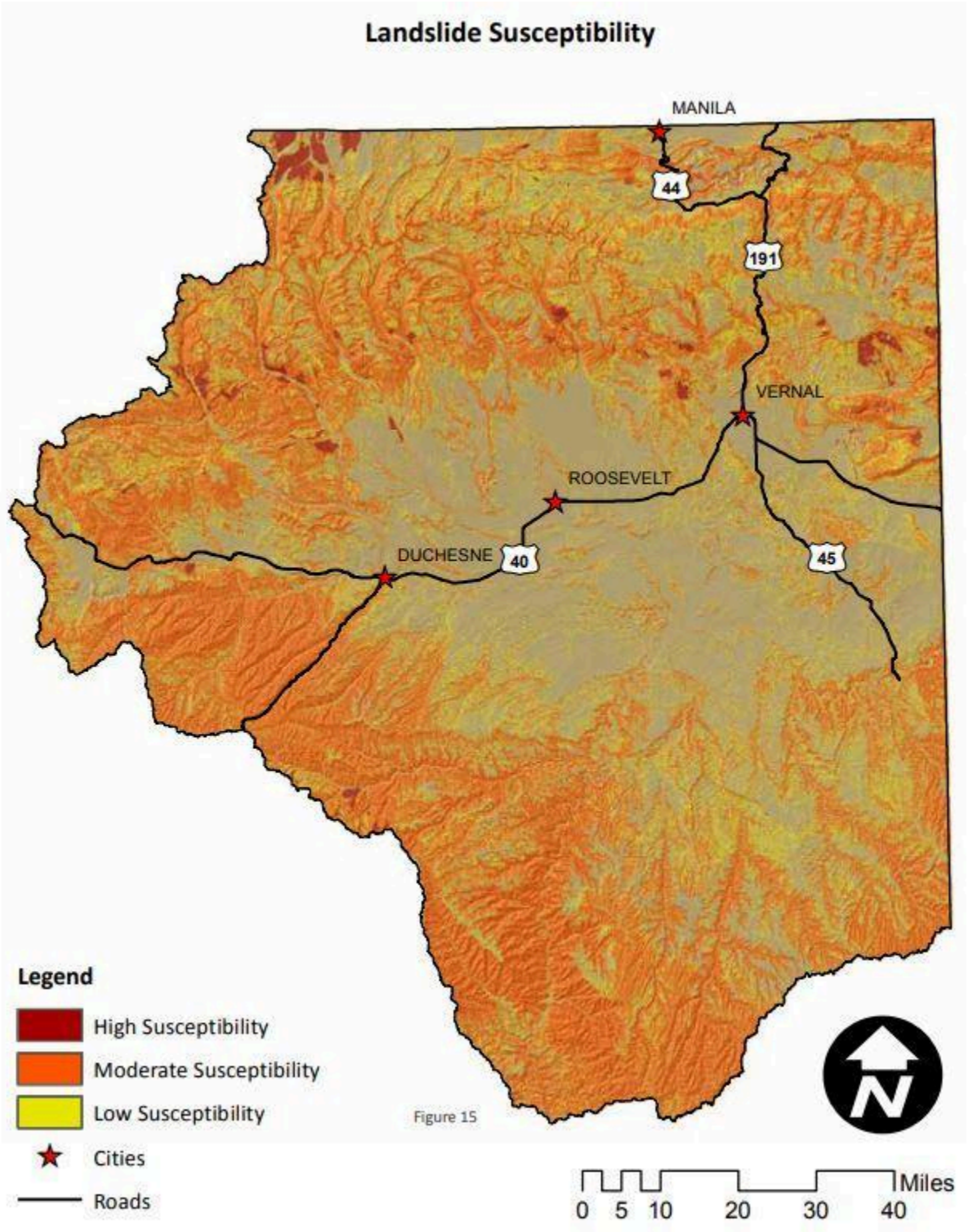


Figure 9-3. Landslide Susceptibility in the Uinta Basin (USU, 2013)

o HISTORICAL FREQUENCY & PROBABILITY OF FUTURE OCCURRENCE

Historically, many of the past landslides in the county occurred in the northern mountainous region of Uintah County. Generally, these landslides develop in well-defined, localized areas. Previous landslide areas will most likely be the location of future landslides. Additionally, several small-scale rockslides and landslides occur annually in Uintah County, usually due to heavy rain and flash flooding. These rockslides are often classified as debris flows, in which moving water carries mud, rocks, and other debris over the affected areas. The following table shows one mudslide, one debris flow, and one rockslide in the county between 2000–2023.

Table 9-2. Rockslide/Mudslide/Landslide Events in Uintah County, UT (2000–2023)

Location Within County	Date	Description
Eastern Uinta Mountains	08/09/2005	Heavy rain caused several mudslides 12 miles north of Lapoint, wiping out 200 feet of fence
Fort Duchesne, Vernal, Naples	08/07/2008	Debris flow across several roads near Vernal with up to four feet of debris. Debris also filled sewer lines in the Maeser area.
Jones Hole Canyon	06/20/2013	Large rockslide on trail
Source: NOAA Storm Events Database, 2000–2023		

Landslides are influenced by weather and climate events, such as drought, severe weather, wildfire, and flooding, which are expected to increase in severity with climate change. According to Neighborhoods at Risk, Uintah County is expected to experience 13 more days that reach above 95°F by 2049 with an increase in average annual temperature of 3°F. Additionally, the county is expected to experience 0.1 more days of heavy precipitation per year by 2049 (from 0.5 days to 0.7 days per year) with a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation (2024). The planning area should anticipate potential for heightened landslide risk because of climate change and changing weather patterns. The planning area is subject to severe storms and weather on an annual basis, with monsoon rains regularly triggering flash flooding or debris flow events. Where severe storm events are expected to increase in frequency and intensity, landslides are likewise expected to become more frequent. Events such as wildfire and drought can change the landscape of an area as vegetation is damaged or lost with these events. These changes can make landscapes vulnerable to landslides and debris flows.

On June 20, 2013, a large rockslide occurred on Jones Hole Trail in Jones Hole Canyon in Uintah County during which a 100-by-50-foot section of sandstone broke off a cliff face and sprayed dust, rock, and boulders into and across the creek below. The initial slab was over 10 feet thick and broke apart when it fell, creating several massive boulders, with the largest measuring more than 10 feet tall and 10 feet wide. Multiple smaller rockslides occurred before and after this event, as well. The trail was closed for nearly two months, and a section of the creek was closed for over two years to continue monitoring movement (KSL, 2013).

o IMPACTS & LOSS ESTIMATES

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by landslides, as presented in the table below.

Table 9-3. Impacts of Landslide by Jurisdiction

Jurisdiction	Impacted by Landslides	Potential Impacts of Landslides
Uintah County	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
City of Ballard	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
City of Naples	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses
City of Vernal	Yes	Injury, blunt force trauma, death, property damage, road closures, road destruction/blockages, loss of land usage, industrial/agricultural/forest productivity losses, reduced property values, decreased tourism, loss of utilities, unintentional dams, reduced water quality, economic losses, repair expenses, debris removal expenses

Some of the many direct and indirect impacts of landslides are:

- Human and animal deaths and injuries and resulting productivity losses
- Damage or destruction of structures
- Destruction or blockage of roadways and resulting transportation interruption
- Loss of or reduced land usage
- Loss of industrial, agricultural, and forest productivity
- Reduced property values in areas threatened by landslide
- Loss of tourist revenues and recreational opportunities
- Damaged or destroyed infrastructure and utilities
- Damming or alteration of the course of streams and resulting flooding
- Reduced water quality

There is only limited information on the direct and indirect economic costs of geologic hazards in the U.S., such as landslides. However, it is estimated that landslides in the U.S. cause between $1.7 and $3.4 billion in damages each year (Utah Hazard Mitigation Plan, 2019).

Losses due to landslide events are generally tied to the repair of roadways or the removal of debris on roadways. These roads are maintained by UDOT. Limited course of mitigation may occur because it is not economically feasible for UDOT to spend tax dollars to rebuild a new road route or remove the large facing walls of rock and soil.

Based upon figures provided by the Uintah County Assessor's Office in 2012, the market value of residential structures at risk to potential landslides was estimated to be $5,280,000. The potential loss to roads and utilities is shown in the table below.

Table 9-4. Potential Landslide Losses to Roads and Utilities

Transportation	
Name	**Estimated Cost**
Local Neighborhood/City Roads	$46,000,000
Utilities	
Name	**Estimated Cost**
Power Lines	$241,390
Natural Gas	$1,544
Note: Costs are in 2012 dollars.	

The Expected Annual Loss scores from the National Risk Index can be seen below.

Table 9-5. Landslide: Expected Annual Loss for Uintah County, UT | FEMA National Risk Index

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County							
0 events per year	0.0	$5,030	$1,404	N/A	$6,434	93.7	Relatively High
Census Tract 968201: City of Naples and Unincorporated Uintah County							
0.2 events per year	0.0	$43,964	$16,059	N/A	$60,023	99.4	Very High
Census Tract 968302: Unincorporated Uintah County							
0 events per year	0.0	$6,476	$1,400	N/A	$7,876	95.3	Relatively High
Census Tract 968301: City of Vernal and Unincorporated Uintah County							
0 events per year	0.0	$2,181	$524	N/A	$2,704	82.1	Relatively Moderate
Census Tract 968401: City of Vernal							
0 events per year	0.0	$0	$0	N/A	$0	0.0	No Expected Annual Losses
Census Tract 968403: City of Vernal and Unincorporated Uintah County							
0 events per year	0.0	$210	$51	N/A	$261	50.2	Relatively Low
Census Tract 968404: City of Vernal and City of Naples							
0 events per year	0.0	$0	$0	N/A	$0	0.0	No Expected Annual Losses

Annualized Frequency	Population	Population Equivalence	Building Value	Agriculture Value	Total Value	Expected Annual Loss Score	Rating
Census Tract 968202: Unincorporated Uintah County							
0 events per year	0.0	$866	$157	N/A	$1,023	65.6	Relatively Low

Annualized Frequency: The natural hazard annualized frequency is defined as the expected frequency or probability of a hazard occurrence per year. Annualized frequency is derived either from the number of recorded hazard occurrences each year over a given period or the modeled probability of a hazard occurrence each year.
Population: Population exposure is defined as the estimated number of people determined to be exposed to a hazard according to a hazard type-specific methodology.
Expected Annual Loss scores are calculated using an equation that combines values for exposure, annualized frequency, and historic loss ratios (Expected Annual Loss = Exposure x Annualized Frequency x Historic Loss Ratio). Source: National Risk Index, 2024e; 2024f

▪ Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People who are unable to seek immediate protection during a landslide or transport themselves to a safe location after a landslide may be at further risk.

Table 9-6. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and may lack resources to adequately recover after a landslide.

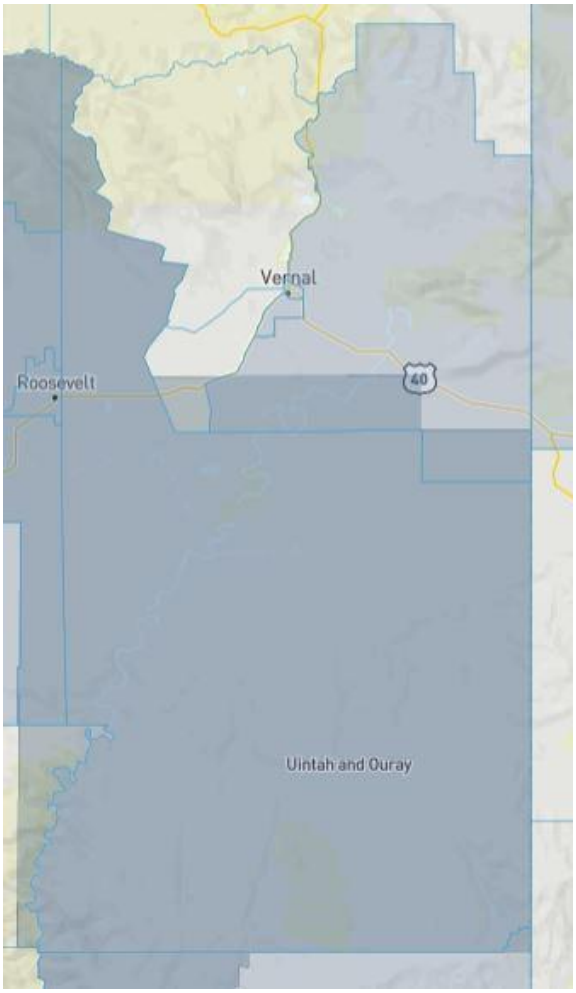
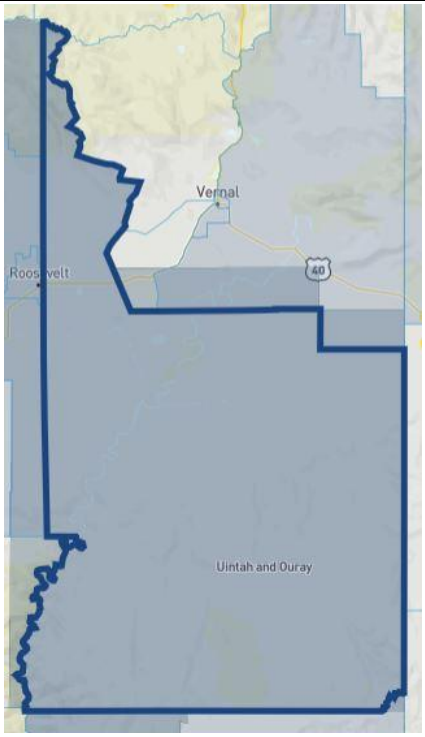
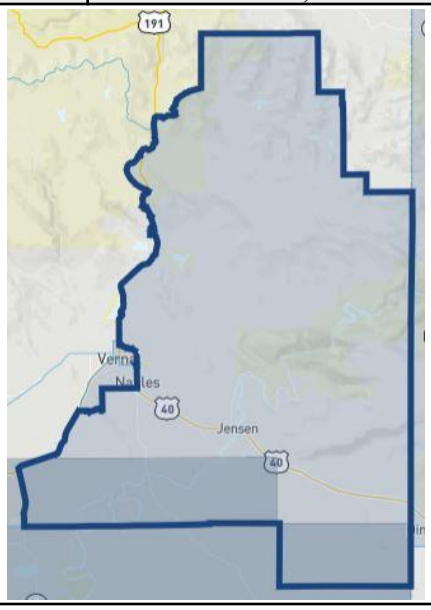


Figure 9-4. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 9-7. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Landslides may cause significant damage to critical facilities and could take out power or communication lines. The following table lists types of critical facilities that could be negatively affected by landslides, which could delay emergency response and access to life-saving medical equipment.

Table 9-8. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

▪ Changes in Development

There is no impact based on current development trends on either current or future development.

o CLIMATE CHANGE IMPLICATIONS

Effects of Climate Change on Severity of Impacts

According to the Environmental Defense Fund (EDF), a warmer planet is evaporating more water into the atmosphere, resulting in more precipitation in the form of heavy snowfall or downpour (Environmental Defense Fund, 2023). Additionally, heavy precipitation leads to riverine flooding and flash floods as the ground fails to absorb the high volume of precipitation that falls in a short period. This can make the ground more unstable and at risk for increased landslides. Increasing annual precipitation contributes to sustained flooding (Neighborhoods at Risk, 2024).

Effects of Climate Change on Probability of Future Events

Table 9-9. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	Increasing annual precipitation can lead to unstable ground and contribute to landslides.
Source: Neighborhoods at Risk, 2024	

o FEMA NRI SCORE

Table 9-10. Landslide: Overall National Risk Index Score for Uintah County, UT | FEMA National Risk Index

Risk Index Score	Risk Index Rating	Social Vulnerability Rating	Community Resilience Rating
Census Tract 940201: City of Ballard and Unincorporated Uintah County			
95.71	Relatively High	Very High	Relatively Low
Census Tract 968201: City of Naples and Unincorporated Uintah County			
99.34	Very High	Relatively Low	Relatively Low
Census Tract 968302: Unincorporated Uintah County			
94.4	Relatively High	Relatively Low	Relatively Low
Census Tract 968301: City of Vernal and Unincorporated Uintah County			
84.47	Relatively Moderate	Relatively Moderate	Relatively Low
Census Tract 968401: City of Vernal			
0.0	No Rating	Relatively High	Relatively Low
Census Tract 968403: City of Vernal and Unincorporated Uintah County			
53.01	Relatively Low	Very High	Relatively Low
Census Tract 968404: City of Vernal and City of Naples			
0.0	No Rating	Relatively Moderate	Relatively Low
Census Tract 968202: Unincorporated Uintah County			
68.33	Relatively Low	Relatively Moderate	Relatively Low
Risk Index scores are calculated using an equation that combines scores for Expected Annual Loss due to natural hazards, Social Vulnerability, and Community Resilience (Expected Annual Loss x Social Vulnerability / Community Resilience = Risk Index). Source: National Risk Index, 2024b; 2024d			

PROBLEM SOILS

HAZARD DESCRIPTION

Problem soils, such as expansive, compressible, and collapsible soils, can cause extensive damage to structures and foundations. Land subsidence, earth fissures, and radon gas are a few of the effects of problem soils and rock. Problem soils also prevent or limit successful crop production because the land is not fertile or productive, and there is a possibility of erosion hazard when cultivated.

Expansive soils and land subsidence are of most concern to the communities of Uintah County, so they are broken down further in the following *Related Hazards* section.

RELATED HAZARDS

Expansive Soils

Hazard Description

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Ballard, Naples, and Vernal	
Seasonal Pattern or Conditions	Year-round event	
Duration	Ongoing variable	
Analysis Used	UGS, 2019 Utah Hazard Mitigation Plan, Science Direct, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk	

Expansive soil and rock consist of high clay content that swells when wet and shrinks when dry (UGS, 2024). Expansive clay is prone to large volume changes when affected by water. In drier seasons, soils experience shrinkage, often causing deep cracks in the ground, which are called vertisols. These soils are considered to be one of the more problematic soils because they can cause damage to various structures, especially lightweight civil structures such as sidewalks and driveways, due to the shifting soils beneath the structures (Science Direct, 2024).

Soils consisting of coarse-grained particles (e.g., cobbles, pebbles, and sands) can also be expansive depending on the percentage and type of clay minerals present in the soil's fine content. The primary elements present in clays are silicone, aluminum, and oxygen, although other elements such as hydrogen, sodium, calcium, magnesium, and sulphur may also be present. Common clay minerals that are prone to swelling include smectite, bentonite, montmorillonite, vermiculite, and chlorite (Science Direct, 2024).

- ***Location***

Expansive soils as a hazard is site-specific, meaning that each incorporated jurisdiction will have its own vulnerability level. Every jurisdiction, including Ballard, Naples, and Vernal, may be affected by expansive soils, although limited data currently exists on specific locations.

- ***Extent***

Expansive soils have a swelling potential that depends on the mineral composition of the soil and the in situ moisture content and density. Soil permeability also affects the rate of swelling. According to Atterberg limits, which are useful in predicting soil behavior, the degree of expansion of a soil can be classified as seen in the table below (Science Direct, 2024).

Table 10-1. Degree of Expansion

Soil Properties	Low	Medium	High	Very High
Liquid Limit	20–25	35–50	50–70	70–90
Plasticity Index	< 12	12–23	23–32	> 32
Shrinkage Index	< 15	15–30	30–60	> 60
Free Swell Percentage	< 50	50–100	100–200	> 200
Source: Science Direct, 2024				

Expansive soils can also be classified in terms of linear extensibility percent (LEP), which ranges from low to very high. LEP is the linear expression of the volume difference of natural soil fabric at 1/3 bar or 1/10 bar water content and oven dryness, as reported as a percent change for the whole soil (Canadian County, 2013). The following table shows the LEP classifications.

Table 10-2. Linear Extensibility Percent (LEP) Classifications

Expansion Potential	Linear Extensibility Percent
Very High	> 9%
High	6%–9%
Moderate	3%–6%
Low	< 3%
Water	0%
Source: Canadian County, 2013	

- ***Historical Frequency & Probability of Future Occurrence***

Due to lack of data, there is no way to predict the likely frequency of expansive soil impacts. As of the time of this plan's development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as the county's infrastructure ages, especially dated water and sewer lines, it becomes more susceptible to damage from expansive soils. A prolonged period of drought could also significantly speed and intensify infrastructure deterioration.

- ***Impacts & Loss Estimates***

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by expansive soils, as presented in the table below.

Table 10-3. Impacts of Expansive Soils by Jurisdiction

Jurisdiction	May Be Impacted by Expansive Soils	Potential Impacts of Expansive Soils
Uintah County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Ballard	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Naples	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Vernal	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Structural damage to lightweight structures, such as sidewalks, driveways, and roadways, is most common due to expansive soils. Lifting of buildings, damage to basements, building settlement, and cracks in walls and ceilings are other problems related to the continual shrinking and swelling of soils. Damage may occur to pipelines and other public utilities, as well. Lateral movement of foundations and retaining walls is a likely impact due to pressure exerted on vertical walls from shifting soils. This can also lead to loss of residual shear strength (Science Direct, 2024).

Damaged pavements may result in high maintenance and replacement costs, along with increased legal and financial liability from pavement separation and gaps causing possible trip hazards. Future maintenance may disrupt business activities, resulting in increased costs or loss of revenue. While problem soils have caused significant infrastructure damage and economic impact, there have been no deaths recorded in Utah due to problem soils directly (Utah Hazard Mitigation Plan, 2019).

Due to the nature of expansive soils, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by expansive soils.

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in

disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an incident may be at further risk.

Table 10-4. Vulnerable Populations in Uintah County, UT

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and whose communities lack robust infrastructure and adequate funding for repairs.

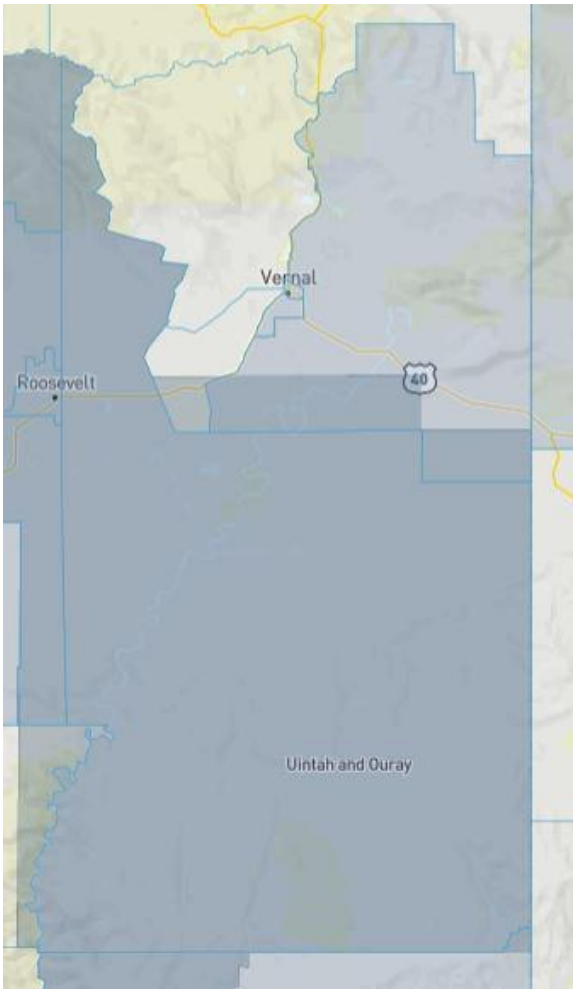
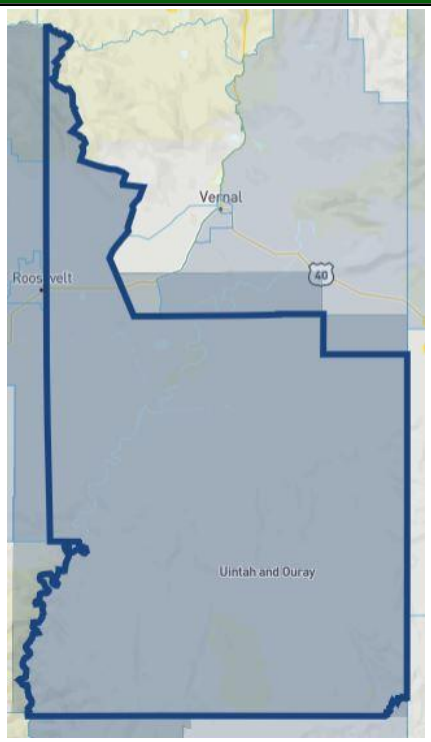
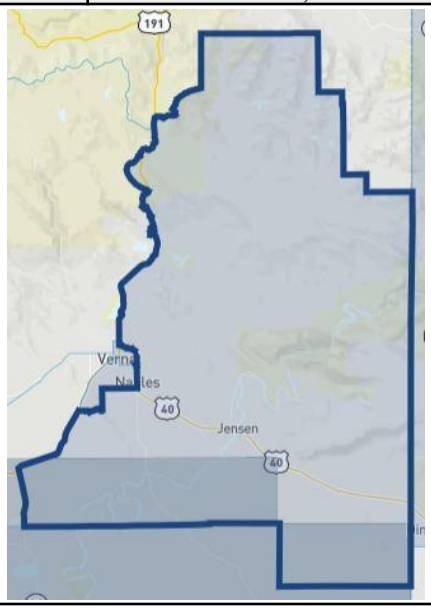


Figure 10-1. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 10-5. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Problem soils could cause significant damage to critical facilities depending on location. The following table lists types of critical facilities that could be negatively affected by problem soils, which could delay emergency response and access to life-saving medical equipment.

Table 10-6. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

- ***Climate Change Implications***

Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

Effects of Climate Change on Probability of Future Events

Table 10-7. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Precipitation Projections	By 2049, Uintah County is expected to experience 0.1 more days of heavy precipitation per year (from 0.5 days to 0.7 days per year).
	By 2049, Uintah County is expected to have a 0.6” increase (from 12.6” to 13.2”) in average annual precipitation.
	Increasing annual precipitation can lead to unstable ground and contribute to additional soil swelling.
Source: Neighborhoods at Risk, 2024	

● *FEMA NRI Score*

FEMA does not evaluate expansive soils as part of its National Risk Index.

▪ Land Subsidence

● *Hazard Description*

Potential Probability		Low
Potential Consequence		Low
Location	Countywide, including Ballard, Naples, and Vernal	
Seasonal Pattern or Conditions	Year-round event	
Duration	Ongoing variable	
Analysis Used	UGS, USGS, NOAA, 2019 Utah Hazard Mitigation Plan, Water Education Foundation, local newspaper articles, National Risk Index, U.S. Census, Headwaters Economics, Climate & Economic Justice Screening Tool, Resilience Analysis & Planning Tool, HHS, Neighborhoods at Risk	

Land subsidence is the sinking or settling of the Earth’s surface caused by groundwater depletion and/or underground mine subsidence or collapse. Earth fissures may result from subsidence, which are permanent, linear tension cracks in the ground that extend upward from the groundwater table (UGS, 2024). Primary causes of subsidence include groundwater withdrawals, drainage of organic soils, underground mining, and natural compaction or collapse (e.g., sinkholes). Natural hazards like earthquakes and erosion can cause subsidence, as well (USGS, 2019). The photo to the right depicts an earth



fissure from land subsidence and groundwater withdrawal in Enoch, Utah (UGS, 2011).

- ***Location***

Every jurisdiction, including Ballard, Naples, and Vernal, may be affected by expansive soils, although limited data currently exists on specific locations.

- ***Extent***

The NOAA National Geodetic Survey maintains a network of GPS receivers throughout the country, called a Continuously Operating Reference Station (CORS). This can track height changes at local stations to monitor subsidence. Areas without a CORS can measure subsidence from satellite radar, temporary GPS receivers, repeated surveys of geodetic leveling, or installations of ground and water sensors (NOAA, 2024).

Extensometers are another way to measure subsidence and aquifer compaction by measuring the amount of compaction between the well anchor and the ground level. Extensometers are deep wells of up to 3000 feet below the ground surface. The following figure depicts a diagram of a borehole extensometer (Harris-Galveston, 2024).

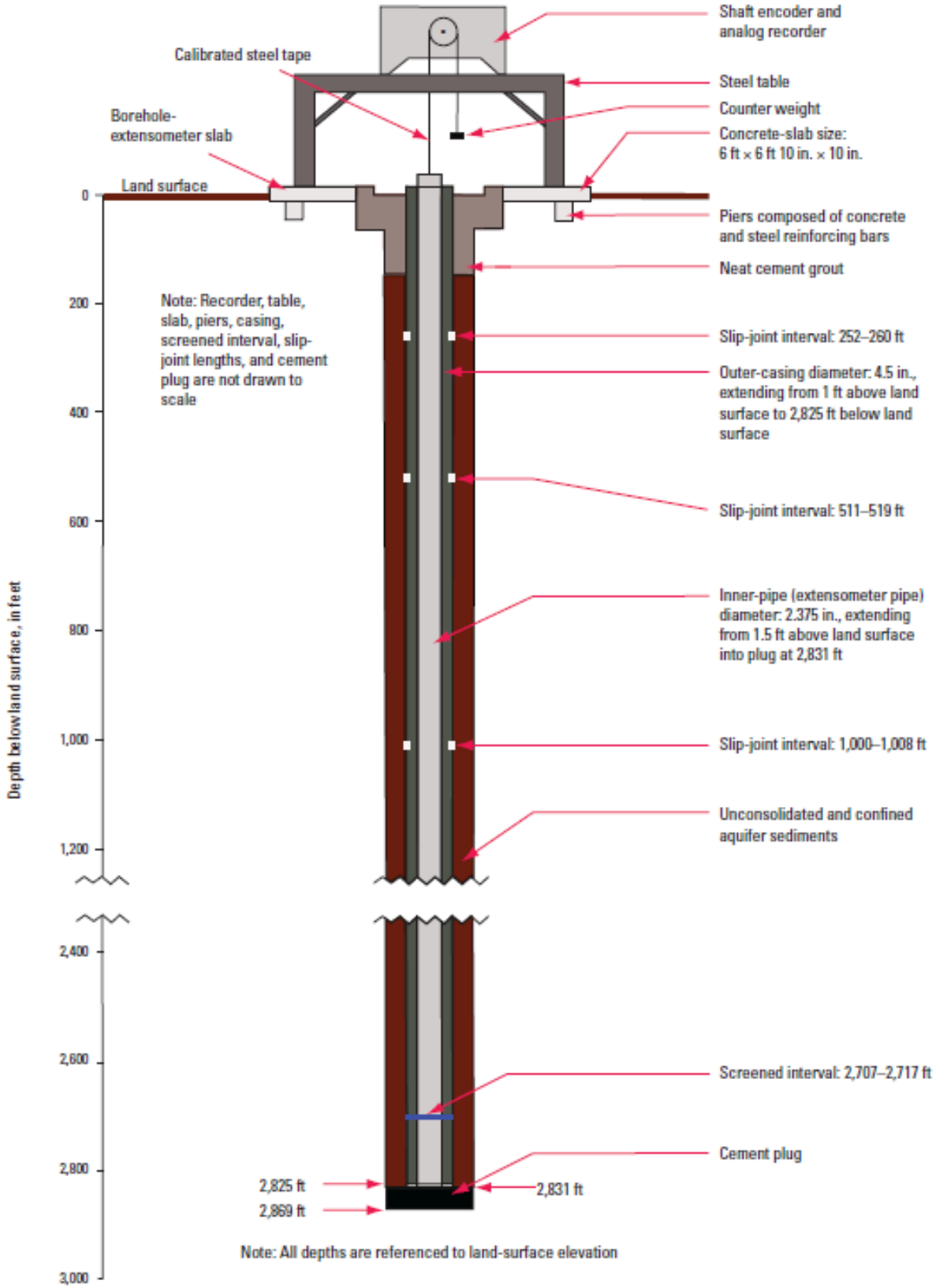

Shaft encoder and analog recorder
Calibrated steel tape
Steel table
Counter weight
Borehole-extensometer slab
Concrete-slab size: 6 ft × 6 ft 10 in. × 10 in.
Land surface
0
Piers composed of concrete and steel reinforcing bars
Neat cement grout
200
Note: Recorder, table, slab, piers, casing, screened interval, slip-joint lengths, and cement plug are not drawn to scale
Slip-joint interval: 252–260 ft
Outer-casing diameter: 4.5 in., extending from 1 ft above land surface to 2,825 ft below land surface
400
Slip-joint interval: 511–519 ft
600
Inner-pipe (extensometer pipe) diameter: 2.375 in., extending from 1.5 ft above land surface into plug at 2,831 ft
800
1,000
Slip-joint interval: 1,000–1,008 ft
Unconsolidated and confined aquifer sediments
1,200
2,400
2,600
Screened interval: 2,707–2,717 ft
2,800
Cement plug
2,825 ft
2,831 ft
2,869 ft
3,000
Depth below land surface, in feet
Note: All depths are referenced to land-surface elevation

Figure 10-3. Borehole Extensometer Diagram

● *Historical Frequency & Probability of Future Occurrence*

As of the time of this plan's development, there is not an inventory of past problem soil events throughout the county. The history, therefore, has been largely reliant on the community knowledge of residents in the region, sharing experiences with problem soil impacts. Limited data makes it difficult to know how likely a future problem soil occurrence is in the county. However, as more water is pumped from the ground and prolonged periods of drought continue, land subsidence in Uintah County will only worsen. Damage from subsidence may occur more frequently as the county's infrastructure ages.

● *Impacts & Loss Estimates*

Uintah County and the jurisdictions of Ballard, Naples, and Vernal may be impacted by land subsidence, as presented in the table below.

Table 10-8. Impacts of Land Subsidence by Jurisdiction

Jurisdiction	May Be Impacted by Land Subsidence	Potential Impacts of Land Subsidence
Uintah County	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Ballard	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Naples	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures
City of Vernal	Yes	Property damage, roadway/walkway damage, maintenance/replacement costs, increased legal liability, increased possibility of injury, economic losses, road closures

Land subsidence may damage buildings, civil structures, aqueducts, well casings, bridges, and highways. Flooding events can increase or intensify as the land sinks. This can also impact sewer lines, water lines, and storm drainage. Drought can magnify impacts as more groundwater is extracted from aquifers, causing the ground to compact and cave in on itself (Water Education, 2024).

Due to the nature of land subsidence, since it rests upon moisture content and geologic makeup throughout the county, it is difficult to mitigate. Transportation corridors have existed for decades throughout the county, and road structures were made during times when soil analysis was not utilized as it is today. When it is economically and environmentally feasible, roads may be relocated to accommodate vehicle travel. However, where building construction is an issue, building codes are followed to ensure lives and lands are protected.

Further studies and data will need to be explored to evolve the mitigation efforts and responses to avoid building and continuous repairing of problems caused by subsidence.

Vulnerable Populations

There are many vulnerable populations in Uintah County, including those in the table below. People who live in areas with low infrastructure funding are more likely to experience issues with problem soils, such

as damage to pavements and roads, crumbling building foundations, and sinkholes. While these issues could occur anywhere, the damage is more likely to go unrepaired and continue to worsen in disadvantaged locations. Those who are unable to immediately respond and transport themselves to a safe location after an earth fissure or sinkhole opens up may be at further risk.

Table 10-9. Vulnerable Populations in Uintah County

Vulnerability Category	Number	Percent
Families in poverty	644	8.2%
People with disabilities	4,459	12.7%
People over 65 years	3,845	10.8%
Difficulty with English	444	1.4%
Households with no car	333	3.0%
Mobile homes	1,236	11.0%
Source: U.S. Census QuickFacts, 2022; Headwaters Economics Populations at Risk, 2023		

As demonstrated in blue in the following map, Uintah County's central to southern region is especially disadvantaged, and the county as a whole is seen as partially disadvantaged (Climate and Economic Justice Screening Tool, 2024). This area has a large population of Native Americans, the majority of whom are low income and whose communities lack robust infrastructure and adequate funding for repairs.

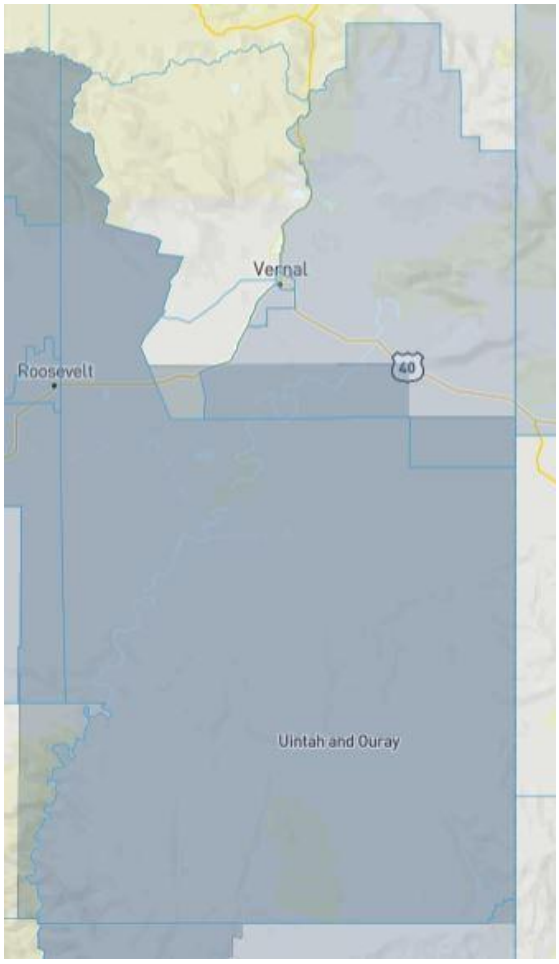
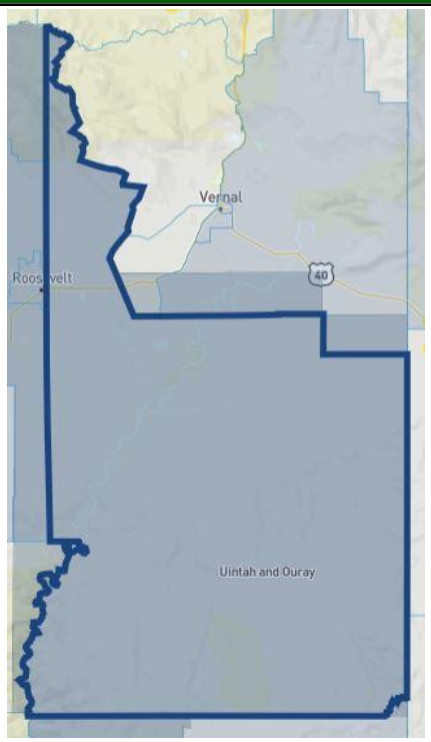
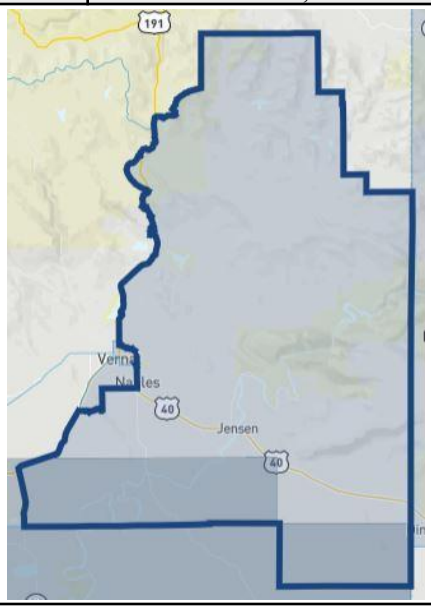


Figure 10-4. Map of Disadvantaged Communities in Uintah County

The following table details the two completely disadvantaged census tracts in Uintah County along with the specific burdens and disadvantages each census tract experiences.

Table 10-10. Disadvantaged Communities in Uintah County

UINTAH COUNTY, UT		
CLIMATE & ECONOMIC JUSTICE SCREENING TOOL—DISADVANTAGED CENSUS TRACT		
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047940201	5,481	YES

UINTAH COUNTY, UT		
		
CENSUS TRACT BURDENS: Health, Legacy Pollution, Workforce Development		
94th *% (above 90th percentile)*	*Share of people who have been told they have asthma*	
YES	*Presence of one or more abandoned mine land within the tract*	
92nd *% (above 90th percentile)*	*Number of unemployed people as part of the labor force*	
20% *(above 10%)*	*Percent of people 25 years or older whose high school education is less than a high school diploma*	
CENSUS TRACT 2010 ID	**CENSUS TRACT POPULATION**	**LOW INCOME TRACT?**
49047968200	8,966	YES
		

UINTAH COUNTY, UT	
CENSUS TRACT BURDENS: Legacy Pollution	
YES	*Presence of one or more abandoned mine land within the tract*
Source: U.S. Council on Environmental Quality—Climate & Economic Justice Screening Tool (2024)	

Problem soils could cause significant damage to critical facilities depending on location. For example, if a sinkhole opened up under or near a hospital or fire station, the impact to the community could become detrimental. The following table lists types of critical facilities that could be negatively affected by land subsidence, which could delay emergency response and access to life-saving medical equipment.

Table 10-11. Critical Facility Types in Uintah County

Critical Facility Type	Location
Hospital	Vernal
Emergency Room	Vernal
Dialysis Center	Vernal
4 Nursing Homes	Vernal
Nursing Home	Maeser
Nursing Home	Naples
4 Pharmacies	Vernal
2 Fire Stations	Lapoint
Fire Station	Near Randlett
Fire Station	Near Ouray
3 Fire Stations	Vernal
Fire Station	Naples
Fire Station	Jensen
Power Plant	Near Little Bonanza
Public Health Department	Vernal
2 Local Law Enforcements	Vernal
Local Law Enforcement	Naples
Wastewater Treatment Plant	Whiterocks
4 Wastewater Treatment Plants	Near Fort Duchesne
Wastewater Treatment Plant	Randlett
Wastewater Treatment Plant	Naples
Wastewater Treatment Plant	Bonanza
Source: Resilience Analysis and Planning Tool, 2024	

Additionally, over 2.9 million Medicare beneficiaries in the U.S. rely on electricity-dependent durable medical and assistive equipment (DME) and devices to live independently in their homes, and some of those individuals also have health care service dependencies (HHS Empower Program, 2024). In Uintah County, 5,013 people are beneficiaries of Medicare, and 969 of these beneficiaries are considered at-risk and would be vulnerable during a power outage.

Changes in Development

There is no impact based on current development trends on either current or future development.

● *Climate Change Implications*

Effects of Climate Change on Severity of Impacts

The exact nature and extent of this impact still needs to be studied and fully understood as it pertains to climate change.

Effects of Climate Change on Probability of Future Events

Table 10-12. Climate Projections for Uintah County, UT | Neighborhoods at Risk

Heat Projections	By 2049, Uintah County is expected to experience 13 more days that reach above 95°F (from 16 days to 29 days per year).
	By 2049, Uintah County is expected to have a 3°F increase (from 46°F to 49°F) in average annual temperatures.
	Increasing annual temperatures and prolonged periods of frequent drought can contribute to land subsidence as more groundwater is drained.
Source: Neighborhoods at Risk, 2024	

- ***FEMA NRI Score***

FEMA does not evaluate land subsidence as part of its National Risk Index.

• CAPABILITY ASSESSMENT

o JURISDICTIONAL CAPABILITY ASSESSMENT

▪ Uintah County

Table 11-1. Uintah County Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
Uintah County Office of Emergency Management	2024 Hazard Mitigation Plan; Community Emergency Response Team (CERT) Program; EOP	X			CERT: Educates community about disaster preparedness and how to respond to local hazards
Uintah County Planning & Zoning Division	2017 General Plan; Land Use Code; 2017 Transportation Master Plan; 2017 Resource Management Plan; 2008 Ashley Valley Storm Water Master Plan; 2018 Uintah County Trails Master Plan; OHV Master Plan; Ashley National Forest Plan; Landownership/Parcel Maps	X			General Plan: No hazard section, but includes resource info and goals about building codes, land use, recreation/tourism, agriculture, public safety, transportation and infrastructure, environmentally sensitive areas, natural resources, floodplain risk areas, and stormwater. Recognizes need for alignment with hazard mitigation plan and mitigating development in hazardous areas. Storm Drainage Master Plan: Details precipitation patterns, flood-prone areas, storm drain placement, land use, dams of note, soil conditions, existing water systems, etc.
Uintah County GIS	Ashley Valley Map; FEMA Flood Map;	X			Uintah County Flood Zone Map: Details

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
	Zoning Map; Transportation System Map				flood zones and inundation areas for Ashley Valley, Dry Fork, West Side, Lapoint, and Jensen
Uintah County Building Division	Building Codes; Building Permits; FIRM; Floodplain Maps; Floodplain Ordinances	X			FIRM: Shows floodplain zones and inundation areas

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan. There is an opportunity to align mitigation projects within the Uintah County Storm Water Master Plan.

- ***Opportunities for Plan Integration***

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Uintah County Local Emergency Planning Committee (LEPC), Uintah County department heads, and the incorporated cities of Ballard, Naples, and Vernal. The Uintah County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Uintah County will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every Monday at 9am for a work session and every Tuesday at 3pm for the regular session.

Table 11-2. Uintah County Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants. The county will also anticipate that the time and cost of maintaining the hazard mitigation plan will be significantly higher than in previous updates due to increased planning requirements by FEMA. Funds to support the cost match for updating this plan will need to be strategically determined.

Table 11-3. Uintah County Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	Yes
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	Yes
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Uintah County will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-4. Uintah County Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Division
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Department

Administrative and Technical Capability			
Personnel skilled or trained in GIS applications	Yes	Full Time	Uintah County GIS
Emergency manager	Yes	Full Time	Uintah County Office of Emergency Management
Grant writers	Yes	Full Time	We have a grants department in the County that helps write and facilitate grants for any department.

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-5. Uintah County National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Uintah County Community Development
Who is your jurisdiction's floodplain administrator? (department/position)	Community Development Director
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the county's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification. Floodplain mapping for the entire county is limited and needs to be completed.

▪ City of Ballard

Table 11-6. City of Ballard Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
City of Ballard	2019 General Plan; 2018 International Building Code; Future Land Use Map; Ballard City Transportation Master Plan	X			Chapter 2 references zoning ordinances that detail building stipulations in flood zones

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

● *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Uintah County Local Emergency Planning Committee (LEPC), Uintah County department heads, and the incorporated cities of Ballard, Naples, and Vernal. The Uintah County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Ballard will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every first and third Tuesday of each month.

Table 11-7. City of Ballard Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-8. City of Ballard Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?

Legal and Regulatory Capability	
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Ballard will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-9. City of Ballard Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Department
Personnel skilled or trained in GIS applications	Yes	Full Time	Uintah County GIS
Emergency manager	Yes	Full Time	Uintah County Emergency Management
Grant writers	Yes	yes	Uintah County has a grants department that helps write and facilitating

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-10. City of Ballard National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Uintah County Community Development
Who is your jurisdiction's floodplain administrator? (department/position)	Uintah County Community Development Director
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

▪ City of Naples

Table 11-11. City of Naples Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
City of Naples	2021 General Plan; 2018 International Building Code; Land Use Ordinance; Ashley Valley Storm Water Master Plan	X			Chapter 10 includes a section on Emergency Preparedness and Hazard Mitigation and shows how the city of Naples has been closely involved in the county's hazard mitigation plan
City of Naples Police Department	Uintah Basin Critical Incident Protocol	X			Describes the importance of acting swiftly in an emergency situation

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

● *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Uintah County Local

Emergency Planning Committee (LEPC), Uintah County department heads, and the incorporated cities of Ballard, Naples, and Vernal. The Uintah County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Naples will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every third Thursday of each month.

Table 11-12. City of Naples Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	No

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-13. City of Naples Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Naples will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-14. City of Naples Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Zoning Department
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Building Department
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Zoning Department
Personnel skilled or trained in GIS applications	Yes	Full Time	Uintah County GIS
Emergency manager	Yes	Full Time	Uintah County Emergency Management
Grant writers	Yes	Full Time	Uintah County has a grants department that helps write and facilitate grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-15. City of Naples National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Building Department
Who is your jurisdiction's floodplain administrator? (department/position)	Building Official
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	No
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

▪ City of Vernal

Table 11-16. City of Vernal Capability Assessment

Agency Name (Mission/Function)	Programs, Plans, Policies, Regulations, Funding, or Practices	Effect of Loss Reduction			Comments
		Support	Facilitate	Hinder	
City of Vernal	2020 General Plan; 2021 International Building Code; Land Use Ordinance; Zoning Map; Ashley Valley Storm Water Master Plan; Future Land Use Map	X			General Plan: No hazard section, but includes existing and future land use overview, acknowledges sensitive lands and environmental conditions, and identifies critical facilities and infrastructure that could be affected during hazardous events
City of Vernal Engineering	FIRM; Floodplain Maps; Public Infrastructure Standards Specifications; Vernal City Storm Water Management Plan	X			FIRM: Shows floodplain zones and inundation areas Storm Water Management Plan: Details current water/drainage systems and goals for mitigating flooding
City of Vernal Building Department	Building Permits	X			Details building codes and best practices to withstand certain natural hazards

Expansion, Implementation, and Improvement: The General Plan will more closely align with the hazard mitigation plan.

● *Opportunities for Plan Integration*

The plan will be reviewed on an annual basis by the Emergency Manager and by the local hazard mitigation planning team, which is comprised of representatives from the Uintah County Local Emergency Planning Committee (LEPC), Uintah County department heads, and the incorporated cities of Ballard, Naples, and Vernal. The Uintah County local hazard mitigation planning team will determine the effectiveness of programs and reflect changes that may affect mitigation priorities and identify opportunities for plan integration based on plans that are being developed or updated. The Planning Commission for Vernal will be a mechanism to ensure mitigation strategies and priorities are included in land use decisions and plans. The commission meets every second Tuesday of each month.

Table 11-17. City of Vernal Fiscal Capability

Fiscal Capability	
Financial Resources	**Accessible or Eligible to Use?**
Community Development Block Grants	Yes
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Water, Sewer, Gas, or Electric Service	Yes
Withhold Public Expenditures in Hazard-Prone Areas	Yes
State/Federal Sponsored Grant Programs	Yes
Development Impact Fees for Homebuyers or Developers	Yes

Expansion, Implementation, and Improvement: There is an opportunity to establish specific funding to support the cost match for the implementation of FEMA Hazard Mitigation Assistance grants.

Table 11-18. City of Vernal Legal and Regulatory Capability

Legal and Regulatory Capability	
	Local Authority Exists to Develop and Implement/ Enforce?
Building Code Development and Enforcement	Yes
Zoning Ordinance(s)	Yes
Subdivision Ordinance(s)	Yes
Stormwater Management Program	Yes
Floodplain Ordinance(s)	Yes
Post Disaster Recovery Program	No
Growth Management	Yes
Site Plan Review Requirements	Yes
General or Comprehensive Plan	Yes
Capital Improvement Plan	No
Comprehensive Emergency Management Plan / Local Emergency Operations Plan	Yes

Expansion, Implementation, and Improvement: Vernal will review building and fire codes based on development trends in identified hazards and mitigation measures that can make them more effective at preventing losses. They will be updated to comply with the latest State Codes, as required and applicable.

Ordinances must be modified and updated to reflect changes in development. Ordinances may be used to address land use regulations that support mitigation actions, such as preservation of open space. It should be implemented to require adequate infrastructure to support residential area populations.

Table 11-19. City of Vernal Administrative and Technical Capability

Administrative and Technical Capability			
Staff/Personnel Resources	**Available?**	**Full Time/Part Time/Other**	**Department/Agency/Position**

Administrative and Technical Capability			
Planners or engineers with knowledge of land development and land management practices	Yes	Full Time	Planning & Development Department, City Planning Division
Engineers or professionals trained in building or infrastructure construction practices	Yes	Full Time	Planning & Development Department, Engineering Division
Planners or engineers with an understanding of natural hazards	Yes	Full Time	Planning & Development Department, Engineering Division
Personnel skilled or trained in GIS applications	Yes	Full Time	Uintah County GIS
Emergency manager	Yes	Full Time	Uintah County Emergency Management
Grant writers	Yes	Full Time	Uintah County has a grants department that helps write and facilitate grants

Expansion, Implementation, and Improvement: Provide opportunities for continued education to planning staff to maintain state-of-the-art knowledge of new code and regulatory requirements. Grant writing staff need additional support and training on FEMA Hazard Mitigation Assistance grants and conducting BCAs.

Continue to acquire and conduct training for GIS technicians on the latest versions of ArcGIS, improve overall GIS data and attributes, and address hazard vulnerability data gaps.

Table 11-20. City of Vernal National Flood Insurance Compliance

National Flood Insurance Compliance	
What department is responsible for floodplain management in your jurisdiction?	Planning & Development Department, Public Works
Who is your jurisdiction's floodplain administrator? (department/position)	Assistant City Manager/Planning Director/Floodplain Manager
Does your jurisdiction have any outstanding NFIP compliance violations that need to be addressed? If so, please state what they are.	No
Do your flood hazard maps adequately address the flood risk within your jurisdiction? (If no, please state why)	Yes
Does your floodplain management staff need any assistance or training to support its floodplain management program? If so, what type of assistance/training is needed?	Yes. Training and education
Does your jurisdiction participate in the Community Rating System (CRS)? If so, is your jurisdiction seeking to improve its CRS Classification? If not, is your jurisdiction interested in joining the CRS program?	No

Expansion, Implementation, and Improvement: Continue to manage the city's NFIP participation. Support the development of mitigation activities consistent with the best practices for floodplain management and work toward a better CRS Classification.

o BUILDING CODES

Updating and adopting new building codes, as well as addressing the effectiveness of these codes, can be one of the best ways to conduct mitigation. When properly designed and constructed, many buildings can withstand the impacts of high winds, earthquakes, floods, snow loads, or a tornado. The communities in

Uintah County are working with various versions of the International Codes published by the International Code Council, Inc. (ICC). These codes include:

- 2021 International Residential Code
- 2021 International Building Code
- 2021 International Mechanical Code
- 2021 International Plumbing Code
- 2021 International Fuel Gas Code
- The residential provisions of the 2015 International Energy Conservation Code
- The commercial provisions of the 2021 International Energy Conservation Code
- 2021 International Existing Building Code
- 2020 edition of the Utah Wildland Urban Interface Code

Additionally, Uintah County enforces the 2017 National Electrical Code and the 2005 edition of the NFPA 225 Model Manufactured Home Installation Standard, both issued by the National Fire Protection Association. Ground snow loads are found by entering specific locations into the 2018 Utah Ground Snow Load Map.

The cities of Ballard, Naples, and Vernal all follow the above International Codes.

▪ Code Administration

Enforcement of code standards is very important to hazard mitigation. Adequate inspections are needed during the course of construction to ensure that the builder understands and implements the requirements. The Building Code Effectiveness Grading Schedule (BCEGS) is a national program used by the insurance industry to determine how well new construction is protected from wind, earthquake, and other non-flood hazards. It is similar to the CRS program and the fire insurance rating scheme: building permit programs are reviewed and scored. A class 1 community is the highest rating, and a class 10 community is the most basic rating.

Training of code officials is also very important for code enforcement. Training of code officials and inspectors is a large part of the BCEGS rating for a community. Courses are offered through the building code associations to help local officials understand standards that apply to seismic, wind, and flood hazards.

The table below lists building code adoptions in use within Uintah County.

Table 11-21. Building Code Adoptions in Uintah County

	Building Code Residential	Building Code Commercial
Uintah County	IRC 2021	IBC 2021
Ballard	IRC 2021	IRC 2021
Naples	IRC 2021	IRC 2021 and State of Utah
Vernal	IRC 2021	IBC 2021

o PUBLIC SAFETY AGENCIES

Fire Protection

The Utah Fire Marshal lists six fire departments in Uintah County, which include Uintah Fire Suppression Special Service District, Vernal/Uintah County Fire Department (plus Vernal/Maeser Fire Substation), Naples Fire Department, Avalon Fire Department, Jensen Fire Department, and Lapoint-Tridell Fire Department (2020). The county's fire warden is Corey Auger, who serves Uintah County and Daggett County (Uintah Fire District, 2024). Avalon, Jensen, Lapoint, Naples, Tridell, and Vernal all have fire departments with rescue capabilities for accidents on highways.

When needed, Uintah County also has access to fire crews and resources from the U.S. Forest Service, BLM, National Park Service, U.S. Fish and Wildlife Service, and the U.S. Bureau of Indian Affairs. The state of Utah trains and provides hand crews and engine crews, as well.

Healthcare Facilities

Uintah County has one primary hospital and several health clinics. Ashley Regional Medical Center is located in Vernal and provides 24/7 emergency services, a variety of surgery options, radiology and lab services, OB services, intensive care unit, cardiac rehabilitation, and chemotherapy/infusions (Ashley Regional, 2024). The 39-bed facility is owned by LifePoint Hospitals. The hospital has been in service since 1941 when it was known as Uintah Basin Hospital. It has changed names and ownership several times over the years and recently completed a new Women's Center and Infusion Center in 2019.

Although located in Duchesne County, Uintah Basin Medical Center in Roosevelt is an independently owned 24/7 critical access hospital that services many Uintah County residents and provides comprehensive healthcare services, including dialysis, obstetrics, emergency care, surgery, lab and radiology services, cancer care and infusion services, and more (Uintah Basin Healthcare, 2024). Uintah Basin Healthcare has several clinics and offices, including locations in Vernal. The 35-bed hospital has been open since 1944.

Additionally, the Uintah-Ouray Service Unit is a health center in Fort Duchesne that services the Ute tribes of the Uintah and Ouray Indian Reservation. The health center provides ambulatory services, general medical services, surgical follow-up, pediatrics, optometry, prenatal, and postpartum care. They also partner frequently with Uintah Basin Medical Center and Ashley Valley Medical Center to provide care (IHS, 2024).

The Tri-County Health Department, Uintah Care Center, Golden Age Center, and Northeastern Counseling Center provide medical, health, and human services and programs throughout the county, as well (Uintah County General Plan, 2005, amended 2012).

Emergency Services

Uintah County Emergency Management is located in Vernal, Utah and is under the direction of Heidi Lundberg, who is the county's Emergency Manager.

EMS for the county are dispatched from the Central Dispatch Center in Vernal. EMTs are all certified by the state of Utah, Bureau of EMS. Additional ambulance services are provided by Gold Cross Ambulance, Uintah Basin Medical Center, and Ute Indian Tribe EMS.

Several air ambulance and helicopter transport/rescue companies service the Uintah County area, including, but not limited to, Air Ambulance World, Classic Air Medical, Angel MedFlight, Intermountain Life Flight, and the Utah Department of Public Safety Aero Bureau.

▪ Law Enforcement & Public Safety

The Utah Department of Public Safety (DPS) includes one participating law enforcement agency in Uintah County, which is the Uintah County Sheriff's Office. The Sheriff's Office is located at 641 E 300 S in Vernal, Utah. The Uintah County Sheriff is Steve Labrum with Chief Deputy Brian Fletcher. The Sheriff's Office provides law enforcement throughout the county where other primary law enforcement agencies do not exist. There are also BLM-administered lands, U.S. Forest Service lands, SITLA lands, tribal lands, and one National Monument in the county that each have their own attendant law enforcement authorities in addition to the county sheriff.

Naples Police Department is located at 1420 E 2850 S in Naples. Vernal Police Department is located at 374 E Main St. in Vernal.

The Highway Patrol Office in the county is located at 641 E 300 S Suite 300 in Vernal. This office services the entire Uintah Basin Region of Daggett, Duchesne, and Uintah Counties.

o LAND USE PLANNING & CHANGES IN DEVELOPMENT AND FUTURE DEVELOPMENT

This section of the Uintah County Hazard Mitigation Plan Annex examines the relationship between the county's General Plan, Land Use or Zoning Ordinances, and the AHMP. Incorporating hazard mitigation practices into land use planning is extremely important as future developments are planned and constructed. Through proper planning within the individual jurisdictions, risk to property owners can be reduced and future disaster related economic losses avoided. Land Use and Mitigation Planning Integration are seen as critical components of the mitigation program in Uintah County.

Uintah County's General Plan was last revised and adopted in 2012. The plan should be reviewed and updated to address condition changes within the county and the economy.

The Future Land Use Map can be found in the Uintah County Land Use Plan on page 33, which was last updated in 2011. The map provides a comprehensive, legal, and strategic basis for implementing zoning changes and land use code updates that the county may want to pursue in the immediate term. It will also provide the basis for future decisions regarding individual rezone requests for years to come. The end goal is to produce a sustainable, well-balanced development pattern for the future. To develop the Future Land Use Map, citizens, planning bodies, and decision makers assessed current zoning, as compared to what exists on the ground now, and envisioned how the county will develop into the future, taking into consideration and balancing many variables, including existing community values, hazard risks, and other concerns. The latest update represents the vision for how the county will develop over the next 20–30 years.

The hazard risk assessment (see *Chapter 2 Hazard Risk Summary*) took into consideration changes in development and future development trends based on planning and zoning maps and documents. The following tables highlight those sections of the assessment:

Hazard Event	Changes in Development and Hazard Vulnerability (High, Medium, Low)	Vulnerability Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Extreme Heat	Low	1	1
Lightning	Low	1	1
Hail	Low	1	1
Tornado	Low	1	1
Straight-line Wind	Low	1	1
Extreme Cold	Low	1	1
Winter Storm	Low	1	1
Avalanche	Medium	2	2
Wildfire	Medium	2	2
River or Stream Flood	Medium	2	2
Flash Flood	Medium	2	2
Dam Failure	Medium	2	2
Drought	Low	1	1
Earthquake	Medium	2	2
Landslide	Low	1	1
Expansive Soils	Low	1	1
Land Subsidence	Low	1	1

Changes in Development Factor—Changes in development since the previous plan was approved (if this is an update) or in the past five years (if this is a new plan) have increased or decreased the community's vulnerability/exposure to this hazard. **[Weighted Factor: 1]**

High—Changes in development have significantly increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 3)

Medium—Changes in development have increased the vulnerability/exposure of the community to this hazard, but not significantly (Vulnerability Factor = 2)

Low—Changes in development have minimally increased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 1)

No Vulnerability—Changes in development have had no effect and/or have decreased the vulnerability/exposure of the community to this hazard (Vulnerability Factor = 0)

Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Extreme Heat	Low	1	1
Lightning	Low	1	1
Hail	Low	1	1
Tornado	Low	1	1

Hazard Event	Impact of Future Development (High, Medium, Low)	Impact Factor (Adjust Impact Factor to Change Scores)	Multiplied by Weighting Factor (1)
Straight-line Wind	Low	1	1
Extreme Cold	Low	1	1
Winter Storm	Low	1	1
Avalanche	Medium	2	2
Wildfire	Medium	2	2
River or Stream Flood	Medium	2	2
Flash Flood	Medium	2	2
Dam Failure	Medium	2	2
Drought	Low	1	1
Earthquake	Medium	2	2
Landslide	Low	1	1
Expansive Soils	Low	1	1
Land Subsidence	Low	1	1
Future Development Factor—The potential that future development will have on increasing or decreasing the impact/consequence of this hazard. **[Weighted Factor: 1]**			
High—Future development trends will significantly increase the impact/consequence of this hazard (Impact Factor = 3)			
Medium—Future development trends will increase the impact/consequence of this hazard, but not significantly (Impact Factor = 2)			
Low—Future development trends will minimally increase impact/consequence of this hazard (Impact Factor = 1)			
No Impact—Future development trends will not increase the impact/consequence of this hazard, and/or may even decrease the impact/consequence of this hazard (Impact Factor = 0)			

▪ City of Ballard

The city of Ballard updated their General Plan in 2019. The plan establishes how Ballard will "provide a formal policy foundation for enhancing community relations, pursuing economic development activities, coordinating infrastructure planning, and fostering city and county/state cooperation" (Ballard General Plan, 2019). It describes the city's plans and goals for transportation, public services, public safety, moderate income housing, community promotion and economic development, recreation, parks, aesthetics, historic preservation, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, climate, history, socioeconomic drivers, and demographics of the area. However, it is recommended that the city of Ballard include an update to their General Plan in

which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

▪ City of Naples

The city of Naples updated their General Plan in 2021. The plan provides a set of defined community visions or goals for a community to focus on for the years that follow final acceptance of the plan (Naples General Plan, 2021). It describes the city's plans and goals for transportation, public services, public safety, moderate income housing, community promotion and economic development, infrastructure, heritage and culture, historic preservation, community design, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, history, socioeconomic drivers, land capacity, and demographics of the area. However, it is recommended that the city of Naples include an update to their General Plan in which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

▪ City of Vernal

The city of Vernal updated their General Plan in 2020. The plan establishes how the citizens of Vernal can "take a look at the community today, to determine what is good and what requires improvement, and to look into the future and 'plan' for anticipated changes" (Vernal General Plan, 2020). It describes the city's plans and goals for transportation, public services, public safety, funding options, community promotion and economic development, sensitive lands and environmental conditions, recreation, parks, aesthetics, historic preservation, infrastructure, and land use. It also complements the community profile in the Mitigation Plan by detailing the location, history, socioeconomic drivers, and demographics of the area. However, it is recommended that the city of Vernal include an update to their General Plan in which they add a Hazardous Areas section that outlines each hazard in the Mitigation Plan to more fully align with the Mitigation Plan.

o NFIP CONTINUITY STRATEGY

Uintah County participates in the National Flood Insurance Program (NFIP) as do the cities of Ballard, Naples, and Vernal. Uintah County's participation in the regular phase of the National Flood Insurance Program began February 1, 1986. The city of Ballard began its participation in the regular phase of the NFIP on January 30, 2013. The city of Naples began on July 11, 2011. The city of Vernal began on March 18, 1986.

Uintah County has no communities within the 100-year floodplain hazard area that are not participating in the NFIP. Uintah County has no communities under suspension or revocation of participation in the NFIP.

Table 11-22. NFIP Participation in Uintah County

NFIP Participation Category	Uintah County	City of Ballard	City of Naples	City of Vernal
FIRM Date	02/14/1975	10/06/2010	10/06/2010	07/30/1976
Participating in CRS (Class)	N/A	N/A	N/A	N/A
Number of NFIP Policies	72	1	2	23
Total Coverage				
Total Written Premium + FPF				
Are FIRMs Digital or Paper?	Digital	Digital	Digital	Digital
Repetitive Loss Properties	0	0	0	0

NFIP Participation Category	Uintah County	City of Ballard	City of Naples	City of Vernal
Severe Repetitive Loss Properties	0	0	0	0
Source: FEMA Repetitive Losses/BCX Claims Utah, 2023				

Specific NFIP and floodplain related activities include:

- Uintah County published the Storm Water Master Plan in June 2008.
- Uintah County continues to offer one-on-one advice to property owners on how to protect property and has staff available to make site visits to property owners regarding flooding and drainage issues on private property.
- Uintah County began the Ashley Valley Watershed Project in 2019 to mitigate flooding in Ashley Valley by constructing additional debris/detention basins to collect stormwater and debris, piping 9.6 miles of the Ashley Central Canal, and constructing three miles of recreational trails (Uintah County, 2024).

PART III: MITIGATION STRATEGY

● CHANGES IN PRIORITY

o CHANGES IN PRIORITY

Mitigation priorities have not significantly changed for either Uintah County or the cities of Ballard, Naples, or Vernal since the update of the last plan. For the 2024 plan update, mitigation goals for Uintah County and the cities of Ballard, Naples, and Vernal were significantly updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations. The plan also underwent a complete rewrite to better align with new local mitigation plan requirements.

Also, for past mitigation projects identified in previous iterations of the plan, a *2024 Status Update and Changes in Priority* section was included for each past action. A description of the update and changes in priority were included, if appropriate and applicable.

MITIGATION STRATEGIES

MITIGATION ACTION PLAN

The action plan helps to prioritize mitigation initiatives according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The action plan also provides the framework for how the proposed projects and initiatives will be implemented and administered over the next five years.

Mitigation Strategy/Goals

The planning team reviewed the existing mitigation goals for Uintah County and the cities of Ballard, Naples, and Vernal were updated to better align with current federal priorities, ongoing sustainability efforts in both jurisdictions, and a more concerted focus on achieving equitable outcomes for all communities, including underserved communities and socially vulnerable populations.

Goal 1. Protection of life before, during, and after the occurrence of a disaster and reducing the impact of damage where problems cannot be eliminated.

Goal 2. Protection of emergency response capabilities (critical infrastructure)

Goal 3. Protection of developed property, homes and businesses, industry, education opportunities and the cultural fabric of a community, by combining hazard loss reduction with the community's environmental, social and economic needs.

Goal 4. Protection of natural resources and the environment, when considering mitigation measures.

Goal 5. Promoting public awareness through education of community hazards and mitigation measures.

Goal 6. Preserving and/or restoring natural features that provide mitigation such as floodplains.

Goal 7. Provide a basis for funding of projects outlined as hazard mitigation strategies.

Goal 8. Establish a framework and database for the jurisdictions to use to apply for aid.

Mitigation Strategy/Action Timeline Parameters

While the preference is to provide definitive project completion dates, this is not possible for every mitigation strategy/action. Therefore, the parameters for the timeline (Projected Completion Date) are as follows:

- **Short-term**—To be completed in 1 to 5 years
- **Long-term**—To be completed in greater than 5 years
- **Ongoing**—Currently being implemented under existing programs but without a definite completion date

Mitigation Strategy/Action Benefit Parameters

Benefit ratings are defined as follows:

- **High**—Project will provide an immediate reduction of risk exposure for life and property.
- **Medium**—Project will have a long-term impact on the reduction of risk exposure for life and property, or project will provide an immediate reduction in the risk exposure for property.
- **Low**—Long-term benefits of the project are difficult to quantify in the short term.

Mitigation Strategy/Action Estimated Cost Parameters

While the preference is to provide definitive costs (dollar figures) for each mitigation strategy/action, this is not possible for every mitigation strategy/action. Therefore, the estimated costs for the mitigation initiatives identified in this plan are identified as high, medium, or low, using the following ranges:

- **High**—Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (e.g., bonds, grants, and fee increases).
- **Medium**—The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.
- **Low**—The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.

Mitigation Strategy/Action Prioritization Process

The action plan must be prioritized according to a benefit/cost analysis of the proposed projects and their associated costs (44 CFR, Section 201.6(c)(3)(iii)). The benefits of proposed projects were weighed against estimated costs as part of the project prioritization process. The benefit/cost analysis was not of the detailed variety required by FEMA for project grant eligibility under the Hazard Mitigation Grant Program (HMGP) and Building Resilient Infrastructure and Communities (BRIC) grant program. A less formal approach was used because some projects may not be implemented for up to 10 years, and associated costs and benefits could change dramatically in that time. Therefore, a review of the apparent benefits versus the apparent cost of each project was conducted. Parameters were established for assigning subjective ratings (high, medium, and low) to the costs and benefits of these projects.

The priorities are defined as follows:

- **High**—A project that addressed numerous goals or hazards, has benefits that exceed cost, has funding secured or is an ongoing project, and meets eligibility requirements for the HMGP or BRIC grant program. High priority projects can be completed in the short term (1 to 5 years).
- **Medium**—A project that addressed multiple goals and hazards, that has benefits that exceed costs, and for which funding has not been secured but that is grant eligible under HMGP, BRIC, or other grant programs. The project can be completed in the short term once funding is secured. Medium priority projects will become high priority projects once funding is secured.
- **Low**—A project that will address few or no goals, mitigate the risk of one or few hazards, has benefits that do not exceed the costs or are difficult to quantify, for which funding has not been secured, that is not eligible for HMGP or BRIC grant funding, and for which the timeline for completion is long term (1 to 10 years). Low priority projects may be eligible for other sources of grant funding from other programs.

For many of the strategies identified in this action plan, the partners may seek financial assistance under the HMGP or HMA programs, both of which require detailed benefit/cost analyses. These analyses will be performed on projects at the time of application using the FEMA benefit-cost model. For projects not seeking financial assistance from grant programs that require detailed analysis, the partners reserve the right to define “benefits” according to parameters that meet the goals and objectives of this plan.

o MITIGATION PROJECTS

Listed below are the goals and objectives developed by the mitigation plan and the priority projects that were developed to address the risks posed. Included in the list are a rough estimate of cost and an anticipated period for further investigation, project development, and implementation.

Participating jurisdictions agreed upon [] mitigation actions that apply to the county and all or some participating jurisdictions (see *17.2.1 New Mitigation Projects* and *17.2.2 Ongoing Mitigation Projects*). These shared actions, some of which address all hazards, help to meet the following FEMA requirement: "Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? Does the plan include one or more action(s) per jurisdiction for each hazard identified within the risk assessment?" In addition to the [] mitigation measures that apply to the county and all participating jurisdictions, most communities identified additional mitigation actions unique to their jurisdiction. The following table summarizes the jurisdictions' mitigation measures in relationship to the hazards addressed in the risk assessment.

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▪ New Mitigation Projects

● *Uintah County New Projects*

Mitigation Project: Install backup generators in assisted living/nursing homes in Uintah County.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Uintah County	Uintah County Emergency Management	Nursing Homes and Assisted Living Agencies	High	Ongoing	The total cost of this action item is highly dependent on the community. The primary cost associated with this action item is the staff time that will be required. Communities that have a greater awareness of the critical facilities within their community will have an easier time verifying backup generation capabilities. Implementation of redundant power and the cost to do so will vary.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal1and 2		All Hazards Severe Summer Weather Severe Winter Weather Wildfire Flood Drought Earthquake Landslide		High		Uintah County general funds, HMGP

Mitigation Project: Install backup generators in assisted living/nursing homes in Uintah County.			
	Problem Soils		
Action/Implementation Plan and Project Description:			

Mitigation Project: Upgrade culverts in Uintah County.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Uintah County	Uintah County Road Department	Uintah County Emergency Management	High	Ongoing	Medium costs dependent on the number and size of culverts.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Flood		High		Uintah County general funds, HMGP and BRIC
Action/Implementation Plan and Project Description:						

Mitigation Project: Upgrade canals in Uintah County.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Upgrade canals in Uintah County.						
2024	Uintah County	Canal Companies	Uintah County Emergency Management, Uintah County Road Department	High	Ongoing	High, would require outside funding and input from both canal owners and residential owners in the anticipated areas.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Flood		High		Uintah County general funds, SHGP, HMGP and BRIC
Action/Implementation Plan and Project Description:						

Mitigation Project: Install water retention pond for Yellow Hill area.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Uintah County	Uintah County Community Development	Uintah County Emergency Management, Uintah Fire Suppression Special Service District, Roads Department	Medium	Ongoing	High, outside funding sources will likely be required.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Install water retention pond for Yellow Hill area.			
Goal 1, 2, 3 and 4	Flood	Medium	Uintah County general funds, SHGP, HMGP and BRIC
Action/Implementation Plan and Project Description:			

Mitigation Project: Install rip rap along Ashley Creek.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	Uintah County, City of Vernal, City of Naples	Uintah County Road Department, Community Development	Uintah County Emergency Management	High	Ongoing	Medium, costs dependent up the size of the area to be mitigated additional costs anticipated.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 2, 3 and 4		Flood		High		Uintah County general funds, SHGP, HMGP and BRIC
Action/Implementation Plan and Project Description:						

- ***City of Vernal New Projects***

Mitigation Project: Improve traffic control and clearance priority during heavy snow, snow drifting, and white out conditions.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	City of Vernal	City of Vernal	Uintah County	High	Ongoing	$10,000
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1 and 2		Avalanche, Straight-line Wind, Severe Winter Weather		High		Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Facilitate exercises for public and elected officials to educate and promote reduced water usage.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2024	City of Vernal	Uintah County, Local Water Districts	Uintah County Emergency Management	High	Ongoing	$20,000
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Facilitate exercises for public and elected officials to educate and promote reduced water usage.			
Goal 1 and 5	Drought, Flood	High	Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:			

▪ Ongoing Mitigation Projects

• *Uintah County Ongoing Projects*

Mitigation Project: Facilitate exercises for public attendance to educate and inform local elected officials, developers, and citizens of dam failure risk and preparedness actions.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah County Emergency Management	Uintah County Law Enforcement	Medium	Ongoing	Medium costs
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1 and 5		Dam Failure		Medium		Uintah County general funds, BOR, local water districts
Action/Implementation Plan and Project Description:						

Mitigation Project: Obtain and retain updated Emergency Action Plans for dams with inundation areas within the county.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah County Emergency Management	N/A	Low	Ongoing	Low, EAPs from high hazard dam owners have the needed information.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1 and 6		Dam Failure		Low		Uintah County general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Conduct public awareness campaign(s) to promote reduced water usage.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah County Emergency Management	Uintah County local water companies	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Conduct public awareness campaign(s) to promote reduced water usage.			
Goal 1 and 5	Drought	Medium	Uintah County general funds
Action/Implementation Plan and Project Description:			

Mitigation Project: Educate the public regarding earthquake safety and preparedness through dissemination of earthquake literature at preparedness fairs, faith-based preparedness efforts, and the county building/EOC.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County, City of Ballard, City of Naples, City of Vernal	Uintah County Emergency Management on behalf of all jurisdictions (Uintah County, Ballard, Naples, and Vernal)	N/A	Low	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1 and 5		Earthquake		Low		Uintah County general funds, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Promote awareness of the local earthquake hazard by participating in the Great Utah ShakeOut.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah County Emergency Management	N/A	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1 and 5		Earthquake		Medium		Uintah County general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Maintain substantial supply of sandbags and filler to protect life, structures, and property in the event of flooding incidents.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County, City of Ballard, City of Naples, City of Vernal	Uintah County Road Department	Uintah County Emergency Management on behalf of all jurisdictions (Uintah County, Ballard, Naples, and Vernal)	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis**		**Potential Funding Source(s)**

Mitigation Project: Maintain substantial supply of sandbags and filler to protect life, structures, and property in the event of flooding incidents.			
		(Low, Medium, High)	
Goal 1, 2, 3, 4 and 6	Flood	High	Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:			

Mitigation Project: Provide public awareness campaign during high snowpack years regarding the need to mitigate against flood damage. Involve private sector vendors to stock supplies whereby private citizens can prepare for their own property protection.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah County Emergency Management	Private sector vendors	Medium	Ongoing	Medium, dependent upon the amount of supplies stored for each POD
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1 and 5		Flood		Medium		Uintah County general funds, private sector vendors, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Promote private citizen flood mitigation efforts in the county through public awareness campaign(s) using social media.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah County Emergency Management	N/A	High	Ongoing	Low, use of county and city existing websites and social media.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1 and 5		Flood		High		Uintah County general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Provide landslide hazard education via social media and Local Emergency Planning Committee (LEPC) meetings for public and private sector participant education.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah County Emergency Management	Private sector vendors	Low	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Provide landslide hazard education via social media and Local Emergency Planning Committee (LEPC) meetings for public and private sector participant education.			
Goal 1 and 5	Landslide	Low	Uintah County general funds
Action/Implementation Plan and Project Description:			

Mitigation Project: Emergency management assist Uintah Fire Suppression Special Service District efforts to promote defensible space in the Wildland/Urban Interface and fire safety.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County, City of Ballard, City of Naples, City of Vernal	Uintah Fire Suppression Special Service District	Uintah County Emergency Management on behalf of all jurisdictions (Uintah County, Ballard, Naples, and Vernal)	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1,4 and 5		Wildfire		High		Uintah County general funds, Uintah Fire Suppression Special Service District
Action/Implementation Plan and Project Description:						

Mitigation Project: Develop and maintain defensible space around the Eagle View Elementary and Lapoint Elementary schools located on the outskirts of town in wildfire areas.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County	Uintah Fire Suppression Special Service District	Uintah County Emergency Management	High	Ongoing	Medium, dependent upon amount of space needed
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1,4 and 5		Wildfire		High		Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Coordinate with Uintah Fire Suppression Special Service District on developing a Community Wildfire Preparedness Plan (CWPP) for the county.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	Uintah County, City of Ballard, City of Naples, City of Vernal	Uintah Fire Suppression Special Service District	Uintah County Emergency Management on behalf of all jurisdictions (Uintah County, Ballard, Naples, and Vernal)	High	Ongoing	Low, utilizing existing planning mechanisms and implementing into mitigation measures
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis**		**Potential Funding Source(s)**

Mitigation Project: Coordinate with Uintah Fire Suppression Special Service District on developing a Community Wildfire Preparedness Plan (CWPP) for the county.			
		(Low, Medium, High)	
Goal 1,4 and 5	Wildfire	High	Uintah County general funds, Uintah Suppression Special Service District
Action/Implementation Plan and Project Description:			

- ***City of Ballard Ongoing Projects***

Mitigation Project: Enforce zoning laws that restrict building in floodplain areas.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Ballard	Uintah County Emergency Management	City of Ballard	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1,4 and 5		Flood		Medium		Uintah County general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Assist Uintah Fire Suppression Special Service District and Roosevelt Fire Department in efforts to promote defensible space in the Wildland/Urban Interface and fire safety in the community.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Ballard, Uintah County	Uintah Fire Suppression Special Service District	Uintah County Emergency Management, Roosevelt Fire Department, City of Ballard	High	Ongoing	Low

Applicable Goal(s)	**Hazard(s) Mitigated**	**Benefit Analysis** (Low, Medium, High)	**Potential Funding Source(s)**
Goal 1,4 and 5	Wildfire	High	Uintah County general funds, Uintah Fire Suppression Special Service District, Roosevelt Fire Department

Action/Implementation Plan and Project Description:

Mitigation Project: Participate in county's development of a Community Wildfire Preparedness Plan (CWPP) for the county which will include the city.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Ballard, Uintah County	Uintah County Emergency Management	Uintah Fire Suppression Special Service District, Roosevelt Fire	High	Ongoing	Low, participating in existing planning mechanism and incorporating mitigation measures.

Mitigation Project: Participate in county's development of a Community Wildfire Preparedness Plan (CWPP) for the county which will include the city.						
			Department, City of Ballard			
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1,4 and 5		Wildfire		High		Uintah County general funds, Uintah Fire Suppression Special Service District, Roosevelt Fire Department, HMGP
Action/Implementation Plan and Project Description:						

- ***City of Naples Ongoing Projects***

Mitigation Project: Participate in county facilitated exercises for public attendance to educate and inform local elected officials, developers, and citizens of dam failure risk and preparedness actions.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Naples, Uintah County	Uintah County Emergency Management	Local water districts, City of Naples	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, and 5		Dam Failure		Medium		Uintah County general funds, BOR, local water districts, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Explore possibility of waterwise landscaping ordinances and study feasibility of increasing current water storage capabilities as the city's needs for water increase.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Naples, Uintah County	Naples Water & Sewer	Uintah County Emergency Management, City of Naples	Medium	Ongoing	Medium, additional costs associated with studies needed.
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 2 and 4		Drought		Medium		Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Enforce zoning laws related to floodplain building.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Naples	City of Naples	Uintah County Emergency Management	Medium	Ongoing	Low, enforcing existing regulations
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Enforce zoning laws related to floodplain building.			
Goal 1, 3 and 4	Flood	Medium	Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:			

Mitigation Project: Participate in updating of the County EOP for coordination and communication in regard to flooding.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Naples, Uintah County	Uintah County Emergency Management	City of Naples	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 7 and 8		Flood		High		Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Complete the update of the Ashley Valley Storm Water Master Plan that reconciles the current development and surface drainage project with the plan.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance**	**Projected Completion Date**	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Complete the update of the Ashley Valley Storm Water Master Plan that reconciles the current development and surface drainage project with the plan.						
				(Low, Medium, High)	(Short-term, Long-term, or Ongoing)	
2019	City of Naples	Uintah County Planning & Zoning Division	Uintah County Emergency Management, City of Naples	Medium	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 4, 7 and 8		Flood		Medium		Uintah County general funds, Ashley Valley Water & Sewer Improvement District
Action/Implementation Plan and Project Description:						

Mitigation Project: Participate in updating of the County EOP for coordination and communication in regard to wildfire.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Naples, Uintah County	Uintah County Emergency Management	City of Naples, Uintah Fire Suppression Special Service District	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 4, 7 and 8		Wildfire		High		Uintah County general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Participate in updating of the County EOP for coordination and communication in regard to wildfire.

Mitigation Project: Assist Uintah Fire Suppression Special Service District in efforts to promote defensible space in the Wildland/Urban Interface and fire safety in the community.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Naples, Uintah County	Uintah Fire Suppression Special Service District	Uintah County Emergency Management, City of Naples	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Wildfire		High		Uintah County general funds, Uintah Fire Suppression Special Service District
Action/Implementation Plan and Project Description:						

Mitigation Project: Participate in county's development of a Community Wildfire Preparedness Plan (CWPP) for the county which will include the city.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Participate in county's development of a Community Wildfire Preparedness Plan (CWPP) for the county which will include the city.						
2019	City of Naples, Uintah County	Uintah Fire Suppression Special Service District	Uintah County Emergency Management, City of Naples	High	Ongoing	Medium
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Wildfire		High		Uintah County general funds, Uintah Fire Suppression Special Service District, SHGP, HMGP
Action/Implementation Plan and Project Description:						

- ***City of Vernal Ongoing Projects***

Mitigation Project: Enforce zoning laws related to floodplain building.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Vernal	Vernal Planning & Development, Public Works	Uintah County Emergency Management, City of Vernal	Medium	Ongoing	Low, enforcing existing ordinances
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Flood		Medium		Uintah County general funds
Action/Implementation Plan and Project Description:						

Mitigation Project: Enforce zoning laws related to floodplain building.

Mitigation Project: Maintain supply of sandbags and filler to assist community with the protection of life, structures, and property in the event of flooding.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Vernal, Uintah County	Uintah County Emergency Management	Vernal Planning & Development, Public Works, City of Vernal	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Flood		High		Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Participate in updating of the County EOP for coordination and communication in regard to flooding.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)

Mitigation Project: Participate in updating of the County EOP for coordination and communication in regard to flooding.						
2019	City of Vernal, Uintah County	Uintah County Emergency Management	Vernal Planning & Development, Public Works, City of Vernal	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3, 4, 7 and 8		Flood		High		Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Participate in updating of the County EOP for coordination and communication in regard to wildfire.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Vernal, Uintah County	Uintah County Emergency Management	Uintah Fire Suppression Special Service District, City of Vernal	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Wildfire		High		Uintah County general funds, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Assist Uintah Fire Suppression Special Service District in efforts to promote defensible space in the Wildland/Urban Interface and fire safety in the community.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Vernal, Uintah County	Uintah Fire Suppression Special Service District	Uintah County Emergency Management, City of Vernal	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**
Goal 1, 2, 3 and 4		Wildfire		High		Uintah County general funds, Uintah Fire Suppression Special Service District, SHGP, HMGP
Action/Implementation Plan and Project Description:						

Mitigation Project: Participate in county's development of a Community Wildfire Preparedness Plan (CWPP) for the county which will include the city.						
Year Initiated	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Supporting Agencies/ Organizations**	**Priority and Level of Importance** (Low, Medium, High)	**Projected Completion Date** (Short-term, Long-term, or Ongoing)	**Estimated Cost & Analysis** (Low, Medium, High)
2019	City of Vernal, Uintah County	Uintah Fire Suppression Special Service District	Uintah County Emergency Management, City of Vernal	High	Ongoing	Low
Applicable Goal(s)		**Hazard(s) Mitigated**		**Benefit Analysis** (Low, Medium, High)		**Potential Funding Source(s)**

Mitigation Project: Participate in county's development of a Community Wildfire Preparedness Plan (CWPP) for the county which will include the city.			
Goal 1, 2, 3 and 4	Wildfire	High	Uintah County general funds, Uintah Fire Suppression Special Service District, SHGP, HMGP
Action/Implementation Plan and Project Description:			

▪ Completed Mitigation Projects

COMPLETED MITIGATION PROJECTS						
Mitigation Project	**Year Initiated**	**Applicable Jurisdiction**	**Lead Agency/ Organization**	**Priority** (Low, Medium, High)	**Status**	**Hazard(s) Mitigated**
Uintah County (County-Led)						
Support the implementation and enforcement of water laws that encourage the legal use of water resources. Accomplish through press releases, building relationships and publishing a "fact sheet."	2014	Uintah County	Uintah County Emergency Management	High	Completed	Drought
Identify and maintain critical transportation and utility services.	2014	Uintah County	Uintah County Roads Department	High	Completed	Earthquake
Develop and enforce current local, state, and federal fire and building codes regarding defensible spaces and other measures.	2014	Uintah County	Uintah Fire Suppression Special Service District	High	Completed	Wildfire
City of Naples						
Work with the Utah Division of Water Rights and other groups	2014	City of Naples	Utah Division of Water Rights	Low	Completed	Dam Failure

COMPLETED MITIGATION PROJECTS						
to implement Emergency Action Plans on a local level.						
Require wild land/urban interface mitigation through county ordinance. Talk with Utah FFSL about writing a Community Wildfire Protection Plan, and encourage firewise ordinances and building codes.	2014	City of Naples	Uintah Fire Suppression Special Service District	Low	Completed	Wildfire
City of Vernal						
Maintain and enforce water rate policies that encourage water conservation.	2013	City of Vernal	City of Vernal	High	Completed	Drought

APPENDIX

APPENDIX A: REFERENCES

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2024

Uintah Basin Region

Multi-Jurisdictional All Hazard Mitigation Plan

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ANNEX A: DAGGETT COUNTY

ANNEX B: DUCHESNE COUNTY

ANNEX C: UINTAH COUNTY

SCALE

NO.	DATE	APPROVED BY

REVISIONS

CIVCO Engineering, Inc.
1256 W. 400 S. STE. 1, P.O. Box 1758, Vernal, Utah 84078
Telephone: (435) 789-5448 Fax: (435) 789-4485

DRAWN BY .

QC CHECKED BY .

APPROVED: DATE

PROFESSIONAL ENGINEER

OWNER

PROJECT NAME:

PHASE

SHEET NO.



NOTES:

1) 30' WIDE EASEMENT
2) ~ 3939' LONG SEWER LINE
3) TOTAL ACREAGE ~ 2.75 ACRES

SUNRISE ENGINEERING
148 SOUTH VERNAL AVENUE
VERNAL, UTAH 84078
TEL 435.789.7364
www.sunrise-eng.com

SEWER LINE IMPROVEMENTS

DAGGETT COUNTY AIRPORT EASEMENT EXHIBIT

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NORTH

SCALE
0 50' 100'
1" = 100'

PROPOSED SEWER LINE
AND EASEMENT BOUNDARY

AIRPORT PROPERTY

RUBLE LANE

KOKANEE LANE

YLINCHETA LANE

NOTES:

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SEWER LINE IMPROVEMENTS

DAGGETT COUNTY AIRPORT EASEMENT EXHIBIT

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NORTH

SCALE
0 75' 150'
1" = 150'

PROPOSED SEWER LINE
AND EASEMENT BOUNDARY

AIRPORT PROPERTY

RUBLE LANE

KOKANEE LANE

YLINCHETA LANE

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SEWER LINE IMPROVEMENTS

PEARCE PROPERTY
EASEMENT EXHIBIT

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