NOTICE OF MEETING
PLANNING COMMISSION
CITY OF ST. GEORGE
WASHINGTON COUNTY, UTAH

Public Notice

Notice is hereby given that the Planning Commission of the City of St. George, Washington County, Utah, will hold a **Planning Commission** meeting in the City Council Chambers, 175 East 200 North, St George, Utah, on **Tuesday, April 26, 2022**, commencing at **5:00 p.m**.

The agenda for the meeting is as follows:
Call to Order
Flag Salute

1. **CONTINUED ITEMS**

   Consider a request for a general plan amendment to change the land-use map from Low Density Residential (LDR) and Medium Density Residential (MDR) to Professional Office (PO) and Commercial (COM) on approximately 7.36 acres generally located on the southeast quadrant of River Road and 1450 South Street. The applicant is RCSG, LLC, and the representative is Richie Webb. The project will be known as River Crossing Case No. 2022-GPA-006. (Staff – Carol Davidson)

2. **GENERAL PLAN AMENDMENT (GPA) *(Public Hearing)* Legislative**

   A. Consider a request for a general plan amendment to change the land-use map from Commercial (COM) to High Density Residential (HDR) to on approximately 10.13 acres generally located on the west side of Dixie Drive just south of Gap Canyon Parkway. The applicant is Tonaquint Inc, and the representative is Tim Stewart. The project will be known as Dixie Drive Apartments Case No. 2022-GPA-005. (Staff – Carol Davidson)

   B. A request to change the General Plan from Low Density Residential (LDR) to Commercial (COM) on approximately 13 acres generally located at 1295 N Bluff Street. The applicant and representative is John Walter. The project will be known as Dodge Springs General Plan Amendment. Case No. 2022-GPA-004. (Staff – Mike Hadley)

   THIS ITEM WILL BE HEARD AT A LATER DATE

3. **CONDITIONAL USE PERMIT (CUP) Administrative**

   Consider a request a conditional use permit for an 80’ cell tower at 1842 W Sunset Blvd. The City Code requires a conditional use permit for any proposed tower over 50’ in height. The applicant is Atlas Tower LLC, and the representative is Carri Wullner. The project will be known as Atlas Tower. Conditional Use Permit Case No. 2022-CUP-004. (Staff – Mike Hadley)

4. **ZONE CHANGE (ZC) *(Public Hearing)* Legislative**

   A. Consider a request to to change the zone from R-1-10 (Residential Single Family, 10,000 sq ft minimum lot size) to OS (Open Space) on approximately 42.76 acres located on several properties throughout the northern portion of the Divario development. The applicant is St. George 730 LC and the representative is Rick Rosenberg. The project will be known as Divario at St. George Open Space Rezone. Case No. 2022-ZC-019 (Staff –Dan Boles)

   B. Consider a request to change the zone from R-1-10 (Residential Single Family, 10,000 sq ft minimum lot size) to PD-R (Planned Development Residential) on approximately 9.43 acres located south of the Gap Canyon Pkwy and Divario Canyon Dr intersection. The applicant is proposing 81

townhome units on the property. The applicant is Henry Walker Homes and the representative is Brock Loomis. The project will be known as Becco Creek. Case No. 2022-ZC-004 (Staff- Dan Boles)

5. HILLSIDE PERMIT (HS) Administrative

Consider a request for a hillside development permit at the Divario development. The applicant is proposing to construct in the area shown on the slope map labeled 20-29% and open space. This is specifically in the PA-18 area which is situated in the northern portion of the Divario development. The property is currently zoned Single-Family Residential, minimum lot size 10,000 square feet (R-1-10). The applicant is 730 St George, LLC. Case No. 2022-HS-004. (Staff – Wes Jenkins)

6. PRELIMINARY PLAT (PP) Administrative

A. Consider a request for a four (4) lot residential subdivision known as Glenview located at 2262 South and 2100 East. The property is .54 acres and is zoned R-1-10. The applicant is Bush & Gudgell, representative Rick Meyer. Case No. 2022-PP-015. (Staff – Wes Jenkins)

B. Consider a request for an eight (8) open space parcels located west of Divario Canyon Drive Between Sunbrook Drive and Alienta Drive within the Divario Development. The property is zoned R-1-10. The applicant is Rosenberg Associates, representative Rick Rosenberg. Case No. 2022-PP-016. (Staff – Wes Jenkins)

C. Consider a request for a one (1) lot residential subdivision known as Divario (PA-18) located on the southwest corner of the intersection of Divario Canyon Drive and Gap Canyon Drive. The property is 9.43 acres and is zoned R-1-10. The applicant is Rosenberg Associates, representative Allen Hall. Case No. 2022-PP-020. (Staff – Wes Jenkins)

D. Consider a request for a two (2) lot commercial subdivision known as Staybridge located 1301 Sunland Drive. The property is 3.50 acres and is zoned C-3. The applicant is Bush & Gudgell, representative Bob Hermandson. Case No. 2022-PP-023. (Staff – Wes Jenkins)

7. MINUTES

Consider a request to approve the meeting minutes from the April 12, 2022, meeting.

8. CITY COUNCIL ACTIONS
No meeting was held April 21, 2022.

Brenda Hatch – Development Office Supervisor

Reasonable Accommodation: The City of St. George will make efforts to provide reasonable accommodations to disabled members of the public in accessing City programs. Please contact the City Human Resources Office at (435) 627-4674 at least 24 hours in advance if you have special needs

St.George
Community Development

ITEM 1
General Plan Amendment

PLANNING COMMISSION AGENDA REPORT: 04/12/2022
CONTINUATION: 04/26/2022

River Crossing General Plan Amendment (Case No. 2022-GPA-006)	
Request:	Consider approval of an ordinance changing the general plan future land-use map from Low Density Residential (LDR) and Medium Density Residential (MDR) to Commercial (COM), Professional Office (PO), and Open Space (OS) on 7.36 acres located at the southeast quadrant of River Road and 1450 South for a project to be known as River Crossing.
Applicant:	RCSG, LLC
Representative:	Richie Webb
Location:	Southeast quadrant of 1450 South Street and River Road
Existing General Plan:	Low Density Residential (LDR) and Medium Density Residential (MDR)
Proposed General Plan:	Commercial (COM), Professional Office (PO), and Open Space (OS)
Existing Zoning:	Single Family Residential, minimum lot size 10,000 sf (R-1-10)
Land Area:	Approximately 7.36 acres

BACKGROUND:
The General Plan is a guide for land-use decisions and contains various policies to help direct decisions related to land use and development of the City. This General Plan Amendment is for land generally located at the southeast corner of 1450 South Street and River Road. This property sits just south and east of a larger commercial land use designation. To the east, the land use map has Medium Density Residential (MDR) and to the south it is Low Density Residential (LDR). This proposal would extend the commercial development to the existing medium and low-density existing neighborhoods. This would include approximately 7.36 acres of undeveloped land.

This development was formally known as Boulder Creek Commons and has been through the planning process many times. The latest case was in February of this year. On February 3, 2022, the applicant had their request to change the General Plan Land Use Map to Commercial (COM) denied (2022 GPA-001). Previous to this case, in the fall of 2021 (2021-ZCA-081), River Crossing Phase 1 was approved.

This general plan amendment is in preparation of River Crossing Phase 2. The applicant is now seeking to change the land use map to three separate designations as apposed to the single designation of COM that was denied earlier this year. This new proposal is to change the land use map to COM, Professional Office (PO), and Open Space (OS). The added OS will help protect the residential development to the south of this property.

A small portion of this property in the north is in the 100-year flood plain.

UPDATE FOR 4/26/2022 MEETING: This item was continued at the 4/12/2022 Planning Commission Meeting. The applicant has since altered their plans to be more in line with the comments from the public and suggestions from the Planning Commissioners. The proposed changes keep the same elements, COM, PO, and OS, but rearrange the location to better address the concerns.

RECOMMENDATION:
Staff recommends approval of this general plan amendment.

ALTERNATIVES:
1. Recommend approval of this General Plan Amendment.
2. Recommend denial of this General Plan Amendment
3. Table the proposed General Plan Amendment to a specific date.

POSSIBLE MOTION:
The Planning Commission recommends approval of this General Plan Amendment for River Crossing.

FINDINGS FOR APPROVAL:
1. The proposed land-uses are compatible with the surrounding land uses in this area.
2. This land use amendment will not be harmful to the health, safety and general

welfare of residences and businesses in the area.

3. Vacant sites that are less desirable for residences (such as busy intersections) might be suitable for individual commercial or business establishments

Exhibit A
Applicant's Narrative

River Crossing

General Plan - Brief Narrative of Proposed Change

We are proposing a change to the General Plan regarding the following three tax parcels: SG 5-2-32-2316, SG 5-2-32-246, SG 5-2-32-22001. The parcels are located at 1450 South and River Road. Consistent with the zoning directly to the north and to the west of the property, we hope to develop this property according to its highest and best use by creating an inviting neighborhood shopping destination. The St. George General Plan under Section 6.5.3 reads, "Within existing residential areas of the City, there are small, isolated vacant sites that are less desirable for residences (such as busy intersections) that might be suitable for individual commercial or business establishments". Consistent with this stated vision, we are proposing to amend the General Plan from low/medium density to office and commercial. While we feel commercial is the best use for the property, we are proposing to create a buffer between the residential and commercial uses by proposing the designation of office for a portion of the property and commercial designation for the balance of the property. The attached site plan shows the proposed division line between office and commercial.

On pages 6-5 under the "Office" designation of the General Land Use Plan Designation/Purpose, it reads, "Development of professional offices including business and medical offices but not including retail sales. Often a buffer between residential and commercial or industrial areas". We believe with careful planning and coordination with the nearby local residents, we can develop the property in a manner that will not only serve as a neighborhood center with shopping, eateries and convenient workplaces, it will also serve to reduce the number of trips that are passing by this site in search of other options.

Exhibit B
Comments from the Public

St.George
THE BRIGHTER SIDE

Carol Davidson <carol.davidson@sgcity.org>

River Crossing Case No. 2022-GPA-006.

1 message

Ron Olive [redacted] Wed, Apr 6, 2022 at 7:59 AM
Reply-To: Ron Olive [redacted]
To: "carol.davidson@sgcity.org" <carol.davidson@sgcity.org>

I support the zone change to professional office and commercial for the area indicated, generally SE corner of 1450 S. and River Road.

Sincerely,
Ron Olive

Exhibit C
PowerPoint Presentation

RIVER CROSSING

General Plan Amendment

2022-GPA-006

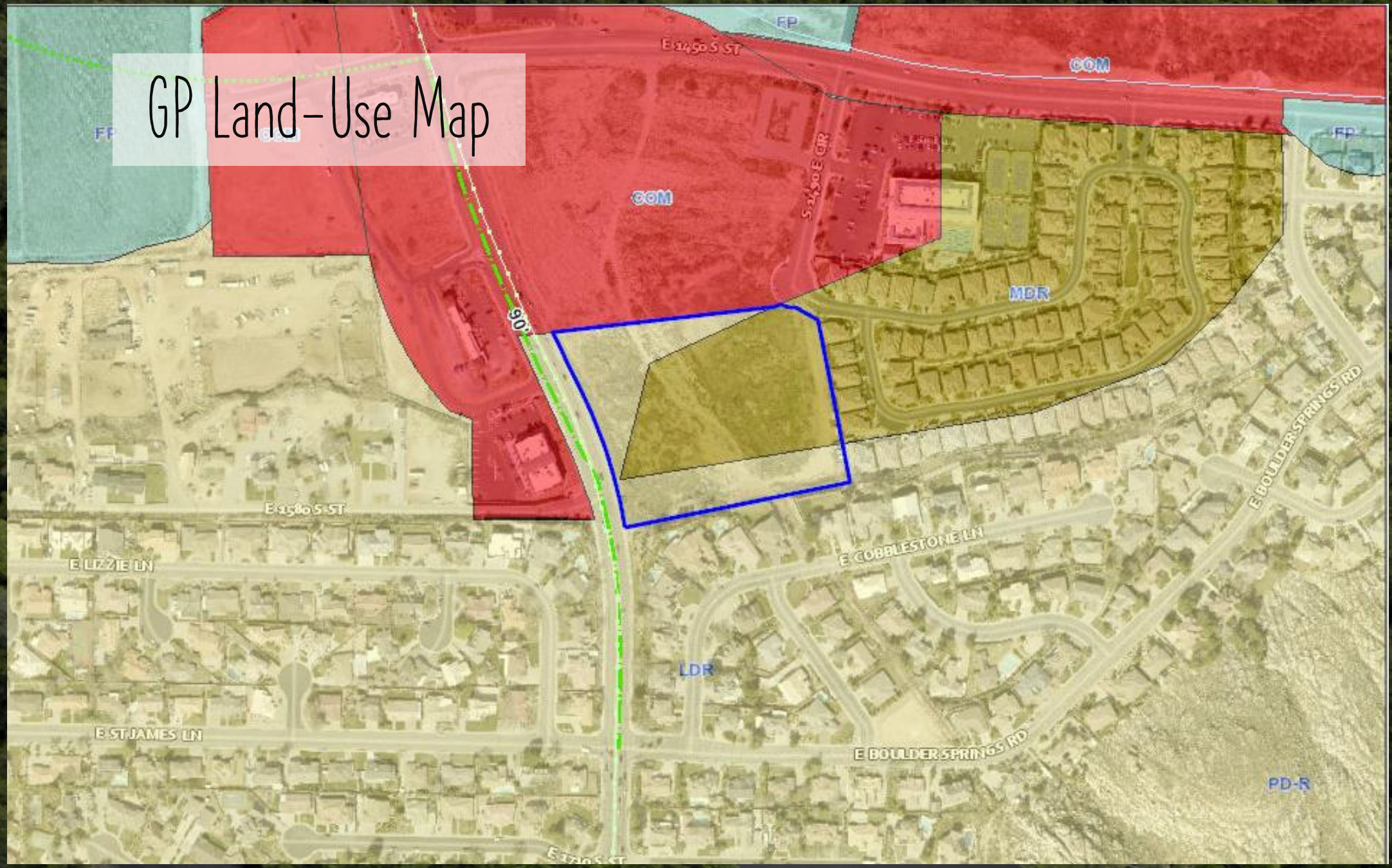
Aerial Map


E 1450 S ST
S 1450 E DR
E 1580 S ST
E LIZZIE LN
E COBBLESTONE LN
E BOULDER SPRINGS RD
E ST JAMES LN
E BOULDER SPRINGS RD
E 1710 S ST

Zoning Map


PD-C
E 1450 S ST
PD-C
PD-C
S 1450 E CIR
PD-C
PD-C
PD-R
OS
PD-C
R-1-10
E 1580 S ST
E BOULDER SPRINGS RD
E COBBLESTONE LN
E LIZZIE LN
R-1-10
E ST JAMES LN
E BOULDER SPRINGS RD
PD-R

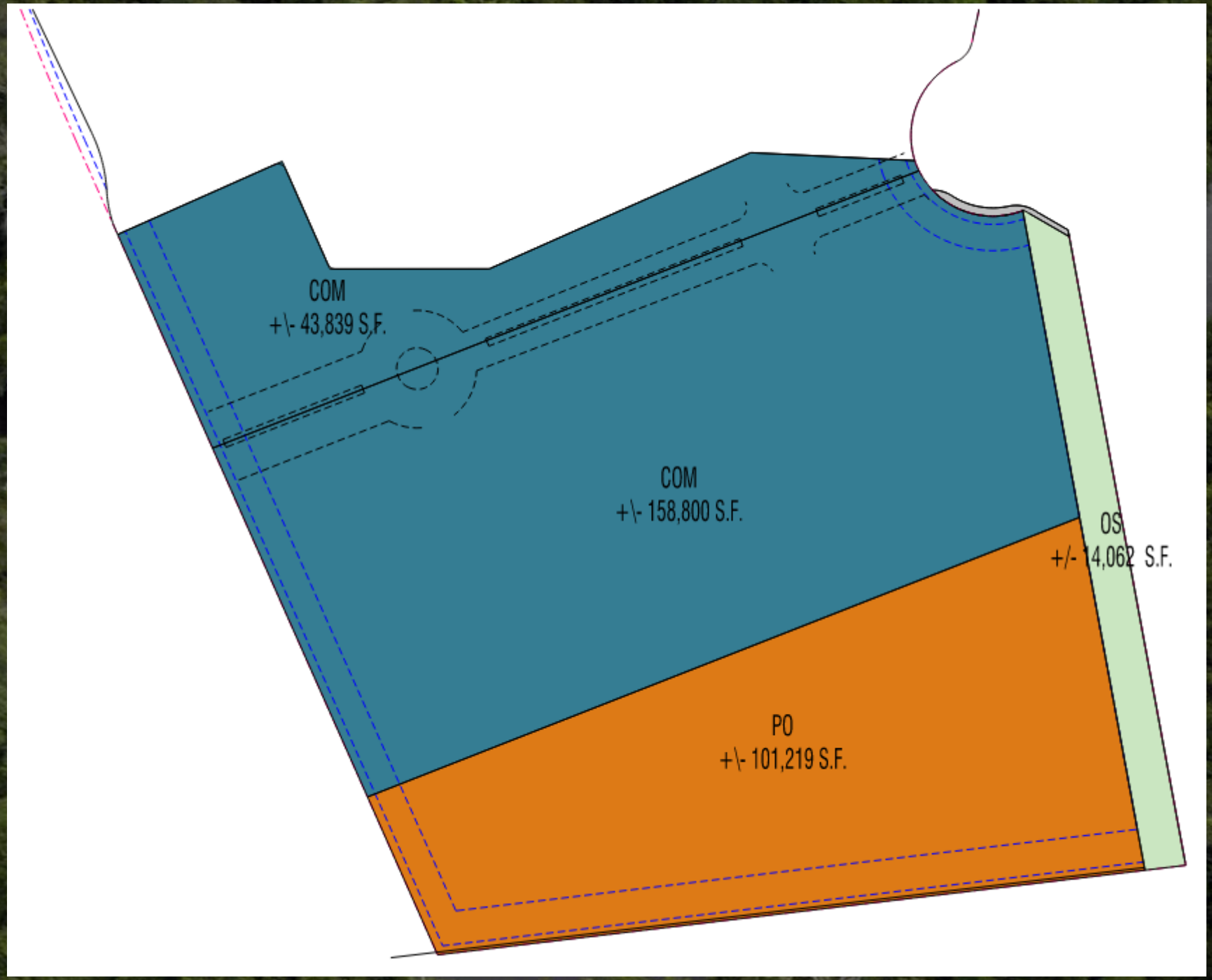
GP Land-Use Map



Proposal

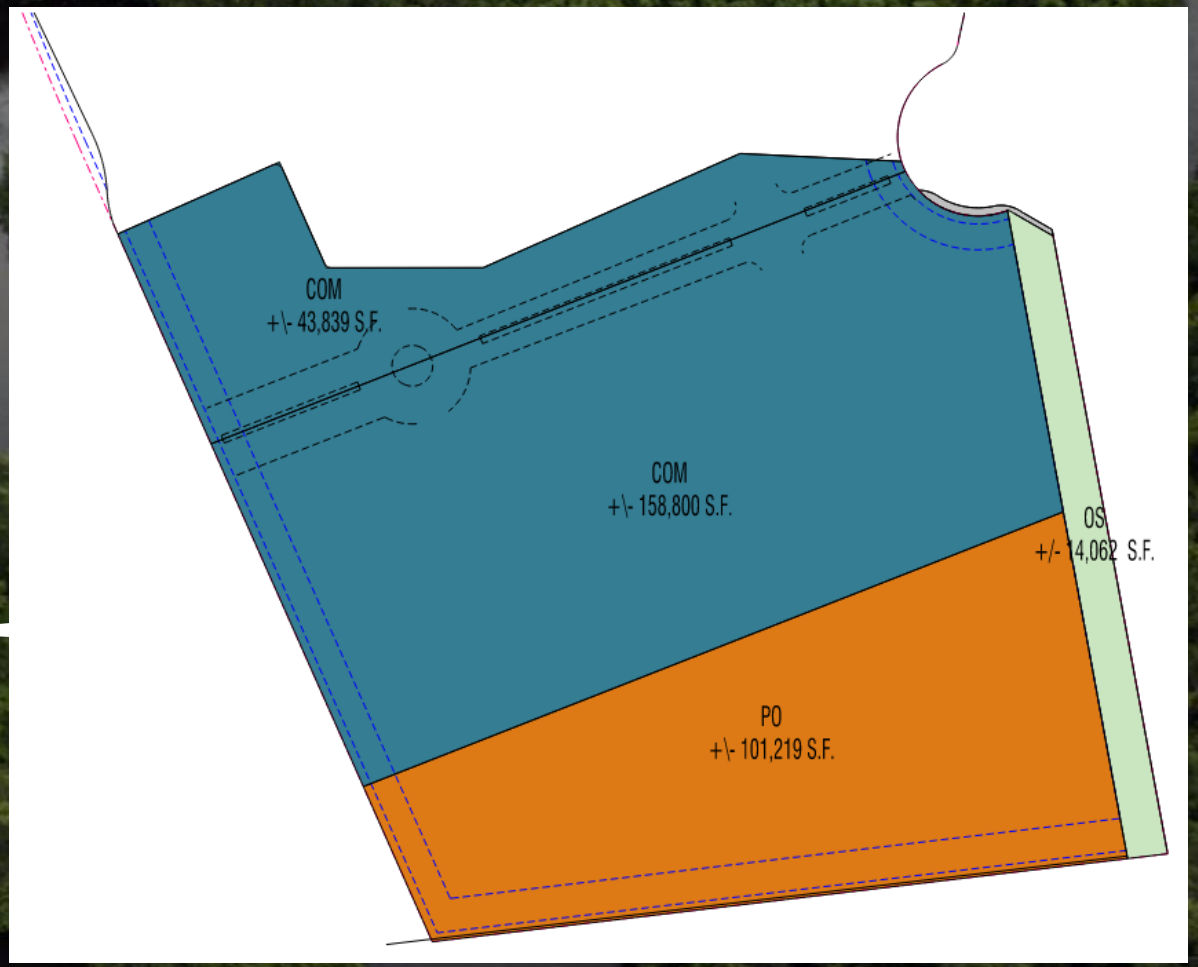
Updated Proposal

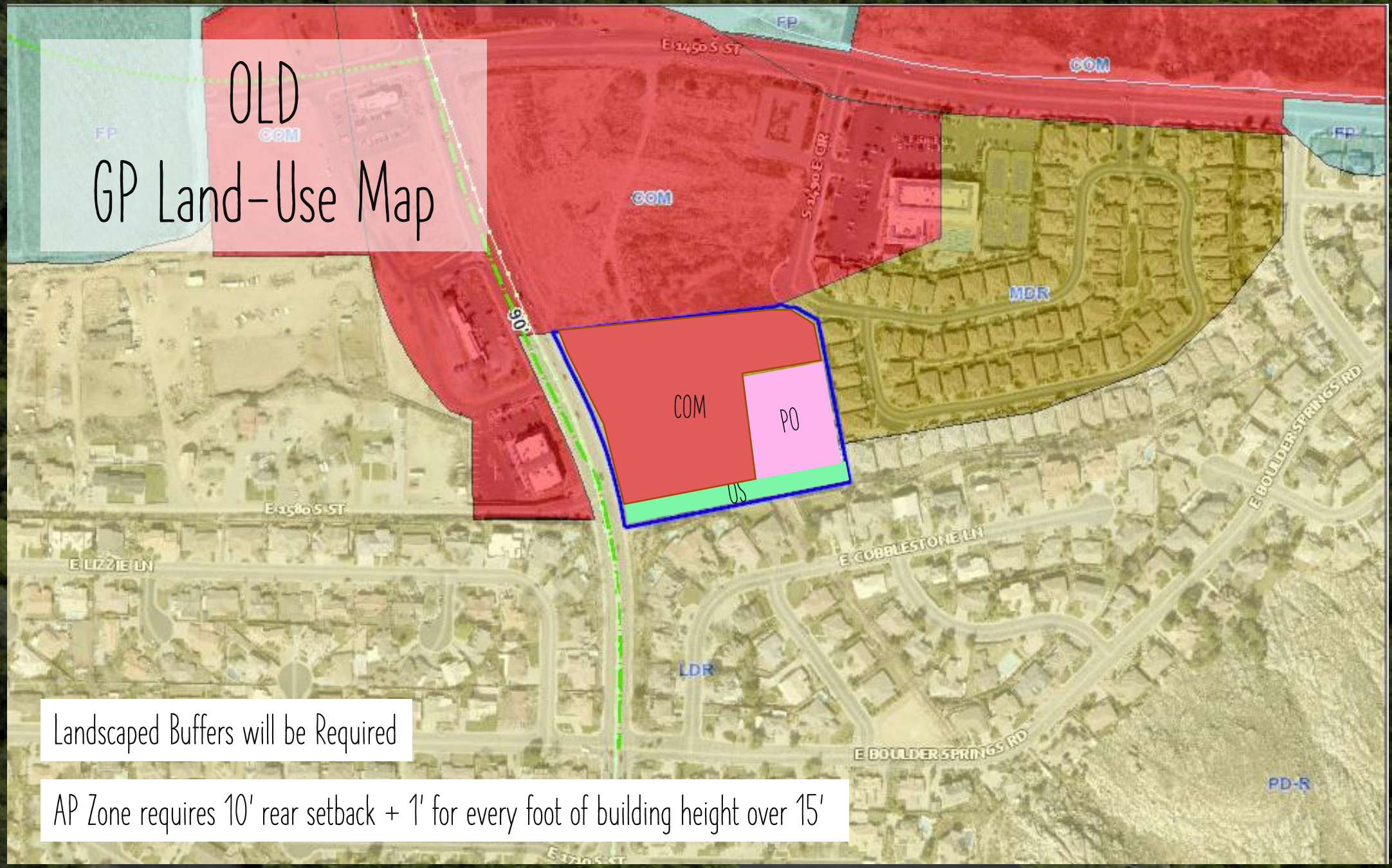
Updated Proposal

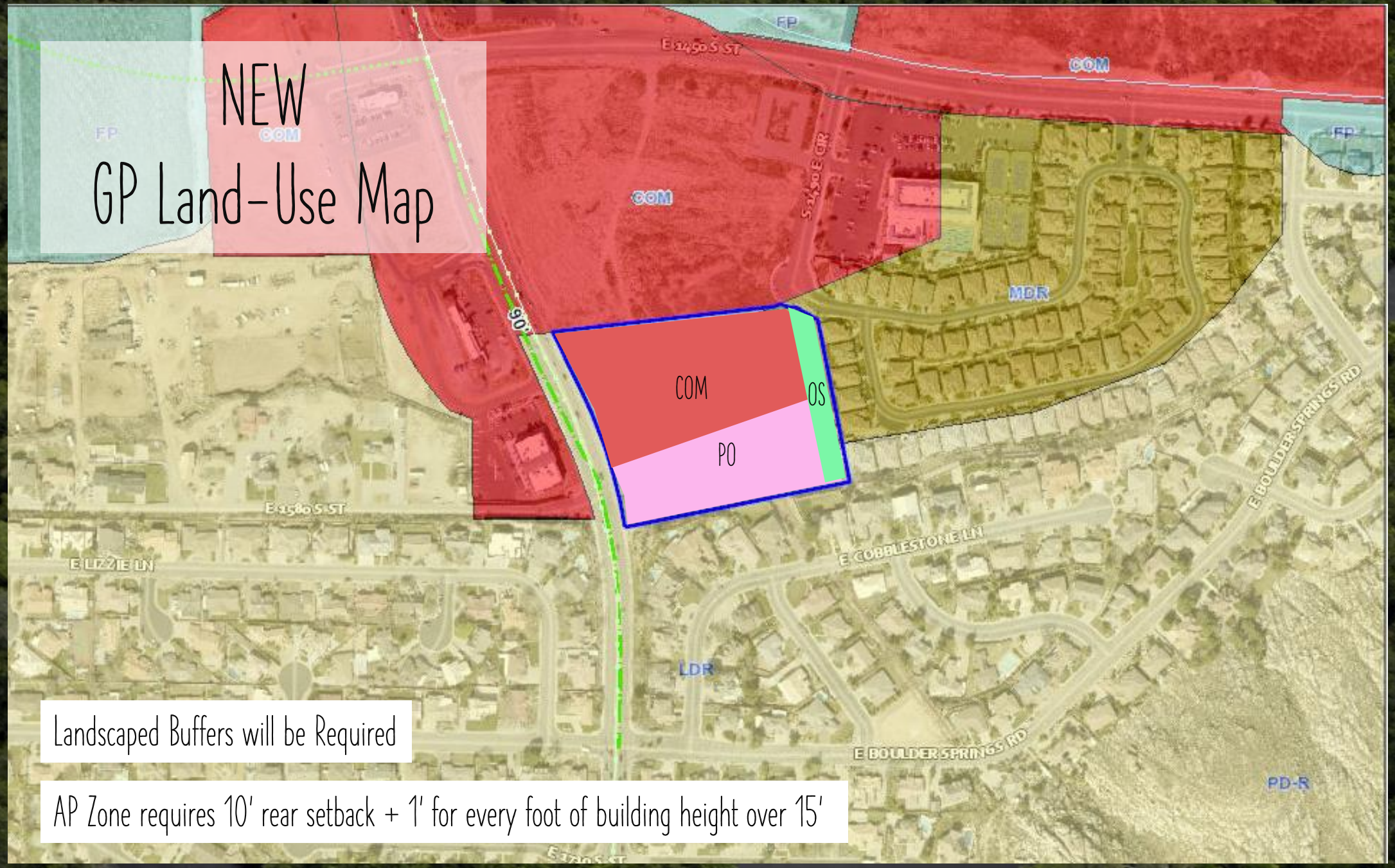


OLD

NEW




OLD
GP Land-Use Map
FP
COM
E 2450 S ST
S 2450 E DR
MDR
COM
PO
US
E 2580 S ST
E LIZZIE LN
E COBBLESTONE LN
E BOULDER SPRINGS RD
LDR
PD-R
Landscaped Buffers will be Required
AP Zone requires 10' rear setback + 1' for every foot of building height over 15'


NEW
GP Land-Use Map
COM
OS
PO
MDR
LDR
PD-R
FP
E 2450 S ST
E 1580 S ST
E LIZZIE LN
E COBBLESTONE LN
E BOULDER SPRINGS RD
Landscaped Buffers will be Required
AP Zone requires 10' rear setback + 1' for every foot of building height over 15'

PLANNING COMMISSION AGENDA REPORT: 04/12/2022

Dixie Drive Apartments General Plan Amendment (Case No. 2022-GPA-005)	
Request:	Consider approval of an ordinance changing the general plan future land-use map from Commercial (COM) to High Density Residential (HDR) on approximately 10.13 acres located on the west side of Dixie Drive just south of Gap Canyon Parkway for a project to be known as Dixie Apartments.
Applicant:	Tonaquint Inc
Representative:	Tim Stewart
Location:	West side of Dixie Drive, south of Gap Canyon Parkway
Existing General Plan:	Commercial (COM)
Proposed General Plan:	High Density Residential (HDR)
Existing Zoning:	Single Family Residential, minimum lot size 10,000 sf (R-1-10)
Land Area:	Approximately 10.13 acres

BACKGROUND:
The General Plan is a guide for land-use decisions and contains various policies to help direct decisions related to land use and development of the City. This proposal is for approximately 10.13 acres of undeveloped land. The purpose of this request is to change the land use map from commercial to a high-density residential classification to be able to build high density housing at this location. High Density Residential land allows 16- 22 dwelling units per acre.

The adjacent land to the west and south has the land-use designation of Low Density Residential (LDR) and the adjacent land to the north is Commercial (COM) with the land to the east being COM and Park (PK). If approved, this would reduce the size of the commercial land use and increase the density of this general location.

The existing zoning for this site is Single Family Residential, minimum lot size 10,000 sf (R-1-10). To the south and to the west are all single family residentially zoned properties as well. This property is also within the hillside overlay and will be required to go to the Hillside Review Board before any development can occur.

RECOMMENDATION:
Due to the proximity of Low Density Residential property that surrounds this land and the amount of existing and approved High Density Residentially designated properties in this area, staff recommends a better fit for the land use designation for this property would be Medium Density Residential.

ALTERNATIVES:
1. Recommend approval of this General Plan Amendment.
2. Recommend approval of Medium Density Residential.
3. Recommend denial of this General Plan Amendment.
4. Table the proposed General Plan Amendment to a specific date.

POSSIBLE MOTION:
The Planning Commission recommends approval of this General Plan Amendment with staff's recommendation to change the land use designation to Medium Density Residential.

FINDINGS FOR APPROVAL:
1. The proposed land-uses are compatible with the surrounding land uses in this area.
2. This land use amendment will not be harmful to the health, safety and general welfare of residences and businesses in the area.
3. Vacant sites that are less desirable for residences (such as busy intersections) might be suitable for individual commercial or business establishments

Exhibit A
Applicant's Narrative

Tonaquint Inc. proposes a General Plan Amendment for Parcel #SG-6-3-1-4431; located at approximately 1700 S Dixie Drive. It is proposed to amend the general plan from Commercial (COM) to High Density Residential (HDR) to allow for the development of the Dixie Drive Apartments project. The subject parcel is 10.13 acres located at the intersection of Dixie Drive and Gap Canyon Parkway. Adjacent properties to the south and west are general planed as Low Density Residential (LDR) and adjacent propertied to the north and east are general planed as Commercial (COM).

Exhibit B
PowerPoint Presentation

Dixie Drive Apartments

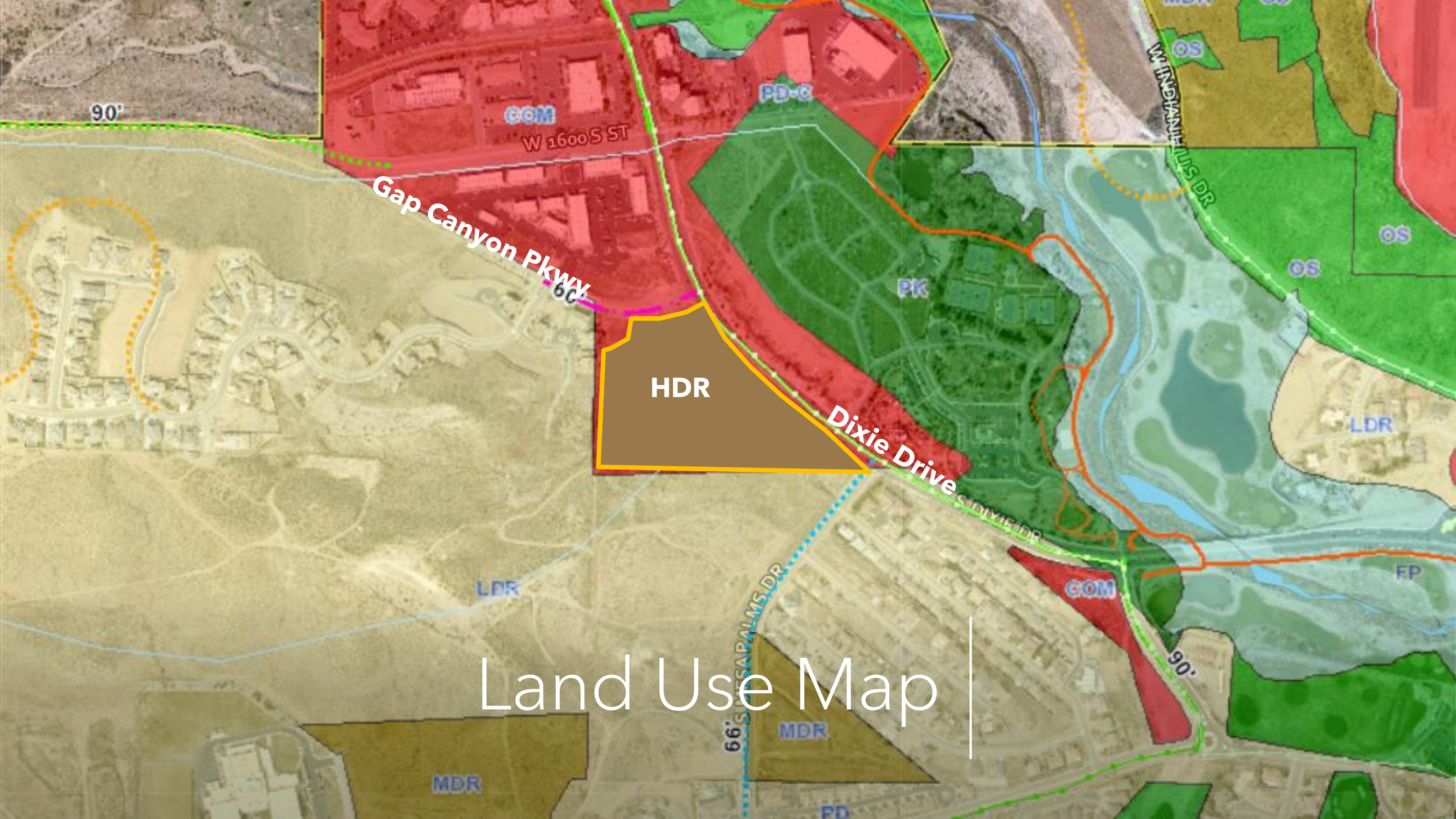
GENERAL PLAN AMENDMENT


W 1600 S ST
Gap Canyon Pkwy
W INDIANHILLS DR
S DIXIE DR
S MESAPALMS DR

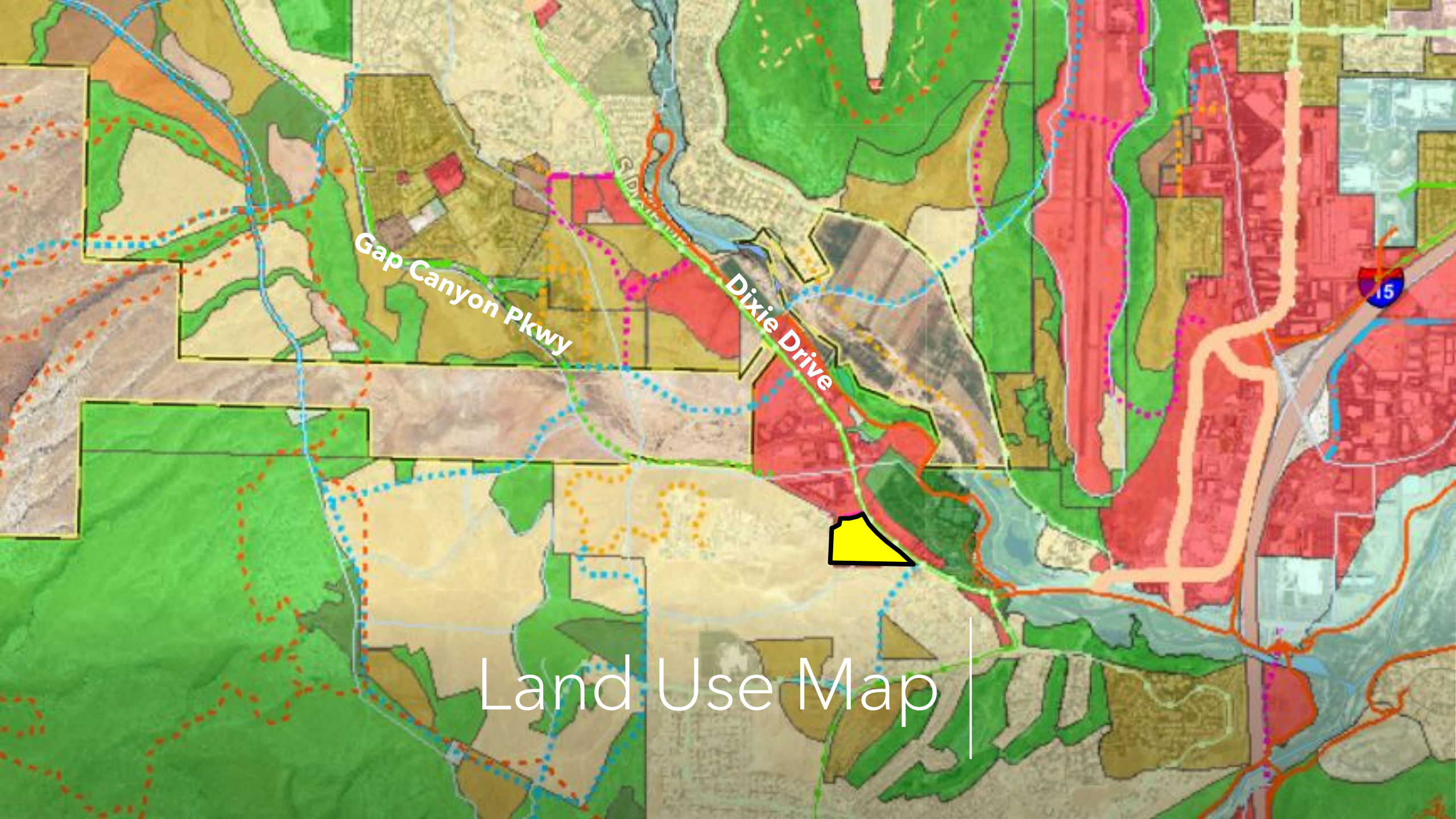
Aerial


Gap Canyon Pkwy
Dixie Drive
Zoning
PD-C
PD-R
R-1-10
R-1-8
W 1600 S ST
DIXIE DR
WINDIANHILLS DR
S MESA PALMS DR
OS

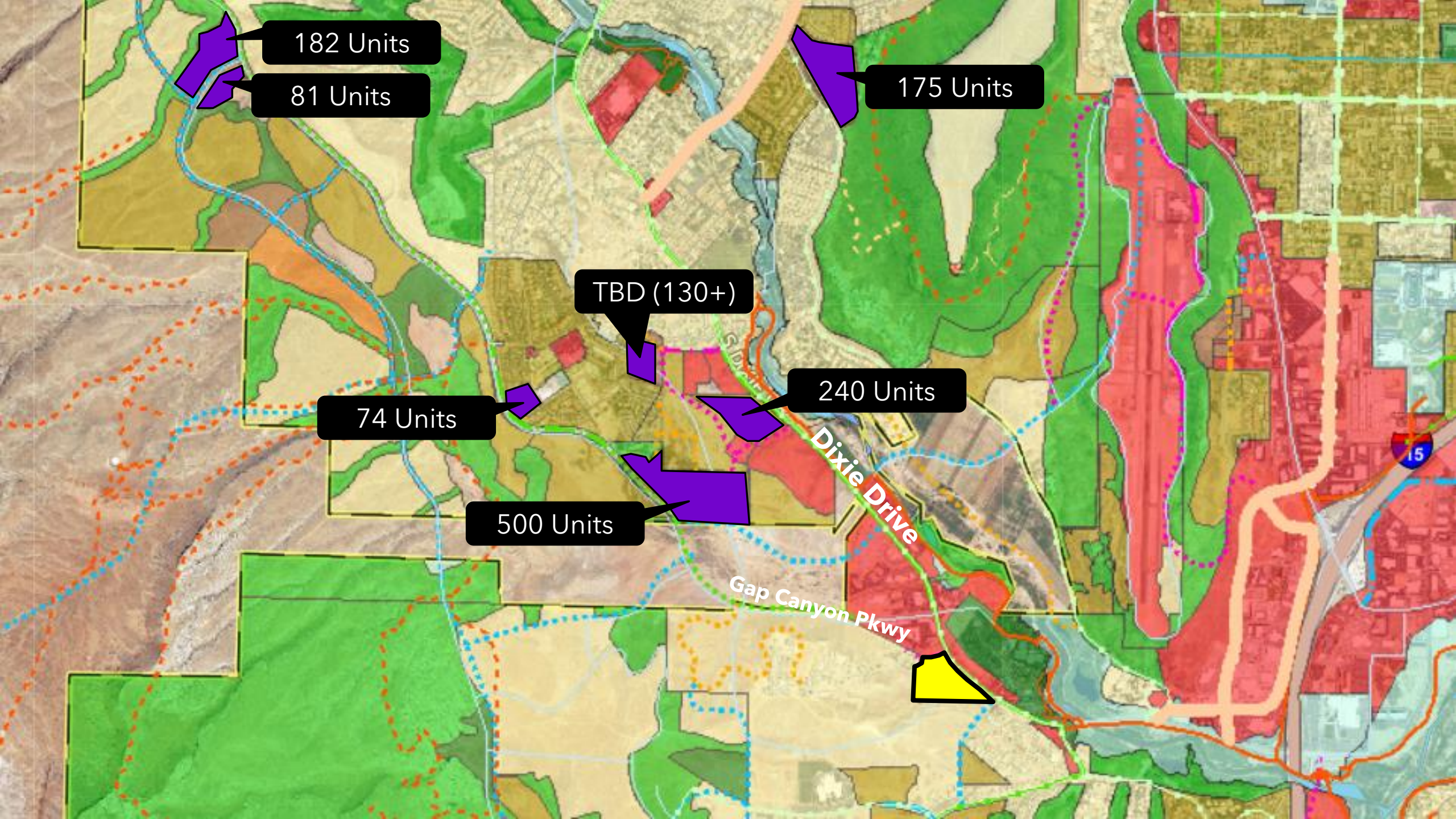
Land Use Map



90'
COM
W 1600 S ST
PD-C
Gap Canyon Pkwy
60'
HDR
Dixie Drive
PK
OS
OS
OS
LDR
LDR
FP
COM
90'
66'
MDR
MDR
PD



Land Use Map


182 Units
81 Units
175 Units
TBD (130+)
240 Units
74 Units
500 Units
Dixie Drive
Gap Canyon Pkwy
15


S DIXIE DR
Dixie Drive
Gap Canyon Pkwy
15

Dixie Drive Apartments

RECOMENDATION

St.George
Community Development

ITEM 3
CUP Communication Transmission Facility

PLANNING COMMISSION AGENDA REPORT: **04/26/2022**

CONDITIONAL USE PERMIT
Atlas Cell Tower LLC
Case # 2022-CUP-004

Request:	Consider a Conditional Use Permit (CUP) to construct an 80' tall, unmanned telecommunication facility at 1842 W Sunset Blvd
Location:	SG-NCS-4
Applicant:	Atlas Cell Tower, LLC
Representative:	Carri Wullner
General Plan:	Com (Commercial)
Zoning:	C-3 (COM)
Background:	Atlas Tower is proposing a new telecommunications tower. The new tower would be in the C3 zone at the property address of 1842 W Sunset Blvd. This request does require a conditional use permit. The facility will be roughly 1,600 square feet and house an 80' monopole tower that can accommodate up to four wireless carriers.
Height:	80' to top of monopole. The submitted plans show a 60' monopole. The applicant will need to submit updated plans for the site plan review process showing the true proposed height if approved for 80' pole.
Fencing:	The City requires a 6'4" solid masonry wall enclosure. The applicant will be required to install the solid masonry fence.

Ordinance(s):

10-8B-1: ALLOWED USES:

Allowed Uses Commercial

	C-1	C-2	C-3	C-4
Service businesses, limited to the following uses:				
Body piercing, ancillary to a permitted use		P	P	P
Carpet and rug cleaning		P	P	P
Child care center	P	P	P	P
Communication transmission facilities, including wireless, primary		PS	PS	PS
Communication transmission facilities, including wireless, primary, height over 50'	**C**	**C**	**C**	**C**

10-17B-3: REVIEW CRITERIA:
In reviewing an application for a conditional use permit, the land use authority shall consider whether the application:
A. Identifies the maximum intensity of the proposed development and use;
B. Complies with all provisions of the code; and
C. Compared to permitted development and uses within the zone, substantially mitigates the adverse impacts that are reasonably anticipated from the magnitude and intensity of the development and use, as proposed, considering:
1. The size and location of the site;
2. Traffic generation, timing and nature of traffic impacts and the existing condition and capacity of the streets in the area;
3. Utility demand and available capacity, including storm water retention;
4. Emergency vehicle access and anticipated average- and peak-day demand;
5. Location and amount of off-street parking;
6. Internal vehicular and pedestrian circulation system, including delivery vehicles, loading and unloading;
7. Fencing, screening, and landscaping to separate the conditional use from adjoining property and uses;
8. Building mass, bulk, design and orientation, and the location of buildings on the site including orientation to buildings on adjoining lots or parcels;
9. Usable open space;
10. Signs and lighting;
11. Physical design and compatibility with surrounding structures in terms of mass, scale, style, design, and architectural detailing;
12. Noise, vibration, odors, steam, or other factors that might adversely affect people and property on site and off site;
13. Control of delivery and service vehicles, loading and unloading zones;

14. Generation and screening of trash, and automated garbage collection (dumpsters);
15. Recycling program and pickup areas;
16. The potential adverse impacts arising from the conduct of patrons, guests, employees, occupants, or their affiliates;
17. Within and adjoining the site, the impacts of the use on public property and environmentally sensitive lands;
18. Hours of operation, delivery and use;
19. Special hazards arising from the use, or from its reasonably anticipated secondary effects, including its potential to attract criminal behavior; and
20. Demand for public infrastructure or services

10-17B-4: CONDITIONAL USE PERMIT STANDARDS:
…the proposal shall:

A. Be compatible in use, scale and design with allowed uses in the zone; and

B. Not compromise the health, safety, or welfare of:
   1. Persons employed within or using the proposed development;
   2. Those residing or working in the vicinity of the proposed use or development;
   3. Property or improvements in the vicinity of the proposed use or development; or
   4. Not impose disproportionate burdens on the citizens of the city.

Staff Recommendation:
Review criteria of note has been formatted in **bold**.
Staff recommends approval of the proposed CUP with findings that the Application requirements per 10-17B-1, the review criteria per 10-17B-3 and the Conditional Use Permit Standards in 10-17B-4 have been met.

The preferred design is an 80’ tall monopole structure enclosed with a 6’4” tall masonry fence.

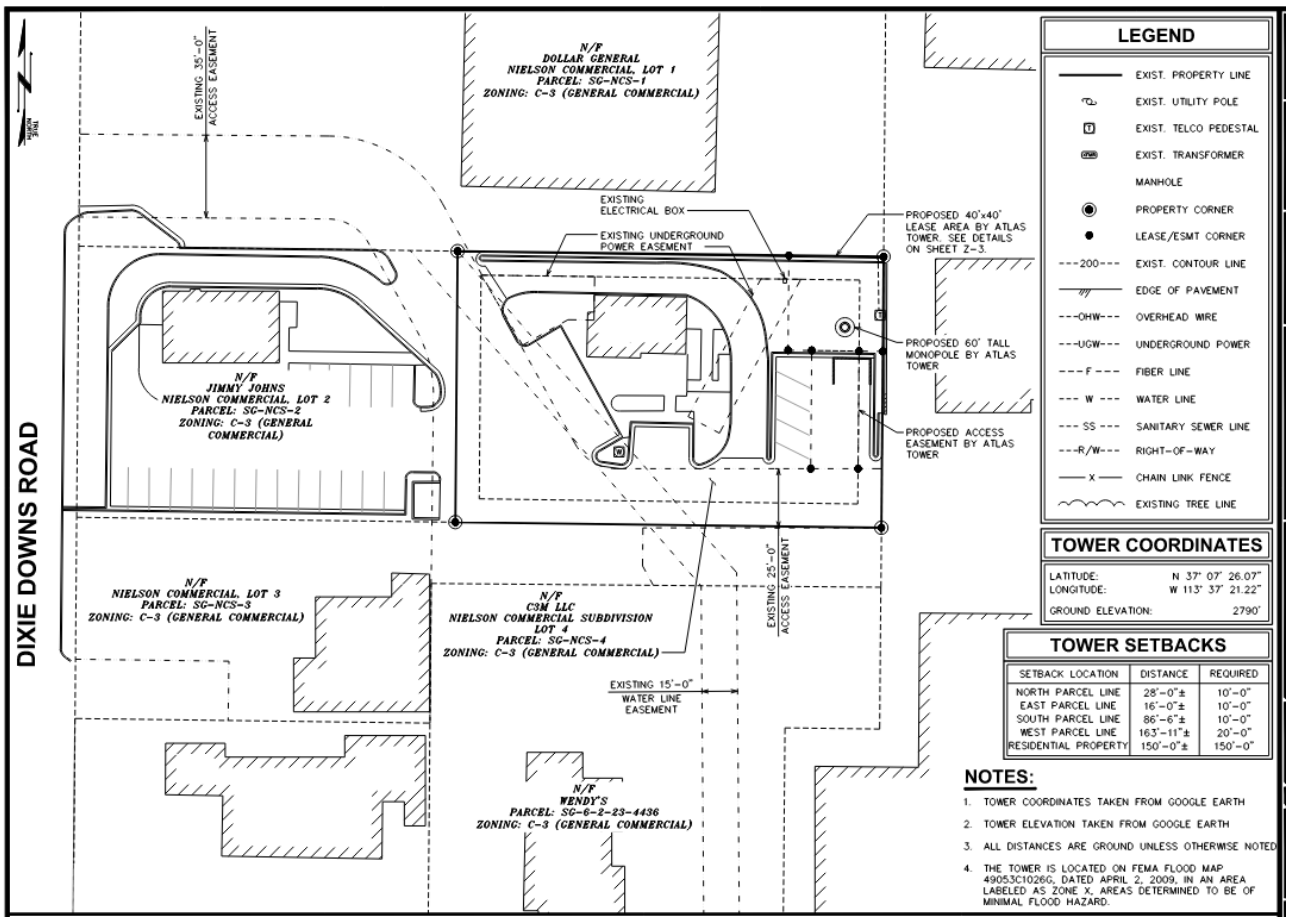
Site


N DIXIE DOWNS RD
1867 W
1863 W
1851 W
1947 W
1935 W
1831 W
1819 W
1815 W
922 N
1812 W Unit 39
1812 W Unit 37
1812 W Unit 35
1842 W
910 N
1812 W Unit 12
1812 W Unit 14
1812 W Unit 16
890 N
1812 W Unit 10
1812 W Unit 8
1812 W Unit 7
1812 W Unit 6
1812 W Unit 4
1812 W Unit 2
1860 W
1838 W

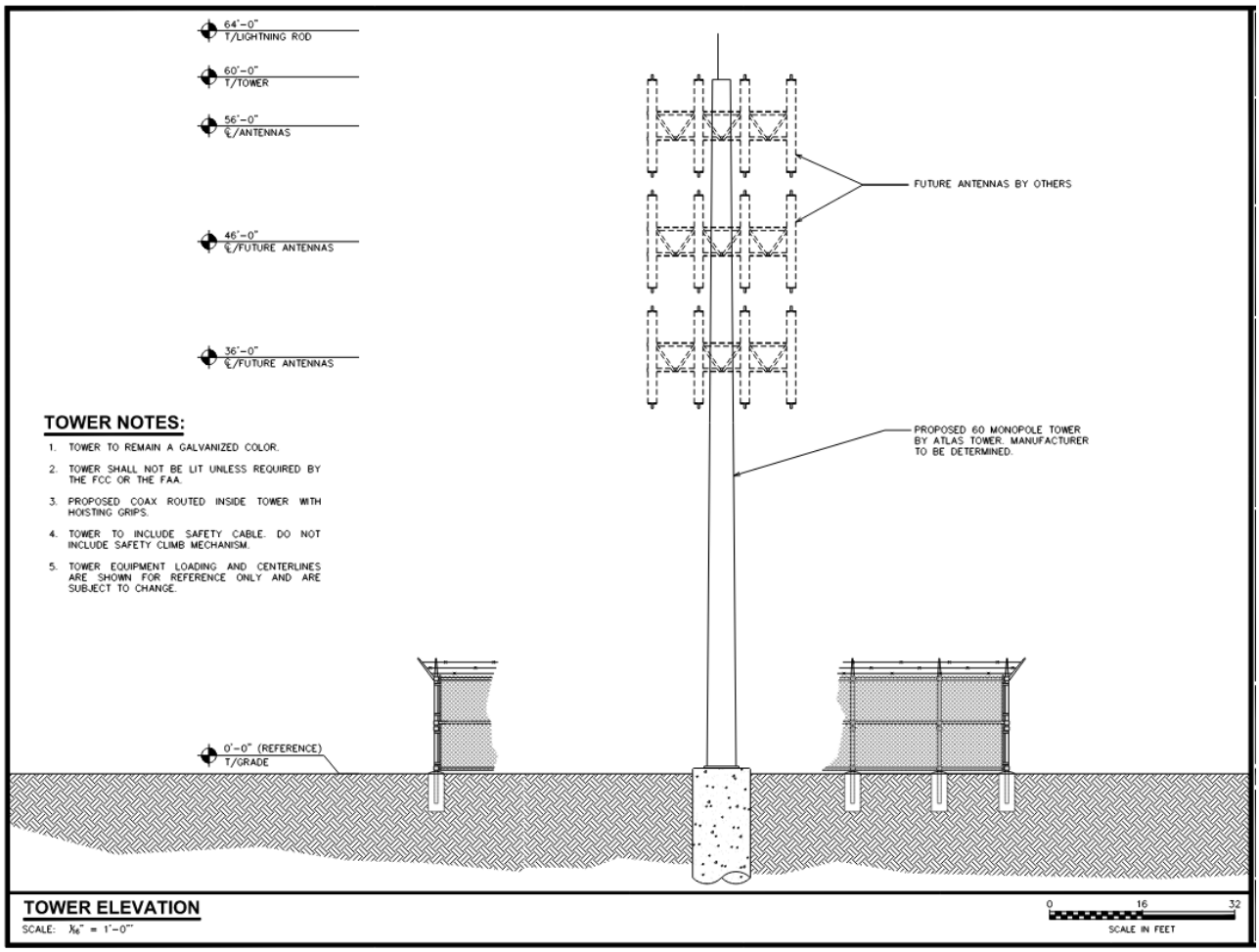
Zoning C-3


N DIXIE DOWNS RD
922 N
1842 W
910 N
866 N
C-3
1860 W
1838 W
1930 W
1812 W Unit 39
1812 W Unit 37
1812 W Unit 35
1812 W Unit 12
1812 W Unit 14
1812 W Unit 16
1812 W Unit 10
1812 W Unit 8
1812 W Unit 7
1812 W Unit 6
1812 W Unit 4
1812 W Unit 2

Site Plan


DIXIE DOWNS ROAD
EXISTING 35'-0" ACCESS EASEMENT
N/F
DOLLAR GENERAL
NIELSON COMMERCIAL, LOT 1
PARCEL: SG-NCS-1
ZONING: C-3 (GENERAL COMMERCIAL)
EXISTING ELECTRICAL BOX
EXISTING UNDERGROUND POWER EASEMENT
PROPOSED 40'x40' LEASE AREA BY ATLAS TOWER SEE DETAILS ON SHEET Z-3.
PROPOSED 60' TALL MONOPOLE BY ATLAS TOWER
PROPOSED ACCESS EASEMENT BY ATLAS TOWER
N/F
JIMMY JOHNS
NIELSON COMMERCIAL, LOT 2
PARCEL: SG-NCS-2
ZONING: C-3 (GENERAL COMMERCIAL)
N/F
NIELSON COMMERCIAL, LOT 3
PARCEL: SG-NCS-3
ZONING: C-3 (GENERAL COMMERCIAL)
N/F
C3M LLC
NIELSON COMMERCIAL SUBDIVISION
LOT 4
PARCEL: SG-NCS-4
ZONING: C-3 (GENERAL COMMERCIAL)
EXISTING 25'-0" ACCESS EASEMENT
EXISTING 15'-0" WATER LINE EASEMENT
N/F
WENDY'S
PARCEL: SG-6-2-23-4436
ZONING: C-3 (GENERAL COMMERCIAL)
LEGEND
EXIST. PROPERTY LINE
EXIST. UTILITY POLE
EXIST. TELCO PEDESTAL
EXIST. TRANSFORMER
MANHOLE
PROPERTY CORNER
LEASE/ESMT CORNER
EXIST. CONTOUR LINE
EDGE OF PAVEMENT
OVERHEAD WIRE
UNDERGROUND POWER
FIBER LINE
WATER LINE
SANITARY SEWER LINE
RIGHT-OF-WAY
CHAIN LINK FENCE
EXISTING TREE LINE
TOWER COORDINATES
LATITUDE: N 37° 07' 26.07"
LONGITUDE: W 113° 37' 21.22"
GROUND ELEVATION: 2790'
TOWER SETBACKS
SETBACK LOCATION | DISTANCE | REQUIRED
NORTH PARCEL LINE | 28'-0"± | 10'-0"
EAST PARCEL LINE | 16'-0"± | 10'-0"
SOUTH PARCEL LINE | 86'-6"± | 10'-0"
WEST PARCEL LINE | 163'-11"± | 20'-0"
RESIDENTIAL PROPERTY | 150'-0"± | 150'-0"
NOTES:
1. TOWER COORDINATES TAKEN FROM GOOGLE EARTH
2. TOWER ELEVATION TAKEN FROM GOOGLE EARTH
3. ALL DISTANCES ARE GROUND UNLESS OTHERWISE NOTED
4. THE TOWER IS LOCATED ON FEMA FLOOD MAP 49053C1026G, DATED APRIL 2, 2009, IN AN AREA LABELED AS ZONE X, AREAS DETERMINED TO BE OF MINIMAL FLOOD HAZARD.

Height (Monopole)



Atlas Cell Tower

2022-CUP-004

Location

2022-CUP-004

Zoning

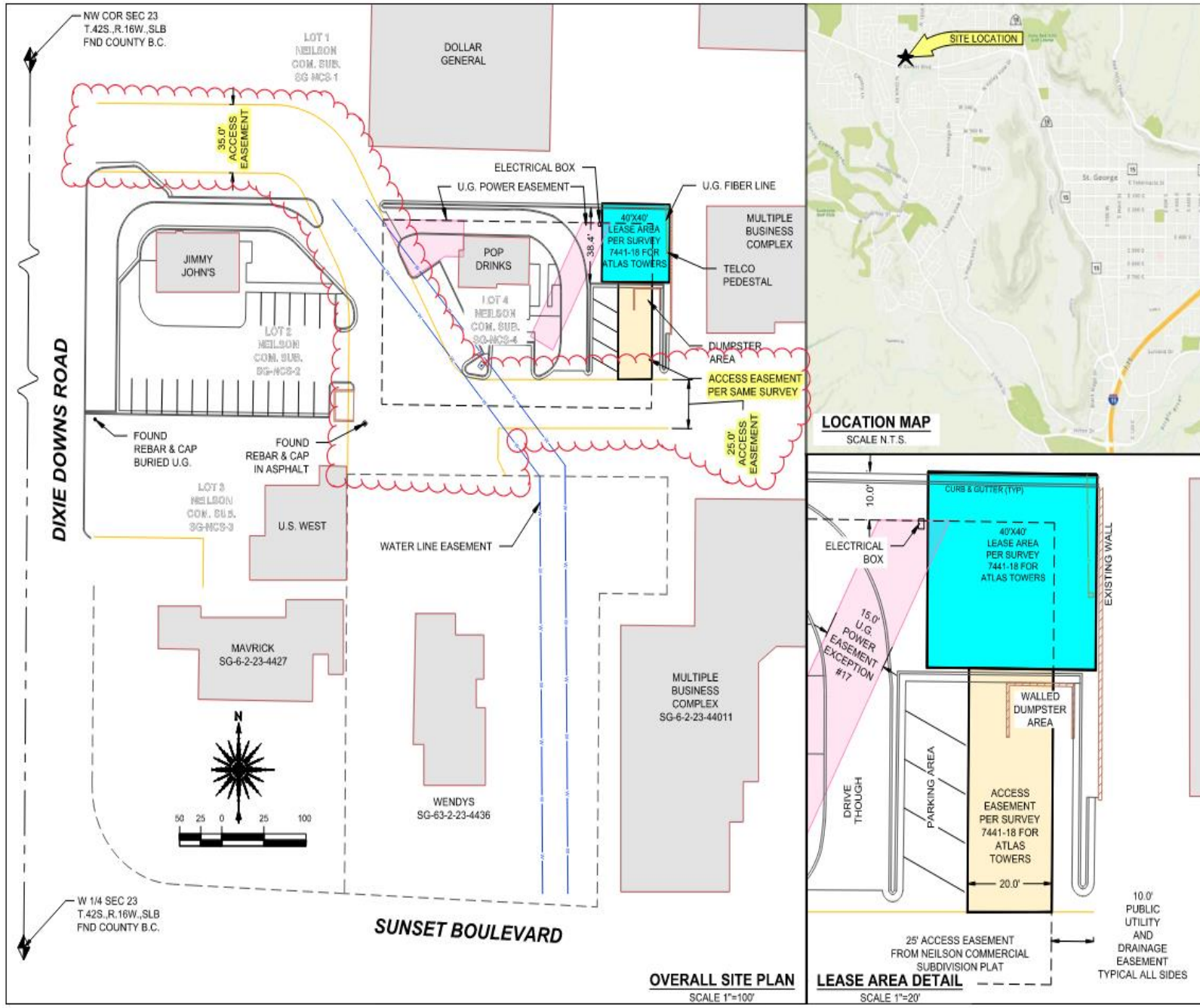
2022-CUP-004

General Plan

2022-CUP-004

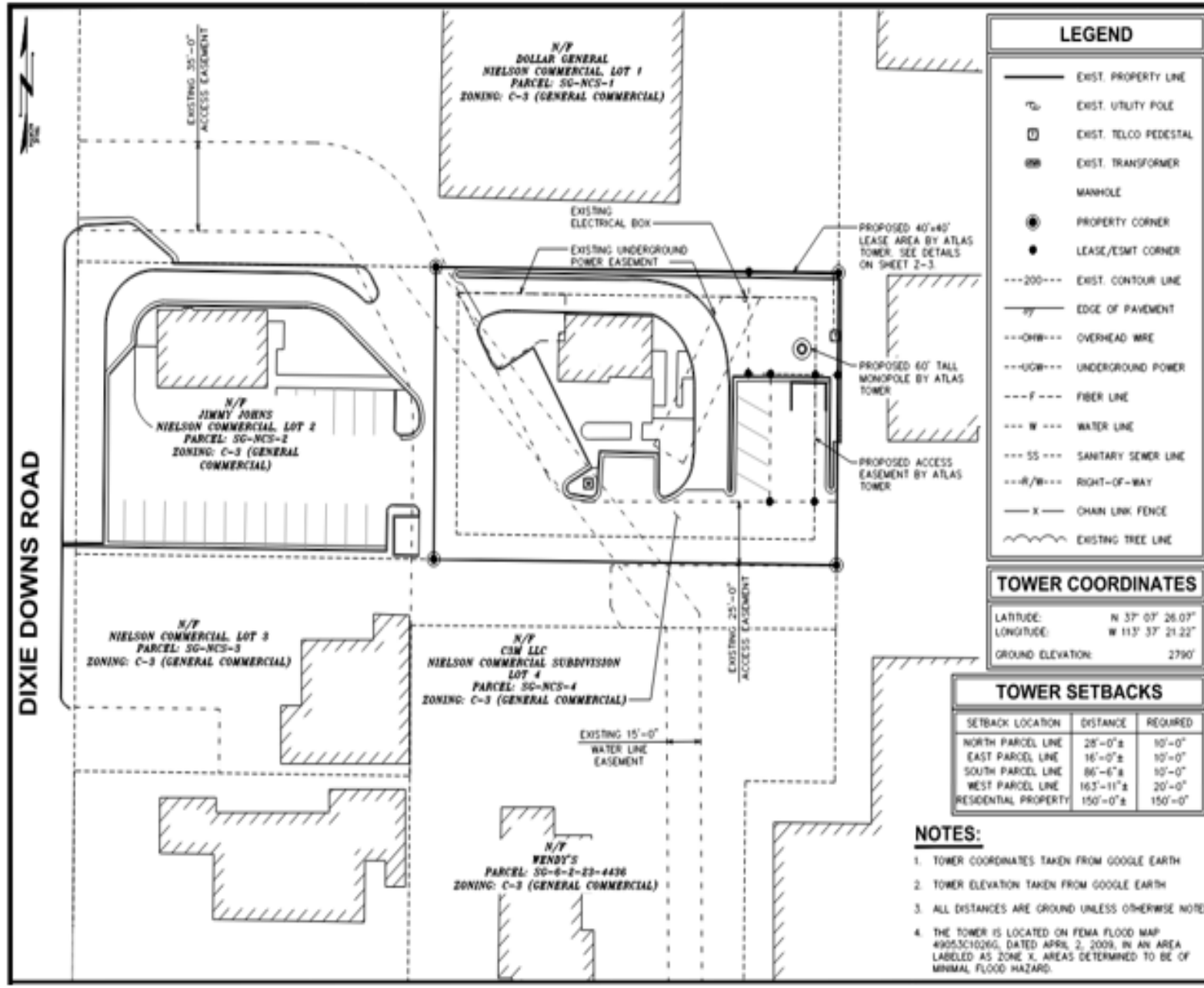
Site Plan

2022-CUP-004



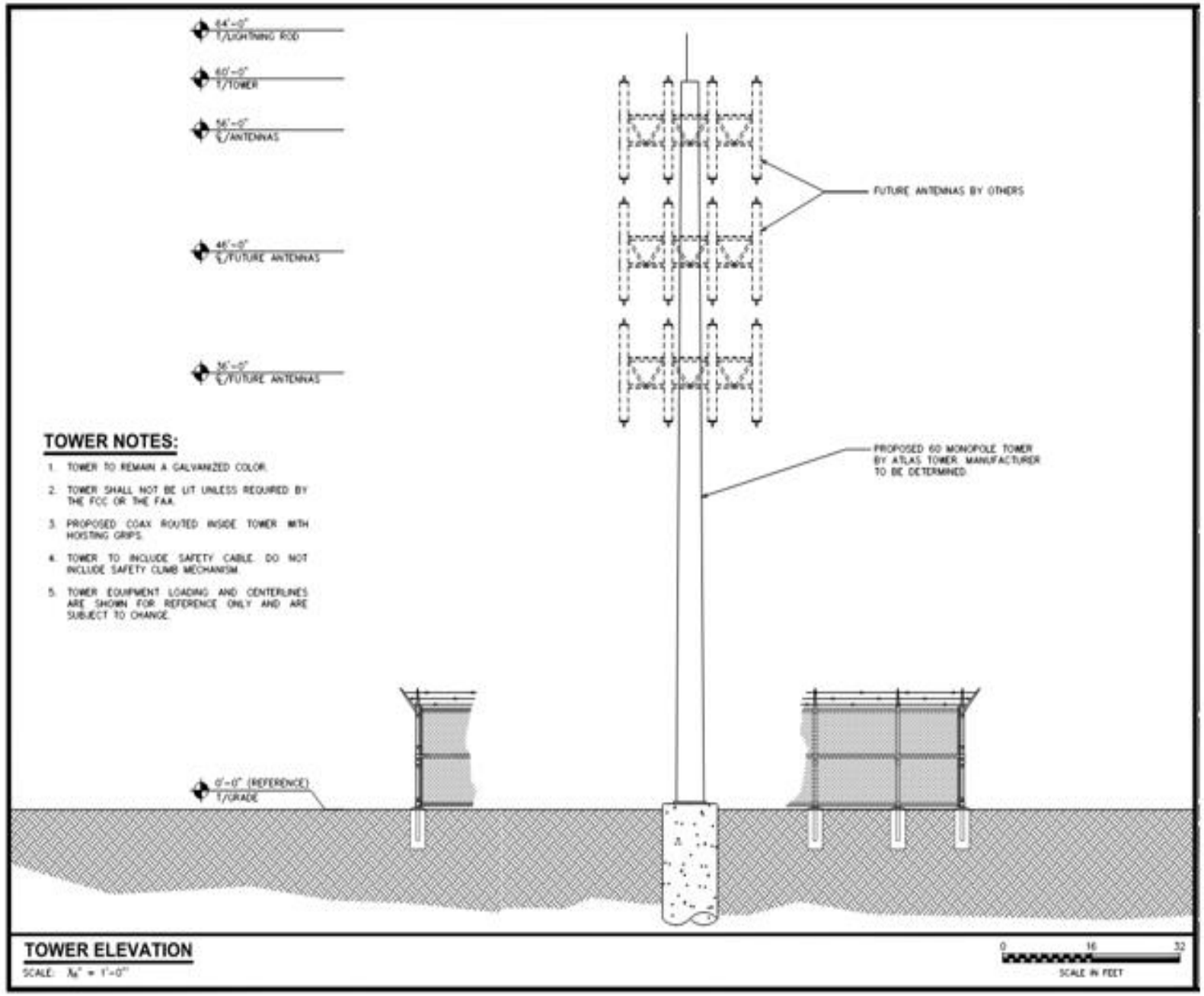
Site Plan

2022-CUP-004



Monopole

2022-CUP-004



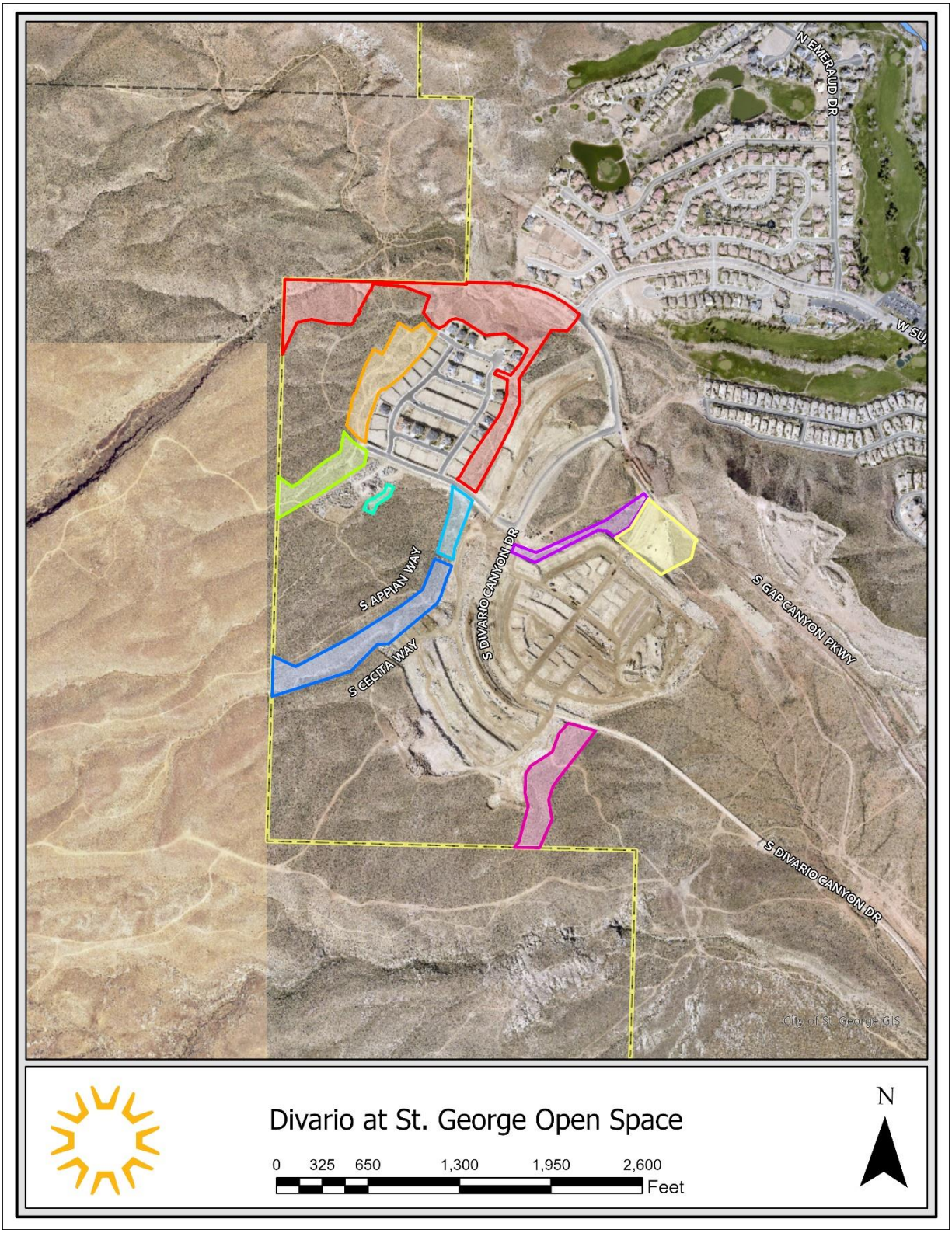
PLANNING COMMISSION AGENDA REPORT: 04/26/2022

Zone Change
Divario at St. George Open Space
Case No. 2022-ZC-019

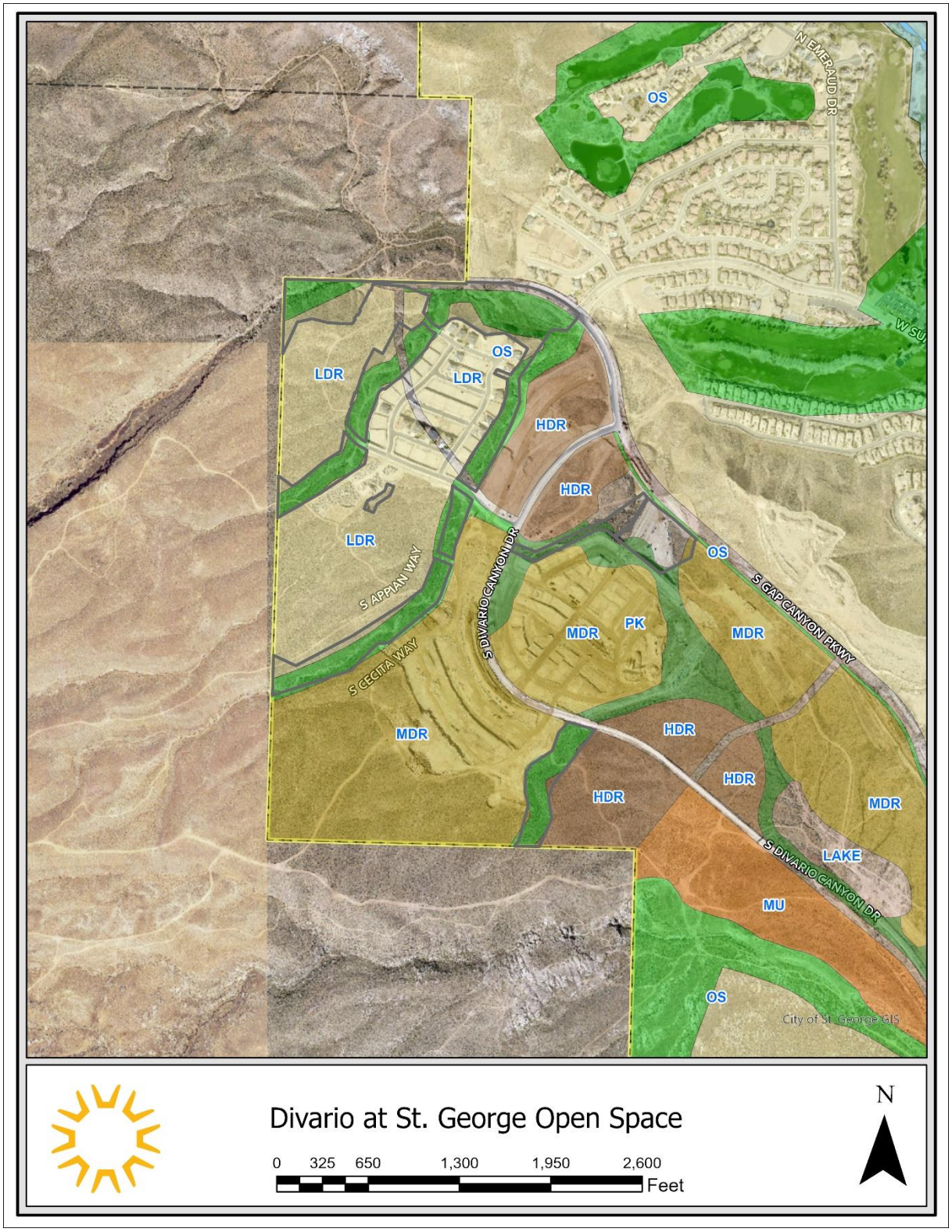
Request:	Rezone several parcels from R-1-10 (Residential Single Family, 10,000 sq ft minimum lots) to Open Space (OS).
Applicant:	St. George 730 LC
Area:	Approximately 42.76 acres
Location:	The property is generally located behind the businesses on the east of Dixie Drive, south of Sunset Blvd and north of 540 N
Current Zone:	Multiple parcels consisting of R-1-10 (Residential Single Family, 10,000 sq ft minimum lot size).
General Plan:	Open Space (OS)
Staff Comments:	From the inception of the Lakes and then the Divario project, open space has been anticipated to be an important aspect of the project. As properties have been approved for preliminary and final plats, open space has been dedicated to the City. In order to keep zoning consistent with the actual open space on the ground, this rezone to open space is being proposed.
Recommendation:	Staff recommends approval of this Zone Change.
Alternatives:	1. Recommend approval as presented. 2. Recommend approval with conditions. 3. Recommend denial. 4. Table the proposed zone change to a specific date.

Possible Motion: "I move that we forward a positive recommendation to the City Council for the zone change for Divario at St. George Open Space as presented, case no. 2022-ZC-019, based on the findings listed in the staff report."

Vicinity Map



General Plan



Current Zoning Map

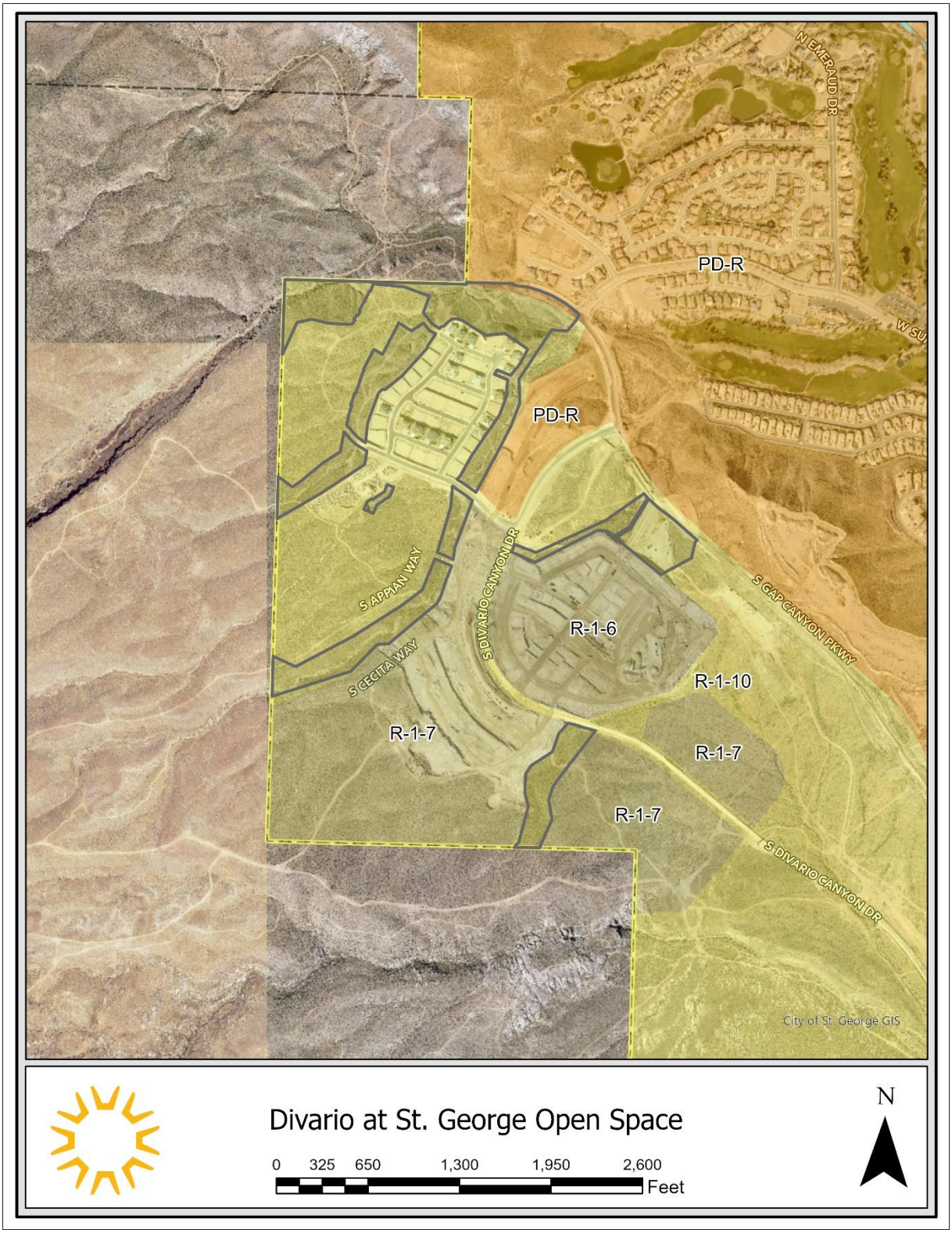


EXHIBIT A
PARCELS MAP

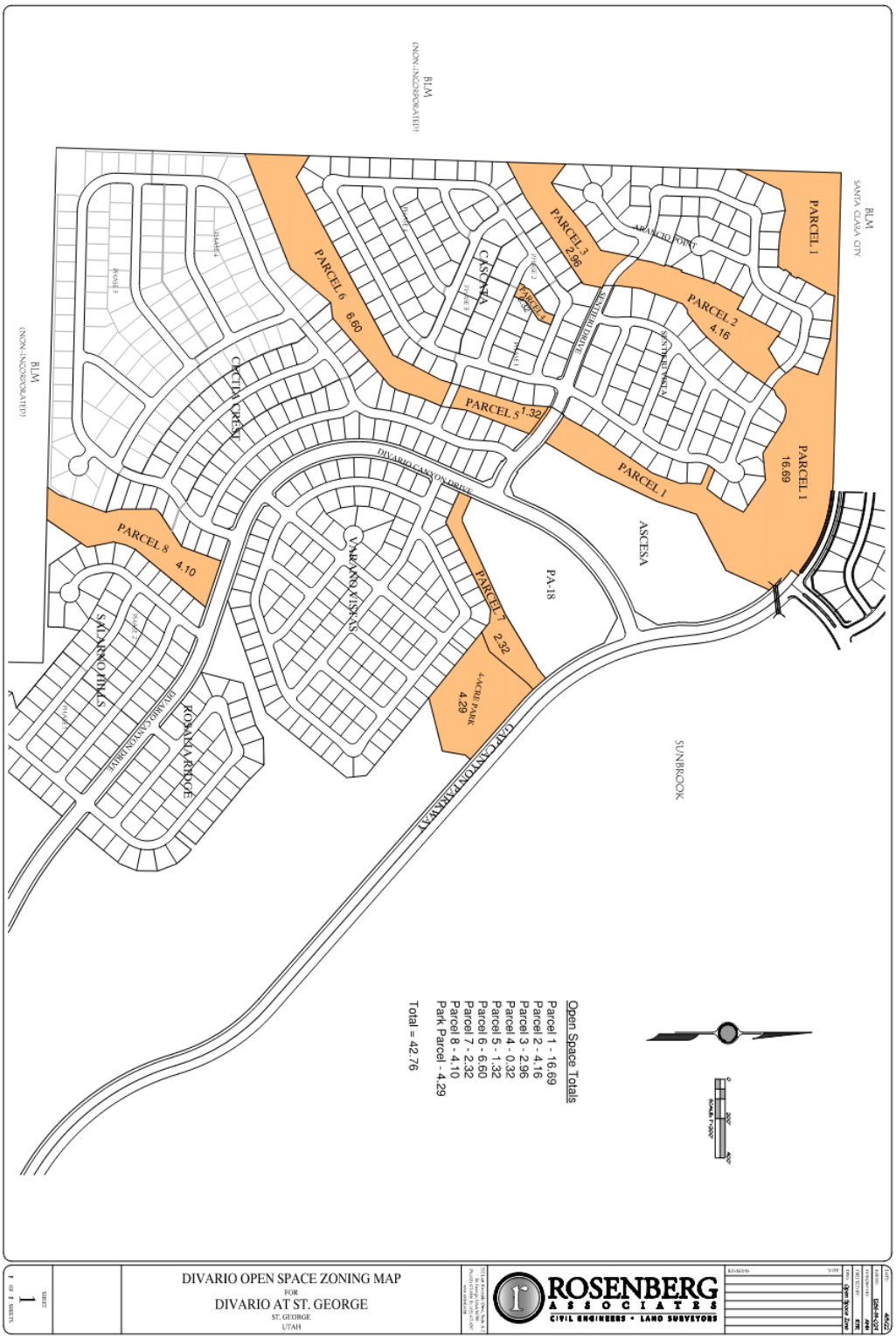
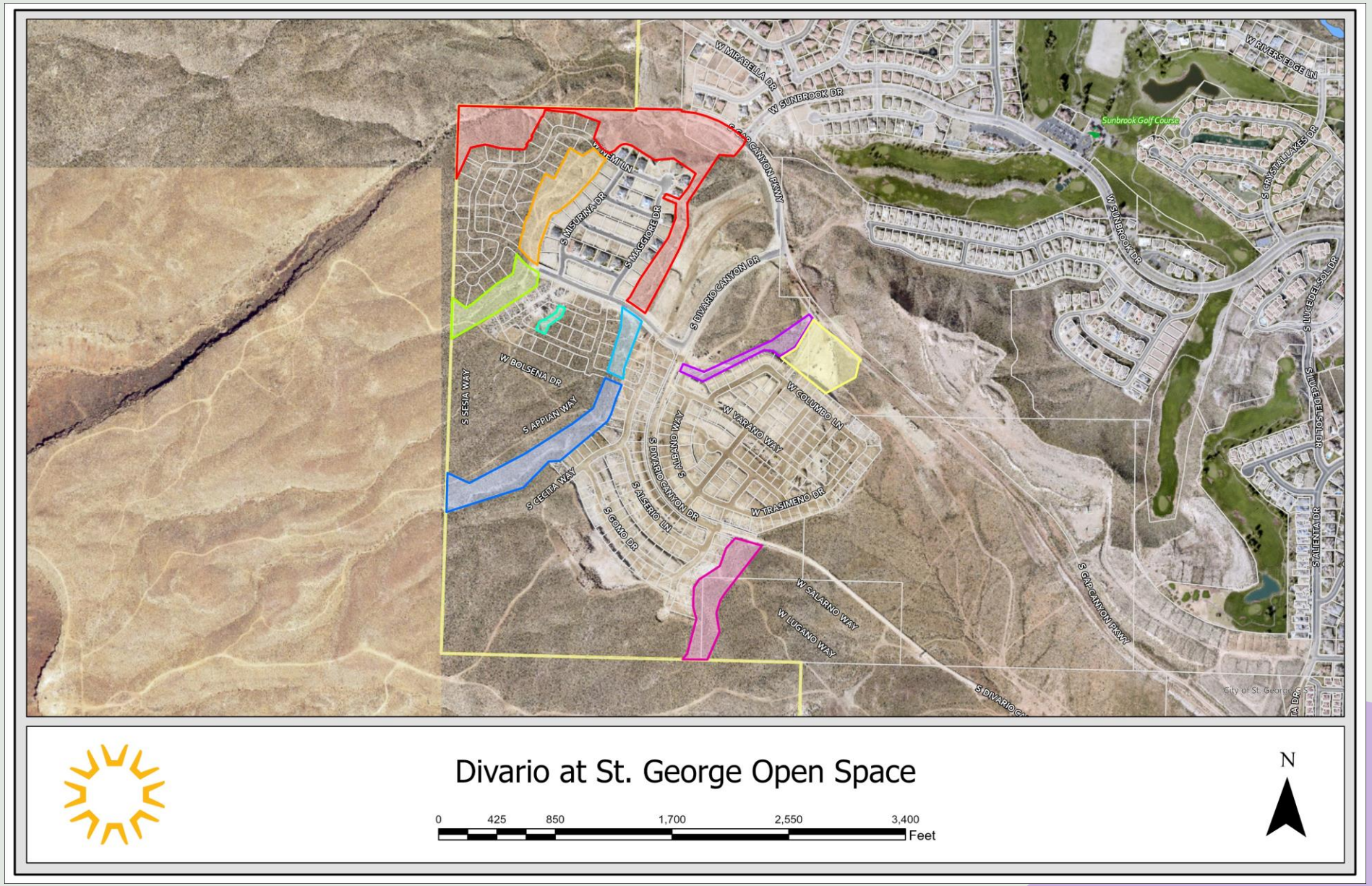


EXHIBIT B
PRESENTATION

Divario at St. George Open Space

2022-ZC-019

Aerial Map


W MIRABELLA DR
W SUNBROOK DR
Sunbrook Golf Course
W RIVERS EDGE LN
S CRYSTAL LAKES DR
S GAP CANYON PKWY
W SUNBROOK DR
S LUCE DEL SOL DR
S MISURINA DR
S MAGGIORE DR
S DIVARIO CANYON DR
W BOLSENA DR
S SESIA WAY
S APPIAN WAY
W GOLUMBO LN
W VARAKO WAY
S CECINA WAY
S ALGERIO LN
S GOMO DR
W TRASIMENO DR
W SALARNO WAY
W LUGANO WAY
S GAP CANYON PKWY
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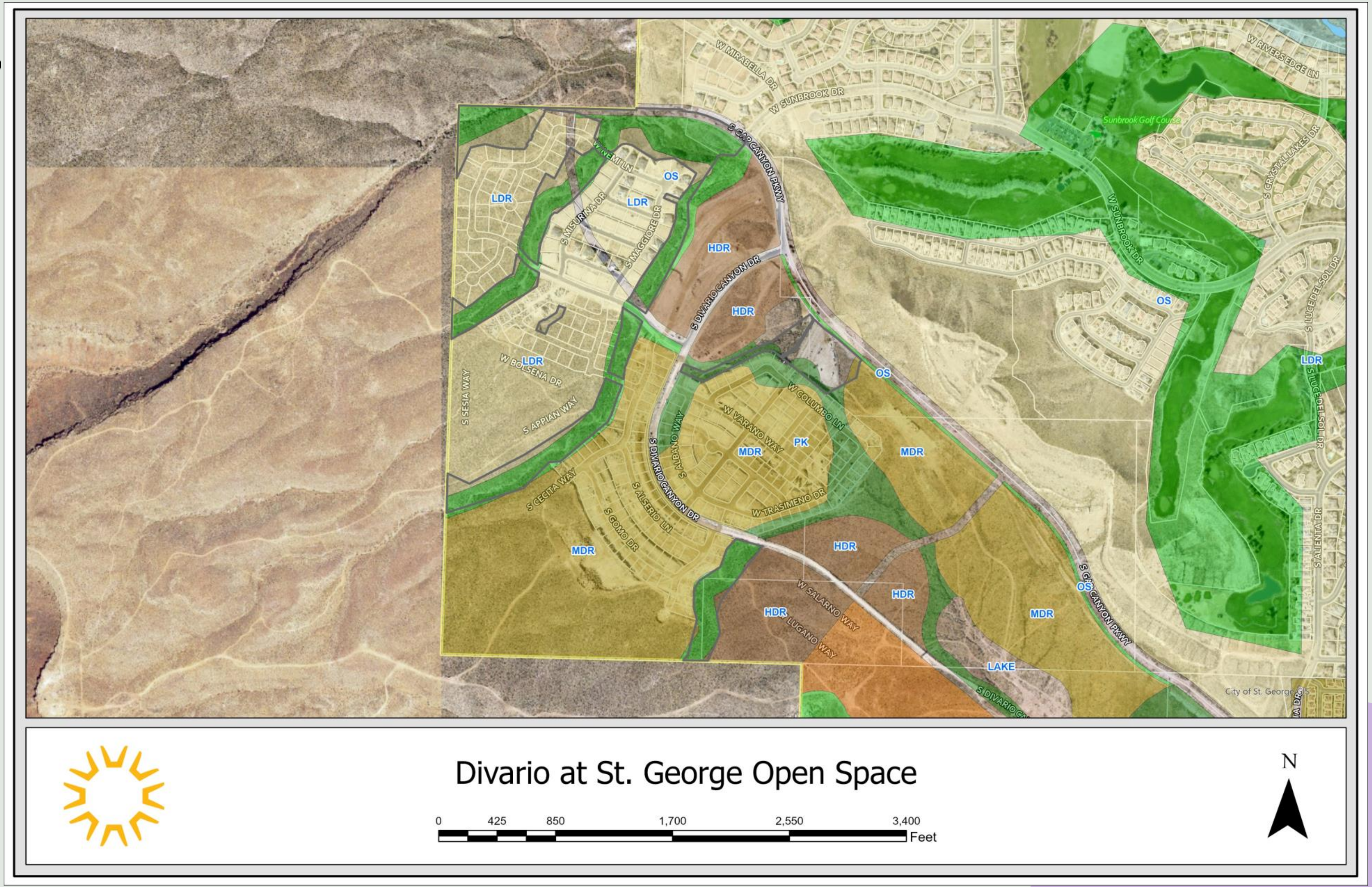
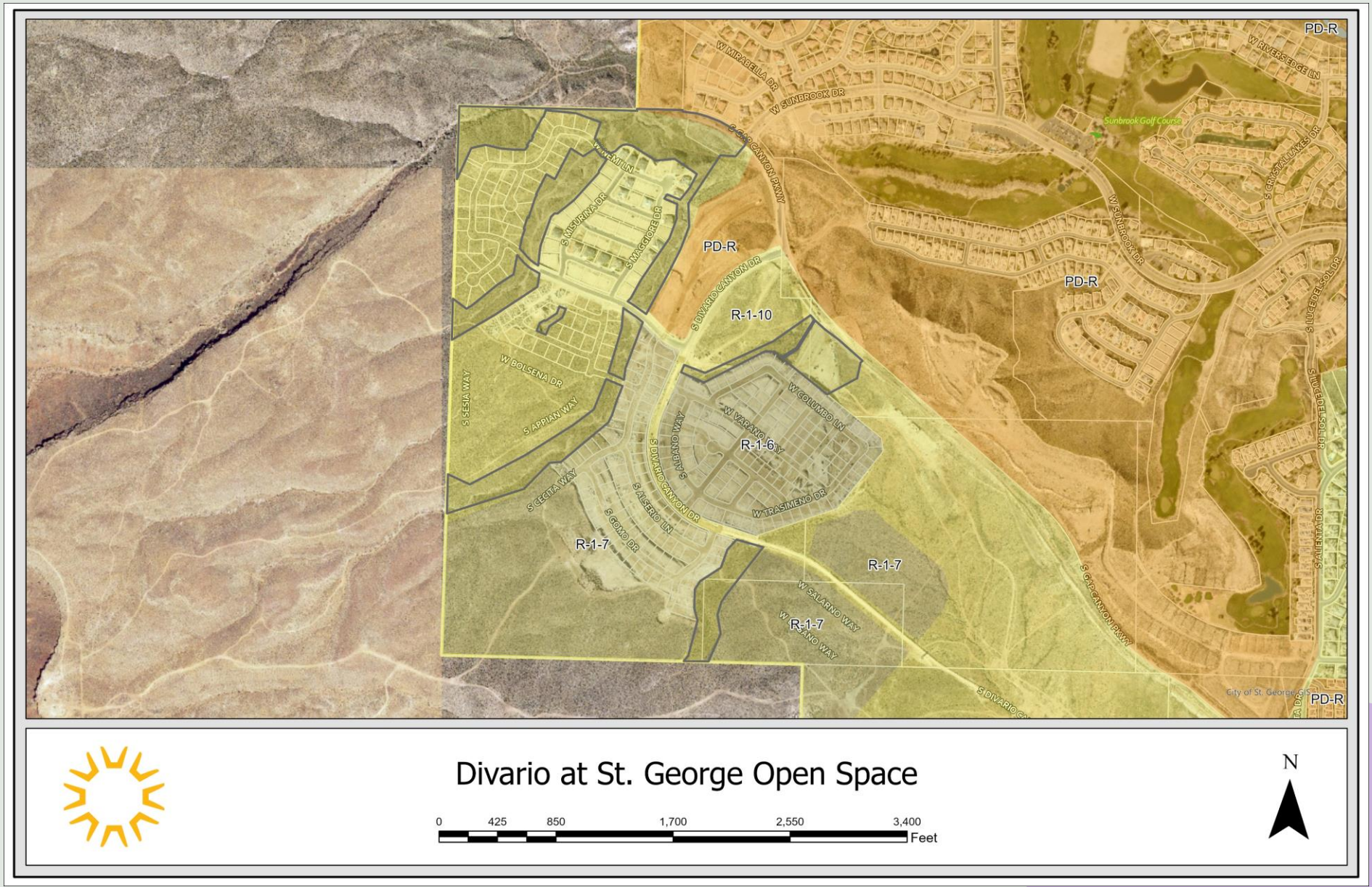
City of St. George
Divario at St. George Open Space
0
425
850
1,700
2,550
3,400
Feet
N

Land Use Map



LDR
OS
HDR
MDR
PK
LAKE
W SUNBROOK DR
W MIRABELLA DR
S CANYON PKWY
S DIVARIO CANYON DR
W COLUMBO LN
W VARANO WAY
W TRASIMENO DR
S SESIA WAY
S APPIAN WAY
W BOLSENA DR
S CECILIA WAY
S GOMO DR
W SALARNO WAY
Sunbrook Golf Course
City of St. George
Divario at St. George Open Space
0
425
850
1,700
2,550
3,400
Feet
N

Zoning Map


PD-R
W MIRABELLA DR
W SUNBROOK DR
W RIVERSEDGE LN
Sunbrook Golf Course
S GOLF CANYON PKWY
S CRYSTAL LAKES DR
W SUNBROOK DR
S MISURINA DR
S MACCIORE DR
PD-R
S DIVARIO CANYON DR
R-1-10
PD-R
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W BOLSENA DR
S SESAJA WAY
S APPIAN WAY
W COLUMBO LN
W VARANO WAY
R-1-6
S ALBANO WAY
S DIVARIO CANYON DR
S CECINA WAY
S ALSERIO LN
W TRASIMENO DR
S GOMO DR
R-1-7
R-1-7
S ALIENTA DR
W SALARNO WAY
R-1-7
W SALARNO WAY
S GOLF CANYON PKWY
S DIVARIO CA
City of St. George
PD-R
Divario at St. George Open Space
0
425
850
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2,550
3,400
Feet
N

Parcels Map


BLM
SANTA CLARA CITY
PARCEL 1
PARCEL 1
PARCEL 2
PARCEL 1
ARANCIO POINT
SENTIERI VISTA
SENTIERI DRIVE
PARCEL 3
PARCEL 4
PHASE 2
PHASE 1
CASCATA
PHASE 3
PHASE 4
PARCEL 5
PARCEL 6
BLM
(NON-INCORPORATED)
ASCESA
SUNBROOK
PA-18
PARCEL 7
4-ACRE PARK
DIVARIO CANYON DRIVE
VARANO VISTAS
CECITA CREST
PHASE 4
PHASE 3
PARCEL 8
ROSALIA RIDGE
DIVARIO CANYON DRIVE
PHASE 2
SALARNO HILLS
PHASE 1
BLM
(NON-INCORPORATED)
0
200'
400'
SCALE: 1"=200'
ROSENBERG ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS
DIVARIO OPEN SPACE ZONING MAP
FOR
DIVARIO AT ST. GEORGE
ST. GEORGE
UTAH
SHEET
1

St.George
Community Development

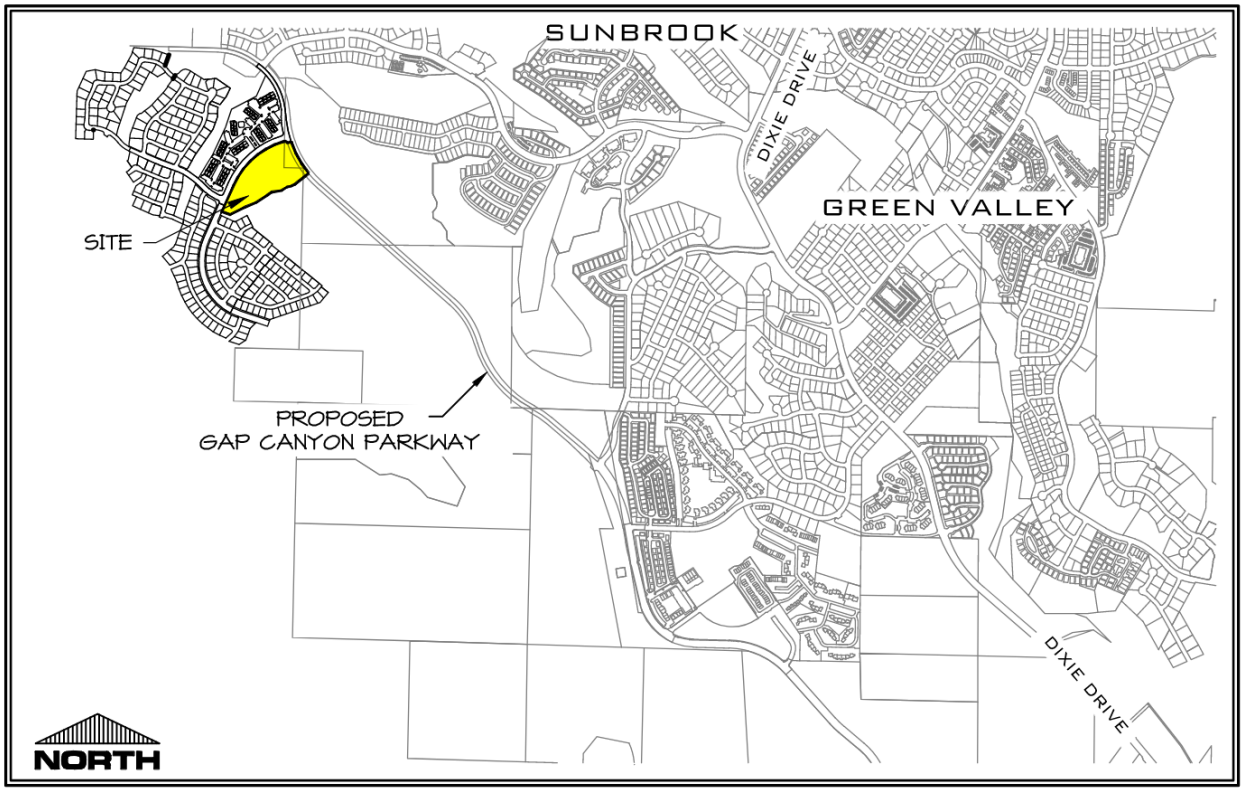
ITEM 4B

ZONE CHANGE

PLANNING COMMISSION AGENDA REPORT: 04/26/2022

Zone Change
Becco Creek (Divario Planning Area (PA) 18
Case No. 2022-ZC-004

Request:	Consider a Zone Change from R-1-10 (Residential Single Family, 10,000 sq ft minimum lots) to PD-R (Planned Development Residential).
Applicant:	Henry Walker Homes
Representative:	Brock Loomis
Area:	9.04 acres
Location:	The property is generally located on the on the south-west corner of Gap Canyon Pkwy and Divario Canyon Drive.
Current Zone:	R-1-10 (Residential Single Family, 10,000 sq ft minimum lots)
General Plan:	High Density Residential (HDR) - up to 22 units per acre



Background:
The property was annexed as part of the Plantations Land in 1994. In 2007, a development agreement was approved between the developer and the City. The development at the time was called "The Lakes". The name has since changed to "Divario". An updated development agreement was approved in 2014 which set forth the parameters of the development, planning areas, etc. A PD (Planned Development) was approved on the property in 2008, but upon failure to construct, expired and reverted back the R-1-10 zoning (current zoning). That PD was very similar in number of units and layout to the currently proposed site plan.

Proposed Site Details:
The site is free from any buildings or structures. The proposed site depicts 25 townhome buildings, all two, three and four-plexes. The two-plex buildings are approximately 27'6" tall while the three and four-plexes are approximately 32' in height. At a total of proposed 81 units over the 9.04-acre site comes to a total of 8.9 units per acre, complying with the maximum density allowed in the High-Density category of the general plan and also compliant with the Divario master plan/development agreement which allows up to 15 units per acre in pod 18.

Parking: Under section 10-19-4(A)(4) of the St. George zoning code, each unit is required to provide two parking stalls, one of which must be covered, plus one stall for every three units for guest parking. With 81 units, this would yield a total requirement of 189 stalls (2x81=162+27 guest stalls). 81 of the stalls must be covered Which will be met in the garage. The site plan shows that the applicant is exceeding the requirements for parking by providing a two-car garage, a twenty-foot driveway and 45 surface spaces for guests.

PARKING:	
DWELLING UNITS -	81
SPACES PER UNIT -	x 2.0
GUEST SPACES 1 PER 3 UNITS -	27
TOTAL SPACES REQ'D. -	189
TANDEM SPACES PROVIDED -	162
STANDARD SPACES PROVIDED -	42
VAN ACCESSIBLE PROVIDED -	3
TOTAL SPACES PROVIDED -	207
COVERED SPACES REQ'D. -	81
COVERED SPACES PROVIDED -	162
TOTAL SPACES PROVIDED -	369

Elevations: As previously discussed, the site depicts a series of 25 townhome buildings measuring between 27'6" – 32' in height which complies with the standards found in the code which sets the maximum height at 40' in a PDR. The materials to be used are stucco, composite siding, powder coated steel, and stone veneer. The materials and colors have been chosen to complement each other.

Landscaping/Amenities: The site is required to maintain a minimum of 30% landscaping/open space. The site has been designed with 43% landscaped open space. At the outset of the approval of the Lakes development, a certain percentage of the land was set aside for open space. the development agreement allows a planned area, such as this one, to use some of that set aside open space if needed. In this case, the developer is providing the necessary open space on site. Additionally, a multi-family development must provide usable recreation areas, in this case at least 16,200 sq ft. The site depicts 20,604 sq ft of amenity area including a pool with restroom and pavilion and a pickleball court which satisfies the requirement for two amenities. The details on all of the amenities and landscaping will be reviewed at the time of site plan.

Hillside Review: The overall area of Divario is over 500 acres. Because of the size of the project, the entire Divario site was reviewed by the Hillside Review Board (HSRB) as part of the initial approvals of the development in 2008. In so doing, the board designated some areas as okay to develop without further review, some that needed further review in the future and some that would be okay to develop if they weren't encroaching into 20% or greater slope. This was made official through a map so designating each planning area, all slopes and which areas were determined to be non-sensitive, etc.

PA-18 did go to the HSRB in February of this year which would allow the applicant to encroach into an area that in the past provided drainage but has since been cut off by development. The applicant is proposing to fill in this area and the hillside review board felt that it could be filled in and utilized in such a way as to not create future problems. See the hillside application on this agenda for further details.

Recommendation:
If the Planning Commission finds that the proposed development is consistent and blends well with its surroundings, staff recommends approval of this Zone Change and PD plan as proposed.

Department Comments - Staff comments were received as follows:

Sewer/Water:	No comments
Power:	No comments
Engineering:	That approval is granted for the hillside permit in conjunction with this application.
Parks:	1. Accommodate mountain bike trails in adjacent open space. 2. Install 10' wide multi-use trail along Gap Canyon Drive to Park Planning standards.
Fire:	Check turning movements especially if the parking is covered for the areas that are circled around the parking lot. If covered please show on site plan.

Alternatives:
1. Recommend approval as presented.
2. Recommend approval with conditions.
3. Recommend denial.
4. Table the proposed zone change amendment to a specific date.

Possible Motion: "I move that we forward a positive recommendation to the City Council for the zone change for Divario PA-18 as presented, case no. 2022-ZC-004, based on the findings listed in the staff report."

Findings for Approval:

1. The proposed amendment meets the requirements of section 10-7F of the zoning code.
2. The site meets the requirement for minimum parking requirements required in the city code.
3. The proposed site plan and densities are consistent with the Divario master plan.

EXHIBIT A
APPLICANT NARRATIVE

April 20, 2022
Prepared for: St. George City Planning Department

Rezone Application Narrative

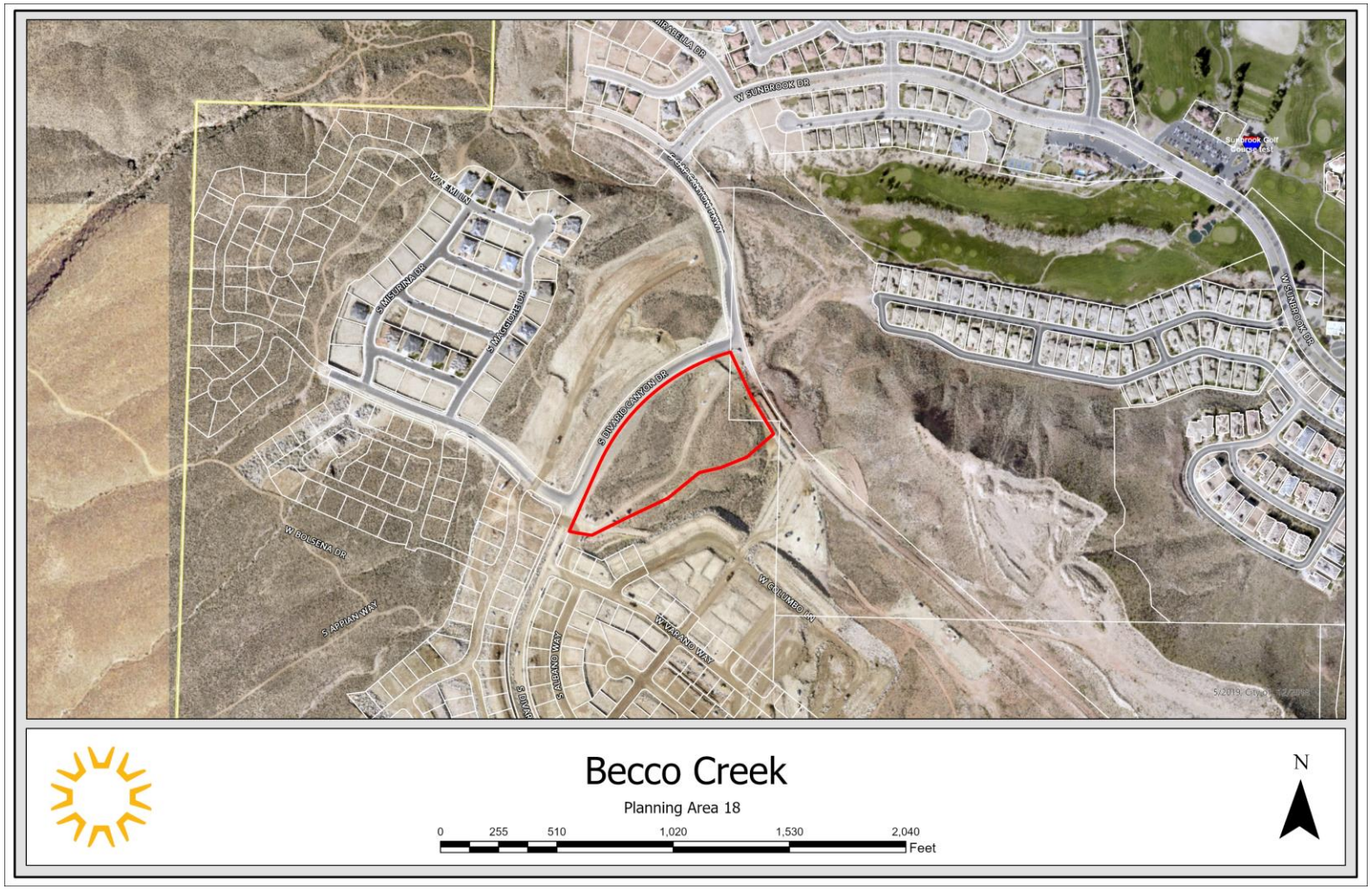
- A detailed list of proposed uses.
  - The proposed use for the property labeled PA-18 is a multi-family townhome project. The project will include two amenities, pickleball courts and a swimming pool, as outlined in St. George City's code.
- The proposed density in terms of dwelling units per gross acre of land and proposed floor area of non-residential uses per acre.
  - There are 81 proposed units for a 9.04-acre parcel. The proposed density of the project is 8.9 units/acre.
- Description of the proposed use of land, including percentages of land devoted to various types of land use, such as building coverage, parking area, landscaped area, etc.
  - Building footprints cover 23% of the total area. Landscaped and open area covers 43% of the total area. Amenities cover 2% of the total area.
- The location and boundaries of any proposed school site, church, park or other common or open spaces.
  - There are no school, church or park areas proposed on the property. Please refer to the site plan for information about open space and park locations near the property.
- A phasing plan, if the development is proposed to be developed in phases.
  - The development is preliminarily planned to be completed in 2 phases. One phase will consist of the buildings on the lower half of the site. The other phase will be comprised on the buildings on the upper half of the site. Both phases will be roughly equal in the number of units constructed in each phase.

EXHIBIT B
POWERPOINT PRESENTATION

Becco Creek Divario PA-18

2022-ZC-004

Aerial Map


W SUNBROOK DR
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S DIAMOND CANYON DR
W BOLSENA DR
S APPIAN WAY
W COLUMBO WY
W VARANO WAY
S ALBANO WAY
Becco Creek
Planning Area 18
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Feet
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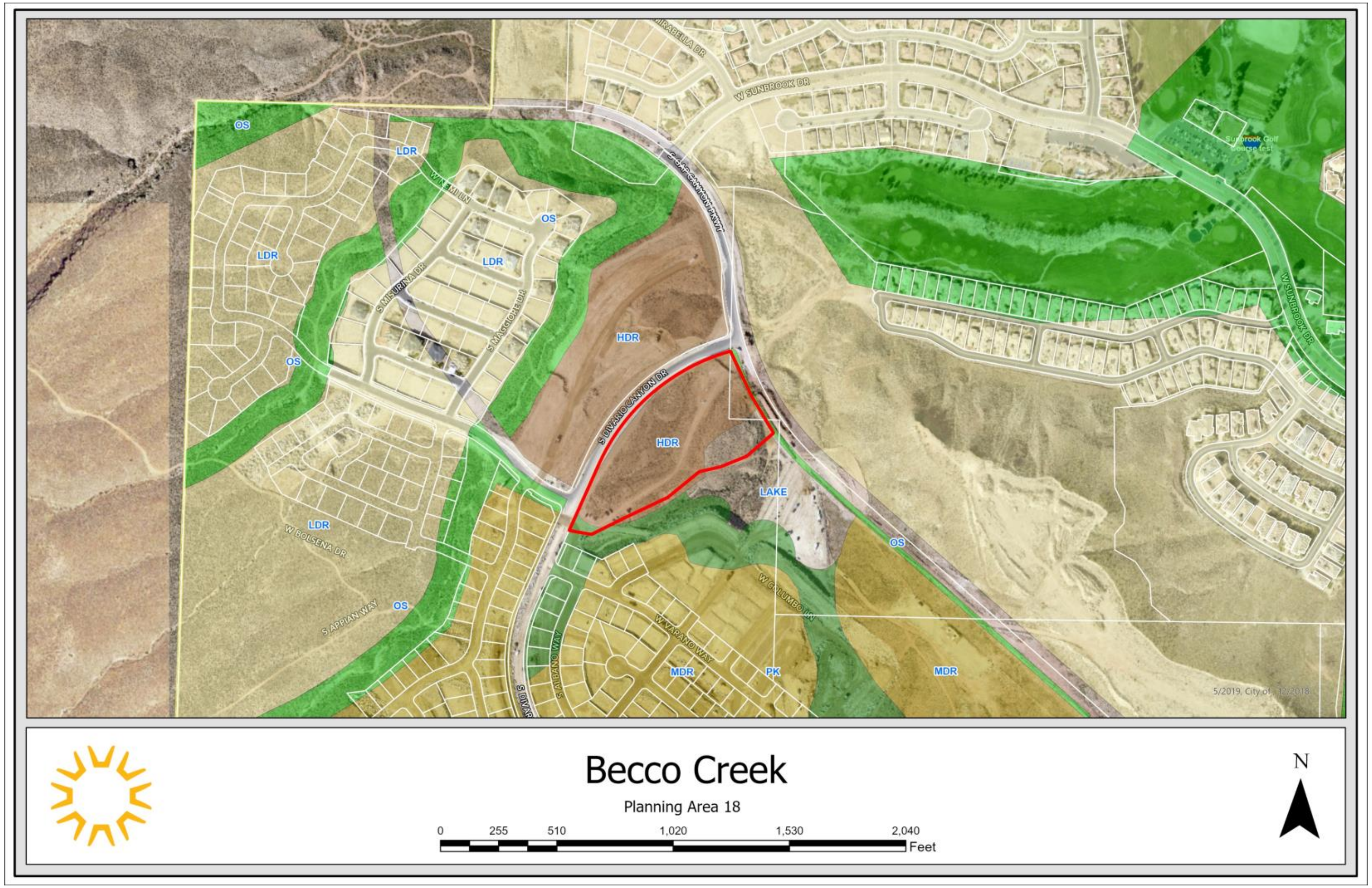
OS
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LDR
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HDR
HDR
LAKE
OS
LDR
OS
MDR
PK
MDR
W SUNBROOK DR
S DIVARIO CANYON DR
W BOLSENA DR
S APPIAN WAY
W VARANO WAY
W COLOMBO LN
Becco Creek
Planning Area 18
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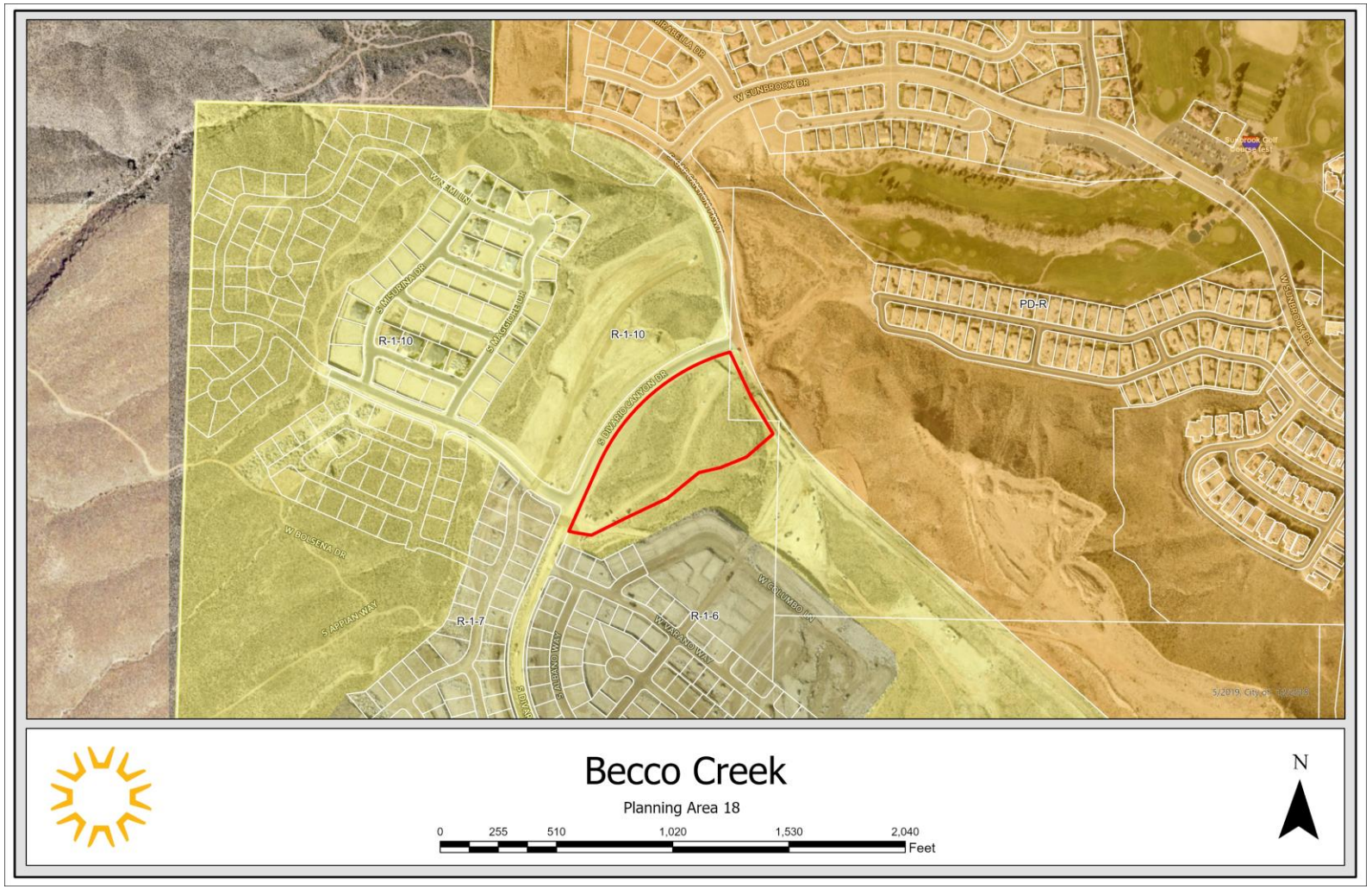
Land Use Map


W SUNBROOK DR
R-1-10
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PD-R
R-1-7
R-1-6
Becco Creek
Planning Area 18
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1,530
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Feet
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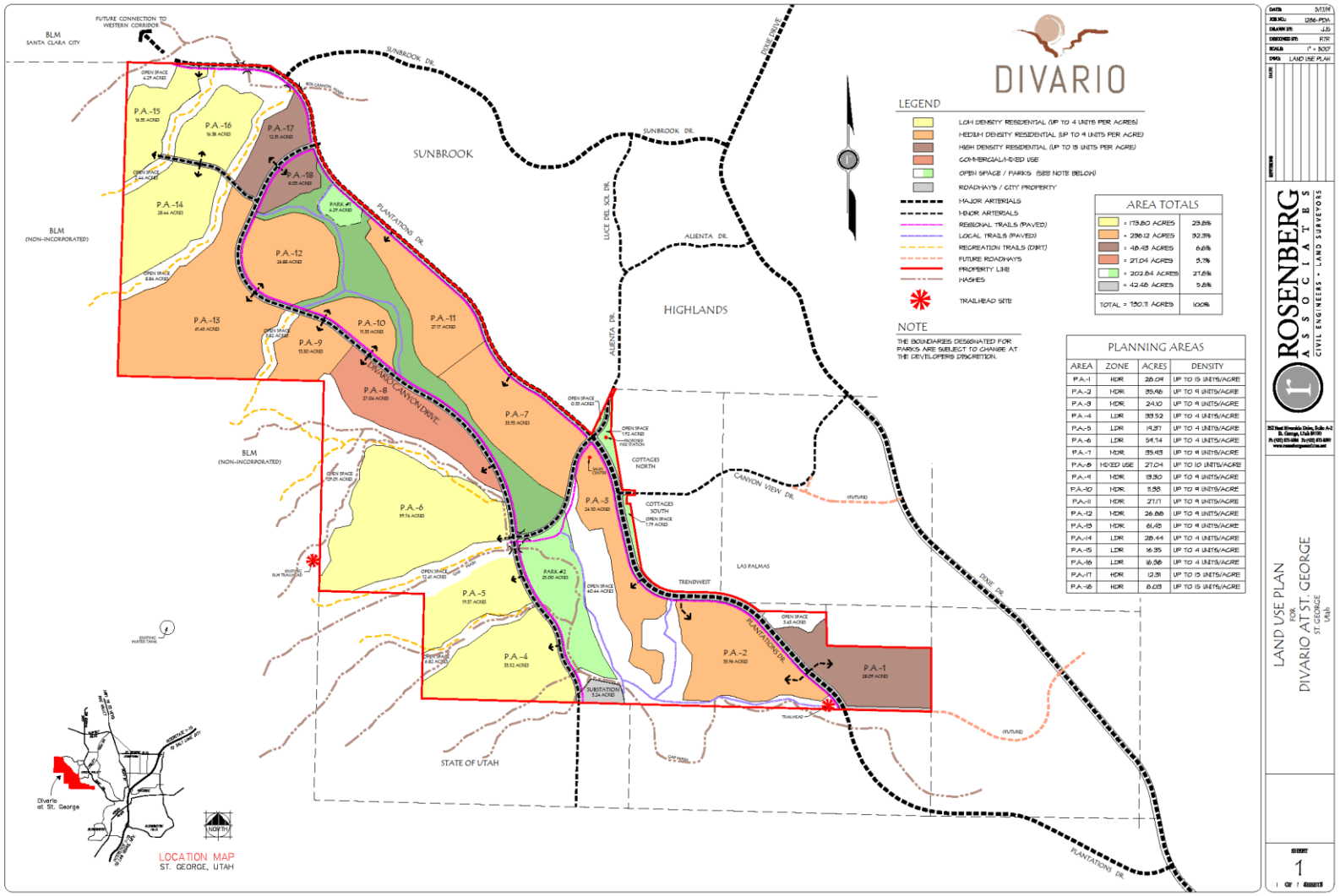
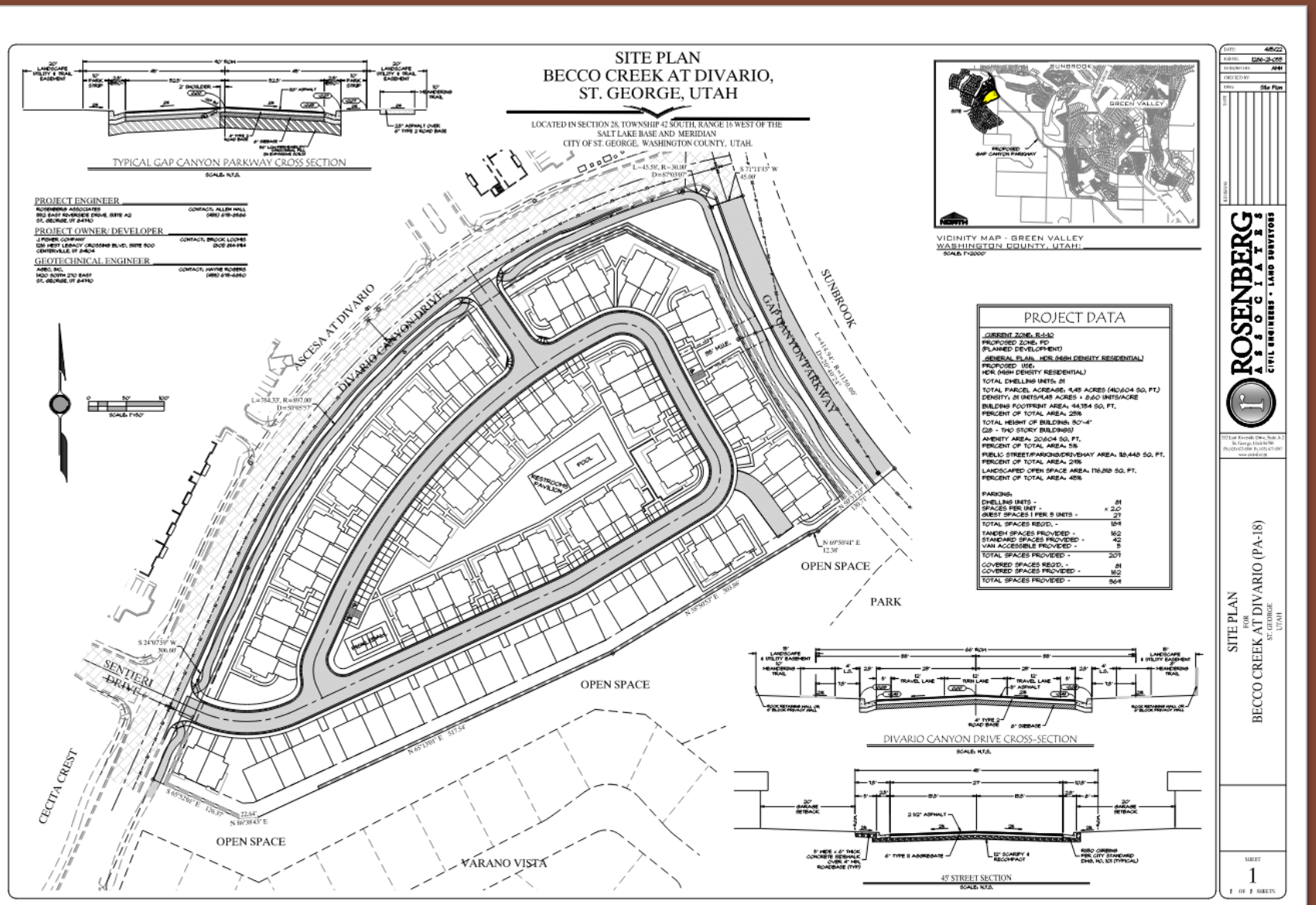
Zoning Map



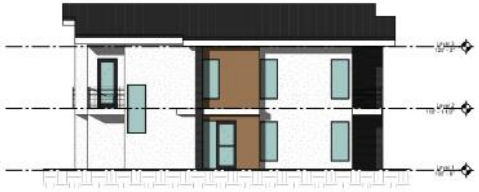
Divario Land Use Plan Map


SITE PLAN
BECCO CREEK AT DIVARIO,
ST. GEORGE, UTAH
LOCATED IN SECTION 28, TOWNSHIP 42 SOUTH, RANGE 16 WEST OF THE SALT LAKE BASE AND MERIDIAN CITY OF ST. GEORGE, WASHINGTON COUNTY, UTAH.
TYPICAL GAP CANYON PARKWAY CROSS SECTION
PROJECT ENGINEER
PROJECT OWNER/ DEVELOPER
GEOTECHNICAL ENGINEER
VICINITY MAP - GREEN VALLEY
WASHINGTON COUNTY, UTAH:
PROJECT DATA
ASCESA AT DIVARIO
DIVARIO CANYON DRIVE
GAP CANYON PARKWAY
SUNBROOK
SENTIERI DRIVE
CECITA CREST
VARANO VISTA
OPEN SPACE
PARK
POOL
RESTROOMS/ PAVILION
DIVARIO CANYON DRIVE CROSS-SECTION
45' STREET SECTION
ROSENBERG ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS
SITE PLAN FOR BECCO CREEK AT DIVARIO (PA-18)
ST. GEORGE UTAH
SHEET 1

Site Plan

06 PERSPECTIVE VIEW 02

05 PERSPECTIVE VIEW 01



4 Elevation 2 - a

03 FRONT ELEVATION

02 SIDE ELEVATION

01 GARAGE SIDE

JSF

ARCHITECT

DIVARIO TOWNHOMES
HENERY WALKER HOMES
XXXXXX
ST GEORGE, UT

STAMP

REVISION NO. DESCRIPTION DATE

DATE
10/11/2021
ISSUE

SHEET TITLE
EXTERIOR ELEVATIONS

SHEET NO
A5.01

Elevations
2-Plex

Elevations
3-Plex

Elevations
4-Plex

Elevations
Front loaded

04 FRONT ELEVATION

03 SIDE ELEVATION

02 SIDE ELEVATION

01 GARAGE SIDE

JSF

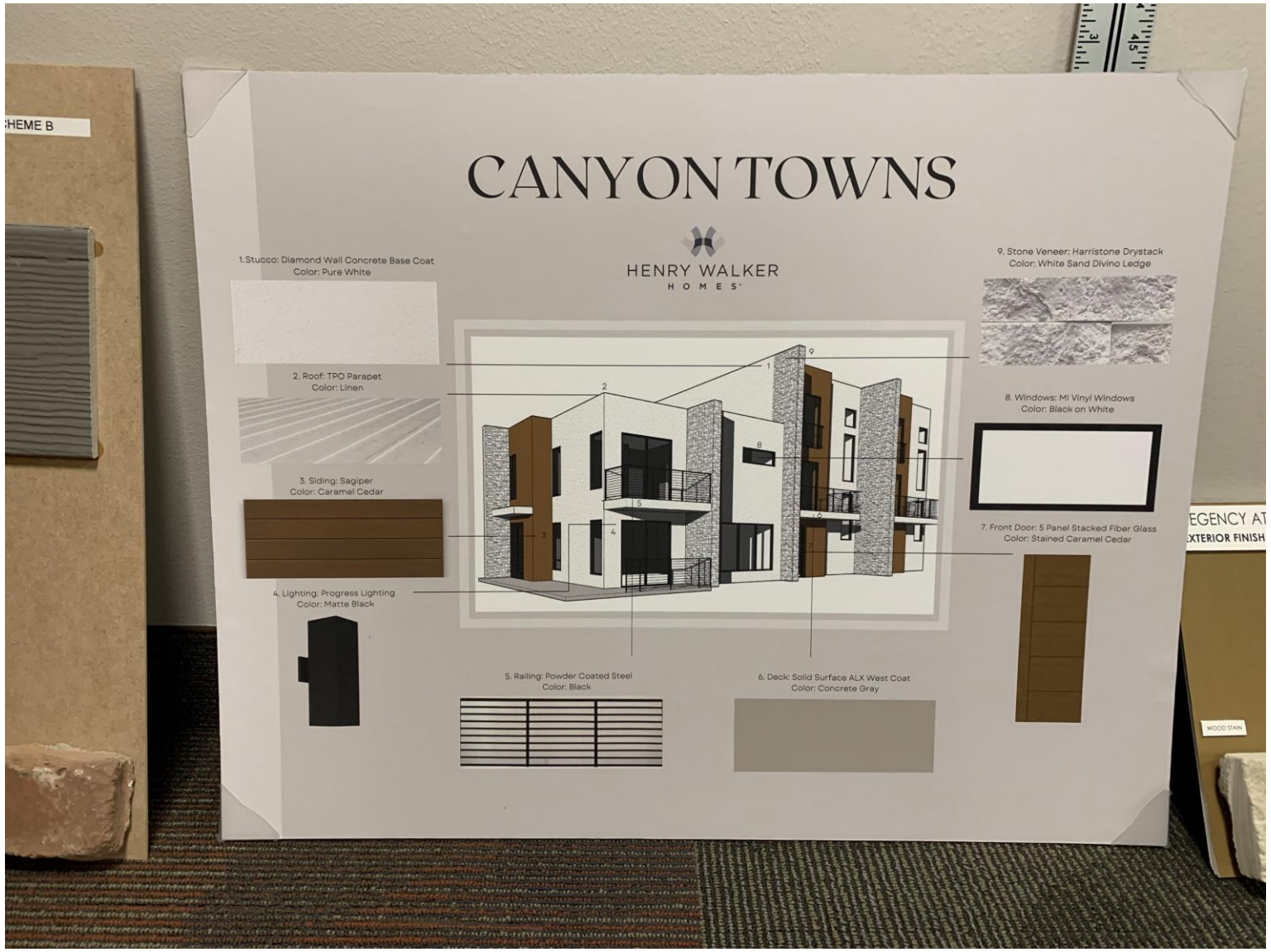
ARCHITECT

TOWNHOMES
ALKER HOMES

02 PERSPECTIVE VIEW 02

01 PERSPECTIVE VIEW 01

Concept Landscape Plan



Materials Board

St.George
Community Development

ITEM 5

Hillside Permit

HILLSIDE REVIEW BOARD AGENDA REPORT: **02/23/2022**
PLANNING COMMISSION AGENDA REPORT: **04/26/2022**

HILLSIDE DEVELOPMENT PERMIT
Divario (Formerly "The Lakes") PA-18
Case No. 2022-HS-004

Request: This is a request for a Hillside Development Permit to allow the applicant to construct in the area shown on the slope map labeled 20-29% and open space. This is specifically in the PA-18 area which is situated in the northern portion of the Divario development.

Hillside History:

1) 2005 - Case No. 2005-HS-013 "The Lakes" (7/21/2005 - agenda item #2) – An overall conceptual hillside development permit review for 730 acres. Rosenberg Associates.

2) 2008 - Case No. 2008-HS-006 "PA-17" The Lakes (7/16/2008) – 12.30 acres. Rosenberg Associates.

3) 2008 - Case No. 2008-HS-012 (10/30/2008) Determine which PA areas have sensitive slopes and will require future hillside meetings for subdivisions; being PA-3, PA-4, PA-12, PA-13, PA-14, PA-15, PA-16, and PA-17 will require HS review (*Note: PA's # 1, 2, 4, 5, 6, 7, 8, 9 (if less than 10 ft.), 10, 11, & 18 will not require hillside review*).

4) 2016 - Case No. 2016-HS-001 (1/20/2016) – Approx. 45.73 acres. The Hillside Review Board met and reviewed PA-14 and PA-16 and at that time approved the exclusion of washes and rock outcroppings in these 2 areas. However, following that review meeting, Rosenberg Associates met with City staff to revisit two additional rock outcroppings that were not looked at as closely by the board. One of these was located in PA-14, labeled as Item #1. Following the meeting with City staff it was determined to re-design the lot layout and grading around the feature and preserve it as a subdivision amenity in order to avoid scheduling another hillside review board meeting. The project design proceeded with that feature preserved.

5) 2021 – Case No. 2021-HS-001 (01/27/2021) – Approx. 19.78 acres. The Hillside Review Board reviewed a request for PA-9 to allow cuts and fills in excess of 10 feet in height. This was a requirement from the original hillside review in 2008. This was ultimately approved by the City Council.

6) **2022** – Case No. 2022-HS-003 (01/26/2022) – Approx. 36.64 acres. At the time of writhing this staff report, this application is still under review. At the

meeting in January, the Hillside Review Board requested that the plans be adjusted to incorporate and save a wash. The applicant was amenable and has revised the drawings. It is anticipated that these two applications will follow the same timeline.

Exhibits Provided:

1) Exhibit A - Overall Slope Analysis – Sheet 1
"Exhibit 1" in the packet shows the overall slope analysis for the entire PA (Planning Areas). *Note: There is a chart "Hillside Review" on the sheet that shows which PA areas will require a hillside review and which will not. Even though PA-18 is in an area not requiring further review, because the applicant is requesting to incorporate a portion of the open space, there is a portion of that property that is in the 20-29% slope range thus requiring a recommendation by the Hillside Review Board.*

2) Exhibit B – Concept Plan
"Exhibit B" depicts the proposed grading and layout for PA-18 at Divario. Additionally, Grading and Cross Sections are a part of that plan.

3) Exhibit C - Drainage Report
August 2016 – Drainage report produce by Rosenberg Associates.

4) Exhibit D – Executive Geotechnical Report
July 2005 – This was produced during the initial review of the Lakes development in 2005. Produced by Rosenberg Associates.

Background:

Open Space - The total proposed undisturbed open space and improved open space area for "The Lakes" will be 30% of the total space of the project. Out of 735 acres, that will equal approximately 220 acres.

Manmade Slopes - Manmade slopes were identified and excluded (see blue area in "Exhibit A")

Exclusions - The hillside board allowed exclusions for small washes and rock outcroppings (see pink area in "Exhibit A")

Future Hillside Review - In 2008 the Hillside Board didn't visit all the small washes and outcroppings but left them for future consideration as plans would be submitted (with subdivisions). It was determined that some would require further review by the Hillside Board. Again, PA-18 was one of those areas that was excluded from further review but is required now due to incursion into the open space/sloped area.

Owner: St George 730, LLC

Engineer: Rosenberg Associates

Location: PA-18 is generally located south of the Gap Canyon Drive/Divario Canyon Drive intersection.

Acreage: 9.47 Acres

Zoning: R-1-10

Powers & Duties: Section 10-13A-8.B.1 of the "Hillside Review Board Powers and Duties" states that the hillside board can make recommendations to "adopt, modify or reject a proposal" to the Planning Commission (PC).

Permit required: Section 10-13A-7 requires that all major development (i.e., cut greater than 4', etc.) on slopes above 20% requires a 'hillside development permit' granted by the City Council upon recommendation from the Hillside Review Board and the Planning Commission.

Applicable Ordinance(s):
(Selected portions)

10-13A-1: Density and Disturbance Standards

A. The hillside development overlay zone (HDOZ) limits development densities and provides specific development incentives to transfer underlying zone densities from hillsides (sending areas), to less steep slopes or more safe development areas (receiving areas), within a development.

Percent Natural Slope	Dwelling Units (DU) / Acre
0-19	See underlying zone
20-29	2 DU/acre, provided the units are clustered on 30 percent (30%) or less of the land area within this slope category. 70 percent of this slope category shall remain undisturbed. The 70 percent area is based upon the overall area/development rather than per lot. Also see subsections A1, A2, and A3 of this section.
30-39	1 DU/10 acres, provided no more than 5 percent (5%) of the site is disturbed, and 95 percent of the site remains undisturbed. If the cumulative area is at least 1 acre but less than 10 acres, the cumulative area shall be allowed 1 DU.
40	Development is not permitted (0%), **except** as provided for in subsection A4 of this section.

Section 10-13A-1: Density and Disturbance Standards

F. The applicant may:

1. Transfer all development density from steeper slope categories (sending areas), to areas within the development with natural slopes of twenty percent (20%) or less (receiving areas); and

2. Develop additional bonus density, calculated from each slope category, as follows:
    a. Natural slopes twenty percent (20%) or less transferred on a one-to-one (1:1) unit basis; plus
    b. One (1) additional density unit for each density unit transferred from natural slopes of twenty-one percent (21%) to thirty percent (30%); plus
    c. Two (2) additional density units for each density unit transferred from natural slopes of thirty-one percent (31%) to forty percent (40%).
3. Unit calculation for the receiving area shall be based on the requirements of the sending area zone.

G. Density transfers to the receiving area may occur without a zone change within the receiving area even though the resulting density or configuration may exceed the density limits of the receiving area zone. Other than density, the receiving area's zoning requirements apply to development in the receiving area. For instance, lot sizes may vary, but single-family zoning districts only allow single-family detached dwellings.

H. If the applicant proposes to develop within the twenty-one percent (21%) to forty percent (40%) slope area, the applicant cannot employ partial density transfers from the sending area and must propose a design, site development plans, and a grading plan that blends and harmonizes all aspects of the proposed development into the natural topography, and that minimizes road cuts and fills.

I. Non-disturb areas within a residential lot as shown on the slope analysis map shall not be used to calculate minimum lot size.

J. Disturbance standards do not apply to the city for limited city facilities: trails, parks, and utilities.

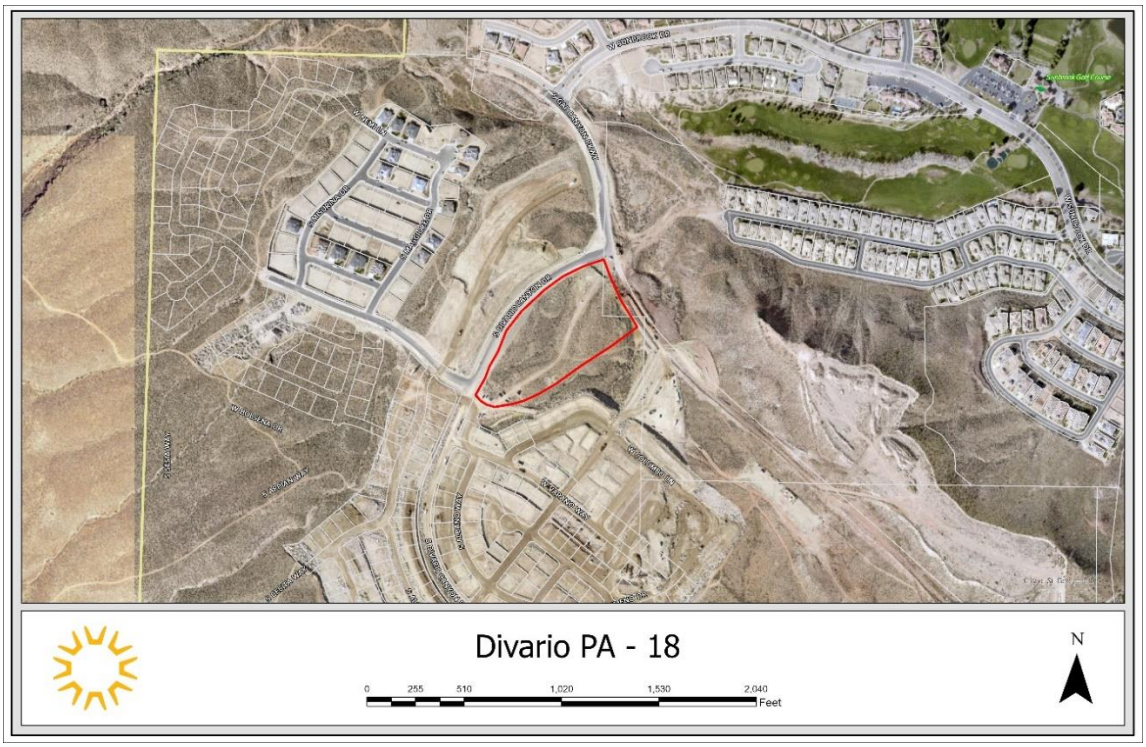
Hillside Review: The Hillside Review Board (HSRB) heard the request on February 23, 2022. At that meeting, the HSRB recommended approval of the hillside permit.

PC Options: The Planning Commission may recommend several different options to the City Council:

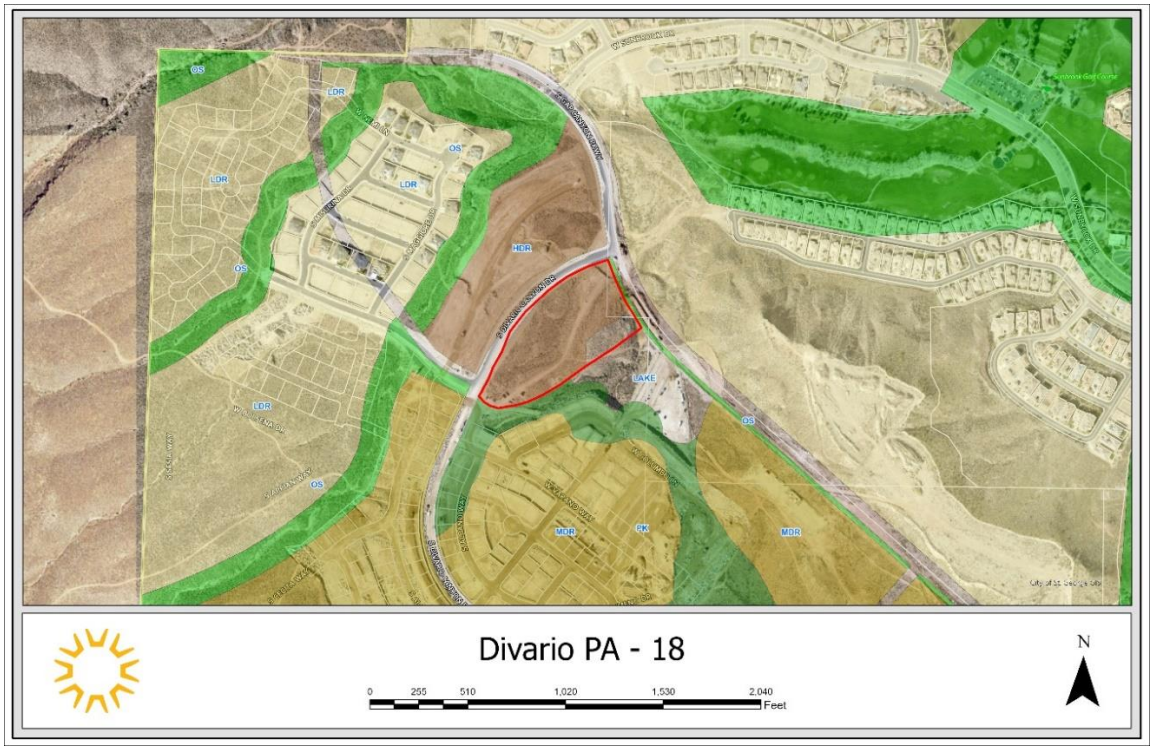
1. Denial
2. Approval as presented
3. Approval with specific conditions and comments added as required.

Example Motion: "I move that we forward a positive recommendation to the City Council for the hillside permit for Divario PA-18 (Becco Creek) as presented, case no. 2022-HS-004, based on the findings listed in the staff report."

Vicinity Map



General Plan = LDR



Zoning = R-1-10

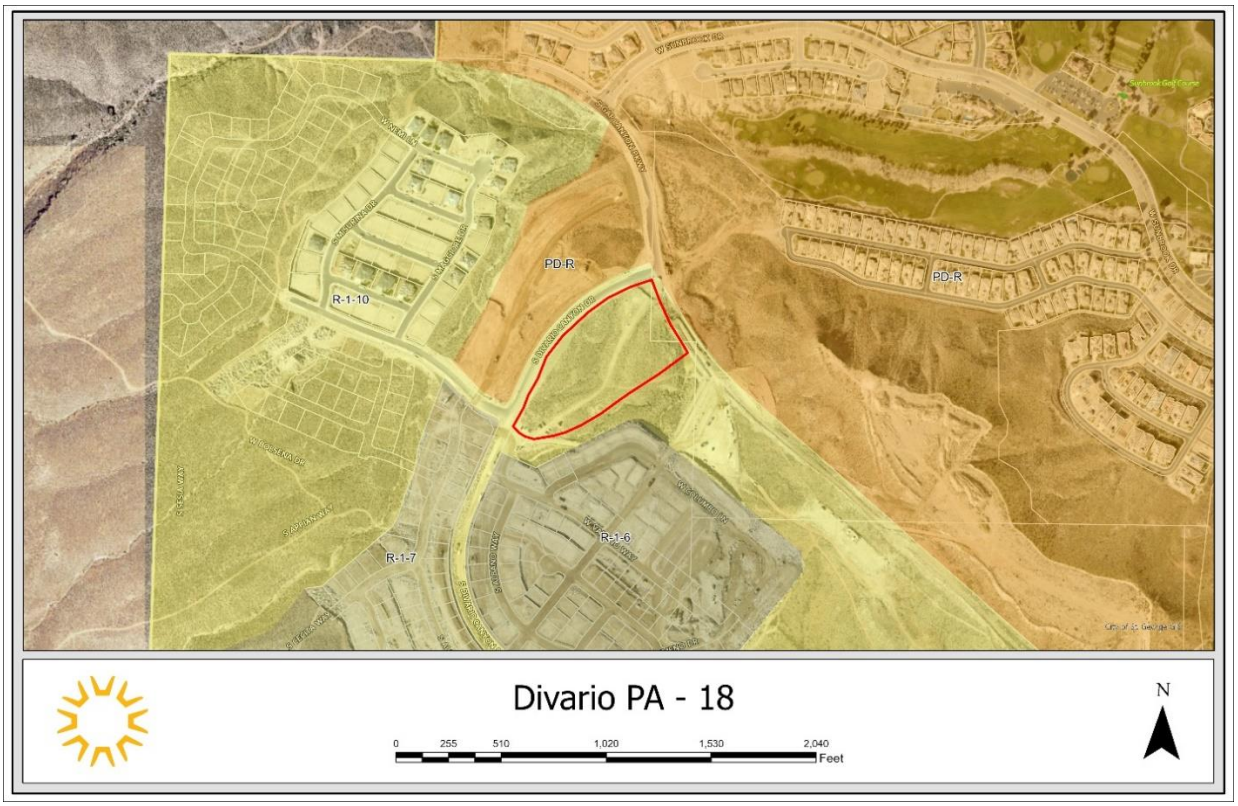
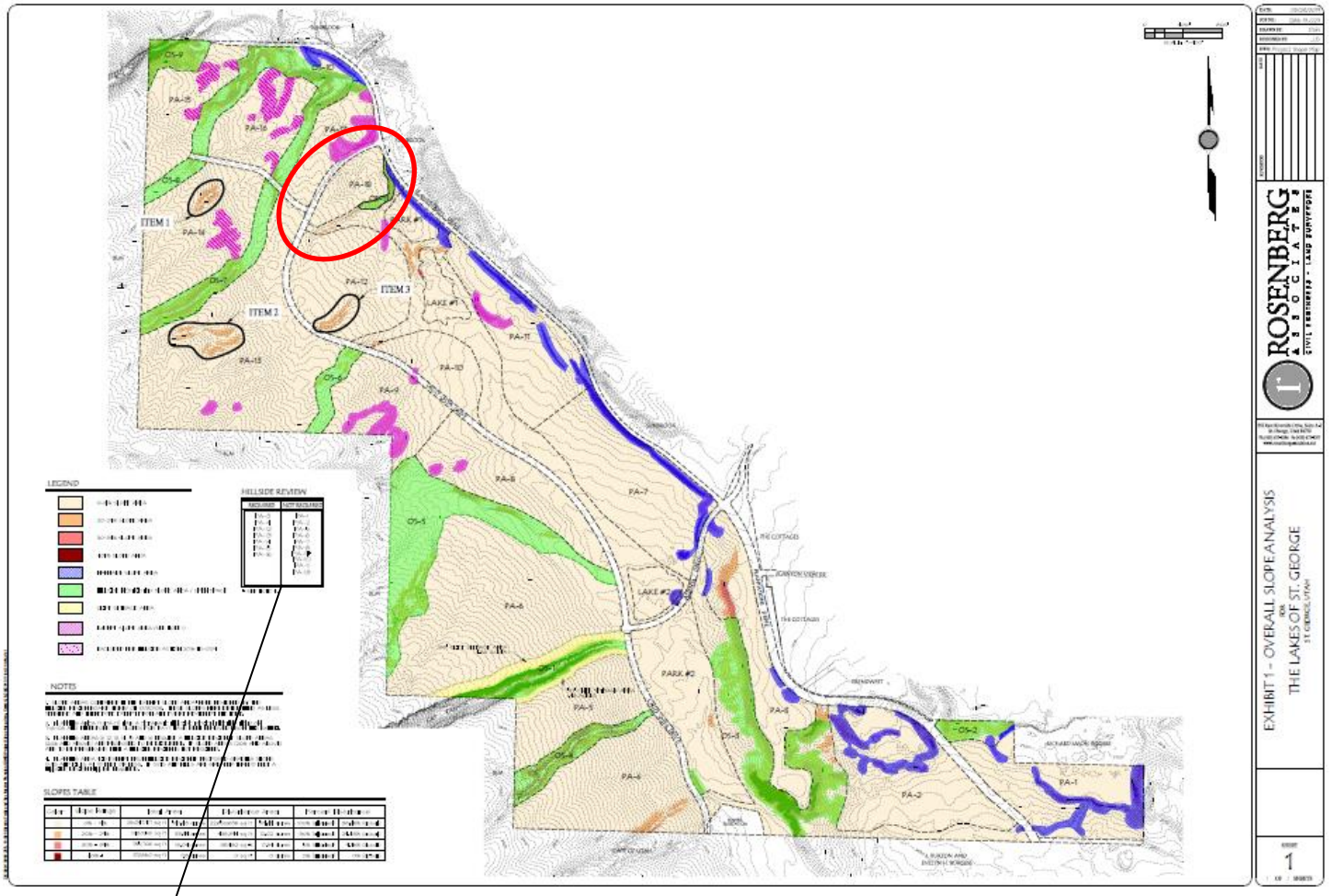

PD:R
R-1-10
PD:R
R-1-7
R-1-6
Divario PA - 18
0
255
510
1,020
1,530
2,040
Feet
N

Exhibit A

Slope Map



HILLSIDE REVIEW

REQUIRED	NOT REQUIRED
PA-3	PA-1
PA-4	PA-2
PA-12	PA-5
PA-13	PA-6
PA-14	PA-7
PA-15	PA-8
PA-16	PA-9*
	PA-10
	PA-11
	PA-18

* SEE NOTE 4.

NOTES

1. SLOPE AREAS CONTAINED IN THE 'EXEMPT SLOPE AREA' WERE REVIEWED BY THE HILLSIDE REVIEW BOARD (HSRB) ON 10/30/08. THESE SLOPES WERE DETERMINED AS LESS SENSITIVE AND THEREFORE EXEMPT FROM ANY FUTURE REVIEW BY THE HSRB.

2. PLANNING AREA 17 (PA-17) HAD A SEPARATE HILLSIDE REVIEW MEETING HELD ON 7-16-08 AND THEREFORE THE SLOPES FOR PA-17 HAVE BEEN REMOVED FROM THIS EXHIBIT.

3. PLANNING AREAS 3, 12, 13, 14, 15 AND 16 REQUIRE A HILLSIDE REVIEW IF SLOPE AREAS (20% AND ABOVE) ARE PROPOSED TO BE DISTURBED. IF SLOPE AREAS (20% AND ABOVE) ARE TO BE PRESERVED, THEN A HILLSIDE REVIEW IS NOT REQUIRED.

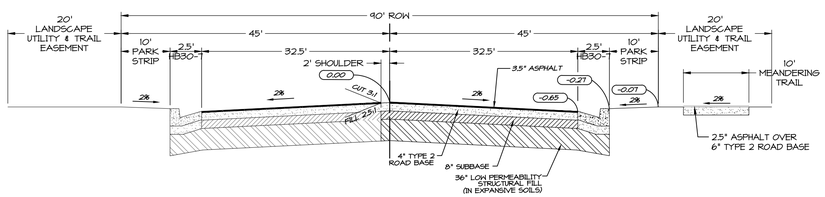
4. PLANNING AREA 9 IS EXEMPT FROM HILLSIDE REVIEW IF PROPOSED GRADING SHOWS CUTS AND FILLS AT 10 FEET OR LESS. IF CUTS AND FILLS ARE GREATER THAN 10 FEET A HILLSIDE REVIEW WILL BE REQUIRED.

Exhibit B

Concept Plan

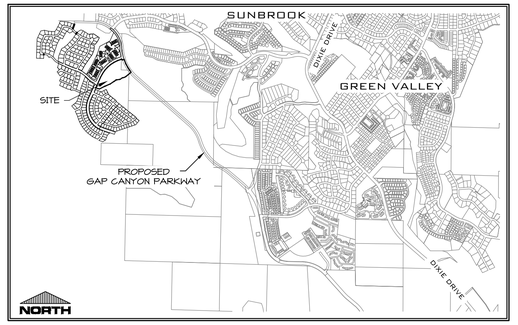
SITE PLAN
BECCO CREEK AT DIVARIO,
ST. GEORGE, UTAH

LOCATED IN SECTION 28, TOWNSHIP 42 SOUTH, RANGE 16 WEST OF THE
SALT LAKE BASE AND MERIDIAN
CITY OF ST. GEORGE, WASHINGTON COUNTY, UTAH.



TYPICAL GAP CANYON PARKWAY CROSS SECTION

SCALE: N.T.S.



VICINITY MAP - GREEN VALLEY
WASHINGTON COUNTY, UTAH:

SCALE: 1"=2000'

PROJECT ENGINEER

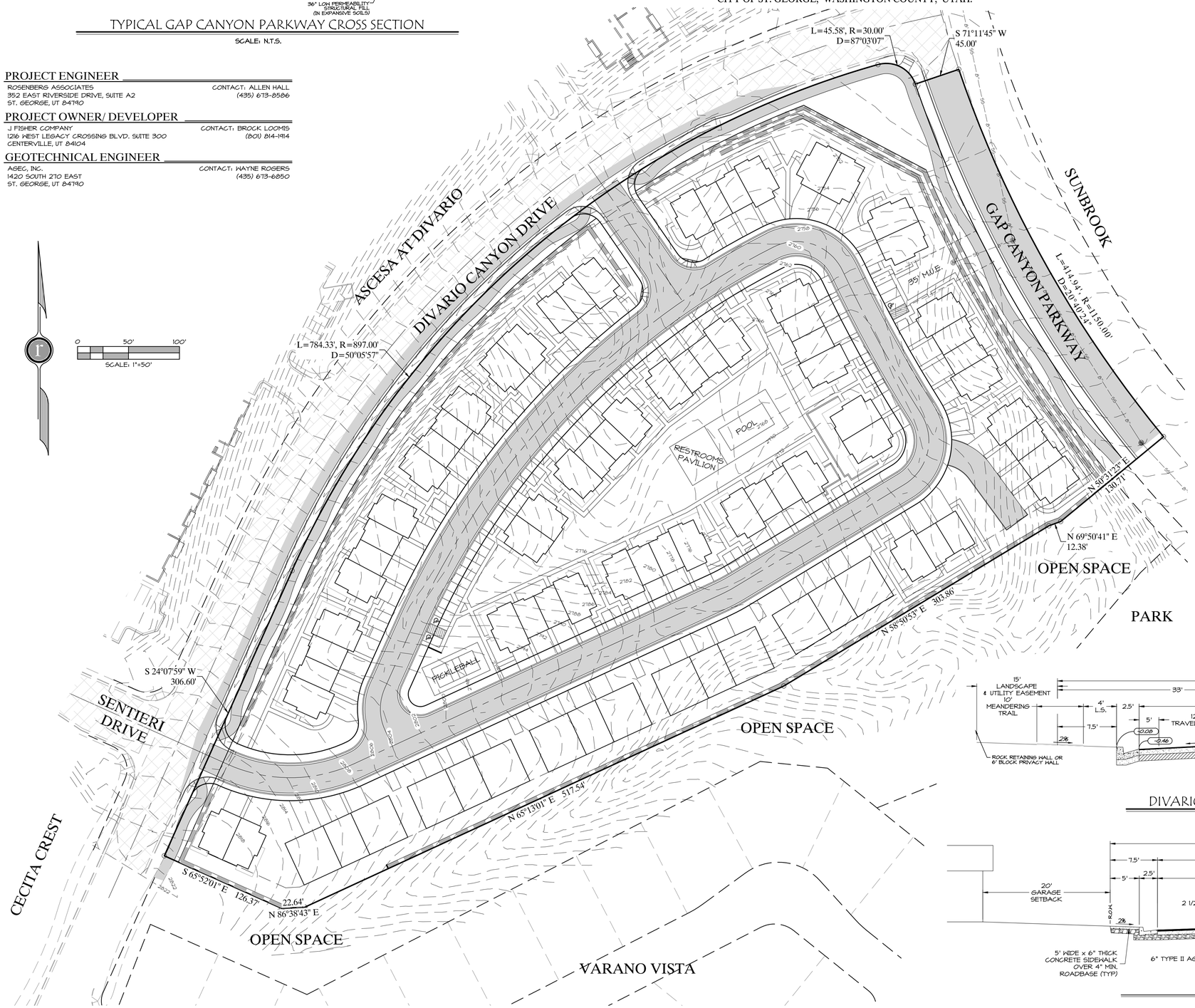
ROSENBERG ASSOCIATES
352 EAST RIVERSIDE DRIVE, SUITE A2
ST. GEORGE, UT 84790
CONTACT: ALLEN HALL
(435) 673-8586

PROJECT OWNER/ DEVELOPER

J FISHER COMPANY
1216 WEST LEGACY CROSSING BLVD. SUITE 300
CENTERVILLE, UT 84104
CONTACT: BROCK LOOMIS
(801) 814-1914

GEOTECHNICAL ENGINEER

AGEC, INC.
1420 SOUTH 270 EAST
ST. GEORSE, UT 84790
CONTACT: WAYNE ROGERS
(435) 673-6850

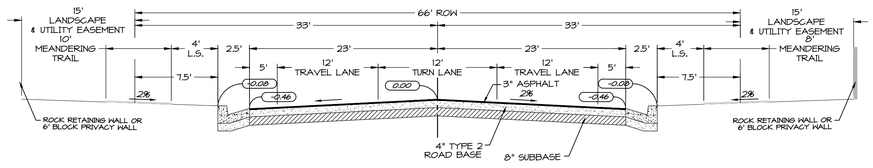


PROJECT DATA

CURRENT ZONE: R-1-10
PROPOSED ZONE: PD
(PLANNED DEVELOPMENT)
GENERAL PLAN: HDR (HIGH DENSITY RESIDENTIAL)
PROPOSED USE:
HDR (HIGH DENSITY RESIDENTIAL)
TOTAL DWELLING UNITS: 81
TOTAL PARCEL ACREAGE: 9.43 ACRES (410,604 SQ. FT.)
DENSITY: 81 UNITS/9.43 ACRES = 8.60 UNITS/ACRE
BUILDING FOOTPRINT AREA: 94,734 SQ. FT.
PERCENT OF TOTAL AREA: 23%
TOTAL HEIGHT OF BUILDING: 30'-4"
(28 - TWO STORY BUILDINGS)
AMENITY AREA: 20,604 SQ. FT.
PERCENT OF TOTAL AREA: 5%
PUBLIC STREET/PARKING/DRIVEWAY AREA: 118,448 SQ. FT.
PERCENT OF TOTAL AREA: 29%
LANDSCAPED OPEN SPACE AREA: 176,818 SQ. FT.
PERCENT OF TOTAL AREA: 43%

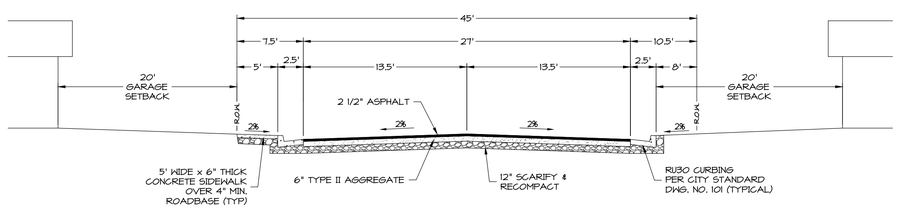
PARKING:

DWELLING UNITS -	81
SPACES PER UNIT -	x 2.0
GUEST SPACES 1 PER 3 UNITS -	27
TOTAL SPACES REQ'D. -	189
TANDEM SPACES PROVIDED -	162
STANDARD SPACES PROVIDED -	42
VAN ACCESSIBLE PROVIDED -	3
TOTAL SPACES PROVIDED -	207
COVERED SPACES REQ'D. -	81
COVERED SPACES PROVIDED -	162
TOTAL SPACES PROVIDED -	369



DIVARIO CANYON DRIVE CROSS-SECTION

SCALE: N.T.S.



45' STREET SECTION

SCALE: N.T.S.

DATE: 3/14/22
JOB NO.: 1286-21-053
DESIGNED BY: AMH
CHECKED BY:
DWG: Site Plan
DATE
REVISIONS

ROSENBERG ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS
352 East Riverside Drive, Suite A-2
St. George, Utah 84790
Ph (435) 673-8586 Fx (435) 673-8397
www.racivil.com

SITE PLAN
FOR
BECCO CREEK AT DIVARIO (PA-18)
ST. GEORGE
UTAH

SHEET
1
1 OF 1 SHEETS

Exhibit C

Drainage Report

TECHNICAL DRAINAGE CONTROL REPORT

Project Land Use Planning, Offsite Road Construction, and Mass Grading
The Lakes Master Plan Community
St. George, Utah

Prepared For:

730 St. George, LLC
1636 Indian Wells Drive
Boulder City, Nevada 89005

Rosenberg Associates
352 East Riverside Drive, Suite A-2
St. George, Utah 84790

August 30, 2016

ROSENBERG ASSOCIATES
CIVIL ENGINEERS LAND SURVEYORS

TABLE OF CONTENTS

1.0 PROJECT LOCATION

The following Drainage Control Plan and Report is submitted in support of The Lakes at St. George Master Plan Community, a proposed project, located along Plantations Drive in western St. George, Utah, spanning the distance between the Sunbrook Community at the end of Sunbrook Drive to the north, and near the Tonaquint Business Park to the South. The site is located within Sections 27, 28, 34 and 35 in Township 42 South, Range 16 West, Salt Lake Base and Meridian.

This report has been prepared to evaluate regional storm flows at key locations within the project area in order to perform mass grading operations, and to construct the following proposed off-site roadways to access the proposed development/planning areas:

- Plantations Drive
- Lago Vista Drive
- Alienta Drive
- Sentieri Vista Drive

This report has been prepared in accordance with the requirements and procedures outlined in the *Washington County Flood Control Authority Storm Drainage Systems Design and Management Manual*[1]. Conclusions and recommendations are made herein regarding drainage improvements required, floodplain impacts, and general conformance to city ordinances. Separate drainage studies will be prepared for each specific planning area to address localized drainage concerns and compliance with the city's drainage requirements.

The following supplemental figures have been prepared and included in the Appendix for reference and illustration information:

- *Figure 1 – Land Use Plan for The Lakes at St. George*, illustrating project location, project planning areas, and proposed planning area land uses and densities.
- *Figure 2 – Watershed Map for The Lakes at St. George*, illustrating the major watershed boundaries impacting the site.
- *Figure 3 – FEMA Regulatory 100-Year Floodplain Exhibit Map*, illustrating the drainage channels subject to the regulatory requirements of the Federal Emergency Management Agency (FEMA).
- *Figure 4 –Culvert Crossings*, showing the approximate location, minimum pipe diameter, and minimum slope requirements of culvert crossings and storm drain pipelines for the offsite roads including Plantations Drive, Lago Vista Drive, Alienta Drive, and Sentieri Vista Drive.
- *Figure 5 – Custom Soil Resource Report for Washington County Area*, showing soils and soil properties on the subject property.

[1] Bowen, Collins and Associates, Washington County Flood Control Authority Storm Drainage Design and Management Manual, Draft v0.3.

2.0 PROPERTY DESCRIPTION

The proposed Lakes at St. George is a 731-acre master plan community that is planned to be comprised of single-family residences, multi-family residences, parks and open spaces, commercial areas, public buildings such as churches, and associated streets of various right-of-way widths. *Figure 1 – Land Use Plan*, shows an overall view of the property. The proposed project is divided into 16 individual planning areas noted as PA-1, PA-2, etc. A legend on Figure 1 lists the master planned land uses and densities proposed for each planning area as follows:

- Low Density Residential: up to 4 units per acre, includes PA-4, PA-5, PA-6, PA-14, PA-15, and PA-16 covering approximately 174 acres.
- Medium Density Residential: up to 9 units per acre, includes PA-2, PA-3, PA-7, PA-9, PA-10, PA-11, PA-12, and PA-13 covering approximately 236 acres.
- High Density Residential: up to 15 units per acre, includes PA-1, PA-17, and PA-18 covering approximately 48 acres.
- Commercial/Mixed Use: includes PA-8 covering approximately 27 acres.

The remainder of the property will remain as undisturbed or improved open spaces to consist of parks, trails and other recreational facilities. These open spaces provide a natural break between each planning area, and most of them are located to accommodate the existing naturally flowing drainage patterns. The focal point of the open spaces will be two 5-acre lakes that will be used for detention, and to provide storage facilities for the City of St. George re-use water network.

3.0 EXISTING OFF-SITE DRAINAGE DESCRIPTION

3.1 UPSTREAM DRAINAGE

Storm water impacting the project from upstream sources generally originates on undeveloped desert land and drain in a sheet flow manner towards ephemeral washes that carry the concentrated water to the project property from the west and south.

The watershed impacting the proposed Lakes at St. George is illustrated in *Figure 2 – Watershed Map*. As seen in the exhibit, the total watershed area has been divided into a number of subareas to better pinpoint runoff amounts at specific locations within the project. Most off-site storm water enters the project from property belonging to the Bureau of Land Management (BLM). A small amount of off-site storm water enters the project along Plantations Drive from property belonging to the Sunbrook master plan community.

3.2 DOWNSTREAM DRAINAGE

In both the existing and proposed developed condition, storm water will exit the property in either the Box Canyon Wash, draining the northern portion of the property consisting of subarea Groups X, Y, A and B; or the Gap Wash, draining the rest of the property to the south and east. Flows leaving the project in the Box Canyon Wash travel through the Sunbrook Golf Course a distance of approximately 6,000 feet before discharging to the Santa Clara River just upstream of the Dixie Drive crossing at Mathis Park. Flows leaving the project in the Gap Wash travel eastward toward the Tonaquint Business Park, covering a total distance of approximately 4,800 feet before discharging to the Santa Clara River just north of the City of St. George Tonaquint Cemetery.

4.0 EXISTING ON-SITE DRAINAGE DESCRIPTION

In the undeveloped condition, the study area drains by sheet flow and washes to the Box Canyon Wash and the Gap Wash as shown in Figure 2. In the developed condition, storm water runoff will drain to the same major washes preserved in the designated open space corridors, as in the undeveloped condition.

5.0 MASTER PLANNED DRAINAGE CONSIDERATIONS

5.1 MASTER PLAN HYDROLOGIC MODEL

The Lakes property has been included in the hydrologic model prepared for the city's drainage master plan summarized in the *City of St. George Storm Drain Master Plan Update*[2]. Referencing Figure 2, Subareas A1, A2, A3, B1, B2, B3, B4, X1, X2, Y1, and Y2 in this report are part of the Box Canyon Wash BC100 master plan subarea. Subareas C1, C2, C3, C4, C5, D1, D2 in this report are part of the Gap Wash G20 master plan subarea. Subareas E1, E2, E3, E4, F1, F2, G1, G2, and H1 are part of the Gap Wash watershed G40 master plan subarea.

5.2 MASTER PLAN DRAINAGE INFRASTRUCTURE

Existing master planned drainage infrastructure impacting The Lakes project is limited to one 36-inch diameter pipe, labeled Pipe G50-2 in the city master plan and noted to carry a design flow of 65 cubic feet per second (cfs). This pipe conveys drainage from the Las Palmas and Worldmark Resort properties along 1790 West Street, discharging into the project property along the Plantations Drive right-of-way.

Proposed master planned drainage infrastructure impacting The Lakes project includes two proposed pipes linking to Pipe G50-2:

[2] Bowen, Collins and Associates and John H. Humphrey, City of St. George Storm Drain Master Plan Update, July, 2009.

- Pipe G50-1, a proposed 30-inch diameter pipe noted to carry a design flow of 65 cfs, to convey storm water along the Plantations Drive right-of-way along the Worldmark Resort frontage, and connecting to existing Pipe G50-2 at the intersection of 1790 West Street.
- Pipe G50-3, a proposed 42-inch diameter pipe noted to carry a design flow of 196 cfs, to combine flows from G50-1 and G50-2 and convey storm water south and eastward along the future Plantations Drive right-of-way.

The above existing and proposed pipelines were factored into this report analysis with some modifications to suit the drainage patterns and open space corridors proposed in The Lakes land use plan.

6.0 FEMA AND OTHER REGULATORY REQUIREMENTS

6.1 FEMA 100-YEAR FLOODPLAIN DELINEATION

Two drainage washes are located within the 100-year floodplain that are subject to the regulatory requirements of the Federal Emergency Management Agency (FEMA) including the Box Canyon Wash and the Gap Wash, as noted on the current FEMA Flood Insurance Rate Maps[3]. The 100-year floodplain boundaries for these two washes are shown in *Figure 3 – FEMA Regulatory 100-Year Floodplain Exhibit Map*.

Box Canyon Wash clips the north side of the property and receives drainage from Subareas A1, A2, A3, B1, B2, B3, Y1, Y2, X1, and X2. The remaining Subareas drain to the Gap Wash. Figure 3 illustrates the location of regulatory Zone A for both the Box Canyon and Gap washes, which is defined as the 100-year floodplain Special Flood Hazard Area with no base flood elevations established. All areas noted as Zone A are located within the designated open spaces for The Lakes master plan community. Areas proposed for development are all located within Zone X, which is defined to be outside the 0.2% annual floodplain.

6.2 EROSION HAZARD ZONE

The subject property is not located within an "Erosion Hazard Zone" as defined by the City of St. George.

[3] Federal Emergency Management Agency (FEMA) National Flood Insurance Program, Flood Insurance Rate Map, Washington County, Utah Map Numbers 49053C1007G and 49053C1009G, Effective Date April 2, 2009.

7.0 OTHER DRAINAGE STUDIES IMPACTING THE SITE

The following studies were referenced in preparing this report:

- The Lakes at St. George Hydrology Report, prepared by Rosenberg Associates, dated May 15, 2008. This report is a general overview of major drainage patterns encompassing the entire Lakes planned development property boundary. This report updates the earlier report to current city analysis and drainage design standards.
- Four Dams at The Lakes Preliminary Drainage Evaluation, prepared by Rosenberg Associates, dated September 14, 2005. This report is a hydrologic analysis of the proposed "lakes" to be constructed in the master plan community open space.
- Box Canyon Wash Hydraulic Modeling, performed by Rosenberg Associates in 2008. This work resulted in the delineation of the 100-year floodplain along the Box Canyon Wash.

8.0 PROPOSED DRAINAGE FACILITIES

Drainage facilities proposed for The Lakes master plan community will convey water through the planning areas and connecting roads by a combination of grading, street improvements, and storm drain infrastructure. Specific routing, sizing, and placement of storm drain infrastructure will be proposed during the detailed design stage of each planning area; however, this report has been prepared to evaluate regional storm flows at key locations within the project area in order to perform mass grading operations, and to construct the following proposed off-site roadways to access the proposed development/planning areas:

- Plantations Drive: Extending from the north property boundary and heading in a southeasterly direction approximately 12,400 feet to the southeastern property boundary.
- Lago Vista Drive: Extending from the point of intersection with Plantations Drive on the northwest side of the parcel, and extending in a southeasterly direction approximately 8,900 feet to the southwestern property boundary.
- Alienta Drive: Extending from Lago Vista Drive northward approximately 2,400 feet where it ties to the existing Alienta Drive.
- Sentieri Vista Drive: Extending from Lago Vista Drive in the northwest area of the project and heading in a westward direction approximately 1,300 feet through planning areas PA-14, Pa-16, and terminating in PA-15.

8.1 MASS GRADING

It is the desire of the project developers to conduct mass grading operations on portions of the master plan project. The purpose of this is to be able to move earth materials between the planning areas. Planning areas with an abundance of quality material that can be used for general fill, structural fill, and/or utility trench bedding will be mined and the excess material moved to planning areas where additional fill material is needed.

Limited grading design will be performed for various phases of mass grading. Plans will be submitted to the City of St. George engineering department and processed for a grading permit before any grading operations begin. Mass grading design will focus on maintaining the existing drainage patterns by picking up storm water offsite flows, routing storm water through the mass graded planning area to be discharged back into the open space areas as close as practicable to the historic point of discharge.

8.2 DETAIL GRADING

Detailed grading plans will be submitted with the project development plans for each planning area to include individual lot and/or building pad grading, interior road plan and profile drawings, and underground storm drain plan and profile where needed.

A detailed drainage study will be prepared for the proposed development and submitted with the project construction plans for each individual planning area.

8.3 OFFSITE ROADWAYS

Construction of the offsite roadways including Plantations Drive, Lago Vista Drive, Alienta Drive, and Sentieri Vista Drive, as noted above, will occur in phases as needed to service the development of the planning areas. The peak storm water runoff values in this drainage study were used to evaluate roadway cross section conveyance capacity, to size in-line underground storm water pipelines, and to locate and size offsite roadway culvert crossings. The approximate location, minimum pipe diameter sizing, and minimum slope requirements of culvert crossings and storm drain pipelines are illustrated in *Figure 4 – Proposed Offsite Road Culvert Crossing and Storm Drain Facilities*. Detailed construction plans for all offsite roadway drainage improvements will be submitted with the applicable planning area construction plans.

8.4 OPEN CHANNELS

Construction of open channels are proposed to convey storm water through the disturbed open space areas. The proposed routing location, size, minimum design slope and capacity of these channels will be addressed with the detailed drainage design of the adjacent planning areas or design of open space area. The channels are generally located as follows:

- Between Lake 1 and Lake 2 adjacent to Lago Vista Drive
- Routing the Gap Wash through Park 2 adjacent to Lago Vista Drive, between Lake 2 and the power substation.
- Routing the Gap Wash through planning areas PA-1 and PA-2 inside the boundaries of the delineated floodplain.

Additional temporary man-made open channels may need to be constructed to route storm water through mass-graded planning areas, then directed back into the natural drainages located in the adjacent open space areas. The peak flow values of this report will be used to

size these temporary channels, which will be called out as needed on the individual mass grading construction plans. Once the planning area goes into final design, these channels will be replaced with improved streets, storm drains, or culverts.

8.5 REGIONAL DETENTION

It is the desire of the project developers to detain increased storm water caused by development. Rather than design numerous smaller detention facilities for each planning area, storm water will be routed into regional facilities adjacent to the two 5-acre lake amenities, as discussed below. Storm water won't be routed directly in the lake amenities, but into a containment area next to the lake to help maintain the quality of the city's re-use water that will be stored in the lake facilities. Master Plan Model results indicate that detention may be minimal or not required. Finalization of detention needs will be addressed with detailed drainage design of each planning area.

- Lake 1 Detention Basin: Increased storm water runoff generated in Subareas B2 and B3 will be routed directly into a detention basin adjacent to Lake 1, then discharged into the Box Canyon Wash. Additional capacity and outlet control facilities will be installed in this detention basin to also detain the total combined increase from Subareas A2, A3, X2, and Y2. This will allow the increase from these subareas to discharge directly to Box Canyon Wash while limiting the total peak flow discharging from the property to the peak "pre-developed" design condition.
- Lake 2 Detention Basin: Increased storm water runoff generated in Subareas C2, C3 and D2 will be routed directly into a detention basin adjacent to Lake 2, then discharged into the Gap Wash. Additional capacity and outlet control facilities will be installed in this detention basin to also detain the total combined increase from Subareas E2, E3, E4, F2 and G2. This will allow the increase from these subareas to discharge directly to the Gap Wash while limiting the total peak flow discharging from the property to the peak "pre-developed" design condition.

9.0 PROPOSED DRAINAGE FACILITIES COMPLIANCE

The hydrologic and hydraulic analysis utilized for design of The Lakes master plan community storm water drainage facilities were performed in accordance with the requirements of the Washington County Flood Control Authority (WCFCA) *Storm drainage Systems Design and Management Manual*. Specific compliance measures were as follows:

- Hydrologic Analysis: The hydraulic analyses performed for The Lakes off-site and on-site watershed was performed in accordance with Section 4 of the drainage manual utilizing the US Army Corps of Engineers HEC-HMS Version 4.1[4] modeling software. The hydrologic

[4] U.S. Army Corps of Engineers, Hydraulic Engineering Circular Hydrologic Modeling System (HEC-HMS) software, Version 3.5.

analysis is discussed in greater detail in Section 10 of this report, with detailed information included in the appendix.

- Street Design: Street drainage design was performed in accordance with Section 3 of the drainage manual assuming that Sentieri Vista Drive is a minor collector, Lago Vista Drive and Alienta Drive are major collectors, and Plantations Drive is a major arterial in accordance with Table 3-1.
- Storm Drain Design: Storm drain design for Sentieri Vista Drive, Lago Vista Drive, Alienta Drive, and Plantations Drive was performed in accordance with Section 3 of the drainage manual assuming an open-channel flow condition.
- Culvert Design: Culverts for the offsite road system were designed in accordance with Section 3 of the drainage manual to fully convey the 100-year design storm event in an open channel flow condition.
- Open Channel Design: Open channels conveying storm water from detention areas to the Box Canyon Wash and Gap Wash, and conveying flows adjacent to Lago Vista Drive, will be designed with future phases. Open channels will be designed to match the natural channel flow characteristics of the existing channels.
- Storage Facilities Design: The two regional detention facilities have been sited and will designed with future phases as needed.

10.0 DESIGN RUNOFF COMPUTATIONS

10.1 HYDROLOGIC CALCULATIONS

The US Army Corps of Engineers HEC-HMS Version 4.1 was used to perform the hydrologic analysis for this study. The Farmer-Fletcher distribution is used for the 3-hour storm events and the SCS Type II distribution is used for the 24-hour storm events. The SCS Composite Curve Number method was utilized to determine the runoff curve number since all areas within the watershed evaluated are currently undeveloped.

Tables summarizing model input for the following values have been included in the appendix:

- Watershed areas, longest length, and average slope for the pre-developed and proposed post-developed condition.
- SCS composite curve number values for the pre-developed and proposed post-developed condition.
- Hydrologic model junction and routing characteristics.
- Calculated times of concentration and lag time.

10.2 COMPARISON OF PEAK FLOW VALUES

Modeling for The Lakes master plan development considered both the existing pre-developed condition and the assumed post-developed condition, in order to size storm drainage facilities and to compare impacts to storm water peak flow values caused by proposed development. HEC-HMS model peak storm values for all subareas, junctions, and routing conditions for the pre-developed and proposed post-developed condition are included in the appendix.

Post-developed conditions were assumed to match the proposed uses and densities described in Section 2 of this report and illustrated in *Figure 1 – Land Use Plan*. Since exact layout for each of the 16 individual planning areas is not known at this point, detailed drainage study update reports will be submitted with the development of each planning area.

11.0 PROPOSED DRAINAGE FACILITIES DESIGN COMPUTATIONS

Computations for the hydraulic design of The Lakes master plan community storm water drainage facilities were performed in accordance with the requirements of the Washington County Flood Control Authority *Storm Drainage Systems Design and Management Manual*. Output tables for calculations are included in the appendix.

11.1 CULVERT AND CHANNEL CAPACITY DESIGN

Culvert and channel capacities utilized Manning's equation for open channel flow:[5]

$$Q = \frac{1.49\,(A)^{5/3}(S)^{1/2}}{n(P)^{2/3}}$$

Where
- Q = Hydraulic Capacity, in cubic feet per second (cfs)
- A = Cross Sectional Flow Area, in square feet
- S = Average Slope, in feet per foot
- n = Manning's Roughness Coefficient
- P = Wetted Perimeter, in feet

[5] Flammer, Jeppson, and Keedy, Fundamental Principles and Applications of Fluid Mechanics, Utah State University, 1986, p. 289.

Table 11-1 lists the Manning's roughness coefficients used in the model evaluation:

TABLE 11-1: MANNING'S ROUGHNESS COEFFICIENTS

Surface Description	Manning's n Value
High Density Polyethylene Pipe (HDPE)	0.010
Concrete Pipe (RCP)	0.013
Open Channels	0.078
Asphalt Pavement	0.015

The following parameters were assumed for each evaluation:

- All culvert capacities were evaluated as flowing full in the open channel flow condition, assuming no surcharge.
- The slope of each culvert was assumed to be the average slope of the drainage basin or routing, unless additional information was known to justify a different value.
- If existing drainage or future road drainage infrastructure was determined to be inadequate to accommodate the modeled design storm, the culvert or open channel was sized to accommodate the full modeled design storm value.

11.2 STREET CAPACITY DESIGN

Street capacities were modeled using Manning's equation for open channel flow based on the master planned street cross-section, assuming full street improvements were constructed. Minimum slopes for all street sections were assumed to be at 0.5%.

11.3 STORAGE FACILITIES DESIGN

The two regional detention facilities are proposed, as discussed in Section 8.5. The master plan calculations summarized in this report do not include a proposed size for these two facilities, since overall post-development values do not exceed the pre-development values. If localized post-developed drainage values are determined to exceed pre-developed values during detailed drainage design of the planning areas, the storage facilities will be designed utilizing HEC-HMS output files, sizing for the 10-year 24-hour design storm, and sizing for the worst-case condition (whichever yielded the greatest volume) of the 100-year 3-hour design storm or the 100-year 24-hour design storm. Since not all subareas will be able to be routed directly through one of the detention basins, it is assumed that the regional facilities may need to be oversized to compensate for the total increased flow where storm water exits the property in the Box Canyon Wash for Lake 1, or in the Gap Wash for Lake 2, as discussed in Section 8.5 of this report.

12.0 REQUIRED EASEMENTS AND RIGHTS-OF-WAY

No additional easements or rights-of-way are being proposed for storm water drainage with the master plan, mass grading, or construction of offsite roadways. Major drainage channels within the proposed project are to remain in the open space areas shown in Figure 1, the master land use plan. Specific drainage easements, if needed within the individual planning areas, will be noted with the submittal of the planning area detailed drainage study report and project construction plans.

13.0 FEMA FLOODWAY AND FLOODPLAIN CALCULATIONS

No additional hydrologic or hydraulic calculations were performed for the purposes of modifying the existing floodplain as delineated on the FEMA flood insurance rate maps. It is the intention of the project developer to leave all designated floodplain areas for the Box Canyon Wash and Gap Wash out of the residential development areas.

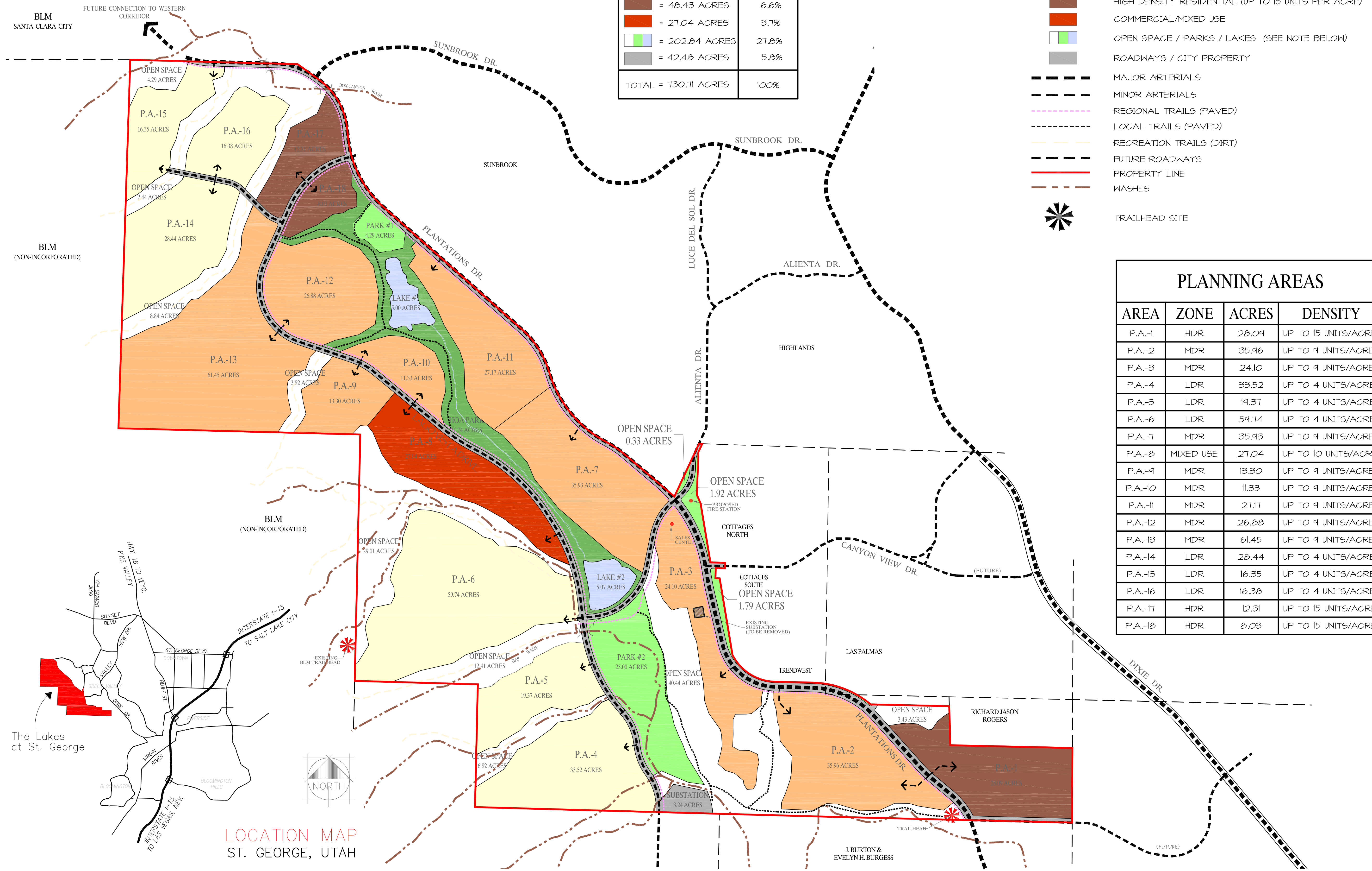
14.0 CONCLUSIONS AND STATEMENT OF COMPLIANCE

This report for the drainage design of The Lakes Master Plan was prepared under my direct supervision in accordance with the provisions of Washington County Flood Control Authority (WCFCA) Storm Drainage Systems Design and Management Manual, and was designed to comply with the provisions thereof. I understand that the City of St. George and WCFCA do not and will not assume liability for drainage facilities design.

APPENDIX

Figure 1 – Land Use Plan for The Lakes at St. George
Figure 2 – Watershed Map for The Lakes at St. George
Figure 3 – FEMA Regulatory 100-Year Floodplain
Figure 4 – Proposed Culvert Crossing Calculations
Figure 5 – Custom Soil Resource Report for Washington County Area

Watershed Hydrology Model Input Spreadsheets
Watershed Hydrology Model Hydraulic Routing Spreadsheets
Watershed Hydrology Model Curve Number Spreadsheets
Watershed Hydrology Model Lag Time Spreadsheets
HEC-HMS Model and Output Tables
Culvert Calculation Worksheets



AREA TOTALS

(Low density residential)	= 173.80 ACRES	23.8%
(Medium density residential)	= 236.12 ACRES	32.3%
(High density residential)	= 48.43 ACRES	6.6%
(Commercial/mixed use)	= 27.04 ACRES	3.7%
(Open space / parks / lakes)	= 202.84 ACRES	27.8%
(Roadways / city property)	= 42.48 ACRES	5.8%
TOTAL	= 730.71 ACRES	100%

NOTE

THE BOUNDARIES DESIGNATED FOR LAKES AND PARKS ARE SUBJECT TO CHANGE AT THE DEVELOPERS DISCRETION.

LEGEND

- LOW DENSITY RESIDENTIAL (UP TO 4 UNITS PER ACRES)
- MEDIUM DENSITY RESIDENTIAL (UP TO 9 UNITS PER ACRE)
- HIGH DENSITY RESIDENTIAL (UP TO 15 UNITS PER ACRE)
- COMMERCIAL/MIXED USE
- OPEN SPACE / PARKS / LAKES (SEE NOTE BELOW)
- ROADWAYS / CITY PROPERTY
- MAJOR ARTERIALS
- MINOR ARTERIALS
- REGIONAL TRAILS (PAVED)
- LOCAL TRAILS (PAVED)
- RECREATION TRAILS (DIRT)
- FUTURE ROADWAYS
- PROPERTY LINE
- WASHES
- TRAILHEAD SITE

PLANNING AREAS

AREA	ZONE	ACRES	DENSITY
P.A.-1	HDR	28.09	UP TO 15 UNITS/ACRE
P.A.-2	MDR	35.96	UP TO 9 UNITS/ACRE
P.A.-3	MDR	24.10	UP TO 9 UNITS/ACRE
P.A.-4	LDR	33.52	UP TO 4 UNITS/ACRE
P.A.-5	LDR	19.37	UP TO 4 UNITS/ACRE
P.A.-6	LDR	59.74	UP TO 4 UNITS/ACRE
P.A.-7	MDR	35.93	UP TO 9 UNITS/ACRE
P.A.-8	MIXED USE	27.04	UP TO 10 UNITS/ACRE
P.A.-9	MDR	13.30	UP TO 9 UNITS/ACRE
P.A.-10	MDR	11.33	UP TO 9 UNITS/ACRE
P.A.-11	MDR	27.17	UP TO 9 UNITS/ACRE
P.A.-12	MDR	26.88	UP TO 9 UNITS/ACRE
P.A.-13	MDR	61.45	UP TO 9 UNITS/ACRE
P.A.-14	LDR	28.44	UP TO 4 UNITS/ACRE
P.A.-15	LDR	16.35	UP TO 4 UNITS/ACRE
P.A.-16	LDR	16.38	UP TO 4 UNITS/ACRE
P.A.-17	HDR	12.31	UP TO 15 UNITS/ACRE
P.A.-18	HDR	8.03	UP TO 15 UNITS/ACRE

DATE:	8/31/2016
JOB NO.:	1286-14-014
DESIGNED BY:	JLW
CHECKED BY:	RMA
DWG:	Land Use Plan

DATE

REVISIONS

ROSENBERG ASSOCIATES
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www.racivil.com

Land Use Plan FOR The Lakes at St. George

St. GeorgE, Utah

SHEET

Fig. 1

1 OF 1 SHEETS

Q= 2,950 CFS
AS PER FEMA
AUGUST 2006

Q= 650 CFS
AS PER FEMA
AUGUST 2006

Box Canyon
Stucki Spring
Mojave Desert
The Gap
Cove Wash
Halfway Wash
Halfway Wash
Santa Clara River

CANYON RIDGE RD
EMERAUD
W SUNBROOK DR
W RIVERS EDGE LN
PLANTATIONS DR.
LAGO VISTA DR.
ALIENTA DR.
S LUCE DEL SOL DR
S VILLAGE RD
S DIXIE DR
S VALLEY VIEW DR
SOL TO VISTA DEL

X1 X2 Y1 Y2 A1 A2 A3 B1 B2 B3 B4 C1 C2 C3 C4 D1 D2 E1 E2 E3 E4 F1 F2 G1 G2 H1

3000 3200 2800 2700

0 1400' 2800'
SCALE: 1"=1400'

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www.rosenbergassociates.net

DATE: 4-14-08
JOB NO.: 1286-PDA
DRAWN BY: JRH
DESIGNED BY:
DWG: WATERSHED MAP
DATE
REVISIONS

FIGURE 2 WATERSHED MAP
FOR
THE LAKES AT ST. GEORGE
ST. GEORGE, UTAH

SHEET
Fig. 2
1 OF 1 SHEETS

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Floodway Data table shown on this FIRM.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 12N. **Horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was provided in digital format by the U.S. Farm Service National Agriculture Imagery Program (NAIP), dated summer 2004, and by the U.S. Geological Survey Digital Orthophoto Quadrangles, dated 1993 and later, produced at a scale of 1:24000. The data was obtained from the State Geographic Information Dataset (SGID) maintained by the Automated Geographic Reference Center (AGRC).

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the Flood Profiles and Floodway Data tables may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and /or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov/business/nfip/.

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1007G

FIRM
FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, UTAH
AND INCORPORATED AREAS

PANEL 1007 OF 1225
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SANTA CLARA, CITY OF	490178	1007	G
ST. GEORGE, CITY OF	490177	1007	G
WASHINGTON COUNTY	490224	1007	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
49053C1007G
EFFECTIVE DATE
APRIL 2, 2009

Federal Emergency Management Agency

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1009G

FIRM
FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, UTAH
AND INCORPORATED AREAS

PANEL 1009 OF 1225
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ST. GEORGE, CITY OF	490177	1009	G
WASHINGTON COUNTY	490224	1009	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
49053C1009G
EFFECTIVE DATE
APRIL 2, 2009

Federal Emergency Management Agency

NFIP — NATIONAL FLOOD INSURANCE PROGRAM

PANEL 1028G

FIRM
FLOOD INSURANCE RATE MAP

WASHINGTON COUNTY, UTAH
AND INCORPORATED AREAS

PANEL 1028 OF 1225
(SEE LOCATOR DIAGRAM OR MAP INDEX FOR FIRM PANEL LAYOUT)

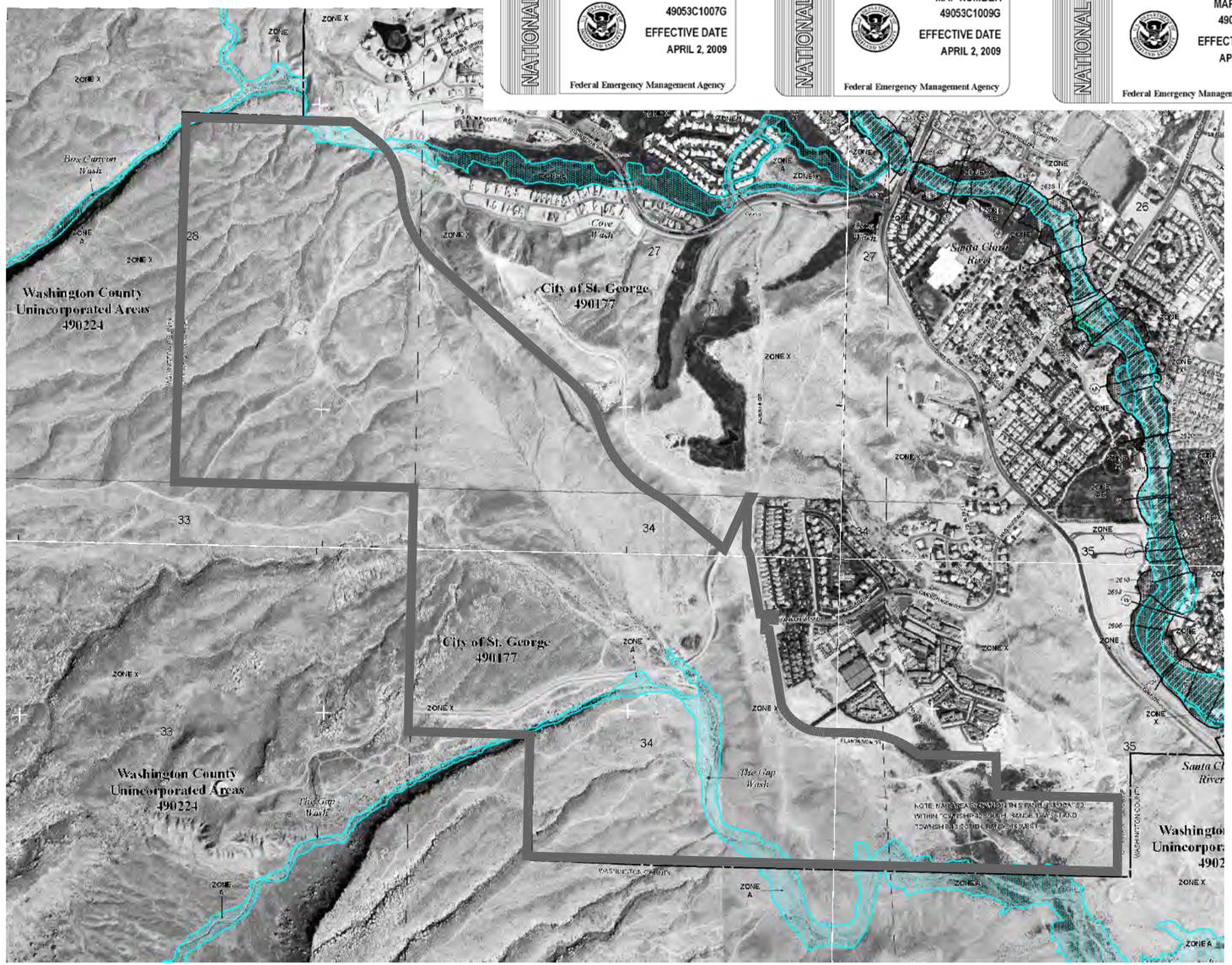
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
ST. GEORGE, CITY OF	490177	1028	G
WASHINGTON COUNTY	490224	1028	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
49053C1028G
EFFECTIVE DATE
APRIL 2, 2009

Federal Emergency Management Agency



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water surface elevation of the 1% annual chance flood.

- ZONE A — No Base Flood Elevations determined.
- ZONE AE — Base Flood Elevations determined.
- ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR — Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99 — Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V — Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE — Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

- ZONE X — Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D — Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAS)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL. 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

- (A) — (A) — Cross section line
- (23) — (23) — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
- 4376 000 E — 1000-meter Universal Transverse Mercator grid values, zone 12
- 6000000 FT — 5000-foot grid ticks: Utah State Plane coordinate system, south zone (FIPSZONE 4302), Lambert Conformal Conic projection
- DK5510 X — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
APRIL 2, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000 FEET
150 0 150 300 METERS

DATE: 4-14-08
JOB NO.: 1286-PDA
DRAWN BY: JRH
DESIGNED BY:
DWG: WATERSHED MAP
DATE
REVISIONS

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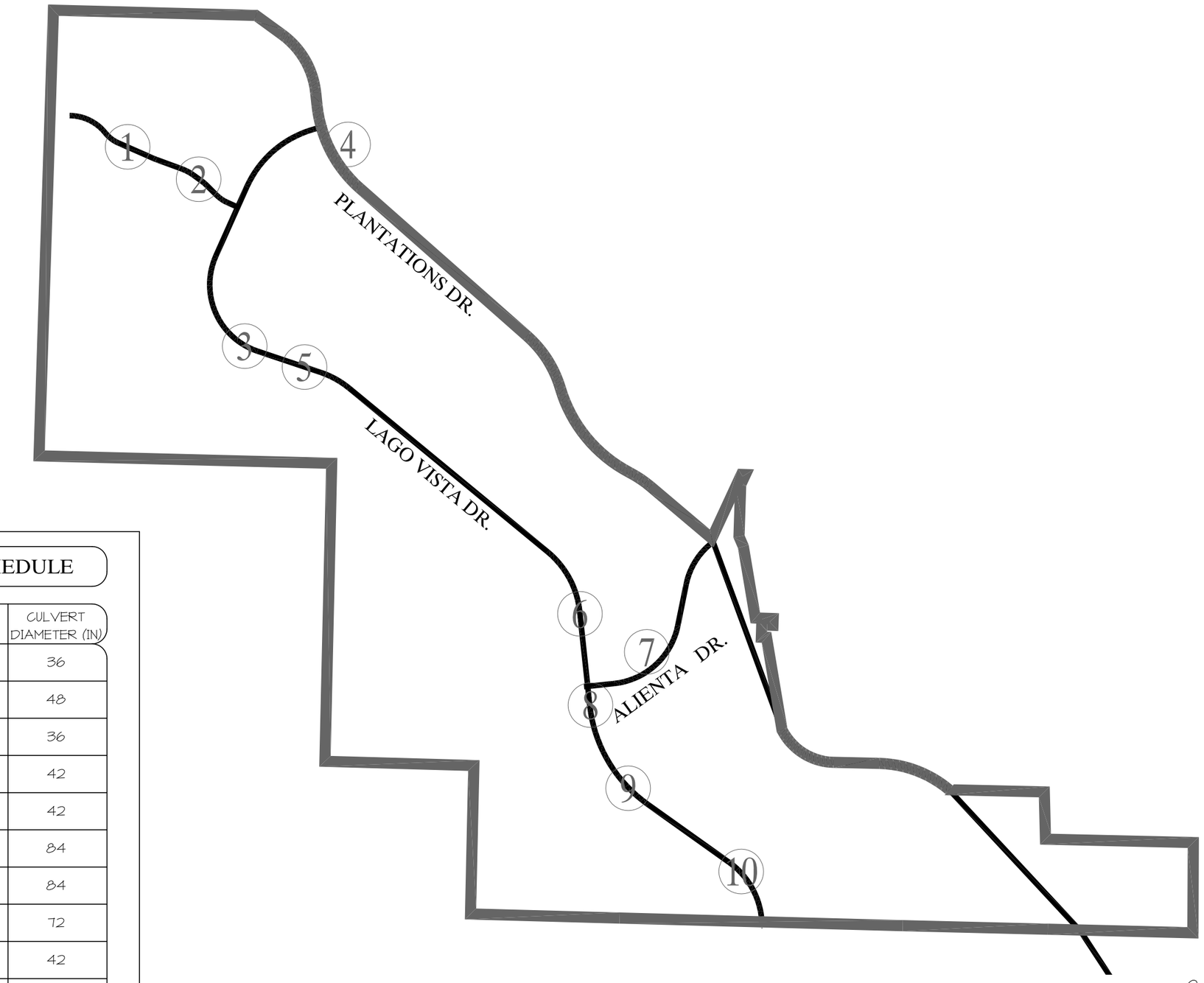
FIGURE 3- FEMA Regulatory 100-YR Floodplain
FOR
The Lakes at St. George
St. George, Utah

SHEET
Fig. 3
1 OF 1 SHEETS



CULVERT SCHEDULE

CULVERT ID	100-YR FLOW (CFS)	CULVERT DIAMETER (IN)
1	80.7	36
2	191.9	48
3	88.1	36
4	139.9	42
5	104.5	42
6	654.3	84
7	810.0	84
8	456.7	72
9	134.7	42
10	249.4	60

NOTE
CULVERT DIAMETER CALCULATIONS ASSUME 1.0% SLOPE.

0 1000' 2000'

SCALE: 1"=1000'

DATE: 4-14-08
JOB NO.: 1286-PDA
DRAWN BY: JLN
DESIGNED BY: RMA
DWG: WATERSHED MAP

REVISIONS DATE

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FIGURE 4 CULVERT CROSSINGS FOR THE LAKES AT ST. GEORGE

ST. GEORGE, UTAH

SHEET
Fig. 4
1 OF 1 SHEETS

United States Department of Agriculture

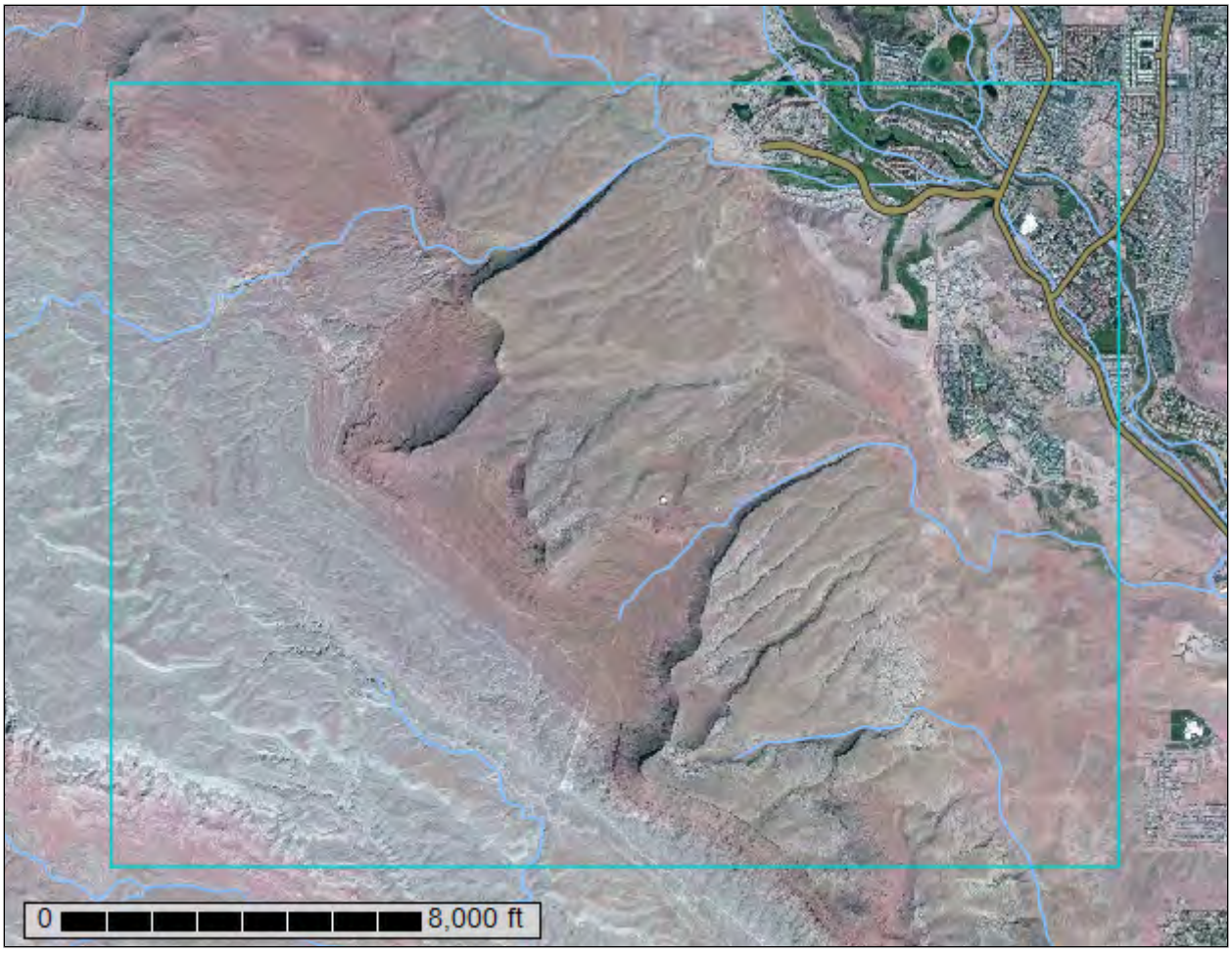
NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for Washington County Area, Utah

The Lakes



August 19, 2016

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the

individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

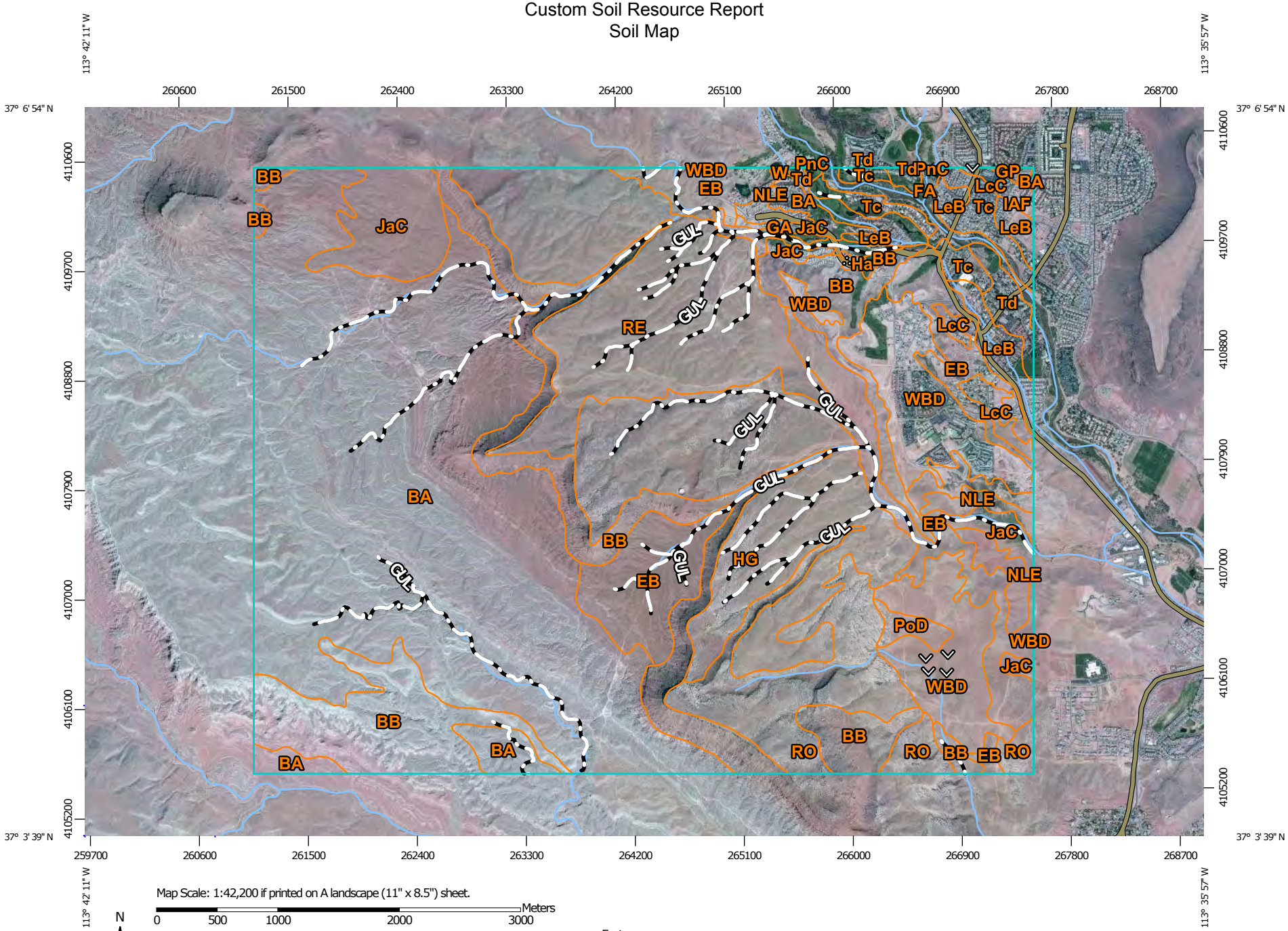
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map



MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washington County Area, Utah
Survey Area Data: Version 9, Sep 23, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 11, 2010—Nov 3, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Washington County Area, Utah (UT641)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
BA	Badland	2,583.6	32.5%
BB	Badland, very steep	1,031.7	13.0%
EB	Eroded land-Shalet complex, warm	727.4	9.1%
FA	Fluvaquents and torrifluvents, sandy	63.4	0.8%
GA	Gullied land	35.1	0.4%
GP	Gravel pits	4.1	0.1%
Ha	Hantz silty clay loam	9.7	0.1%
HG	Hobog-Rock land association	870.7	10.9%
IAF	Isom cobbly sandy loam, 3 to 30 percent slopes	15.6	0.2%
JaC	Junction fine sandy loam, 2 to 5 percent slopes	250.5	3.1%
LcC	Laverkin fine sandy loam, 2 to 5 percent slopes	49.5	0.6%
LeB	Leeds silty clay loam, 1 to 2 percent slopes	142.6	1.8%
NLE	Nikey sandy loam, 3 to 15 percent slopes	100.1	1.3%
PnC	Pintura loamy fine sand, 1 to 5 percent slopes	3.1	0.0%
PoD	Pintura loamy fine sand, hummocky, 1 to 10 percent slopes	30.4	0.4%
RE	Renbac-Rock land association	893.1	11.2%
RO	Rock land	431.7	5.4%
Tc	Tobler fine sandy loam	129.0	1.6%
Td	Tobler silty clay loam	71.5	0.9%
W	Water	2.7	0.0%
WBD	Winkel gravelly fine sandy loam, 1 to 8 percent slopes	507.9	6.4%
Totals for Area of Interest		**7,953.3**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Washington County Area, Utah

BA—Badland

Map Unit Composition

Badland: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Badland

Setting

Landform: Escarpments, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Free face, side slope
Down-slope shape: Convex
Across-slope shape: Convex

BB—Badland, very steep

Map Unit Composition

Badland: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Badland

Setting

Landform: Escarpments, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Free face, side slope
Down-slope shape: Convex
Across-slope shape: Convex

EB—Eroded land-Shalet complex, warm

Map Unit Setting

National map unit symbol: j8ds
Elevation: 3,600 to 5,550 feet
Mean annual precipitation: 10 to 13 inches
Mean annual air temperature: 52 to 56 degrees F
Frost-free period: 165 to 170 days
Farmland classification: Not prime farmland

Map Unit Composition

Eroded land: 78 percent
Shalet and similar soils: 20 percent
Minor components: 2 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eroded Land

Setting

Landform: Erosion remnants
Parent material: Residuum weathered from shale

Description of Shalet

Setting

Landform: Swales
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from shale

Typical profile

H1 - 0 to 4 inches: clay loam
H2 - 4 to 12 inches: clay loam
H3 - 12 to 16 inches: weathered bedrock

Properties and qualities

Slope: 2 to 20 percent
Depth to restrictive feature: 4 to 15 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Desert Shallow Loam (Creosotebush) (R030XY134UT)
Hydric soil rating: No

Minor Components

Badland

Percent of map unit: 2 percent

FA—Fluvaquents and torrifluvents, sandy

Map Unit Setting

National map unit symbol: j8dt
Elevation: 2,500 to 3,000 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 190 to 205 days
Farmland classification: Not prime farmland

Map Unit Composition

Fluvaquents and similar soils: 55 percent
Torrifluvents and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Fluvaquents

Setting

Landform: Swales
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 5 inches: fine sand
H2 - 5 to 60 inches: stratified fine sand to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 6 to 24 inches
Frequency of flooding: Frequent
Frequency of ponding: Rare
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 10.0
Available water storage in profile: Low (about 4.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: Loamy Bottom (Basin Big Sagebrush) (R035XY011UT)

Hydric soil rating: Yes

Description of Torrifluvents

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 5 inches: loamy fine sand
H2 - 5 to 60 inches: stratified loamy fine sand to silt loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 42 to 72 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to moderately saline (0.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A
Ecological site: Loamy Bottom (Basin Big Sagebrush) (R035XY011UT)
Other vegetative classification: Loamy Bottom (Basin Big Sagebrush) (035XY011UT)
Hydric soil rating: No

Minor Components

Riverwash

Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Tobler, fine sandy loam

Percent of map unit: 3 percent

Tobler, silty clay loam

Percent of map unit: 3 percent

GA—Gullied land

Map Unit Composition

Gullied land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

GP—Gravel pits

Map Unit Composition

Gravel pit: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Gravel Pit

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8s

Hydric soil rating: No

Ha—Hantz silty clay loam

Map Unit Setting

National map unit symbol: j8dy

Elevation: 2,700 to 3,300 feet

Mean annual precipitation: 8 to 11 inches

Mean annual air temperature: 57 to 65 degrees F

Frost-free period: 190 to 195 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hantz and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hantz

Setting

Landform: Alluvial fans

Down-slope shape: Concave

Across-slope shape: Convex

Parent material: Mixed alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 9 inches: silty clay loam

H2 - 9 to 19 inches: silty clay
H3 - 19 to 47 inches: silty clay
H4 - 47 to 70 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: C
Hydric soil rating: No

Minor Components

Leeds

Percent of map unit: 5 percent

Tobler

Percent of map unit: 5 percent

St. george, moderately saline

Percent of map unit: 5 percent

HG—Hobog-Rock land association

Map Unit Setting

National map unit symbol: j8dx
Elevation: 2,600 to 3,800 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 190 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Hobog and similar soils: 50 percent
Rock land: 40 percent

Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hobog

Setting

Landform: Mesas
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Material weathered from sandstone

Typical profile

H1 - 0 to 4 inches: very cobbly loam
H2 - 4 to 13 inches: very flaggy loam
H3 - 13 to 17 inches: unweathered bedrock

Properties and qualities

Slope: 3 to 40 percent
Depth to restrictive feature: 8 to 20 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 0.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Desert Shallow Loam (Creosotebush) (R030XY134UT)
Hydric soil rating: No

Description of Rock Land

Setting

Landform: Ridges
Down-slope shape: Convex
Across-slope shape: Convex

Minor Components

Rock outcrop

Percent of map unit: 5 percent

Renbac

Percent of map unit: 5 percent

IAF—Isom cobbly sandy loam, 3 to 30 percent slopes

Map Unit Setting

National map unit symbol: j8f0
Elevation: 2,700 to 3,900 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 175 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Isom and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Isom

Setting

Landform: Alluvial fans
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Cobbly alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 2 inches: very cobbly sandy loam
H2 - 2 to 10 inches: very cobbly sandy loam
H3 - 10 to 22 inches: very cobbly sandy loam
H4 - 22 to 60 inches: extremely cobbly sandy loam

Properties and qualities

Slope: 3 to 30 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 60 percent
Gypsum, maximum in profile: 10 percent
Salinity, maximum in profile: Very slightly saline to slightly saline (2.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Low (about 3.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A

Ecological site: Desert Shallow Loam (Creosotebush) (R030XY134UT)
Hydric soil rating: No

Minor Components

Shallow soils
Percent of map unit: 5 percent

Nickey
Percent of map unit: 5 percent

JaC—Junction fine sandy loam, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: j8f4
Elevation: 2,700 to 3,400 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 190 to 195 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Junction and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Junction

Setting
Landform: Alluvial fans, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex
Across-slope shape: Convex

Typical profile
H1 - 0 to 2 inches: fine sandy loam
H2 - 2 to 9 inches: fine sandy loam
H3 - 9 to 21 inches: fine sandy loam
H4 - 21 to 32 inches: fine sandy loam
H5 - 32 to 60 inches: fine sandy loam

Properties and qualities
Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum in profile: 20 percent
Gypsum, maximum in profile: 7 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups
Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Desert Loam (Creosotebush) (R030XY110UT)
Hydric soil rating: No

Minor Components

Tobler
Percent of map unit: 5 percent

Harrisburg
Percent of map unit: 5 percent

Junction
Percent of map unit: 5 percent

LcC—Laverkin fine sandy loam, 2 to 5 percent slopes

Map Unit Setting
National map unit symbol: j8fg
Elevation: 2,550 to 3,300 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 190 to 195 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Laverkin and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Laverkin

Setting
Landform: Alluvial fans, stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Convex, concave
Parent material: Alluvium derived from limestone, sandstone, and shale

Typical profile
H1 - 0 to 3 inches: fine sandy loam
H2 - 3 to 16 inches: fine sandy loam
H3 - 16 to 30 inches: sandy clay loam
H4 - 30 to 42 inches: sandy clay loam

H5 - 42 to 60 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Gypsum, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water storage in profile: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Desert Loam (Creosotebush) (R030XY110UT)
Hydric soil rating: No

Minor Components

Tobler

Percent of map unit: 5 percent

Nikey

Percent of map unit: 5 percent

LeB—Leeds silty clay loam, 1 to 2 percent slopes

Map Unit Setting

National map unit symbol: j8fk
Elevation: 2,550 to 3,300 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 190 to 200 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Leeds and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leeds

Setting

Landform: Flood plains

Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 8 inches: silty clay loam
H2 - 8 to 15 inches: silty clay loam
H3 - 15 to 23 inches: sandy loam
H4 - 23 to 60 inches: silt loam

Properties and qualities

Slope: 1 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 20 percent
Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Hydrologic Soil Group: C
Ecological site: Desert Loam (Creosotebush) (R030XY110UT)
Hydric soil rating: No

Minor Components

Hantz

Percent of map unit: 4 percent

St george

Percent of map unit: 4 percent

Leeds

Percent of map unit: 4 percent

Tobler

Percent of map unit: 3 percent

NLE—Nikey sandy loam, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: j8fw
Elevation: 2,650 to 3,350 feet
Mean annual precipitation: 8 to 11 inches

Mean annual air temperature: 59 to 62 degrees F
Frost-free period: 180 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Nikey and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nikey

Setting

Landform: Alluvial fans
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Gravelly alluvium derived from limestone, sandstone, and shale

Typical profile

H1 - 0 to 3 inches: sandy loam
H2 - 3 to 26 inches: fine sandy loam
H3 - 26 to 38 inches: very gravelly loam
H4 - 38 to 46 inches: very gravelly loam
H5 - 46 to 60 inches: very gravelly loam

Properties and qualities

Slope: 3 to 15 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Gypsum, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 6.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: Desert Loam (Creosotebush) (R030XY110UT)
Hydric soil rating: No

Minor Components

Harrisburg

Percent of map unit: 5 percent

Isom

Percent of map unit: 5 percent

Nikey

Percent of map unit: 5 percent

PnC—Pintura loamy fine sand, 1 to 5 percent slopes

Map Unit Setting

National map unit symbol: j8g9
Elevation: 2,600 to 3,600 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 190 to 195 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Pintura and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pintura

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Eolian sands derived from sandstone

Typical profile

H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 65 inches: fine sand

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Desert Sand (Indian ricegrass) (R030XY120UT)
Hydric soil rating: No

Minor Components

Toquerville
Percent of map unit: 4 percent

Harrisburg
Percent of map unit: 4 percent

Tobler
Percent of map unit: 4 percent

Ivins
Percent of map unit: 3 percent

PoD—Pintura loamy fine sand, hummocky, 1 to 10 percent slopes

Map Unit Setting
National map unit symbol: j8gb
Elevation: 2,600 to 3,600 feet
Mean annual precipitation: 7 to 8 inches
Mean annual air temperature: 57 to 67 degrees F
Frost-free period: 190 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition
Pintura and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pintura

Setting
Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Hummocky eolian sands derived from sandstone

Typical profile
H1 - 0 to 3 inches: loamy fine sand
H2 - 3 to 65 inches: fine sand

Properties and qualities
Slope: 1 to 10 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): 3s
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Ecological site: Desert Sand (Indian ricegrass) (R030XY120UT)
Hydric soil rating: No

Minor Components

Dune land

Percent of map unit: 5 percent

Pintura

Percent of map unit: 5 percent

Toquerville

Percent of map unit: 5 percent

RE—Renbac-Rock land association

Map Unit Setting

National map unit symbol: j8gd
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 190 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Renbac and similar soils: 60 percent
Rock land: 25 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Renbac

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Material weathered from sandstone, conglomerate, and shale

Typical profile

H1 - 0 to 2 inches: channery clay loam
H2 - 2 to 5 inches: very channery clay
H3 - 5 to 9 inches: very channery clay

H4 - 9 to 12 inches: very flaggy sandy loam
H5 - 12 to 16 inches: unweathered bedrock

Properties and qualities

Slope: 2 to 30 percent
Depth to restrictive feature: 8 to 17 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 25 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Semidesert Shallow Hardpan (Blackbrush) (R030XY230UT)
Hydric soil rating: No

Minor Components

Hobog

Percent of map unit: 5 percent

RO—Rock land

Map Unit Composition

Rock land: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rock Land

Setting

Landform: Mountain slopes
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex

Minor Components

Shallow soils

Percent of map unit: 20 percent

Tc—Tobler fine sandy loam

Map Unit Setting

National map unit symbol: j8h2
Elevation: 2,500 to 3,500 feet
Mean annual precipitation: 10 to 13 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 160 to 170 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Tobler and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tobler

Setting

Landform: Alluvial fans, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave, convex
Across-slope shape: Convex
Parent material: Alluvium derived from sandstone and shale

Typical profile

H1 - 0 to 4 inches: fine sandy loam
H2 - 4 to 13 inches: fine sandy loam
H3 - 13 to 38 inches: fine sandy loam
H4 - 38 to 60 inches: fine sandy loam

Properties and qualities

Slope: 1 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: Desert Loam (Creosotebush) (R030XY110UT)
Hydric soil rating: No

Minor Components

Harrisburg
Percent of map unit: 4 percent

Ivins
Percent of map unit: 4 percent

Pintura
Percent of map unit: 4 percent

Junction
Percent of map unit: 3 percent

Td—Tobler silty clay loam

Map Unit Setting
National map unit symbol: j8h3
Elevation: 2,500 to 3,500 feet
Mean annual precipitation: 10 to 13 inches
Mean annual air temperature: 48 to 57 degrees F
Frost-free period: 160 to 170 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition
Tobler and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Tobler

Setting
Landform: Flood plains, valleys
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear, concave
Parent material: Alluvium derived from sandstone and shale

Typical profile
H1 - 0 to 10 inches: silty clay loam
H2 - 10 to 13 inches: fine sandy loam
H3 - 13 to 38 inches: fine sandy loam
H4 - 38 to 60 inches: fine sandy loam

Properties and qualities
Slope: 1 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 10 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water storage in profile: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: Desert Loam (Creosotebush) (R030XY110UT)
Hydric soil rating: No

Minor Components

Tobler

Percent of map unit: 3 percent

Leeds

Percent of map unit: 3 percent

Leeds

Percent of map unit: 2 percent

Leeds

Percent of map unit: 2 percent

W—Water

Map Unit Composition

Water: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

WBD—Winkel gravelly fine sandy loam, 1 to 8 percent slopes

Map Unit Setting

National map unit symbol: j8h9
Elevation: 2,800 to 4,000 feet
Mean annual precipitation: 8 to 11 inches
Mean annual air temperature: 57 to 61 degrees F
Frost-free period: 190 to 195 days
Farmland classification: Not prime farmland

Map Unit Composition

Winkel and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Winkel

Setting

Landform: Mesas
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Calcareous material weathered from basalt, limestone, and wind-deposited sand.

Typical profile

H1 - 0 to 1 inches: gravelly fine sandy loam
H2 - 1 to 6 inches: gravelly fine sandy loam
H3 - 6 to 12 inches: very gravelly fine sandy loam
H4 - 12 to 16 inches: extremely cobbly fine sandy loam
H5 - 16 to 20 inches: indurated
H6 - 20 to 24 inches: unweathered bedrock

Properties and qualities

Slope: 1 to 8 percent
Depth to restrictive feature: 11 to 19 inches to petrocalcic; 14 to 24 inches to lithic bedrock
Natural drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately high (0.00 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 30 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 5.0
Available water storage in profile: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: D
Ecological site: Desert Shallow Loam (Creosotebush) (R030XY134UT)
Hydric soil rating: No

Minor Components

Lava flows

Percent of map unit: 5 percent

Harrisburg

Percent of map unit: 5 percent

Bermesa

Percent of map unit: 5 percent

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group (The Lakes)

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

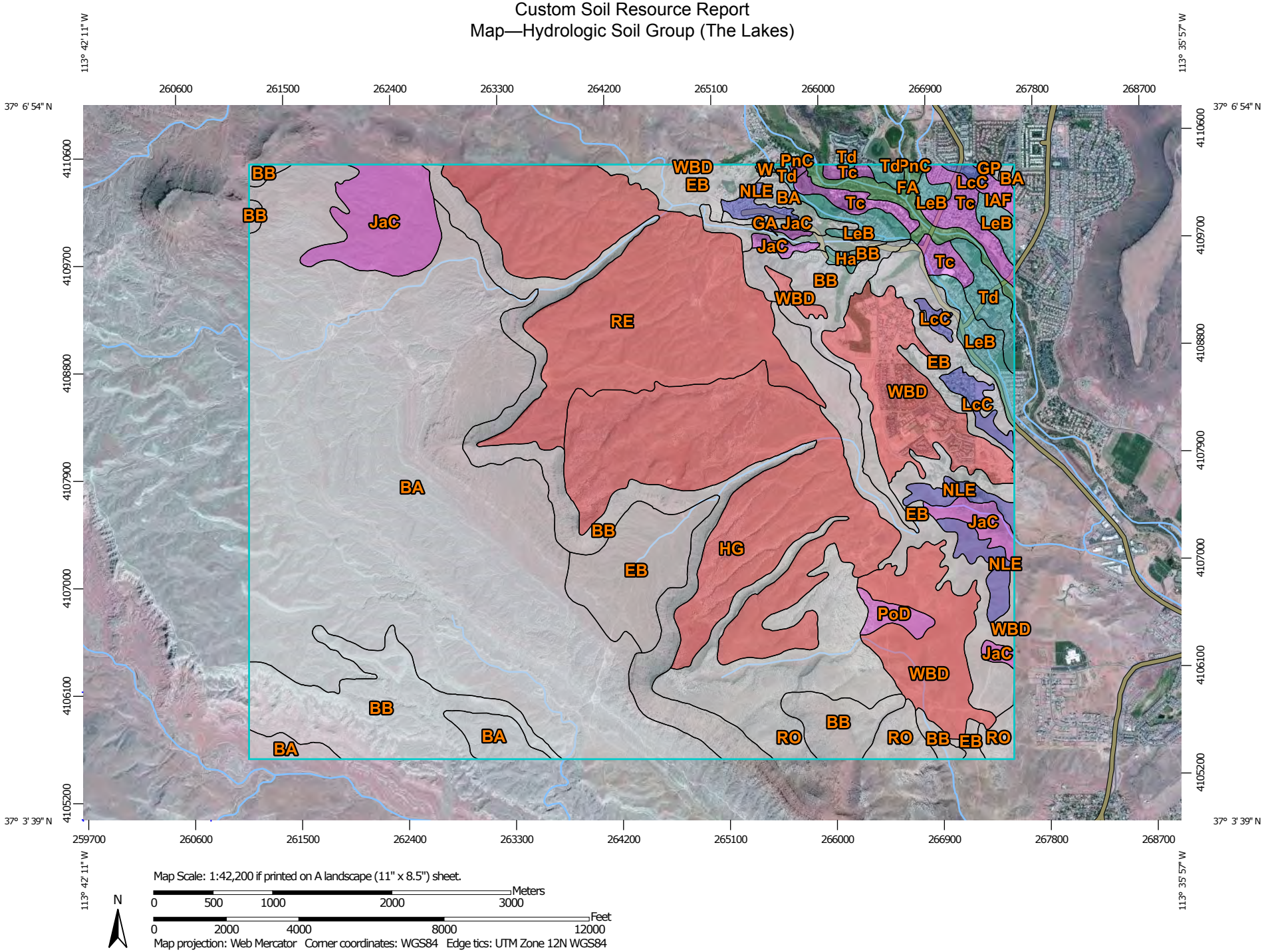
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Custom Soil Resource Report
Map—Hydrologic Soil Group (The Lakes)



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Washington County Area, Utah
Survey Area Data: Version 9, Sep 23, 2015

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Aug 11, 2010—Nov 3, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group (The Lakes)

Hydrologic Soil Group— Summary by Map Unit — Washington County Area, Utah (UT641)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
BA	Badland		2,583.6	32.5%
BB	Badland, very steep		1,031.7	13.0%
EB	Eroded land-Shalet complex, warm		727.4	9.1%
FA	Fluvaquents and torrifluvents, sandy	A/D	63.4	0.8%
GA	Gullied land		35.1	0.4%
GP	Gravel pits		4.1	0.1%
Ha	Hantz silty clay loam	C	9.7	0.1%
HG	Hobog-Rock land association	D	870.7	10.9%
IAF	Isom cobbly sandy loam, 3 to 30 percent slopes	A	15.6	0.2%
JaC	Junction fine sandy loam, 2 to 5 percent slopes	A	250.5	3.1%
LcC	Laverkin fine sandy loam, 2 to 5 percent slopes	B	49.5	0.6%
LeB	Leeds silty clay loam, 1 to 2 percent slopes	C	142.6	1.8%
NLE	Nikey sandy loam, 3 to 15 percent slopes	B	100.1	1.3%
PnC	Pintura loamy fine sand, 1 to 5 percent slopes	A	3.1	0.0%
PoD	Pintura loamy fine sand, hummocky, 1 to 10 percent slopes	A	30.4	0.4%
RE	Renbac-Rock land association	D	893.1	11.2%
RO	Rock land		431.7	5.4%
Tc	Tobler fine sandy loam	A	129.0	1.6%
Td	Tobler silty clay loam	C	71.5	0.9%
W	Water		2.7	0.0%
WBD	Winkel gravelly fine sandy loam, 1 to 8 percent slopes	D	507.9	6.4%
Totals for Area of Interest			**7,953.3**	**100.0%**

Rating Options—Hydrologic Soil Group (The Lakes)

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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ROSENBERG ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS

PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: Drainage Study Hydrology Information CHKD: RMA DATE: 30-Aug-16

EXISTING PRE-DEVELOPMENT CONDITION

Hydraulic Element		Area			Hydraulic Properties	
(label)	*(notes)*	*(sq ft)*	*(acre)*	*(sq mi)*	*Lo (ft)*	*S (%)*
X1	Subarea X - Offiste	625,298	14.35	0.02243	1,480	9.00
X2	Subarea X - Onsite to Plantations	908,340	20.85	0.03258	1,205	8.00
Y1	Subarea Y - Offsite	1,925,866	44.21	0.06908	3,500	9.00
Y2	Subarea Y - Onsite to Sentieri	400,265	9.19	0.01436	802	8.00
A1	Subarea A - Offiste	3,962,682	90.97	0.14214	3,779	7.00
A2	Subarea A - Onsite to Sentieri	2,138,492	49.09	0.07671	2,951	7.00
A3	Subarea A - Onsite to Plantations	1,627,354	37.36	0.05837	1,870	4.45
B1	Subarea B - Offsite	476,820	10.95	0.01710	450	7.80
B2	Subarea B - Onsite to Lago Vista	1,670,183	38.34	0.05991	1,495	7.80
B3	Subarea B - Onsite to Plantations	2,149,110	49.34	0.07709	1,943	5.60
B4	Subarea B - Offsite to Plantations	528,071	12.12	0.01894	1,880	2.00
C1	Subarea C - Offsite	465,481	10.69	0.01670	878	11.67
C2	Subarea C - Onsite to Lago Vista	1,748,993	40.15	0.06274	1,190	6.72
C3	Subarea C - Onsite to Alienta	4,733,374	108.66	0.16979	4,503	2.67
C4	Subarea C - Offsite to Plantations	435,932	10.01	0.01564	1,504	2.00
C5	Subarea C - Offsite to Plantations	979,960	22.50	0.03515	2,040	3.00
D1	Sunarea D - Offsite	16,555,867	380.07	0.59386	4,694	7.48
D2	Subarea D - Onsite to Lago Vista	4,179,275	95.94	0.14991	3,297	7.80
E1	Subarea E - Offsite (Gap Wash)	36,853,282	846.03	1.32193	14,986	2.25
E2	Subarea E - Onsite (Gap Wash) to Lago Vista	894,958	20.55	0.03210	1,303	4.27
E3	Subarea E - Onsite (Gap Wash) to Plantations	3,288,611	75.50	0.11796	3,501	4.47
E4	Subarea E - Onsite (Gap Wash) to Plantations	2,126,723	48.82	0.07629	2,949	9.50
F1	Subarea F - Offsite	1,869,681	42.92	0.06707	3,213	8.42
F2	Subarea F - Onsite to Lago Vista	991,181	22.75	0.03555	1,764	8.80
G1	Subarea G - Offsite	8,038,729	184.54	0.28835	7,531	9.56
G2	Subarea G - Onsite to Lago Vista	1,486,884	34.13	0.05333	561	3.56
H1	Subarea H - Offsite to Plantations	590,142	13.55	0.02117	1,924	4.20

ROSENBERG ASSOCIATES
CIVIL ENGINEERS • LAND SURVEYORS

PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: Drainage Study Hydrology Information CHKD: RMA DATE: 30-Aug-16

PROPOSED POST-DEVELOPMENT CONDITION

Hydraulic Element		Area			Hydraulic Properties	
(label)	*(notes)*	*(sq ft)*	*(acre)*	*(sq mi)*	*Lo (ft)*	*S (%)*
X1	Subarea X - Offiste	625,298	14.35	0.02243	1,480	9.00
X2	Subarea X - Onsite to Plantations	908,340	20.85	0.03258	1,205	8.00
Y1	Subarea Y - Offsite	1,925,866	44.21	0.06908	3,500	9.00
Y2	Subarea Y - Onsite to Sentieri	400,265	9.19	0.01436	802	8.00
A1	Subarea A - Offiste	3,962,682	90.97	0.14214	3,779	7.00
A2	Subarea A - Onsite to Sentieri	2,138,492	49.09	0.07671	2,951	7.00
A3	Subarea A - Onsite to Plantations	1,627,354	37.36	0.05837	1,870	4.45
B1	Subarea B - Offsite	476,820	10.95	0.01710	450	7.80
B2	Subarea B - Onsite to Lago Vista	1,670,183	38.34	0.05991	1,495	7.80
B3	Subarea B - Onsite to Plantations	2,149,110	49.34	0.07709	1,943	5.60
B4	Subarea B - Offsite to Plantations	528,071	12.12	0.01894	1,880	2.00
C1	Subarea C - Offsite	465,481	10.69	0.01670	878	11.67
C2	Subarea C - Onsite to Lago Vista	1,748,993	40.15	0.06274	1,190	6.72
C3	Subarea C - Onsite to Alienta	4,733,374	108.66	0.16979	4,503	2.67
C4	Subarea C - Offsite to Plantations	435,932	10.01	0.01564	1,504	2.00
C5	Subarea C - Offsite to Plantations	979,960	22.50	0.03515	2,040	3.00
D1	Sunarea D - Offsite	16,555,867	380.07	0.59386	4,694	7.48
D2	Subarea D - Onsite to Lago Vista	4,179,275	95.94	0.14991	3,297	7.80
E1	Subarea E - Offsite (Gap Wash)	36,853,282	846.03	1.32193	14,986	2.25
E2	Subarea E - Onsite (Gap Wash) to Lago Vista	894,958	20.55	0.03210	1,303	4.27
E3	Subarea E - Onsite (Gap Wash) to Plantations	3,288,611	75.50	0.11796	3,501	4.47
E4	Subarea E - Onsite (Gap Wash) to Plantations	2,126,723	48.82	0.07629	2,949	9.50
F1	Subarea F - Offsite	1,869,681	42.92	0.06707	3,213	8.42
F2	Subarea F - Onsite to Lago Vista	991,181	22.75	0.03555	1,764	8.80
G1	Subarea G - Offsite	8,038,729	184.54	0.28835	7,531	9.56
G2	Subarea G - Onsite to Lago Vista	1,486,884	34.13	0.05333	561	3.56
H1	Subarea H - Offsite to Plantations	590,142	13.55	0.02117	1,924	4.20

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PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: Hydraulic Links and Routing CHKD: RMA DATE: 30-Aug-16

JUNCTIONS FOR EXISTING PRE-DEVELOPMENT CONDITION

Hydraulic Element	
J-A	Collecting A1, A2
J-Y	Collecting Y1, Y2
J-AY	Collecting CulvertY, Culvert A, A3
J-B	Collecting B1, B2
J-B3	Collecting J-B, B3, B4
Box Canyon	Collecting J-AY, J-B3, X1, X2
J-C2	Collecting C1, C2
J-C5	Collecting C4, C5
J-C3	Collecting J-C2, J-C5
J-D2	Collecting D1, D2
J-CD	Collecting J-C3, J-D2
J-E2	Collecting E1, E2
J-F2	Collecting F1, F2
J-G2	Collecting G1, G2
J-E3	Collecting J-E2, J-F2, J-G2, E3, H1
Gap Wash	Collecting J-E3, E4

JUNCTIONS FOR PROPOSED POST-DEVELOPMENT CONDITION

Hydraulic Element	
J-A	Collecting A1, A2
J-Y	Collecting Y1, Y2
J-AY	Collecting CulvertY, Culvert A, A3
J-B	Collecting B1, B2
J-B3	Collecting J-B, B3, B4
Box Canyon	Collecting J-AY, J-B3, X1, X2
J-C2	Collecting C1, C2
J-C5	Collecting C4, C5
J-C3	Collecting J-C2, J-C5
J-D2	Collecting D1, D2
J-CD	Collecting J-C3, J-D2
J-E2	Collecting E1, E2
J-F2	Collecting F1, F2
J-G2	Collecting G1, G2
J-E3	Collecting J-E2, J-F2, J-G2, E3, H1
Gap Wash	Collecting J-E3, E4

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PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: Hydraulic Links and Routing CHKD: RMA DATE: 30-Aug-16

ROUTING CONDUITS

Hydraulic Element		Routed Length (ft)	Average Slope (%)	Manning's Roughness (n)	Culvert Diameter (in)	Bottom Width (ft)	Side Slopes (H:1V)
X to Box	Routing X1 to Box Canyon	855	2.9	0.023	N/A	N/A	6.50
Y1 to Y2	Routing Y1 to J-Y	549	3.1	0.023	N/A	N/A	6.50
Culvert Y	Routing J-Y to J-AY	900	4.5	0.023	N/A	N/A	6.50
A1 to A2	Routing A1 to J-A	2,951	7.0	0.023	N/A	N/A	6.50
Culvert A	Routing J-A to J-AY	100	5.0	0.010	48	N/A	N/A
A to Box	Routing J-AY to Box Canyon	855	2.9	0.023	N/A	N/A	6.50
B1 to B2	Routing B1 to J-B	1,495	7.8	0.023	N/A	N/A	6.50
B to B3	Routing J-B to J-B3	1,943	5.6	0.023	N/A	N/A	6.50
Culvert B	Routing J-B3 to Box Canyon	855	2.9	0.023	N/A	N/A	6.50
C to C2	Routing C1 to J-C2	1,189	6.7	0.023	N/A	N/A	6.50
C2 to C3	Routing J-C2 to J-C3	4,503	2.7	0.023	N/A	N/A	6.50
C4 to C5	Routing C4 to J-C5	2,043	2.0	0.023	N/A	N/A	6.50
C5 to C3	Routing J-C5 to J-C3	1,170	7.0	0.023	N/A	N/A	6.50
C to D	Routing J-C3 to J-CD	3,088	2.0	0.023	N/A	N/A	6.50
D1 to D2	Routing D1 to J-D2	2,390	7.8	0.023	N/A	N/A	6.50
D to E3	Routing J-D2 to J-CD	120	2.0	0.023	N/A	N/A	6.50
C to E3	Routing J-CD to J-E3	577	2.0	0.023	N/A	N/A	6.50
E1 to E2	Routing JE1 to J-E2	1,303	4.3	0.023	N/A	N/A	6.50
E2 to E3	Routing J-E2 to J-E3	3,501	2.0	0.023	N/A	N/A	6.50
F1 to F2	Routing F1 to J-F2	1,764	8.8	0.023	N/A	N/A	6.50
F to F3	Routing J-F2 to J-E3	2,651	2.0	0.023	N/A	N/A	6.50
G1 to G2	Routing G1 to J-G2	561	2.3	0.023	N/A	N/A	6.50
G to E3	Routing J-G2 to J-E3	883	2.0	0.023	N/A	N/A	6.50
E3 to E4	Routing J-E3 to Gap Wash	2,951	2.0	0.023	N/A	N/A	6.50

TYPICAL MANNING'S n VALUES

0.013 - Poly Pipe	0.023 - Dirt
0.017 - CM Pipe	0.026 - Grass
0.015 - Concrete	0.035 - Gravel
0.016 - Asphalt	0.040 - Riprap

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PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: NRCS Curve Number CHKD: RMA DATE: 30-Aug-16

NRCS CURVE NUMBER (CN) CHART

Land Use Description	SCS Curve Number (CN) Values							
	Group A		Group B		Group C		Group D	
	CN	%	CN	%	CN	%	CN	%
Cultivated Land								
Cultivated Land; Without Conservation Treatment	72		81		88		91	
Cultivated Land; With Conservation Treatment	62		71		78		81	
Pasture or Range Land								
Pasture or Range Land; Poor Condition	68		79		86		89	
Pasture or Range Land; Good Condition	39		61		74		80	
Open Spaces (Lawns, Parks, etc.)								
Open Space; Poor Condition; Grass Cover < 50%	68		79		86		89	
Open Space; Fair Condition; Grass Cover 50% to 75%	49		69		79		84	
Open Space; Good Condition; Grass Cover > 75%	39		61		74		80	
Impervious Areas								
Impervious Areas; Paved Parking Lots, Roofs, Driveways	98		98		98		98	
Impervious Areas; Streets and Roads; Paved; Curbs and Storm Sewers	98		98		98		98	
Impervious Areas; Streets and Roads; Paved; Open Ditches (w/ Right-of-Way)	83		89		92		93	
Impervious Areas; Streets and Roads; Gravel (w/ Right-of-Way)	76		85		89		91	
Impervious Areas; Streets and Roads; Dirt (w/ Right-of-Way)	72		82		87		89	
Urban Commercial and Industrial Districts								
Urban Districts; Commercial and Business; Average 85% Impervious	89		92		94		95	
Urban Districts; Industrial; Average 72% Impervious	81		88		91		93	
Residential Districts								
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77		85		90		92	
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	
Residential Districts; 1/3 Acre; Average 30% Impervious	57		72		81		86	
Residential Districts; 1/2 Acre; Average 25% Impervious	54		70		80		85	
Residential Districts; 1 Acre; Average 20% Impervious	51		68		79		84	
Residential Districts; 2 Acre; Average 12% Impervious	46		65		77		82	
Western Desert Urban Areas								
Natural Desert Vegetation (Pervious Areas Only)	63		77		85		88	
Artificial Desert Landscaping	96		96		96		96	
Developing Urban Area (No Vegetation)								
Newly Graded Area (Pervious Only)	77		86		91		94	

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PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: NRCS Curve Number CHKD: RMA DATE: 30-Aug-16

NRCS WEIGHTED AVERAGE CN VALUES **EXISTING PRE-DEVELOPMENT CONDITION**

Land Use Description	SCS Curve Number (CN) Values									
	Group A		Group B		Group C		Group D		Totals	
	CN	%	CN	%	CN	%	CN	%	CN	%
X1, X2, Y1, Y2, A1, A2, A3, B1, B2, C1, C2, D1, D2, E1, E2, F1, F2, G1, G2, H1									93	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	50	49	50
Natural Desert Vegetation	63		77		85		88	50	44	50
B3, B4, C3, C4, C5 E3									88	100
Natural Desert Vegetation	63		77		85		88	100	88	100
E4									79	100
Natural Desert Vegetation	63	20	77	35	85		88	45	79.2	100

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PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: NRCS Curve Number CHKD: RMA DATE: 30-Aug-16

NRCS WEIGHTED AVERAGE CN VALUES **PROPOSED POST-DEVELOPMENT CONDITION**

Land Use Description	SCS Curve Number (CN) Values									
	Group A		Group B		Group C		Group D		Totals	
	CN	%	CN	%	CN	%	CN	%	CN	%
X1, Y1, A1,B1, C1, D1, E1 F1, G1, H1									93	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	50	49	50
Natural Desert Vegetation	63		77		85		88	50	44	50
X2, Y2									89	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	13	12	13
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	75	65	75
Natural Desert Vegetation	63		77		85		88	12.5	11	12.5
A2									90	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	10	10	10
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77		85		90		92	35	32	35
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	45	39	45
Natural Desert Vegetation	63		77		85		88	10	8.8	10
A3									91	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	13	12	13
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	40	35	40
Urban Districts; Commercial and Business; Average 85% Impervious	89		92		94		95	35	33.3	35
Natural Desert Vegetation	63		77		85		88	12.5	11	12.5
B2									92	100
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77		85		90		92	100	92	100
B3									88	100
Urban Districts; Commercial and Business; Average 85% Impervious	89		92		94		95	15	14.3	15
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	55	48	55
Open Space; Good Condition; Grass Cover > 75%	39		61		74		80	10	8	10
Natural Desert Vegetation	63		77		85		88	20	17.6	20
B4, C4. C5									87	100
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	100	87	100
C2									94	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	10	10	10
Urban Districts; Commercial and Business; Average 85% Impervious	89		92		94		95	45	42.8	45
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77		85		90		92	45	41	45
C3									91	100
Natural Desert Vegetation (NaC Naplene Silt Loam)	63		77		85		88	32	28	32
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77		85		90		92	68	63	68

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PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: NRCS Curve Number CHKD: RMA DATE: 30-Aug-16

Land Use Description	SCS Curve Number (CN) Values									
	Group A		Group B		Group C		Group D		Totals	
	CN	%	CN	%	CN	%	CN	%	CN	%
D2									91	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	30	29	30
Urban Districts; Commercial and Business; Average 85% Impervious	89		92		94		95	10	9.5	10
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	60	52	60
E2									92	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	45	44	45
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	55	48	55
E3									87	100
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77		85		90		92	32	29	32
Open Space; Good Condition; Grass Cover > 75%	39		61		74		80	31	25	31
Natural Desert Vegetation (NaC Naplene Silt Loam)	63		77		85		88	37	32.6	37
E4									84	100
Residential Districts; 1/8 Acre (Town Houses); Average 65% Impervious	77	5	85	35	90		92	45	75	85
Natural Desert Vegetation (NaC Naplene Silt Loam)	63	15	77		85		88		9.45	15
F2									90	100
Natural Desert Vegetation (RO Rock Outcropping, mostly impervious)	98		98		98		98	29	28	29
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	71	62	71
G2									87	100
Residential Districts; 1/4 Acre; Average 38% Impervious	61		75		83		87	100	87	100

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PROJECT NO. 1286-14-014

PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: SCS Lag Time CHKD: RMA DATE: 30-Aug-16

TIME OF CONCENTRATION

$$t_c = \frac{1.67\, L_O^{\,0.8} \left(\frac{1000}{CN} - 9 \right)^{0.7}}{1900 \sqrt{S_{percent}}}$$

Where: CN = SCS runoff curve number
S = Average slope in percent
Lo = Length in ft

SCS LAG TIME

13.46 SCS Lag = 0.6*t_c

EXISTING PRE-DEVELOPMENT CONDITION

Hydrologic Element	SCS CN	Longest Length Lo (ft)	Average Slope S (%)	t_c (hr)	Lag Time (hr)	Lag Time (min)
X1	93	1,480	9.00	0.149	0.089	5.37
X2	93	1,205	8.00	0.134	0.081	4.83
Y1	93	3,500	9.00	0.297	0.178	10.69
Y2	93	802	8.00	0.097	0.058	3.49
A1	93	3,779	7.00	0.358	0.215	12.89
A2	93	2,951	7.00	0.294	0.176	10.58
A3	93	1,870	4.45	0.256	0.153	9.21
B1	93	450	7.80	0.062	0.037	2.23
B2	93	1,495	7.80	0.162	0.097	5.81
B3	88	1,943	5.60	0.290	0.174	10.43
B4	88	1,880	2.00	0.472	0.283	17.01
C1	93	878	11.67	0.086	0.052	3.11
C2	93	1,190	6.72	0.145	0.087	5.22
C3	88	4,503	2.67	0.822	0.493	29.60
C4	88	1,504	2.00	0.395	0.237	14.23
C5	88	2,040	3.00	0.412	0.247	14.82
D1	93	4,694	7.48	0.412	0.247	14.83
D2	93	3,297	7.80	0.304	0.182	10.95
E1	93	14,986	2.25	1.901	1.141	68.44
E2	93	1,303	4.27	0.196	0.117	7.04
E3	88	3,501	4.47	0.520	0.312	18.71
E4	79	2,949	9.50	0.420	0.252	15.12
F1	93	3,213	8.42	0.287	0.172	10.32
F2	93	1,764	8.80	0.174	0.104	6.25
G1	93	7,531	9.56	0.532	0.319	19.15
G2	93	561	3.56	0.109	0.065	3.93
H1	93	1,924	4.20	0.269	0.162	9.70

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PROJECT NO. 1286-14-014

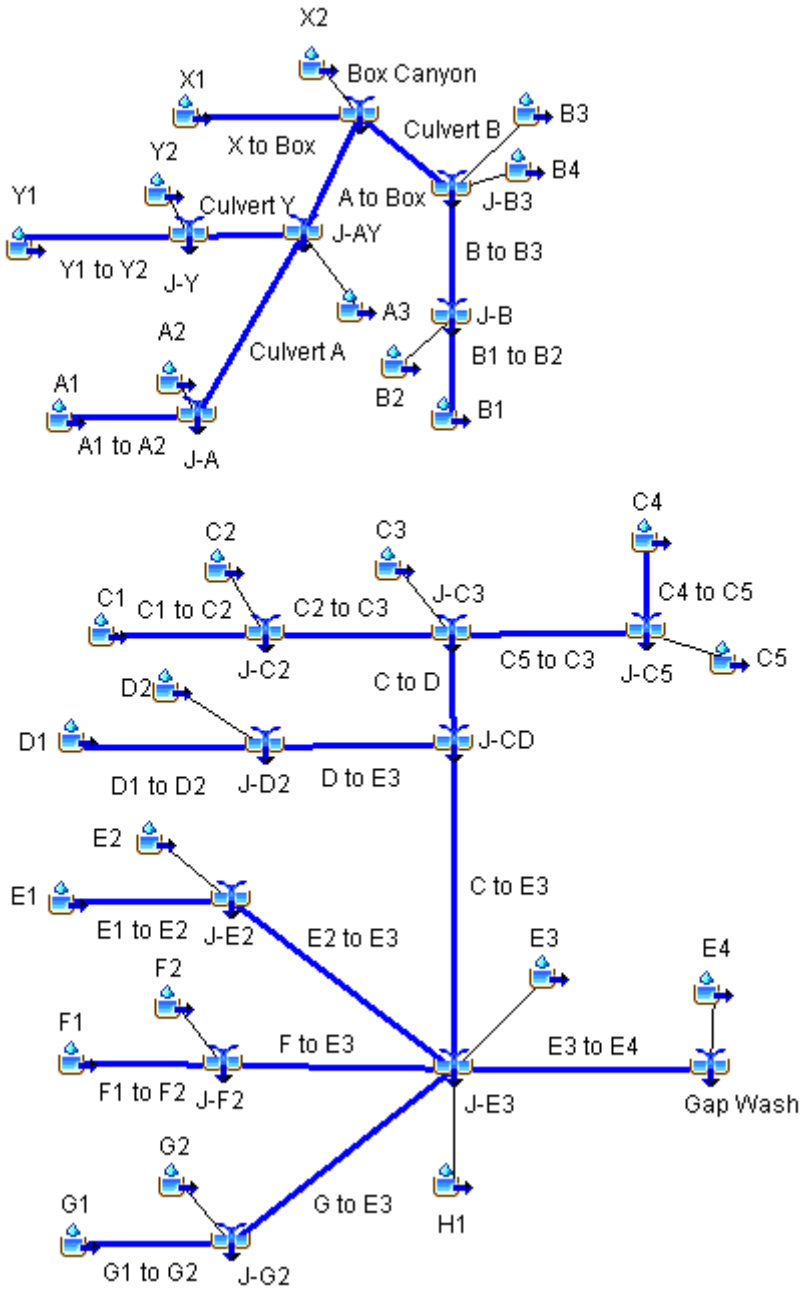
PROJECT: The Lakes - Master Plan BY: JLW DATE: 30-Aug-16

SUBJECT: SCS Lag Time CHKD: RMA DATE: 30-Aug-16

PROPOSED POST-DEVELOPMENT CONDITION

Hydrologic Element	SCS CN	Longest Length Lo (ft)	Average Slope S (%)	t_c (hr)	Lag Time (hr)	Lag Time (min)
X1	93	1,480	9.00	0.149	0.089	5.37
X2	89	1,205	8.00	0.162	0.097	5.84
Y1	93	3,500	9.00	0.297	0.178	10.69
Y2	89	802	8.00	0.117	0.070	4.22
A1	93	3,779	7.00	0.358	0.215	12.89
A2	90	2,951	7.00	0.335	0.201	12.07
A3	91	1,870	4.45	0.276	0.166	9.93
B1	93	450	7.80	0.062	0.037	2.23
B2	92	1,495	7.80	0.169	0.101	6.08
B3	88	1,943	5.60	0.293	0.176	10.55
B4	87	1,880	2.00	0.490	0.294	17.66
C1	93	878	11.67	0.086	0.052	3.11
C2	94	1,190	6.72	0.139	0.083	4.99
C3	91	4,503	2.67	0.737	0.442	26.55
C4	87	1,504	2.00	0.410	0.246	14.77
C5	87	2,040	3.00	0.428	0.257	15.39
D1	93	4,694	7.48	0.412	0.247	14.83
D2	91	3,297	7.80	0.331	0.198	11.91
E1	93	14,986	2.25	1.901	1.141	68.44
E2	92	1,303	4.27	0.205	0.123	7.38
E3	87	3,501	4.47	0.544	0.326	19.57
E4	84	2,949	9.50	0.353	0.212	12.72
F1	93	3,213	8.42	0.287	0.172	10.32
F2	90	1,764	8.80	0.196	0.118	7.06
G1	93	7,531	9.56	0.532	0.319	19.15
G2	87	561	3.56	0.140	0.084	5.03
H1	93	1,924	4.20	0.269	0.162	9.70

HEC-HMS Model



Project: The Lakes Master Simulation Run: N Pre 10 3hr

Start of Run: 01Jan2000, 12:00 Basin Model: Pre
End of Run: 01Jan2000, 20:00 Meteorologic Model: 10-3
Compute Time: 30Aug2016, 13:54:22 Control Specifications: 10-3

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	148.6	01Jan2000, 13:00	0.45
A1	0.14214	59.6	01Jan2000, 12:55	0.45
A1 to A2	0.14214	59.4	01Jan2000, 13:00	0.45
A2	0.07671	35.5	01Jan2000, 12:55	0.45
A3	0.05837	27.7	01Jan2000, 12:55	0.45
Box Canyon	0.58871	223.2	01Jan2000, 12:55	0.41
B to B3	0.07701	40.7	01Jan2000, 12:50	0.45
B1	0.01710	10.5	01Jan2000, 12:45	0.45
B1 to B2	0.01710	9.9	01Jan2000, 12:50	0.45
B2	0.05991	32.5	01Jan2000, 12:50	0.45
B3	0.07709	18.1	01Jan2000, 12:55	0.25
B4	0.01894	0.0	01Jan2000, 12:00	0.00
Culvert A	0.21885	91.0	01Jan2000, 13:00	0.45
Culvert B	0.17304	56.5	01Jan2000, 12:55	0.31
Culvert Y	0.08344	35.4	01Jan2000, 12:55	0.45
C to D	0.30002	0.0	01Jan2000, 12:00	0.00
C to E3	1.04382	0.0	01Jan2000, 12:00	0.00
C1	0.01670	0.0	01Jan2000, 12:00	0.00
C1 to C2	0.01670	0.0	01Jan2000, 12:00	0.00
C2	0.06274	0.0	01Jan2000, 12:00	0.00
C2 to C3	0.07944	0.0	01Jan2000, 12:00	0.00
C3	0.16979	0.0	01Jan2000, 12:00	0.00
C4	0.01564	0.0	01Jan2000, 12:00	0.00
C4 to C5	0.01564	0.0	01Jan2000, 12:00	0.00
C5	0.03515	0.0	01Jan2000, 12:00	0.00
C5 to C3	0.05079	0.0	01Jan2000, 12:00	0.00
D1	0.59389	0.0	01Jan2000, 12:00	0.00

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1 to D2	0.59389	0.0	01Jan2000, 12:00	0.00
D2	0.14991	0.0	01Jan2000, 12:00	0.00
D2 to C3	0.74380	0.0	01Jan2000, 12:00	0.00
E1	1.32193	0.0	01Jan2000, 12:00	0.00
E1 to E2	1.32193	0.0	01Jan2000, 12:00	0.00
E2	0.03210	0.0	01Jan2000, 12:00	0.00
E2 to E3	1.35403	0.0	01Jan2000, 12:00	0.00
E3	0.11796	0.0	01Jan2000, 12:00	0.00
E3 to E4	3.02244	0.0	01Jan2000, 12:00	0.00
E4	0.07629	0.0	01Jan2000, 12:00	0.00
F to E3	0.14378	0.0	01Jan2000, 12:00	0.00
F1	0.06707	0.0	01Jan2000, 12:00	0.00
F1 to F2	0.06707	0.0	01Jan2000, 12:00	0.00
F2	0.07671	0.0	01Jan2000, 12:00	0.00
Gap Wash	3.02244	0.0	01Jan2000, 12:00	0.00
G to E3	0.34168	0.0	01Jan2000, 12:00	0.00
G1	0.28835	0.0	01Jan2000, 12:00	0.00
G1 to G2	0.28835	0.0	01Jan2000, 12:00	0.00
G2	0.05333	0.0	01Jan2000, 12:00	0.00
H1	0.02117	0.0	01Jan2000, 12:00	0.00
J-A	0.21885	91.0	01Jan2000, 13:00	0.45
J-AY	0.36066	149.0	01Jan2000, 12:55	0.45
J-B	0.07701	42.4	01Jan2000, 12:50	0.45
J-B3	0.17304	57.2	01Jan2000, 12:55	0.31
J-CD	1.04382	0.0	01Jan2000, 12:00	0.00
J-C2	0.07944	0.0	01Jan2000, 12:00	0.00
J-C3	0.30002	0.0	01Jan2000, 12:00	0.00
J-C5	0.05079	0.0	01Jan2000, 12:00	0.00
J-D2	0.74380	0.0	01Jan2000, 12:00	0.00
J-E2	1.35403	0.0	01Jan2000, 12:00	0.00
J-E4	3.09873	0.0	01Jan2000, 12:00	0.00

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	0.0	01Jan2000, 12:00	0.00
J-G2	0.34168	0.0	01Jan2000, 12:00	0.00
J-Y	0.08344	36.3	01Jan2000, 12:55	0.45
X to Box	0.02243	12.0	01Jan2000, 12:50	0.45
X1	0.02243	12.3	01Jan2000, 12:50	0.45
X2	0.03258	18.0	01Jan2000, 12:50	0.45
Y1	0.06908	31.9	01Jan2000, 12:55	0.45
Y1 to Y2	0.06908	30.9	01Jan2000, 12:55	0.45
Y2	0.01436	8.4	01Jan2000, 12:45	0.45

Project: The Lakes Master Simulation Run: N Pre 10 24hr

Start of Run: 01Jan2000, 12:00 Basin Model: Pre
End of Run: 03Jan2000, 00:30 Meteorologic Model: 10-24hr
Compute Time: 30Aug2016, 13:54:14 Control Specifications: 24-Hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	141.2	02Jan2000, 00:00	1.03
A1	0.14214	61.6	02Jan2000, 00:00	1.03
A1 to A2	0.14214	54.7	02Jan2000, 00:00	1.03
A2	0.07671	33.2	02Jan2000, 00:00	1.03
A3	0.05837	25.3	02Jan2000, 00:00	1.03
Box Canyon	0.58871	218.4	02Jan2000, 00:00	0.98
B to B3	0.07701	29.7	02Jan2000, 00:00	1.03
B1	0.01710	7.4	02Jan2000, 00:00	1.03
B1 to B2	0.01710	6.7	02Jan2000, 00:00	1.03
B2	0.05991	26.0	02Jan2000, 00:00	1.03
B3	0.07709	22.0	02Jan2000, 00:00	0.71
B4	0.01894	5.1	02Jan2000, 00:00	0.71
Culvert A	0.21885	87.8	02Jan2000, 00:00	1.03
Culvert B	0.17304	54.1	02Jan2000, 00:00	0.86
Culvert Y	0.08344	33.3	02Jan2000, 00:00	1.03
C to D	0.30002	65.9	02Jan2000, 00:30	0.80
C to E3	1.04382	350.4	02Jan2000, 00:00	0.97
C1	0.01670	7.2	02Jan2000, 00:00	1.03
C1 to C2	0.01670	6.7	02Jan2000, 00:00	1.03
C2	0.06274	27.2	02Jan2000, 00:00	1.03
C2 to C3	0.07944	23.6	02Jan2000, 00:00	1.03
C3	0.16979	34.1	02Jan2000, 00:30	0.71
C4	0.01564	4.5	02Jan2000, 00:00	0.71
C4 to C5	0.01564	3.3	02Jan2000, 00:00	0.72
C5	0.03515	10.0	02Jan2000, 00:00	0.71
C5 to C3	0.05079	12.4	02Jan2000, 00:00	0.72
D1	0.59389	257.3	02Jan2000, 00:00	1.03

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1 to D2	0.59389	241.9	02Jan2000, 00:00	1.03
D2	0.14991	65.0	02Jan2000, 00:00	1.03
D2 to C3	0.74380	305.4	02Jan2000, 00:00	1.03
E1	1.32193	266.6	02Jan2000, 01:00	1.03
E1 to E2	1.32193	264.1	02Jan2000, 01:00	1.03
E2	0.03210	13.9	02Jan2000, 00:00	1.03
E2 to E3	1.35403	258.5	02Jan2000, 01:00	1.03
E3	0.11796	29.7	02Jan2000, 00:00	0.71
E3 to E4	3.02244	596.6	02Jan2000, 00:30	1.00
E4	0.07629	7.5	02Jan2000, 00:00	0.35
F to E3	0.14378	50.3	02Jan2000, 00:00	1.03
F1	0.06707	29.1	02Jan2000, 00:00	1.03
F1 to F2	0.06707	26.9	02Jan2000, 00:00	1.03
F2	0.07671	33.2	02Jan2000, 00:00	1.03
Gap Wash	3.02244	644.2	02Jan2000, 00:00	0.99
G to E3	0.34168	124.3	02Jan2000, 00:00	1.03
G1	0.28835	109.3	02Jan2000, 00:00	1.03
G1 to G2	0.28835	106.8	02Jan2000, 00:00	1.03
G2	0.05333	23.1	02Jan2000, 00:00	1.03
H1	0.02117	9.2	02Jan2000, 00:00	1.03
J-A	0.21885	88.0	02Jan2000, 00:00	1.03
J-AY	0.36066	146.4	02Jan2000, 00:00	1.03
J-B	0.07701	32.7	02Jan2000, 00:00	1.03
J-B3	0.17304	56.7	02Jan2000, 00:00	0.86
J-CD	1.04382	358.2	02Jan2000, 00:00	0.96
J-C2	0.07944	33.9	02Jan2000, 00:00	1.03
J-C3	0.30002	66.6	02Jan2000, 00:30	0.80
J-C5	0.05079	13.3	02Jan2000, 00:00	0.72
J-D2	0.74380	306.9	02Jan2000, 00:00	1.03
J-E2	1.35403	267.1	02Jan2000, 01:00	1.03
J-E4	3.09873	602.2	02Jan2000, 00:30	0.98

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	60.2	02Jan2000, 00:00	1.03
J-G2	0.34168	129.9	02Jan2000, 00:00	1.03
J-Y	0.08344	34.9	02Jan2000, 00:00	1.03
X to Box	0.02243	9.0	02Jan2000, 00:00	1.03
X1	0.02243	9.7	02Jan2000, 00:00	1.03
X2	0.03258	14.1	02Jan2000, 00:00	1.03
Y1	0.06908	29.9	02Jan2000, 00:00	1.03
Y1 to Y2	0.06908	28.7	02Jan2000, 00:00	1.03
Y2	0.01436	6.2	02Jan2000, 00:00	1.03

Project: The Lakes Master Simulation Run: N Pre 100 3hr

Start of Run: 01Jan2000, 12:00 Basin Model: Pre
End of Run: 01Jan2000, 18:30 Meteorologic Model: 100-3
Compute Time: 30Aug2016, 13:54:38 Control Specifications: 100-3

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	344.2	01Jan2000, 12:55	0.99
A1	0.14214	139.2	01Jan2000, 12:55	0.99
A1 to A2	0.14214	135.5	01Jan2000, 13:00	0.99
A2	0.07671	80.3	01Jan2000, 12:55	0.99
A3	0.05837	64.4	01Jan2000, 12:50	0.99
Box Canyon	0.58871	541.9	01Jan2000, 12:55	0.94
B to B3	0.07701	94.8	01Jan2000, 12:50	0.99
B1	0.01710	23.5	01Jan2000, 12:40	0.99
B1 to B2	0.01710	23.4	01Jan2000, 12:45	0.99
B2	0.05991	73.1	01Jan2000, 12:45	0.99
B3	0.07709	53.9	01Jan2000, 12:55	0.68
B4	0.01894	10.6	01Jan2000, 13:05	0.68
Culvert A	0.21885	208.0	01Jan2000, 12:55	0.99
Culvert B	0.17304	145.8	01Jan2000, 12:55	0.82
Culvert Y	0.08344	82.4	01Jan2000, 12:55	0.99
C to D	0.30002	152.5	01Jan2000, 13:05	0.76
C to E3	1.04382	815.0	01Jan2000, 13:00	0.93
C1	0.01670	22.7	01Jan2000, 12:45	0.99
C1 to C2	0.01670	22.1	01Jan2000, 12:45	0.99
C2	0.06274	79.6	01Jan2000, 12:45	0.99
C2 to C3	0.07944	98.2	01Jan2000, 12:55	0.98
C3	0.16979	71.3	01Jan2000, 13:20	0.68
C4	0.01564	9.6	01Jan2000, 13:00	0.68
C4 to C5	0.01564	9.4	01Jan2000, 13:05	0.69
C5	0.03515	21.3	01Jan2000, 13:00	0.68
C5 to C3	0.05079	29.4	01Jan2000, 13:05	0.69
D1	0.59389	540.9	01Jan2000, 13:00	0.99

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1 to D2	0.59389	537.5	01Jan2000, 13:00	0.99
D2	0.14991	156.1	01Jan2000, 12:55	0.99
D2 to C3	0.74380	671.7	01Jan2000, 13:00	0.99
E1	1.32193	456.4	01Jan2000, 14:00	0.99
E1 to E2	1.32193	456.3	01Jan2000, 14:00	0.99
E2	0.03210	38.3	01Jan2000, 12:50	0.99
E2 to E3	1.35403	456.8	01Jan2000, 14:05	0.99
E3	0.11796	63.8	01Jan2000, 13:05	0.68
E3 to E4	3.02244	1331.1	01Jan2000, 13:05	0.95
E4	0.07629	19.5	01Jan2000, 13:05	0.33
F to E3	0.14378	152.6	01Jan2000, 12:55	0.99
F1	0.06707	70.4	01Jan2000, 12:55	0.99
F1 to F2	0.06707	69.9	01Jan2000, 12:55	0.99
F2	0.07671	92.3	01Jan2000, 12:50	0.99
Gap Wash	3.02244	1353.9	01Jan2000, 13:00	0.96
G to E3	0.34168	255.8	01Jan2000, 13:05	0.99
G1	0.28835	232.1	01Jan2000, 13:05	0.99
G1 to G2	0.28835	231.6	01Jan2000, 13:05	0.99
G2	0.05333	71.5	01Jan2000, 12:45	0.99
H1	0.02117	22.7	01Jan2000, 12:50	0.99
J-A	0.21885	208.4	01Jan2000, 12:55	0.99
J-AY	0.36066	351.9	01Jan2000, 12:55	0.99
J-B	0.07701	96.5	01Jan2000, 12:45	0.99
J-B3	0.17304	148.6	01Jan2000, 12:50	0.82
J-CD	1.04382	821.0	01Jan2000, 13:00	0.92
J-C2	0.07944	101.7	01Jan2000, 12:45	0.99
J-C3	0.30002	153.6	01Jan2000, 13:00	0.76
J-C5	0.05079	29.6	01Jan2000, 13:00	0.68
J-D2	0.74380	672.3	01Jan2000, 13:00	0.99
J-E2	1.35403	457.9	01Jan2000, 14:00	0.99
J-E4	3.09873	1350.6	01Jan2000, 13:05	0.94

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	154.2	01Jan2000, 12:50	0.99
J-G2	0.34168	256.5	01Jan2000, 13:05	0.99
J-Y	0.08344	82.6	01Jan2000, 12:55	0.99
X to Box	0.02243	27.5	01Jan2000, 12:50	0.99
X1	0.02243	28.2	01Jan2000, 12:45	0.99
X2	0.03258	42.3	01Jan2000, 12:45	0.99
Y1	0.06908	72.2	01Jan2000, 12:55	0.99
Y1 to Y2	0.06908	71.6	01Jan2000, 12:55	0.99
Y2	0.01436	19.4	01Jan2000, 12:45	0.99

Project: The Lakes Master Simulation Run: N Pre 100 24hr

Start of Run: 01Jan2000, 12:00 Basin Model: Pre
End of Run: 03Jan2000, 00:30 Meteorologic Model: 100-24hr
Compute Time: 30Aug2016, 13:54:31 Control Specifications: 24-Hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	251.4	02Jan2000, 00:00	1.80
A1	0.14214	107.9	02Jan2000, 00:00	1.79
A1 to A2	0.14214	97.7	02Jan2000, 00:00	1.80
A2	0.07671	58.2	02Jan2000, 00:00	1.79
A3	0.05837	44.3	02Jan2000, 00:00	1.79
Box Canyon	0.58871	396.1	02Jan2000, 00:00	1.73
B to B3	0.07701	52.9	02Jan2000, 00:00	1.80
B1	0.01710	13.0	02Jan2000, 00:00	1.79
B1 to B2	0.01710	12.0	02Jan2000, 00:00	1.80
B2	0.05991	45.5	02Jan2000, 00:00	1.79
B3	0.07709	44.8	02Jan2000, 00:00	1.39
B4	0.01894	10.3	02Jan2000, 00:00	1.39
Culvert A	0.21885	155.7	02Jan2000, 00:00	1.80
Culvert B	0.17304	104.0	02Jan2000, 00:00	1.58
Culvert Y	0.08344	59.2	02Jan2000, 00:00	1.80
C to D	0.30002	124.8	02Jan2000, 00:30	1.51
C to E3	1.04382	637.6	02Jan2000, 00:00	1.71
C1	0.01670	12.7	02Jan2000, 00:00	1.79
C1 to C2	0.01670	11.8	02Jan2000, 00:00	1.80
C2	0.06274	47.6	02Jan2000, 00:00	1.79
C2 to C3	0.07944	44.4	02Jan2000, 00:00	1.80
C3	0.16979	68.0	02Jan2000, 00:30	1.39
C4	0.01564	9.1	02Jan2000, 00:00	1.39
C4 to C5	0.01564	7.2	02Jan2000, 00:00	1.40
C5	0.03515	20.4	02Jan2000, 00:00	1.39
C5 to C3	0.05079	26.2	02Jan2000, 00:00	1.40
D1	0.59389	451.0	02Jan2000, 00:00	1.79

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1 to D2	0.59389	428.0	02Jan2000, 00:00	1.80
D2	0.14991	113.8	02Jan2000, 00:00	1.79
D2 to C3	0.74380	539.6	02Jan2000, 00:00	1.79
E1	1.32193	466.2	02Jan2000, 01:00	1.79
E1 to E2	1.32193	462.8	02Jan2000, 01:00	1.79
E2	0.03210	24.4	02Jan2000, 00:00	1.79
E2 to E3	1.35403	455.8	02Jan2000, 01:00	1.79
E3	0.11796	60.9	02Jan2000, 00:00	1.39
E3 to E4	3.02244	1088.8	02Jan2000, 00:00	1.75
E4	0.07629	23.8	02Jan2000, 00:00	0.84
F to E3	0.14378	91.3	02Jan2000, 00:00	1.80
F1	0.06707	50.9	02Jan2000, 00:00	1.79
F1 to F2	0.06707	47.8	02Jan2000, 00:00	1.80
F2	0.07671	58.2	02Jan2000, 00:00	1.79
Gap Wash	3.02244	1182.9	02Jan2000, 00:00	1.75
G to E3	0.34168	220.4	02Jan2000, 00:00	1.79
G1	0.28835	192.0	02Jan2000, 00:00	1.79
G1 to G2	0.28835	188.3	02Jan2000, 00:00	1.79
G2	0.05333	40.5	02Jan2000, 00:00	1.79
H1	0.02117	16.1	02Jan2000, 00:00	1.79
J-A	0.21885	155.9	02Jan2000, 00:00	1.80
J-AY	0.36066	259.2	02Jan2000, 00:00	1.80
J-B	0.07701	57.5	02Jan2000, 00:00	1.79
J-B3	0.17304	108.1	02Jan2000, 00:00	1.57
J-CD	1.04382	649.6	02Jan2000, 00:00	1.71
J-C2	0.07944	59.5	02Jan2000, 00:00	1.79
J-C3	0.30002	125.6	02Jan2000, 00:00	1.50
J-C5	0.05079	27.7	02Jan2000, 00:00	1.39
J-D2	0.74380	541.8	02Jan2000, 00:00	1.79
J-E2	1.35403	467.8	02Jan2000, 01:00	1.79
J-E4	3.09873	1112.6	02Jan2000, 00:00	1.73

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	106.0	02Jan2000, 00:00	1.79
J-G2	0.34168	228.8	02Jan2000, 00:00	1.79
J-Y	0.08344	61.5	02Jan2000, 00:00	1.79
X to Box	0.02243	16.0	02Jan2000, 00:00	1.79
X1	0.02243	17.0	02Jan2000, 00:00	1.79
X2	0.03258	24.7	02Jan2000, 00:00	1.79
Y1	0.06908	52.5	02Jan2000, 00:00	1.79
Y1 to Y2	0.06908	50.6	02Jan2000, 00:00	1.79
Y2	0.01436	10.9	02Jan2000, 00:00	1.79

Project: The Lakes Master Simulation Run: Post 10-3

Start of Run: 01Jan2000, 12:00 Basin Model: Post
End of Run: 01Jan2000, 20:00 Meteorologic Model: 10-3
Compute Time: 30Aug2016, 13:54:54 Control Specifications: 10-3

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	132.3	01Jan2000, 13:00	0.40
A1	0.14214	59.6	01Jan2000, 12:55	0.45
A1 to A2	0.14214	59.4	01Jan2000, 13:00	0.45
A2	0.07671	22.3	01Jan2000, 13:00	0.32
A3	0.05837	21.3	01Jan2000, 12:55	0.36
Box Canyon	0.58871	199.4	01Jan2000, 13:00	0.37
B to B3	0.07701	35.9	01Jan2000, 12:50	0.41
B1	0.01710	10.5	01Jan2000, 12:45	0.45
B1 to B2	0.01710	9.9	01Jan2000, 12:50	0.45
B2	0.05991	28.5	01Jan2000, 12:50	0.40
B3	0.07709	18.0	01Jan2000, 12:55	0.25
B4	0.01894	3.1	01Jan2000, 13:05	0.22
Culvert A	0.21885	81.6	01Jan2000, 13:00	0.40
Culvert B	0.17304	54.4	01Jan2000, 12:55	0.32
Culvert Y	0.08344	33.9	01Jan2000, 12:55	0.42
C to D	0.30002	76.2	01Jan2000, 13:10	0.37
C to E3	1.04382	346.1	01Jan2000, 13:05	0.42
C1	0.01670	10.0	01Jan2000, 12:45	0.45
C1 to C2	0.01670	9.5	01Jan2000, 12:50	0.45
C2	0.06274	39.0	01Jan2000, 12:45	0.50
C2 to C3	0.07944	48.0	01Jan2000, 12:55	0.49
C3	0.16979	39.4	01Jan2000, 13:15	0.36
C4	0.01564	2.8	01Jan2000, 13:05	0.22
C4 to C5	0.01564	2.8	01Jan2000, 13:10	0.22
C5	0.03515	6.2	01Jan2000, 13:05	0.22
C5 to C3	0.05079	8.6	01Jan2000, 13:10	0.22
D to E3	0.74380	280.4	01Jan2000, 13:00	0.43

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1	0.59389	238.8	01Jan2000, 13:00	0.45
D1 to D2	0.59389	231.9	01Jan2000, 13:00	0.45
D2	0.14991	52.7	01Jan2000, 12:55	0.36
E1	1.32193	204.8	01Jan2000, 14:00	0.45
E1 to E2	1.32193	204.2	01Jan2000, 14:00	0.45
E2	0.03210	14.7	01Jan2000, 12:50	0.40
E2 to E3	1.35403	204.7	01Jan2000, 14:05	0.45
E3	0.11796	19.2	01Jan2000, 13:10	0.22
E3 to E4	3.02244	551.9	01Jan2000, 13:10	0.42
E4	0.07629	8.7	01Jan2000, 13:05	0.15
F to E3	0.14378	55.0	01Jan2000, 13:00	0.38
F1	0.06707	31.3	01Jan2000, 12:55	0.45
F1 to F2	0.06707	30.0	01Jan2000, 12:55	0.45
F2	0.07671	27.8	01Jan2000, 12:50	0.32
Gap Wash	3.09873	560.5	01Jan2000, 13:10	0.41
G to E3	0.34168	107.2	01Jan2000, 13:05	0.42
G1	0.28835	102.5	01Jan2000, 13:05	0.45
G1 to G2	0.28835	101.5	01Jan2000, 13:05	0.45
G2	0.05333	14.2	01Jan2000, 12:50	0.22
H1	0.02117	10.0	01Jan2000, 12:55	0.45
J-A	0.21885	81.7	01Jan2000, 13:00	0.40
J-AY	0.36066	133.7	01Jan2000, 13:00	0.40
J-B	0.07701	38.4	01Jan2000, 12:50	0.41
J-B3	0.17304	55.9	01Jan2000, 12:55	0.32
J-CD	1.04382	346.3	01Jan2000, 13:05	0.42
J-C2	0.07944	48.1	01Jan2000, 12:50	0.49
J-C3	0.30002	77.0	01Jan2000, 13:00	0.37
J-C5	0.05079	8.6	01Jan2000, 13:10	0.22
J-D2	0.74380	281.4	01Jan2000, 13:00	0.43
J-E2	1.35403	205.1	01Jan2000, 14:00	0.45
J-E3	3.02244	561.0	01Jan2000, 13:05	0.42

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	55.5	01Jan2000, 12:55	0.38
J-G2	0.34168	109.4	01Jan2000, 13:05	0.42
J-Y	0.08344	35.1	01Jan2000, 12:55	0.42
X to Box	0.02243	12.0	01Jan2000, 12:50	0.45
X1	0.02243	12.3	01Jan2000, 12:50	0.45
X2	0.03258	10.5	01Jan2000, 12:50	0.28
Y1	0.06908	31.9	01Jan2000, 12:55	0.45
Y1 to Y2	0.06908	31.1	01Jan2000, 12:55	0.45
Y2	0.01436	5.0	01Jan2000, 12:50	0.28

Project: The Lakes Master Simulation Run: Post 10-24

Start of Run: 01Jan2000, 12:00 Basin Model: Post
End of Run: 02Jan2000, 12:00 Meteorologic Model: 10-24hr
Compute Time: 30Aug2016, 13:54:45 Control Specifications: 24hr

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	129.3	02Jan2000, 00:00	0.95
A1	0.14214	61.6	02Jan2000, 00:00	1.02
A1 to A2	0.14214	54.7	02Jan2000, 00:00	1.02
A2	0.07671	26.1	02Jan2000, 00:00	0.82
A3	0.05837	21.6	02Jan2000, 00:00	0.88
Box Canyon	0.58871	200.2	02Jan2000, 00:00	0.90
B to B3	0.07701	27.8	02Jan2000, 00:00	0.97
B1	0.01710	7.4	02Jan2000, 00:00	1.02
B1 to B2	0.01710	6.7	02Jan2000, 00:00	1.02
B2	0.05991	24.0	02Jan2000, 00:00	0.95
B3	0.07709	22.0	02Jan2000, 00:00	0.71
B4	0.01894	4.5	02Jan2000, 00:00	0.65
Culvert A	0.21885	80.7	02Jan2000, 00:00	0.95
Culvert B	0.17304	51.8	02Jan2000, 00:00	0.82
Culvert Y	0.08344	31.9	02Jan2000, 00:00	0.98
C to D	0.30002	75.9	02Jan2000, 00:30	0.90
C to E3	1.04382	350.7	02Jan2000, 00:00	0.96
C1	0.01670	7.2	02Jan2000, 00:00	1.02
C1 to C2	0.01670	6.7	02Jan2000, 00:00	1.02
C2	0.06274	29.3	02Jan2000, 00:00	1.09
C2 to C3	0.07944	25.4	02Jan2000, 00:00	1.08
C3	0.16979	42.8	02Jan2000, 00:30	0.88
C4	0.01564	4.1	02Jan2000, 00:00	0.66
C4 to C5	0.01564	3.0	02Jan2000, 00:00	0.66
C5	0.03515	9.0	02Jan2000, 00:00	0.66
C5 to C3	0.05079	11.2	02Jan2000, 00:00	0.66
D to E3	0.74380	295.9	02Jan2000, 00:00	0.99

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1	0.59389	257.3	02Jan2000, 00:00	1.02
D1 to D2	0.59389	241.9	02Jan2000, 00:00	1.02
D2	0.14991	55.4	02Jan2000, 00:00	0.88
E1	1.32193	266.6	02Jan2000, 01:00	1.00
E1 to E2	1.32193	264.1	02Jan2000, 01:00	1.00
E2	0.03210	12.9	02Jan2000, 00:00	0.95
E2 to E3	1.35403	258.3	02Jan2000, 01:00	1.00
E3	0.11796	27.0	02Jan2000, 00:00	0.65
E3 to E4	3.02244	590.6	02Jan2000, 00:30	0.97
E4	0.07629	14.5	02Jan2000, 00:00	0.52
F to E3	0.14378	44.0	02Jan2000, 00:00	0.92
F1	0.06707	29.1	02Jan2000, 00:00	1.02
F1 to F2	0.06707	26.9	02Jan2000, 00:00	1.02
F2	0.07671	26.1	02Jan2000, 00:00	0.82
Gap Wash	3.09873	599.6	02Jan2000, 00:30	0.95
G to E3	0.34168	115.3	02Jan2000, 00:00	0.96
G1	0.28835	109.3	02Jan2000, 00:00	1.01
G1 to G2	0.28835	106.8	02Jan2000, 00:00	1.02
G2	0.05333	13.8	02Jan2000, 00:00	0.66
H1	0.02117	9.2	02Jan2000, 00:00	1.02
J-A	0.21885	80.8	02Jan2000, 00:00	0.95
J-AY	0.36066	134.2	02Jan2000, 00:00	0.94
J-B	0.07701	30.7	02Jan2000, 00:00	0.96
J-B3	0.17304	54.3	02Jan2000, 00:00	0.82
J-CD	1.04382	358.5	02Jan2000, 00:00	0.96
J-C2	0.07944	36.0	02Jan2000, 00:00	1.08
J-C3	0.30002	76.1	02Jan2000, 00:00	0.89
J-C5	0.05079	12.0	02Jan2000, 00:00	0.66
J-D2	0.74380	297.4	02Jan2000, 00:00	0.99
J-E2	1.35403	267.0	02Jan2000, 01:00	1.00
J-E3	3.02244	625.5	02Jan2000, 00:00	0.96

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	53.0	02Jan2000, 00:00	0.91
J-G2	0.34168	120.6	02Jan2000, 00:00	0.96
J-Y	0.08344	33.4	02Jan2000, 00:00	0.97
X to Box	0.02243	9.0	02Jan2000, 00:00	1.02
X1	0.02243	9.7	02Jan2000, 00:00	1.02
X2	0.03258	10.2	02Jan2000, 00:00	0.76
Y1	0.06908	29.9	02Jan2000, 00:00	1.02
Y1 to Y2	0.06908	28.9	02Jan2000, 00:00	1.02
Y2	0.01436	4.5	02Jan2000, 00:00	0.76

Project: The Lakes Master Simulation Run: Post 100-3

Start of Run: 01Jan2000, 12:00 Basin Model: Post
End of Run: 01Jan2000, 18:30 Meteorologic Model: 100-3
Compute Time: 30Aug2016, 13:55:09 Control Specifications: 100-3

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	311.8	01Jan2000, 13:00	0.92
A1	0.14214	139.2	01Jan2000, 12:55	0.99
A1 to A2	0.14214	135.5	01Jan2000, 13:00	0.99
A2	0.07671	60.1	01Jan2000, 12:55	0.79
A3	0.05837	52.7	01Jan2000, 12:55	0.86
Box Canyon	0.58871	498.1	01Jan2000, 12:55	0.87
B to B3	0.07701	88.1	01Jan2000, 12:50	0.93
B1	0.01710	23.5	01Jan2000, 12:40	0.99
B1 to B2	0.01710	23.4	01Jan2000, 12:45	0.99
B2	0.05991	67.0	01Jan2000, 12:50	0.92
B3	0.07709	53.8	01Jan2000, 12:55	0.68
B4	0.01894	9.6	01Jan2000, 13:05	0.63
Culvert A	0.21885	191.9	01Jan2000, 13:00	0.92
Culvert B	0.17304	139.9	01Jan2000, 12:55	0.79
Culvert Y	0.08344	80.7	01Jan2000, 12:55	0.95
C to D	0.30002	182.0	01Jan2000, 13:05	0.87
C to E3	1.04382	820.9	01Jan2000, 13:00	0.94
C1	0.01670	22.7	01Jan2000, 12:45	0.99
C1 to C2	0.01670	22.1	01Jan2000, 12:45	0.99
C2	0.06274	88.4	01Jan2000, 12:45	1.06
C2 to C3	0.07944	104.5	01Jan2000, 12:55	1.04
C3	0.16979	97.0	01Jan2000, 13:15	0.86
C4	0.01564	8.7	01Jan2000, 13:00	0.63
C4 to C5	0.01564	8.4	01Jan2000, 13:05	0.63
C5	0.03515	19.1	01Jan2000, 13:00	0.63
C5 to C3	0.05079	26.6	01Jan2000, 13:05	0.63
D to E3	0.74380	654.3	01Jan2000, 13:00	0.96

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1	0.59389	540.9	01Jan2000, 13:00	0.99
D1 to D2	0.59389	537.5	01Jan2000, 13:00	0.99
D2	0.14991	132.9	01Jan2000, 12:55	0.86
E1	1.32193	456.4	01Jan2000, 14:00	0.99
E1 to E2	1.32193	456.3	01Jan2000, 14:00	0.99
E2	0.03210	35.4	01Jan2000, 12:50	0.92
E2 to E3	1.35403	456.7	01Jan2000, 14:05	0.99
E3	0.11796	58.6	01Jan2000, 13:05	0.63
E3 to E4	3.02244	1317.2	01Jan2000, 13:05	0.94
E4	0.07629	31.7	01Jan2000, 13:00	0.50
F to E3	0.14378	134.7	01Jan2000, 12:55	0.89
F1	0.06707	70.4	01Jan2000, 12:55	0.99
F1 to F2	0.06707	69.9	01Jan2000, 12:55	0.99
F2	0.07671	73.2	01Jan2000, 12:50	0.79
Gap Wash	3.09873	1348.4	01Jan2000, 13:05	0.93
G to E3	0.34168	249.4	01Jan2000, 13:05	0.94
G1	0.28835	232.1	01Jan2000, 13:05	0.99
G1 to G2	0.28835	231.6	01Jan2000, 13:05	0.99
G2	0.05333	41.6	01Jan2000, 12:50	0.63
H1	0.02117	22.7	01Jan2000, 12:50	0.99
J-A	0.21885	191.9	01Jan2000, 13:00	0.92
J-AY	0.36066	321.4	01Jan2000, 12:55	0.92
J-B	0.07701	88.1	01Jan2000, 12:45	0.94
J-B3	0.17304	140.3	01Jan2000, 12:50	0.79
J-CD	1.04382	828.6	01Jan2000, 13:00	0.94
J-C2	0.07944	110.5	01Jan2000, 12:45	1.05
J-C3	0.30002	182.6	01Jan2000, 13:00	0.87
J-C5	0.05079	26.8	01Jan2000, 13:05	0.63
J-D2	0.74380	655.1	01Jan2000, 13:00	0.96
J-E2	1.35403	457.8	01Jan2000, 14:00	0.99
J-E3	3.02244	1331.5	01Jan2000, 13:00	0.95

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	135.0	01Jan2000, 12:50	0.89
J-G2	0.34168	250.6	01Jan2000, 13:05	0.93
J-Y	0.08344	81.3	01Jan2000, 12:55	0.95
X to Box	0.02243	27.5	01Jan2000, 12:50	0.99
X1	0.02243	28.2	01Jan2000, 12:45	0.99
X2	0.03258	29.0	01Jan2000, 12:50	0.74
Y1	0.06908	72.2	01Jan2000, 12:55	0.99
Y1 to Y2	0.06908	71.7	01Jan2000, 12:55	0.99
Y2	0.01436	13.3	01Jan2000, 12:45	0.74

Project: The Lakes Master Simulation Run: Post 100-24

Start of Run: 01Jan2000, 12:00 Basin Model: Post
End of Run: 03Jan2000, 00:30 Meteorologic Model: 100-24hr
Compute Time: 30Aug2016, 13:55:01 Control Specifications: 24-Hour

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
A to Box	0.36066	237.5	02Jan2000, 00:00	1.70
A1	0.14214	107.9	02Jan2000, 00:00	1.79
A1 to A2	0.14214	97.7	02Jan2000, 00:00	1.80
A2	0.07671	50.0	02Jan2000, 00:00	1.54
A3	0.05837	40.1	02Jan2000, 00:00	1.62
Box Canyon	0.58871	374.8	02Jan2000, 00:00	1.65
B to B3	0.07701	50.9	02Jan2000, 00:00	1.73
B1	0.01710	13.0	02Jan2000, 00:00	1.79
B1 to B2	0.01710	12.0	02Jan2000, 00:00	1.80
B2	0.05991	43.3	02Jan2000, 00:00	1.70
B3	0.07709	44.8	02Jan2000, 00:00	1.39
B4	0.01894	9.5	02Jan2000, 00:00	1.32
Culvert A	0.21885	147.5	02Jan2000, 00:00	1.71
Culvert B	0.17304	101.2	02Jan2000, 00:00	1.54
Culvert Y	0.08344	57.5	02Jan2000, 00:00	1.74
C to D	0.30002	136.8	02Jan2000, 00:30	1.65
C to E3	1.04382	640.6	02Jan2000, 00:00	1.73
C1	0.01670	12.7	02Jan2000, 00:00	1.79
C1 to C2	0.01670	11.8	02Jan2000, 00:00	1.80
C2	0.06274	49.9	02Jan2000, 00:00	1.88
C2 to C3	0.07944	46.4	02Jan2000, 00:00	1.88
C3	0.16979	78.0	02Jan2000, 00:30	1.62
C4	0.01564	8.6	02Jan2000, 00:00	1.32
C4 to C5	0.01564	6.8	02Jan2000, 00:00	1.33
C5	0.03515	19.0	02Jan2000, 00:00	1.32
C5 to C3	0.05079	24.4	02Jan2000, 00:00	1.33
D to E3	0.74380	528.7	02Jan2000, 00:00	1.76

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
D1	0.59389	451.0	02Jan2000, 00:00	1.79
D1 to D2	0.59389	428.0	02Jan2000, 00:00	1.80
D2	0.14991	103.0	02Jan2000, 00:00	1.62
E1	1.32193	466.2	02Jan2000, 01:00	1.79
E1 to E2	1.32193	462.8	02Jan2000, 01:00	1.79
E2	0.03210	23.2	02Jan2000, 00:00	1.70
E2 to E3	1.35403	455.6	02Jan2000, 01:00	1.79
E3	0.11796	57.3	02Jan2000, 00:00	1.32
E3 to E4	3.02244	1069.7	02Jan2000, 00:00	1.74
E4	0.07629	34.5	02Jan2000, 00:00	1.12
F to E3	0.14378	83.8	02Jan2000, 00:00	1.67
F1	0.06707	50.9	02Jan2000, 00:00	1.79
F1 to F2	0.06707	47.8	02Jan2000, 00:00	1.80
F2	0.07671	50.0	02Jan2000, 00:00	1.54
Gap Wash	3.09873	1104.2	02Jan2000, 00:00	1.73
G to E3	0.34168	209.4	02Jan2000, 00:00	1.72
G1	0.28835	192.0	02Jan2000, 00:00	1.79
G1 to G2	0.28835	188.3	02Jan2000, 00:00	1.79
G2	0.05333	29.2	02Jan2000, 00:00	1.32
H1	0.02117	16.1	02Jan2000, 00:00	1.79
J-A	0.21885	147.6	02Jan2000, 00:00	1.71
J-AY	0.36066	245.0	02Jan2000, 00:00	1.70
J-B	0.07701	55.3	02Jan2000, 00:00	1.72
J-B3	0.17304	105.2	02Jan2000, 00:00	1.53
J-CD	1.04382	652.6	02Jan2000, 00:00	1.73
J-C2	0.07944	61.8	02Jan2000, 00:00	1.86
J-C3	0.30002	145.1	02Jan2000, 00:00	1.64
J-C5	0.05079	25.8	02Jan2000, 00:00	1.32
J-D2	0.74380	530.9	02Jan2000, 00:00	1.76
J-E2	1.35403	467.6	02Jan2000, 01:00	1.79
J-E3	3.02244	1162.8	02Jan2000, 00:00	1.74

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
J-F2	0.14378	97.7	02Jan2000, 00:00	1.66
J-G2	0.34168	217.5	02Jan2000, 00:00	1.72
J-Y	0.08344	59.8	02Jan2000, 00:00	1.74
X to Box	0.02243	16.0	02Jan2000, 00:00	1.79
X1	0.02243	17.0	02Jan2000, 00:00	1.79
X2	0.03258	20.1	02Jan2000, 00:00	1.46
Y1	0.06908	52.5	02Jan2000, 00:00	1.79
Y1 to Y2	0.06908	51.0	02Jan2000, 00:00	1.79
Y2	0.01436	8.8	02Jan2000, 00:00	1.46

Worksheet for Culvert 1

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	36	in
Discharge	80.70	ft^3/s

Results

Normal Depth	2.29	ft
Flow Area	5.79	ft^2
Wetted Perimeter	6.38	ft
Hydraulic Radius	0.91	ft
Top Width	2.55	ft
Critical Depth	2.78	ft
Percent Full	76.4	%
Critical Slope	0.00750	ft/ft
Velocity	13.93	ft/s
Velocity Head	3.02	ft
Specific Energy	5.31	ft
Froude Number	1.63	
Maximum Discharge	93.27	ft^3/s
Discharge Full	86.70	ft^3/s
Slope Full	0.00866	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	76.36	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 1

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.29	ft
Critical Depth	2.78	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00750	ft/ft

Worksheet for Culvert 2

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	48	in
Discharge	191.90	ft^3/s

Results

Normal Depth	3.39	ft
Flow Area	11.35	ft^2
Wetted Perimeter	9.35	ft
Hydraulic Radius	1.21	ft
Top Width	2.88	ft
Critical Depth	3.82	ft
Percent Full	84.7	%
Critical Slope	0.00917	ft/ft
Velocity	16.91	ft/s
Velocity Head	4.44	ft
Specific Energy	7.83	ft
Froude Number	1.50	
Maximum Discharge	200.86	ft^3/s
Discharge Full	186.73	ft^3/s
Slope Full	0.01056	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	84.70	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 2

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.39	ft
Critical Depth	3.82	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00917	ft/ft

Worksheet for Culvert 3

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	36	in
Discharge	88.10	ft³/s

Results

Normal Depth	2.50	ft
Flow Area	6.31	ft²
Wetted Perimeter	6.91	ft
Hydraulic Radius	0.91	ft
Top Width	2.23	ft
Critical Depth	2.83	ft
Percent Full	83.5	%
Critical Slope	0.00893	ft/ft
Velocity	13.97	ft/s
Velocity Head	3.03	ft
Specific Energy	5.54	ft
Froude Number	1.46	
Maximum Discharge	93.27	ft³/s
Discharge Full	86.70	ft³/s
Slope Full	0.01032	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	83.50	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 3

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.50	ft
Critical Depth	2.83	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00893	ft/ft

Worksheet for Culvert 4

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	42	in
Discharge	139.90	ft^3/s

Results

Normal Depth	3.18	ft
Flow Area	9.18	ft^2
Wetted Perimeter	8.85	ft
Hydraulic Radius	1.04	ft
Top Width	2.01	ft
Critical Depth	3.35	ft
Percent Full	90.9	%
Critical Slope	0.00995	ft/ft
Velocity	15.23	ft/s
Velocity Head	3.61	ft
Specific Energy	6.79	ft
Froude Number	1.26	
Maximum Discharge	140.69	ft^3/s
Discharge Full	130.79	ft^3/s
Slope Full	0.01144	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	90.89	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 4

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.18	ft
Critical Depth	3.35	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00995	ft/ft

Worksheet for Culvert 5

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	42	in
Discharge	104.50	ft³/s

Results

Normal Depth	2.37	ft
Flow Area	6.92	ft²
Wetted Perimeter	6.76	ft
Hydraulic Radius	1.02	ft
Top Width	3.28	ft
Critical Depth	3.12	ft
Percent Full	67.6	%
Critical Slope	0.00567	ft/ft
Velocity	15.10	ft/s
Velocity Head	3.54	ft
Specific Energy	5.91	ft
Froude Number	1.83	
Maximum Discharge	140.69	ft³/s
Discharge Full	130.79	ft³/s
Slope Full	0.00638	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	67.60	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 5

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.37	ft
Critical Depth	3.12	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00567	ft/ft

Worksheet for Culvert 6

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	84	in
Discharge	654.30	ft³/s

Results

Normal Depth	4.68	ft
Flow Area	27.37	ft²
Wetted Perimeter	13.41	ft
Hydraulic Radius	2.04	ft
Top Width	6.59	ft
Critical Depth	6.43	ft
Percent Full	66.9	%
Critical Slope	0.00539	ft/ft
Velocity	23.91	ft/s
Velocity Head	8.88	ft
Specific Energy	13.57	ft
Froude Number	2.07	
Maximum Discharge	893.31	ft³/s
Discharge Full	830.44	ft³/s
Slope Full	0.00621	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	66.91	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 6

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.68	ft
Critical Depth	6.43	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00539	ft/ft

Worksheet for Culvert 7

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	84	in
Discharge	810.00	ft³/s

Results

Normal Depth	5.59	ft
Flow Area	32.94	ft²
Wetted Perimeter	15.47	ft
Hydraulic Radius	2.13	ft
Top Width	5.62	ft
Critical Depth	6.73	ft
Percent Full	79.8	%
Critical Slope	0.00830	ft/ft
Velocity	24.59	ft/s
Velocity Head	9.40	ft
Specific Energy	14.99	ft
Froude Number	1.79	
Maximum Discharge	893.31	ft³/s
Discharge Full	830.44	ft³/s
Slope Full	0.00951	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	79.83	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 7

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	5.59	ft
Critical Depth	6.73	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00830	ft/ft

Worksheet for Culvert 8

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	72	in
Discharge	456.70	ft³/s

Results

Normal Depth	4.17	ft
Flow Area	20.98	ft²
Wetted Perimeter	11.83	ft
Hydraulic Radius	1.77	ft
Top Width	5.52	ft
Critical Depth	5.55	ft
Percent Full	69.5	%
Critical Slope	0.00596	ft/ft
Velocity	21.77	ft/s
Velocity Head	7.37	ft
Specific Energy	11.54	ft
Froude Number	1.97	
Maximum Discharge	592.21	ft³/s
Discharge Full	550.53	ft³/s
Slope Full	0.00688	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	69.51	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 8

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	4.17	ft
Critical Depth	5.55	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00596	ft/ft

Worksheet for Culvert 9

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	42	in
Discharge	134.70	ft^3/s

Results

Normal Depth	2.97	ft
Flow Area	8.71	ft^2
Wetted Perimeter	8.21	ft
Hydraulic Radius	1.06	ft
Top Width	2.50	ft
Critical Depth	3.33	ft
Percent Full	84.9	%
Critical Slope	0.00919	ft/ft
Velocity	15.46	ft/s
Velocity Head	3.72	ft
Specific Energy	6.69	ft
Froude Number	1.46	
Maximum Discharge	140.69	ft^3/s
Discharge Full	130.79	ft^3/s
Slope Full	0.01061	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	84.95	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 9

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	2.97	ft
Critical Depth	3.33	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00919	ft/ft

Worksheet for Culvert 10

Project Description

Friction Method	Manning Formula
Solve For	Normal Depth

Input Data

Roughness Coefficient	0.010	
Channel Slope	0.01000	ft/ft
Diameter	60	in
Discharge	249.40	ft^3/s

Results

Normal Depth	3.19	ft
Flow Area	13.23	ft^2
Wetted Perimeter	9.25	ft
Hydraulic Radius	1.43	ft
Top Width	4.81	ft
Critical Depth	4.42	ft
Percent Full	63.8	%
Critical Slope	0.00486	ft/ft
Velocity	18.85	ft/s
Velocity Head	5.52	ft
Specific Energy	8.72	ft
Froude Number	2.00	
Maximum Discharge	364.19	ft^3/s
Discharge Full	338.56	ft^3/s
Slope Full	0.00543	ft/ft
Flow Type	SuperCritical	

GVF Input Data

Downstream Depth	0.00	ft
Length	0.00	ft
Number Of Steps	0	

GVF Output Data

Upstream Depth	0.00	ft
Profile Description		
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	63.82	%
Downstream Velocity	Infinity	ft/s

Worksheet for Culvert 10

GVF Output Data

Upstream Velocity	Infinity	ft/s
Normal Depth	3.19	ft
Critical Depth	4.42	ft
Channel Slope	0.01000	ft/ft
Critical Slope	0.00486	ft/ft

Exhibit D

Executive Geotechnical Summary

July 5, 2005 1286-04-ZC

City of St. George
175 East 200 North
St. George, Utah 84790

Attn: Hillside Review Committee

Subject: Executive Summary
Geotechnical Site Evaluation
Lakes At St. George Development

Gentlemen:

Introduction

The purpose of this letter is to provide a summary of the general geologic and soil conditions at the subject site, and general geotechnical requirements for development. The project site (previously known as the Plantations Development site), is approximately 730 acres in area and is located within and along a relatively small valley west of the Green Valley and Sunbrook developments in St. George, Utah. Development of the site will be in phases and will consist of a 9-hole golf course, three to four lakes, and residential construction.

Previous geotechnical investigations conducted on the project site were referenced for this summary. The following geotechnical reports were reviewed.

2001 Geotechnical Investigation
Plantations at St. George, Phase 1
Residential Pods 12A, 12B & 15
Rosenberg Associates Project No. 95-1198-01

1995 Geotechnical Investigation
The Plantations, Phase 1
Black, Miller & Associates Project No. 95-1198-01

1992 Preliminary Geotechnical Site Assessment
730-Acre Plantations Project
Kleinfelder Project No. 31-800570

General Geologic Conditions

The majority of the site consists of a northwest trending valley flanked by a broad, shallow dip slope to the west and a plateau to the east. The southern-most portion of the site occupies a smaller, east-west trending valley separated from the remaining portion of the site by a south trending spur. The northern third of the site drains to the northeast through a series of subparallel tributary washes that join and exit the site in the northeast corner. The southern two-thirds of the site drains to the southwest from the west through a major tributary wash which enters the site through a feature known as "The Gap". The main wash flows to the south and then to the east, meandering back and forth across the southern site boundary.

Geologic deposits ranging in age from Triassic to Recent are found at the site (see Drawing No. 1 enclosed at the end of this letter). Bedrock consists chiefly of the Triassic Chinle Formation. The lower Shinarump Member consisting of sandstones and conglomerates outcrops extensively on the western portion of the site. The upper Petrified Forest Member (locally known as "Blue Clay"), underlies most of the central alluvial basin deposits and which outcrops on the eastern side of the site. Quaternary deposits consisting of Older gravels, Recent alluvial deposits, and possible landslide deposits are also present on the site as shown on Drawing No. 1 (Christenson and Deen, 1983).

General Subsurface Soil Conditions

For the purpose of this letter, we have separated the subject site into the four (4) general areas based on soil type (see Drawing No. 1). The subsurface conditions encountered on the western portion of the site (see orange colored area on Drawing No. 1), generally consisted of ½ to 1½ feet of loose, surficial silty sand or soft sandy clay soils overlying moderately hard to hard sandstone bedrock. Although generally jointed and fractured, the sandstones have a high shear strength, are relatively incompressible, and provide favorable foundation support characteristics.

The subsurface conditions at the base of the western slopes in the central and along the low ridges of the eastern portion of the site generally consist of varying thicknesses of alluvial soils (soft to stiff clayey soils, or loose to medium dense gravelly soils) overlying red-brown and green-gray highly plastic clays and mudstone bedrock associated with the Petrified Forest Member of the Chinle Formation (see the purple areas on Drawing No. 1). The Petrified Forest Member, or clay soils derived from erosion of this unit, generally have a high to critical swell potential with changes in moisture content, are of relatively low strength, and experience considerable reductions in strength when exposed to moisture.

In the northern portion of the site (see gray colored area on Drawing No. 1), the subsurface conditions generally consist predominantly of green-gray shales. The red-brown and purple mudstones, locally known as "Blue Clay" were not encountered within this area.. Clayey soils derived from the green-gray shales generally have low to moderate swell potentials.

On the plateau area to the east, the subsurface conditions are expected to consist of slightly to very well indurated (naturally cemented) sands, gravels, and cobbles associated with an Older Quaternary gravel formation. The sand and gravel deposits (see the green area on Drawing No. 2) generally provide favorable subgrade characteristics.

Groundwater was encountered during the 1992 preliminary assessment performed by Kleinfelder in the southeastern portion of the property at depths of about 4 to 12½ feet below the existing ground surface.

General Geotechnical Requirements

Based on the subsurface conditions encountered during at the site, and our experience with similar soil conditions, it is our opinion (from a geotechnical view point) that with proper preparation and design the subject site can be utilized for the proposed developments.

In the northern and western portions of the site (see orange and gray colored areas on Drawing No. 1), site grading will generally consist of reworking the existing surficial soils. The proposed structures should receive adequate support from conventional spread footings founded on competent undisturbed medium dense to dense native soils, on properly placed and compacted structural fill, or entirely on undisturbed non-expansive bedrock. The main geotechnical constraint within this area is the presence of moderately hard to hard bedrock. Rock excavating techniques should be anticipated where these materials are encountered during site grading and utility trench excavation. Steel reinforcing is recommended for footings and floor slabs constructed within the gray area due to the localized presence of low to moderately expansive soils.

Where the Petrified Forest Member of the Chinle Formation is present (see purple colored areas on Drawing No. 1), the most significant constraints to the development are related to the overall instability and generally poor foundation support characteristics this formation. Where this formation is present within slopes, the integrity of the slopes can be impaired by grading activities as well as loading and the introduction of water. Special grading and foundation considerations will be required where the Petrified Forest Member will be present within 15 feet of the planned rough pad elevations. We recommend that the structures be supported by a deep foundation systems with grade beams to support wall loads, and a raised structural floor system. Where conventional foundation systems are desired within expansive clay areas, any expansive clay soils or bedrock located within 15 feet of the final building pad elevations would require overexcavation and replacement with approved structural fill materials. Within exterior flatwork and street improvement areas, expansive native materials present within 3 feet of the planned subgrade elevation should be overexcavated and replaced with structural fill.

Older Quaternary gravels at the site (see green colored areas in the southeast portion of the site) occur primarily as a cap overlying the Petrified Forest Member in the plateau areas to the east. These materials consist of slightly to very well cemented sands, gravels, and cobbles. The sand and gravel deposits are generally anticipated to provide favorable foundation support

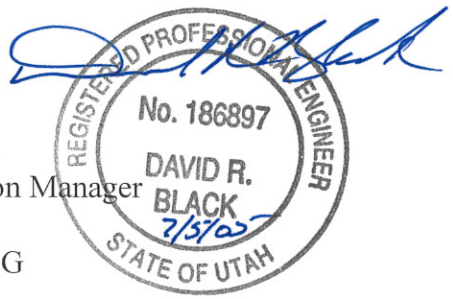
characteristics. However, in the vicinity of slopes, overall stability anticipated to be a consideration for portions of the development within this area due to the underlying presence of the Petrified Forest Member.

Closure

It is our pleasure to be of continued service on this project. If you have any questions concerning the information contained in this letter, please contact us at your convenience.

Sincerely,

ROSENBERG ASSOCIATES

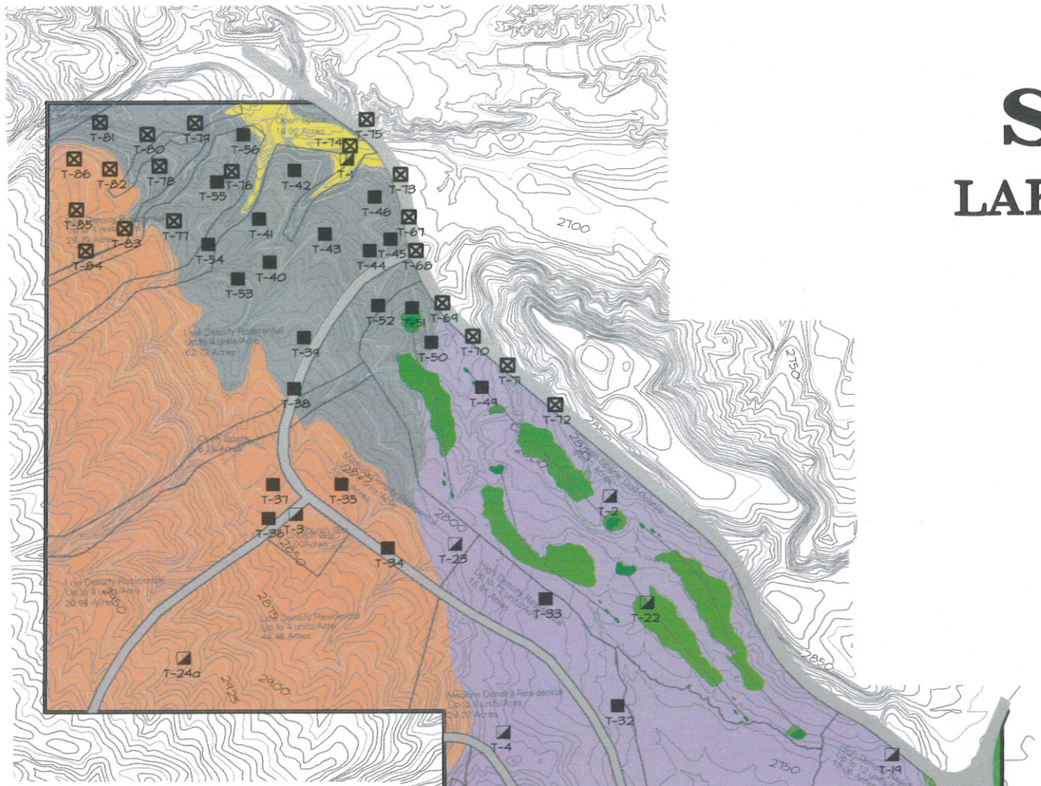


David R. Black, P.E.
Geotechnical Division Manager

DRB/RTR/05R-137.G

SOILS MAP

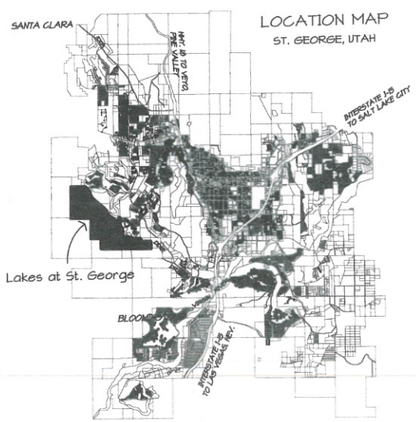
LAKES AT ST. GEORGE



SCALE: 1" = 500'

CONTOUR INTERVAL = 5'

LOCATION MAP
ST. GEORGE, UTAH



LEGEND

- Qal — RECENT ALLUVIAL SANDS AND GRAVELS
- Qls — LANDSLIDE DEBRIS
- Qog — OLDER ALLUVIAL GRAVEL
- TRcp — CHINLE FORMATION, PETRIFIED FOREST MEMBER (WITHIN 12 FEET)
- TRc — CHINLE FORMATION, GREEN/GRAY SHALE BEDS
- TRcs — CHINLE FORMATION, SHINARUMP MEMBER
- TRmk — MOENKOPI FORMATION, UPPER RED MEMBER
- Landfill Area
- Gravel Pit Area
- Fissure Area
- T-1 to T-24a — Approximate Trench Locations (1992 Kleinfelder Preliminary Site Assessment)
- T-24b to T-56 — Approximate Trench Locations (1995 Rosenberg Phase I Geotechnical Investigation)
- T-57 to T-86 — Approximate Trench Locations (2000 Rosenberg Plantations Drive Investigation)
- B-1 — Boring Location (2000 Rosenberg Plantations Drive Investigation)

04-24-04
DATE:

1286-04
JOB NUMBER:

1" = 500'
SCALE:

T.J.F.
DRAWN BY:

CHECKED BY:

REVISIONS | DATE

ROSENBERG ASSOCIATES
CONSULTING ENGINEERS AND LAND SURVEYORS
352 East Riverside Drive, Suite A2 St. George, Utah 84790 - (435) 673-8586

SOILS MAP
PLANTATIONS AT ST. GEORGE
CITY OF ST. GEORGE
WASHINGTON COUNTY, UTAH

DRAWING NAME:
1286SoilTyp

SHEET
OF 1 SHEETS

St.George
Community Development

ITEM 6A

PRELIMINARY PLAT

PLANNING COMMISSION AGENDA REPORT: **04/26/2022**

PRELIMINARY PLAT
Glenview
Case No. 2022-PP-015

Request: To approve a preliminary plat for a four (4) lot residential subdivision.

Location: The site is located at 2262 South and 2100 East.

Property: 2.58 acres

Number of Lots: 4

Density: 0.54 DU/AC

Zoning: R-1-10

Adjacent zones: This plat is surrounded by the following zones:
North – R-1-10
South – R-1-10
East – R-1-10
West – R-1-10

General Plan: LDR

Applicant: Bush & Gudgell

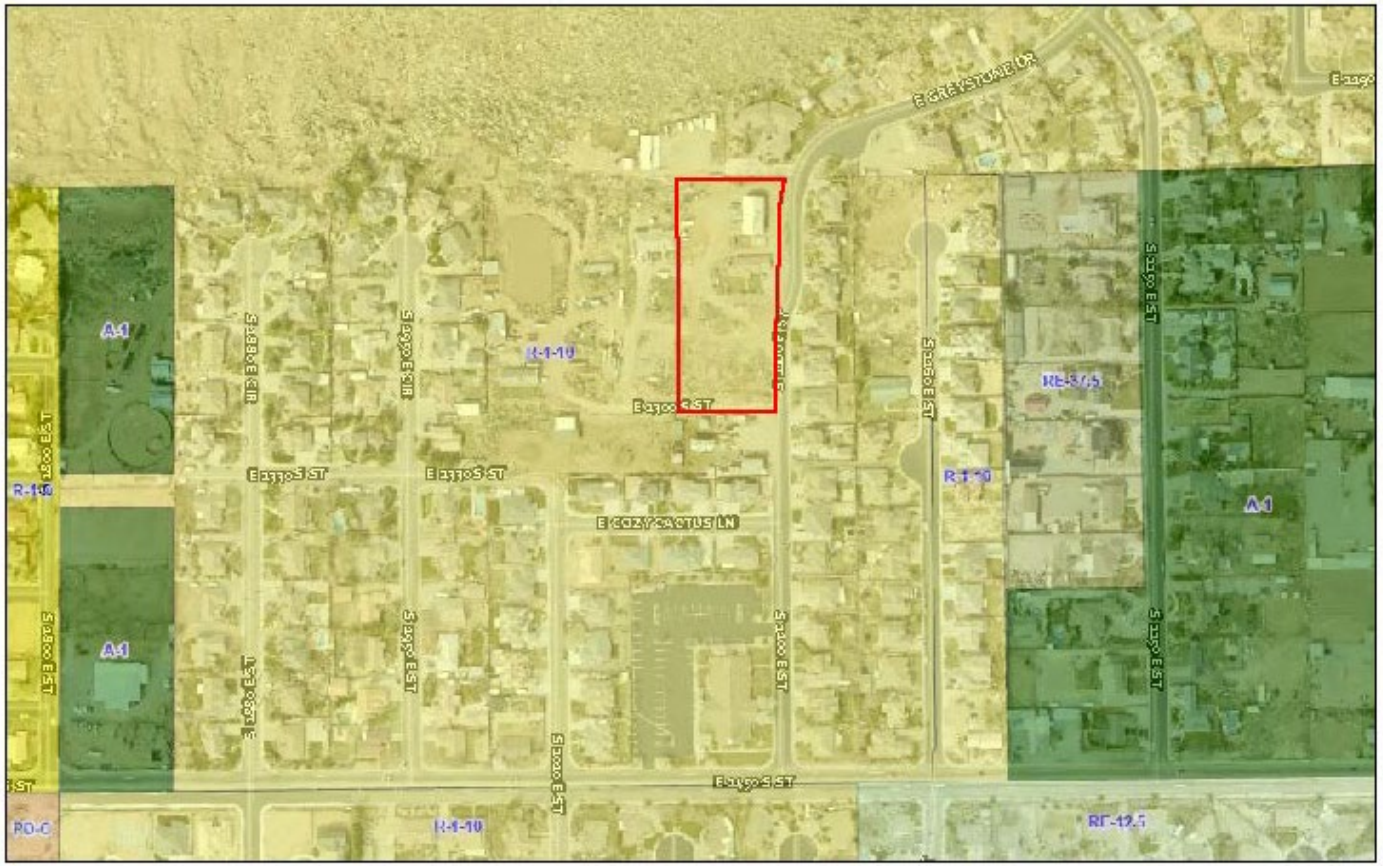
Representative: Rick Meyer

Comments:

Preliminary Plats

April 26, 2022

Preliminary Plat – Glenview



Preliminary Plat – Glenview

B&G PROJECT NUMBER 211280

GLENVIEW

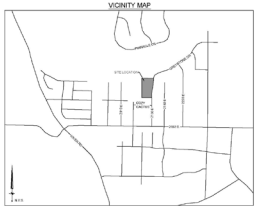
PRELIMINARY PLAT

LOCATED IN ST GEORGE, UTAH

SOUTHWEST 1/4 OF SECTION 4, T 43S, R 15 W, SLB&M

PARCEL # SG-5-3-4-320012

VICINITY MAP



LEGAL DESCRIPTION

COMMENCING AT THE NORTHEAST CORNER OF SECTIONAL LOT 5 WHICH LIES NORTH 69°34'19" EAST ALONG THE CENTER SECTION LINE 1356.73 FEET FROM THE SOUTH QUARTER CORNER OF SECTION 4, TOWNSHIP 43 SOUTH, RANGE 15 WEST, SALT LAKE BASE AND MERIDIAN; THENCE NORTH 39°43'14" WEST ALONG THE NORTH LINE SAID LOT 5 141.40 FEET TO THE TRUE POINT OF BEGINNING; THENCE SOUTH 50°16'46" WEST 210.00 FEET; THENCE SOUTH 39°43'14" EAST 141.40 FEET TO THE NORTH LINE ALONG SAID ROAD RIGHT-OF-WAY LINE THE FOLLOWING FOUR (4) COURSES: (1) SOUTH 50°16'46" WEST 13.65 FEET; (2) SOUTHWESTERLY ALONG A 425.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS SOUTH 47°53'07" WEST A DISTANCE OF 126.63 FEET); (CENTER POINT LIES SOUTH 73°13'28" EAST THROUGH A CENTRAL ANGLE OF 16°41'46", A DISTANCE OF 123.81 FEET; (3) SOUTH 69°34'14" EAST 70.13 FEET, AND (4) SOUTHERLY ALONG A 175.00 FOOT RADIUS CURVE TO THE RIGHT, (CHORD BEARS SOUTH 69°53'29" EAST 5.00 FEET); (CENTER POINT LIES SOUTH 69°34'14" EAST THROUGH A CENTRAL ANGLE OF 01°38'30", A DISTANCE OF 10.05 FEET; THENCE SOUTH 50°16'46" WEST 210.00 FEET; THENCE NORTH 39°43'14" WEST 210.00 FEET; THENCE NORTH 50°16'46" EAST 210.00 FEET; THENCE NORTH 39°43'49" EAST 500.69 FEET TO SAID NORTH LINE OF SECTIONAL LOT 5; THENCE SOUTH 69°43'14" EAST ALONG SAID LINE 238.60 FEET TO THE POINT OF BEGINNING.

CONTAINING 112,421 SQUARE FEET OR 2.58 ACRES.

PROJECT INFORMATION	
ZONING	R-1-10
TOTAL AREA	2.14 ACRES
TOTAL LOTS	4
DENSITY	0.54 D.U./ ACRE

PROJECT MAP

GENERAL NOTES

1) CONTRACTOR IS RESPONSIBLE TO VERIFY LOCATIONS OF ALL UTILITIES PRIOR TO COMMENCEMENT OF WORK IN ANY ZONE.
2) ALL WORK AND MATERIALS SHALL COMPLY WITH ST. GEORGE CITY STANDARD SPECIFICATIONS.
3) PROJECTS SHALL INSTALL AN INFORMATIONAL SIGN ON SITE BEFORE CONSTRUCTION BEGINS. THIS SIGN WILL HAVE A MINIMUM SIZE, PLACEMENT LOCATION AND CONTENT INFORMATION WITH THE COMPANY NAME, PHONE NUMBER AND PERMIT NUMBER.
4) PROJECTS SHALL SUBMIT A DUST CONTROL PLAN WITH DETAILS ON EQUIPMENT, SCHEDULING AND REPORTING OF DUST CONTROL ACTIVITIES.
5) A MANDATORY PRE-CONSTRUCTION MEETING WILL BE REQUIRED ON ALL PROJECTS PRIOR TO ANY GRUBBING, GRADING OR CONSTRUCTION ACTIVITIES. THE PERMIT HOLDER WILL BE REQUIRED TO NOTIFY THE CITY TO SCHEDULE THIS MEETING.
6) FOLLOW APPENDIX J ST ANDARDS FOUND IN THIS IBC.
7) ALL OBJECTS SHALL BE KEPT OUT OF THE SIGHT DISTANCE CORRIDORS THAT MAY OBSTRUCT THE DRIVER'S VIEW.

DUST CONTROL

THESE DUST CONTROL MEASURES MUST BE OBSERVED AT ALL TIMES.

EARTH MOVING ACTIVITIES:
1) APPLY WATER BY MEANS OF TRUCKS, HOSES AND/OR SPRINKLERS AT SUFFICIENT FREQUENCY AND QUANTITY TO KEEP ALL AREAS OF VEHICLE PASSAGE AND EARTH MOVING ACTIVITIES.
2) PRE-APPLY WATER TO THE DEPTH OF THE PROPOSED CUTS OR EQUIPMENT PENETRATION.
3) APPLY WATER AS NECESSARY AND PRIOR TO EXPECTED WIND EVENTS.
4) OPERATE HAUL VEHICLES APPROPRIATELY IN ORDER TO MINIMIZE FUGITIVE DUST AND APPLY WATER AS NECESSARY DURING LOADING OPERATIONS.

DISTURBED SURFACE AREAS OR INACTIVE CONSTRUCTION SITES:
1) WHEN ACTIVE CONSTRUCTION OPERATIONS HAVE CEASED, APPLY WATER AT SUFFICIENT FREQUENCY AND QUANTITY TO KEEP ALL AREAS OF VEHICLE PASSAGE AND PRIOR TO EXPECTED WIND EVENTS.
2) INSTALL FENCE BARRIER AND/OR "NO TRESPASSING" SIGNS TO PREVENT ACCESS TO DISTURBED SURFACE AREAS.

APRIL 2022

BUSH & GUDGELL, INC.
Engineers - Planners - Surveyors
205 East Tabernacle #4
St. George, Utah 84770
Phone (435) 673-2337

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1-800-662-4111

OWNER / DEVELOPER
JMCO, LLC
JAMES SULLIVAN
(435) 628-1961
1302 SOUTH 1000 EAST, 101
ST. GEORGE, UTAH 84790

ENGINEERING CONTACT
BUSH AND GUDGELL, INC.
205 EAST TABERNACLE #4
ST. GEORGE, UTAH
RICK METZE – PROJECT MANAGER
(435)-673-2337

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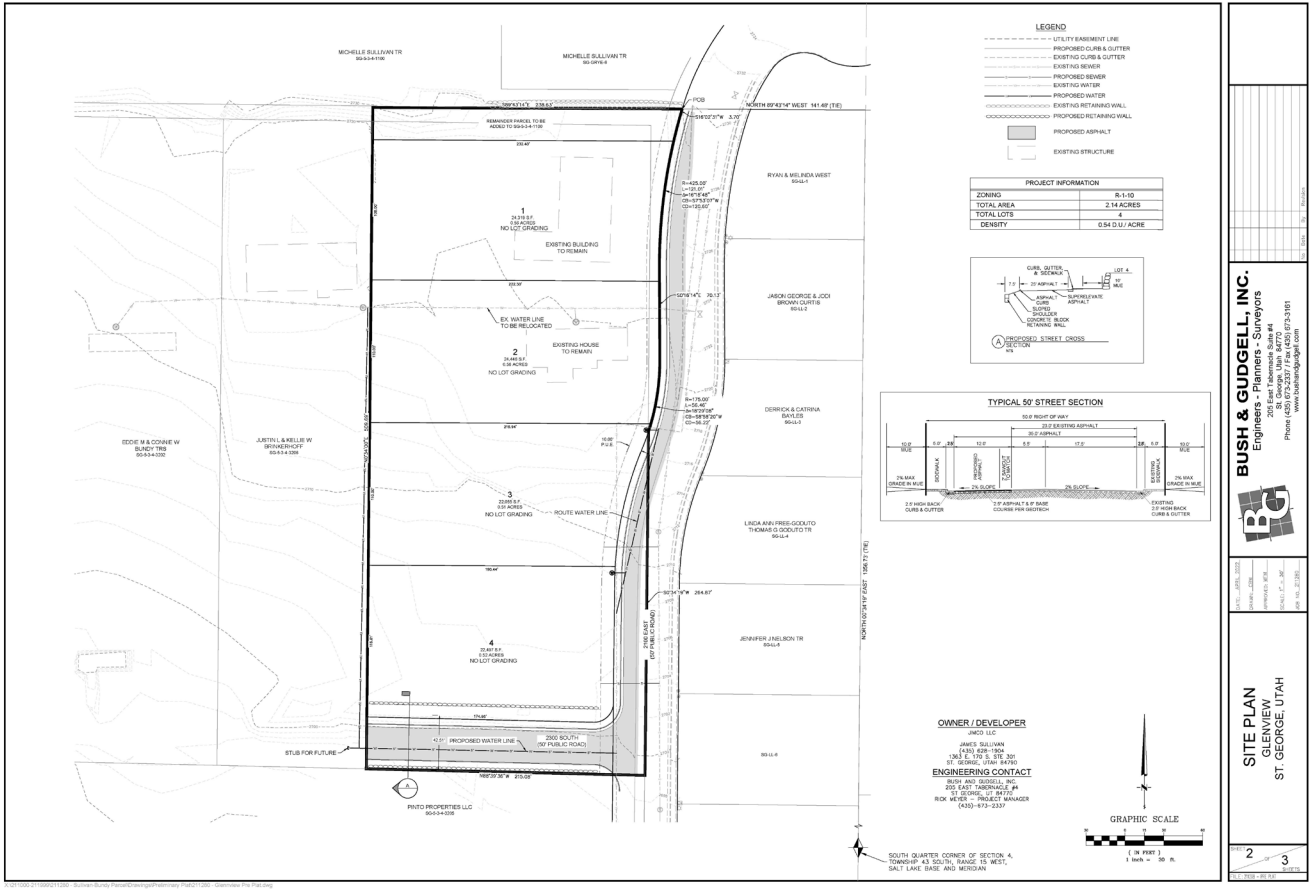
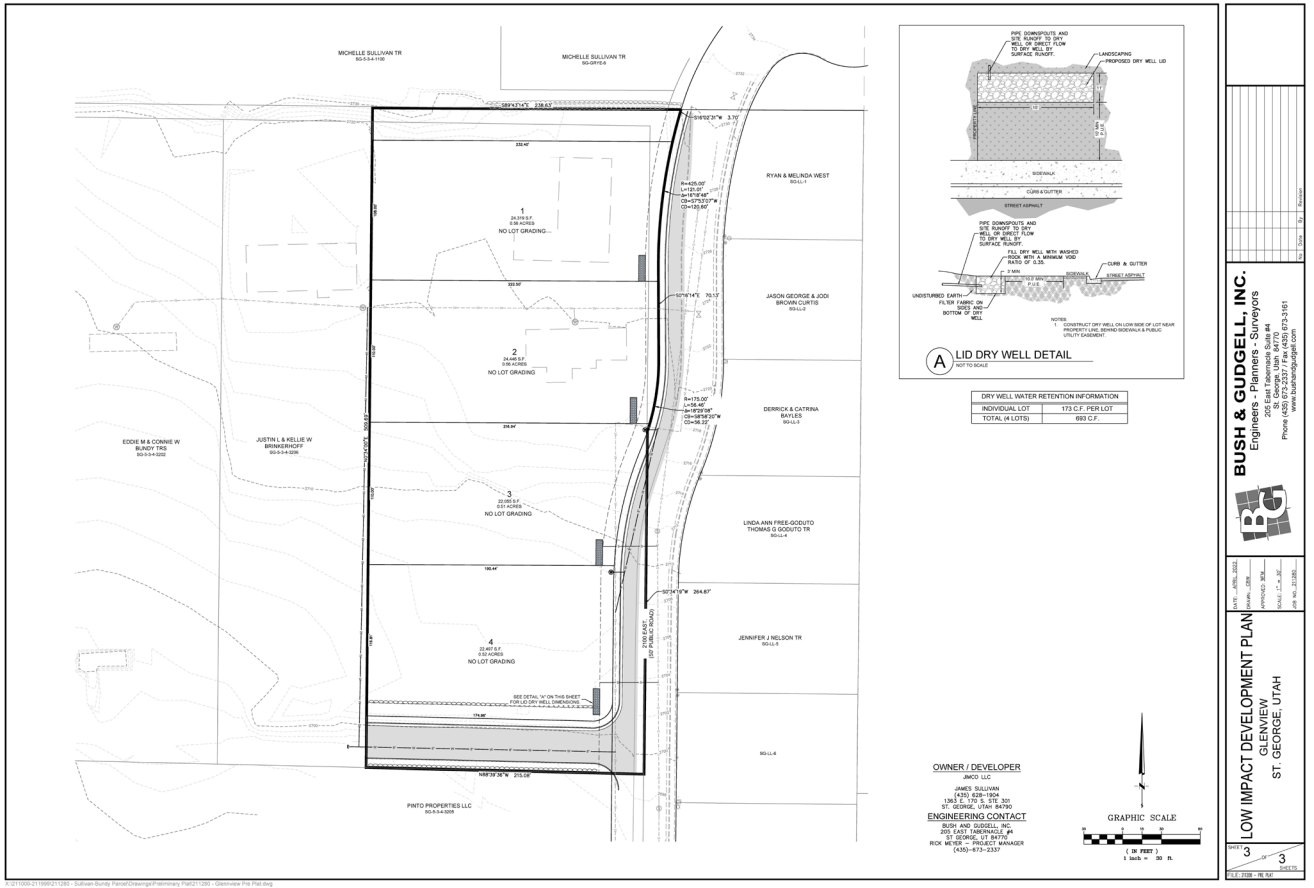
PRELIMINARY PLAT
GLENVIEW
ST. GEORGE, UTAH

SHEET 1 OF 3 SHEETS

Preliminary Plat – Glenview



Preliminary Plat – Glenview



Preliminary Plat – Glenview

St.George
Community Development

ITEM 6B

PRELIMINARY PLAT

PLANNING COMMISSION AGENDA REPORT: **04/26/2022**

PRELIMINARY PLAT
Divario Open Space Dedication Plat
Case No. 2022-PP-016

Request: To approve a preliminary plat to dedicate eight (8) open space parcels.

Location: The proposed open space parcels are located west of Diavrio Canyon Drive between Sunbrook Drive and Alienta Drive, within the Divario development.

Property:

Number of Parcels: 8

Density: N/A

Zoning: R-1-10

Adjacent zones: The proposed open space parcels are surrounded by the following zones: R-1-10, R-1-7, R-1-6, PD-R

General Plan: OS (Open Space)

Applicant: Rosenberg Associates

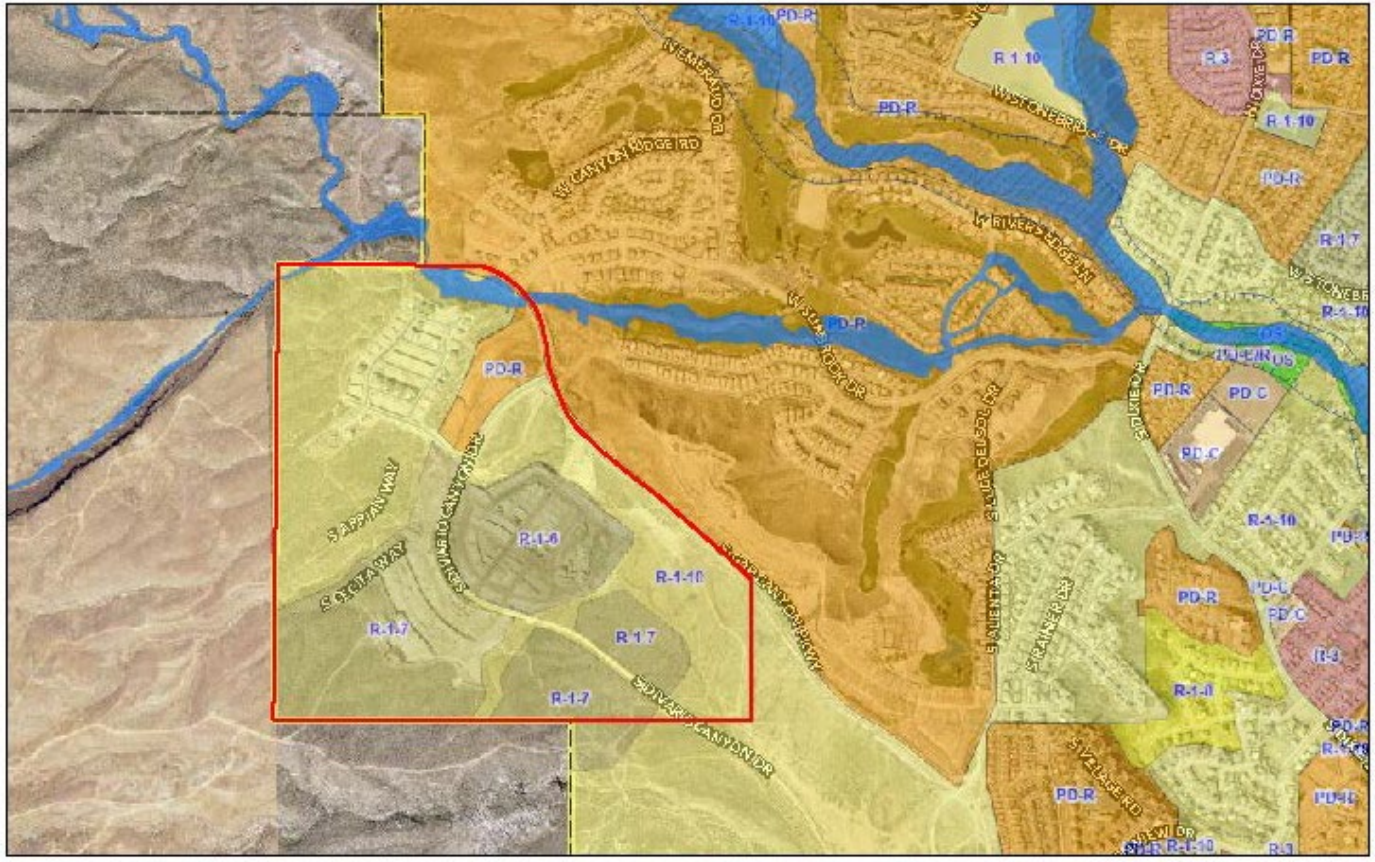
Representative: Rick Rosenberg

Comments:

Preliminary Plats

April 26, 2022

Preliminary Plat – Divario Open Space Dedication



Preliminary Plat – Divario Open Space Dedication

Preliminary Plat – Divario Open Space Dedication

PLANNING COMMISSION AGENDA REPORT: **04/26/2022**

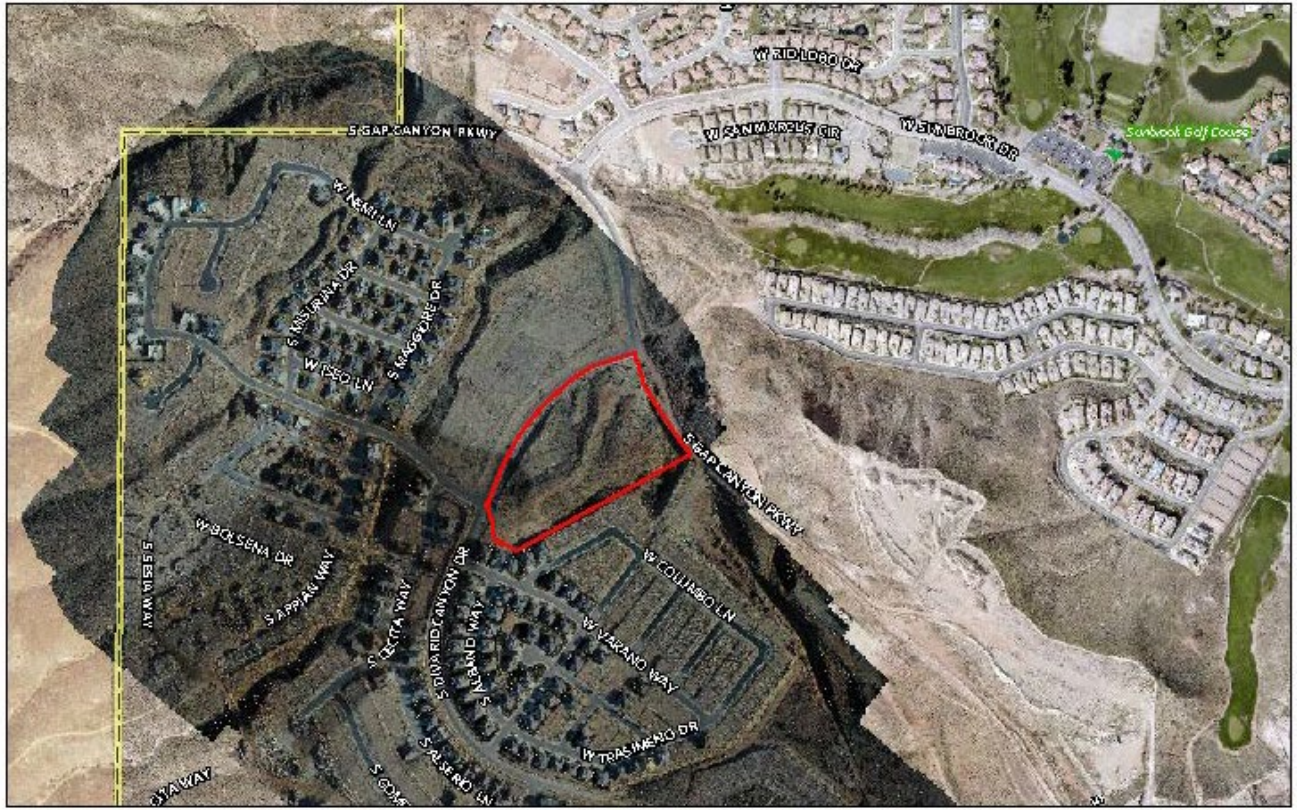
PRELIMINARY PLAT
Divario (PA-18)
Case No. 2022-PP-020

Request:	To approve a preliminary plat for a one (1) lot residential subdivision.
Location:	The site is located on the southwest corner of the intersection of Divario Canyon Drive and Gap Canyon Drive.
Property:	9.43 acres
Number of Lots:	1
Density:	N/A
Zoning:	R-1-10
Adjacent zones:	This plat is surrounded by the following zones: North – PD–R South – OS East – PD–R West – PD–R
General Plan:	HDR
Applicant:	Rosenberg Associates
Representative:	Allen Hall

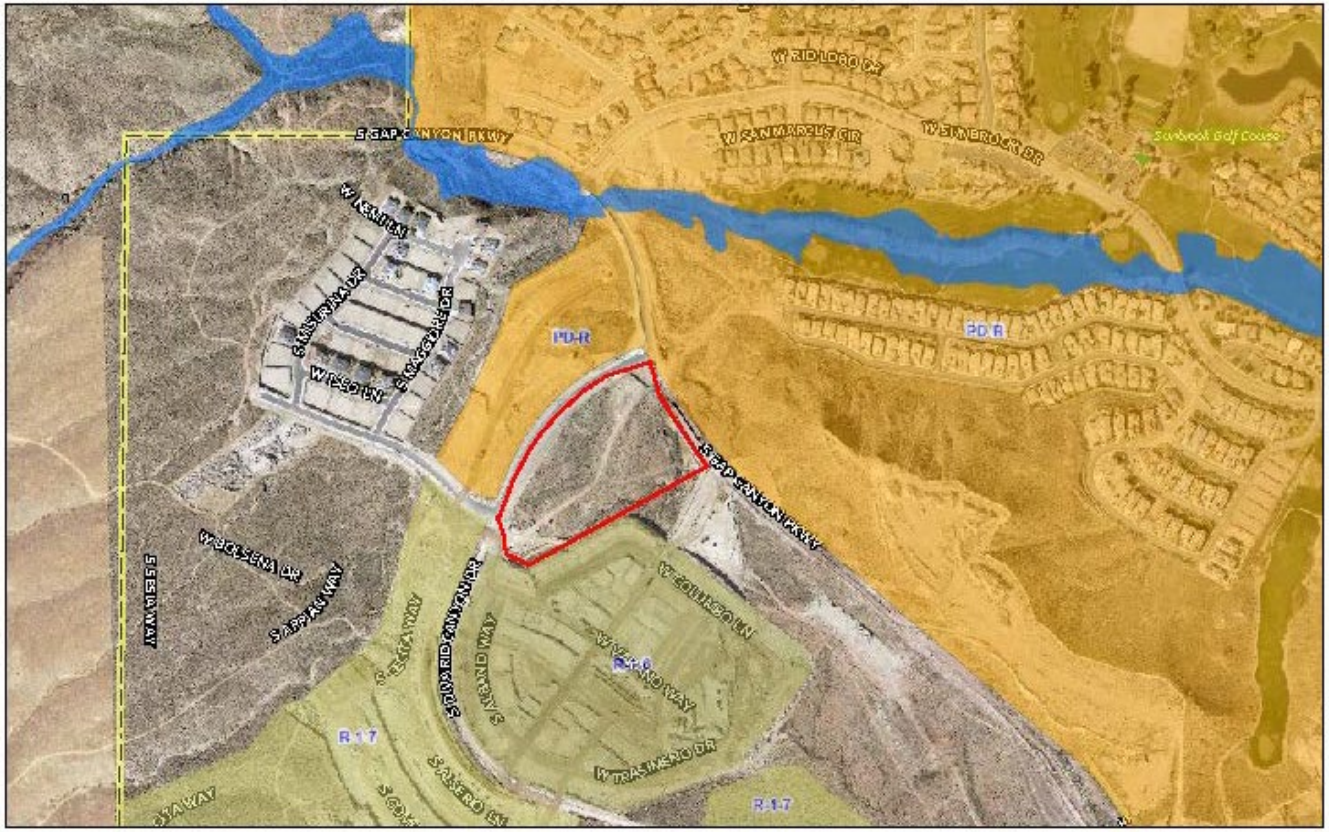
Comments:

Preliminary Plats

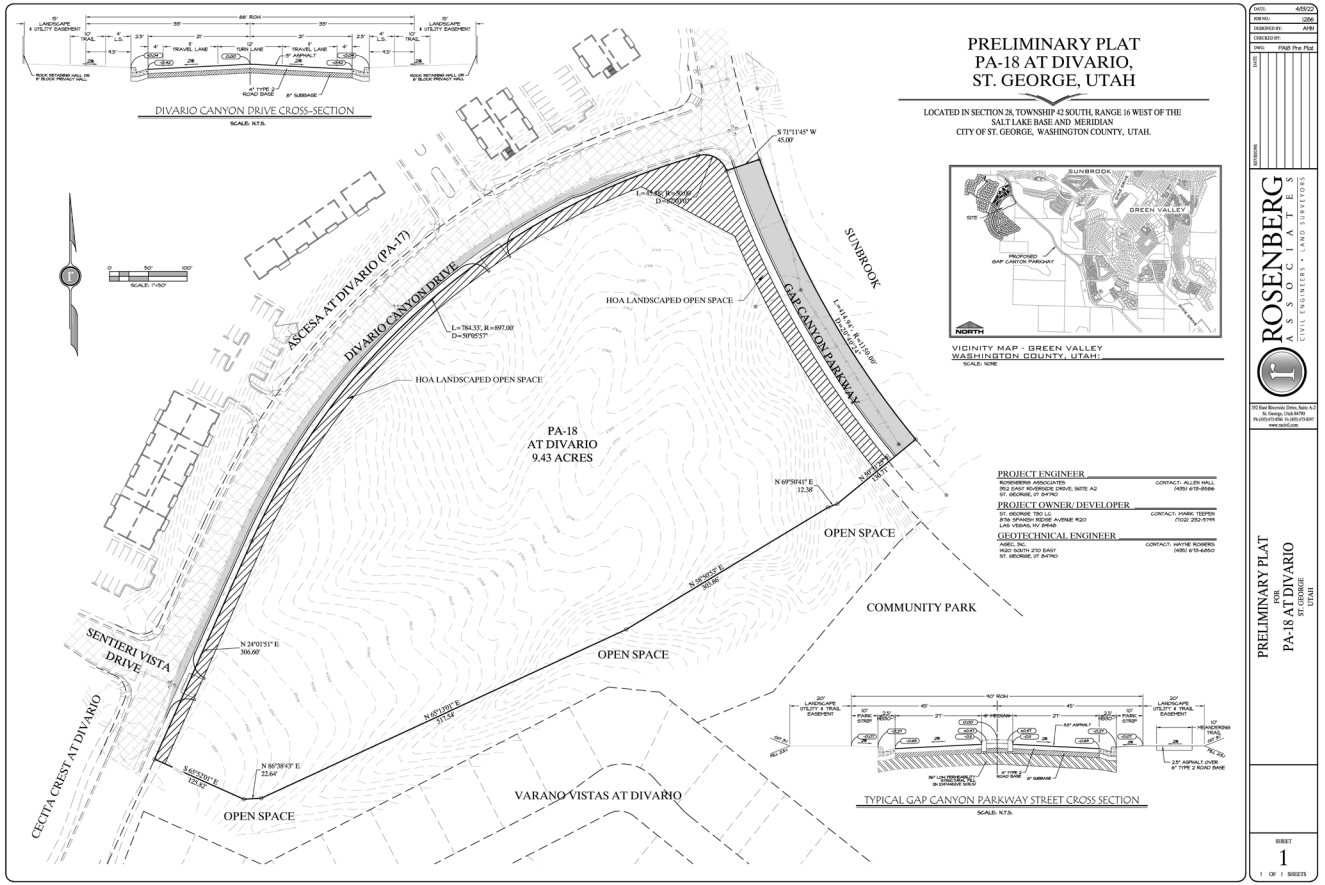
April 26, 2022



Preliminary Plat – Divario (PA 18)



Preliminary Plat – Divario (PA 18)



Preliminary Plat – Divario (PA 18)

PLANNING COMMISSION AGENDA REPORT: **04/26/2022**

PRELIMINARY PLAT
Staybridge
Case No. 2022-PP-023

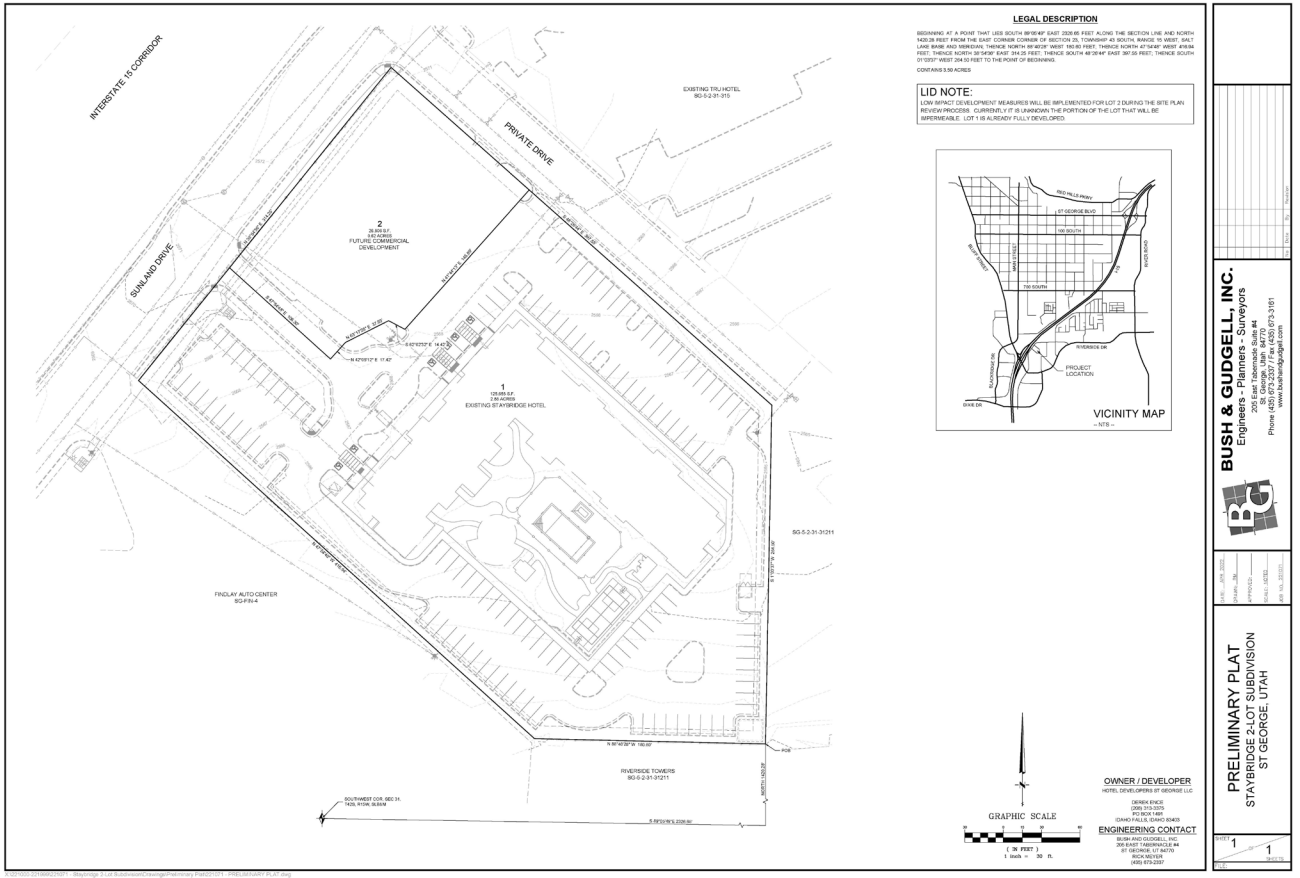
Request:	To approve a preliminary plat for a two (2) lot commercial subdivision.
Location:	The site is located at 1301 Sunland Drive.
Property:	3.50 acres
Number of Lots:	2
Density:	N/A
Zoning:	C-3
Adjacent zones:	This plat is surrounded by the following zones: North – C-3 South – C-3 East – C-3 West – C-3
General Plan:	COM
Applicant:	Bush & Gudgell
Representative:	Bob Hermandson
Comments:	

Preliminary Plats

April 26, 2022

Preliminary Plat – Staybridge

Preliminary Plat – Staybridge



Preliminary Plat – Staybridge

NOTICE OF MEETING
PLANNING COMMISSION
CITY OF ST. GEORGE
WASHINGTON COUNTY, UTAH

Public Notice

Notice is hereby given that the Planning Commission of the City of St. George, Washington County, Utah, will hold a **Planning Commission** meeting in the City Council Chambers, 175 East 200 North, St George, Utah, on **Tuesday, April 12, 2022**, commencing at **5:00 p.m**.

PRESENT: Chairman Ray Draper
Commissioner Emily Andrus
Commissioner Steve Kemp
Commissioner Nathan Fisher
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West

CITY STAFF: Community Development Director John Willis
Assistant Public Works Director Wes Jenkins
Deputy City Attorney Jami Bracken
Planner III Dan Boles
Planner III Michael Hadley
Planner III Carol Davidson
Development Office Supervisor Brenda Hatch

EXCUSED:

Chairman Ray Draper opened the meeting, Commissioner West lead us in the pledge of allegiance.

1. **CONTINUED ITEMS**

Consider a request for zone change amendment to the Atkinville Interchange Area Planned Development Commercial (PD-C) zone. The applicant is seeking approval of their design and site plan for two new buildings on Lot 3 of the Kenworth Commercial Subdivision. This property is generally located on Desert Color Parkway at approximately 4500 South in St. George, Utah. The applicant is Smith Payne Investments, and the representative is Brandee Walker. The project will be known as Moto United Business Park. Case No. 2022-ZCA-012. (Staff – Carol Davidson)

Carol Davidson presented the following:

Carol Davidson – This is a continuation. There were some items or concerns that the Planning Commission had, and they asked the applicant to go back and rework a few things. One of the items that was discussed was the test track that would be out by I-15, it dips down in below. The concerns were dust and noise. The applicant said that they will be using concrete so there won't be any dust. They didn't feel noise would be a concern, the track will only be in use from 9:00 am to 6:00 pm. The decibels will be 70 and the traffic from the interstate are about 80. They have reduced the footprint of both buildings. They have taken off a total of about 20,000 sq. ft. They did update the parking; Carol described the calculations found on the updated slide. I did some quick calculations, there are a few combinations of uses that will work with the new parking that they provided. They are proposing to keep the entrance on the north and it will line up with the Desert Color master plan. The access on the south will be shared with the lot next door so they will meet our access management policy. They will be changing the outside colors of the building; they are taking the red out. It will basically be black and white. They are saying that the signs will be the color for the building as opposed to the red. The staff recommendations are the same. I

did add a couple, that there will be a shared parking agreement between building number 1 and building number 2 as well as a shared access agreement with the lot to the south.

Commissioner Kemp – Can you tell me the amount of square footage and the parking calculations?

Carol – Carol described the way the applicant broke the parking down, shown in the packet.

Commissioner Kemp – That doesn't add up.

Carol Davidson – You can ask the applicant about that.

Brandee Walker – Building number 1 has a ratio of 1 to 763 sq ft. There are actually 150 spaces that will be dedicated to building 2. There are 290 total. I think the red was removed due to having multiple manufacturers they were representing.

Commissioner Kemp – So that means building 2 would be single story, no second floor?

Brandee Walker – That is correct.

Chair Draper – We want to make sure there are no outside displays or anything. Are any of the vehicles going to be on the outside like they do now?

Brandee Walker – The owner doesn't want the track to be dirty because there is no outdoor display, and it will all be inside. We don't want it to get the inside dirty.

Commissioner Anderson – I think it looks good; they added a ton of parking. The track will be concrete, no dust.

Commissioner West – Yes, thank you for taking the time.

Commissioner Kemp – In these type of buildings there is almost always a mezzanine component, they have stated that they will not have that component. Would it be appropriate to condition this on not adding more space because we just don't have the parking?

Jami Bracken – You could condition that no square footage be added.

John Willis – When they submit a building permit it is routed to planning. Anytime they ask for something that would add an additional use there would be a parking requirement.

Commissioner Fisher – What if they sold the property and then the new owner changed the use would anything trigger the parking requirement?

John Willis – There are two things that would trigger that, the business license as well as a building permit.

MOTION: Commissioner Anderson made a motion that we give a positive recommendation for Item 1 with all of the staff's recommendations
SECOND: Commissioner Andrus
ROLL CALL VOTE:
AYES (7)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Nathan Fisher

Commissioner Austin Anderson Commissioner Lori Chapman Commissioner Elise West NAYS (0) Motion Carries unanimous recommend approval

2. GENERAL PLAN AMENDMENT (GPA) *(Public Hearing)* Legislative

A. Consider a request for a general plan amendment to change the land-use map from Commercial (COM) to High Density Residential (HDR) to on approximately 10.13 acres generally located on the west side of Dixie Drive just south of Gap Canyon Parkway. The applicant is Tonaquint Inc, and the representative is Tim Stewart. The project will be known as Dixie Drive Apartments Case No. 2022-GPA-005. (Staff – Carol Davidson)

THIS ITEM WILL BE HEARD AT A LATER DATE

B. Consider a request for a general plan amendment to change the land-use map from Low Density Residential (LDR) and Medium Density Residential (MDR) to Professional Office (PO) and Commercial (COM) on approximately 7.36 acres generally located on the southeast quadrant of River Road and 1450 South Street (Please see map on back). The applicant is RCSG, LLC, and the representative is Richie Webb. The project will be known as River Crossing Case No. 2022-GPA-006. (Staff – Carol Davidson)

Carol Davidson Presented the following:

Carol Davidson – You saw this in January for a general plan amendment however that was for the entire parcel to go to commercial. The proposal is about 5.5 acres will be commercial with professional office on the east side then on the south side do a strip of open space. There is residential on the other side of the office so they would be required there. The only zone they would be allowed to have would be an AP zone so they will have to set the building back for every foot that's over 15 ft they would need to step back an additional foot. So, it would be 10 ft plus 1 additional foot for every foot over 15 ft. That will ensure that they have a significant amount of buffer there on the east side.

Commissioner Andrus – Do we know where the accesses are?

Carol Davidson – It will just be the one that connects it to River Road.

Richie Webb – I will not be here to see this project through, I do have Trevor Anderson here who is our partner, and we will have him come up and answer questions as well. We worked with the City trying to consider the factors why this was not approved at the City Council level. We discovered that it was about the buffer. Our intent is to create that transitional effect using both office and open space. We feel like with those changes we are trying to be responsive to the concerns of the City Council and the concerns of the citizens of the area. We talked a lot about traffic and how creating this neighborhood commercial would help with some traffic. It is helpful in reducing the length of travel to other commercial projects.

Trevor Anderson – We take very seriously the concerns of the project. Traffic was the number one item and also a buffer to residential. Trevor read from the existing general plan regarding small neighborhood commercial. With the road expansion on 1450, River Road is always very busy. To have a pod of commercial here then you don't have to drive so far to get certain items. This will create an opportunity to have less travel time. As a residential buffer, I think it is important that the neighbors are heard on this. They have expressed concerns about both the visual corridor and the buffer, I think those have been addressed.

Chair Draper – Can you tell me how wide that open space is on the south?

Trevor Anderson – It is about 30 ft. Then the buffer where everything over 15 ft is another foot of setback.

Commissioner Anderson – Where do you anticipate the access on River Road?

Wes Jenkins – The access points have already been established.

Commission Anderson – Will it tie into 1450 at all?

Wes Jenkins – Yes that is anticipated.

Commissioner Andrus – If this stayed residential would the access stay the same?

Wes Jenkins – Yes.

Commissioner Kemp – How would you feel about sliding the bubble back? You are the same height as the medium density residential homes there. So, reorienting your office and your PO to include more against the open space would make more sense because you are probably looking to go at least 2 stories.

Richie Webb – To answer your question is that we would be fine doing that.

Carol Davidson – You can go up to 50 ft in PO.

Discussion continued on orientation of the PO and commercial versus PO on the south side.

Commissioner Chapman – If it stays in the MDR what kind of height restriction will there be?

Carol Davidson – It is 40 ft.

Commissioner Kemp – I see problems with the accesses, it needs to line up with the access across the street and if it's residential.

Discussion continued on the access.

Chair Draper opened the public hearing.

Kent Bushleg – I live in the Boulders; I really appreciate Steve Kemp's thoughtful discussion. I was on the Hillside Review Board for 10 years in the past, reporting to this Planning Commission. I've also been Chairman of the Board of the Utah Geological Survey; we produced a comprehensive document under my watch naming the building hazards for zoning and development in St. George. In addition to that I have been a member of Vision Dixie. I have sat on many committees to try and create a better vision here for the City of St. George. Along those lines we are talking about an amendment to change the general plan. I am talking about the comprehensive study by the best people around over the years to decide what the highest and best use of the land. The general plan is a reflection of community values, not the developers' values, of what we want in our neighborhoods and what the community wants as a whole. Read from section 6.3 What we have here is a transition zone from the Boulders and the Boulders Villas on the other side. The Boulder Villas show how a buffer zone can be created that is quite amenable to what we already have. It's been there for a while, on a major arterial, that qualifies what the master plan is all about and we want to preserve that. I ask that you turn down this request. Thank you.

Laurie Puzlick – I have worked with travel, with transportation planners, with City people, 3 or 4 different developers. I just want to let you know that the St. George City Council have denied this request 5 times before and they've upheld residential in this area. We worked with the previous developer to come up with 55 uses, the only thing we asked that they limit is the use of drive thru restaurants. The City Council upheld that then the new City Council overturned that. The reason residents cared about that is because fast food restaurants generate

about 9 times or more the traffic that a residential use will. We heard for years and years, this is what the applicants say that they want to have the highest and best use by providing a neighborhood shopping destination. However, the previously approved commercial areas around it will have considerable retail opportunities and the amount of commercial in this area that has already been approved, or will be approved, far exceeds other places in the City bordering on a residential area. According to a meeting the neighbors had with the developers, the developers said the following will be included in their adjacent development and this is important, because it tells us what could possibly go right next door. McDonalds and Starbucks, the number 1, and number 2 franchises in America. Please listen to who is going there, Jersey Mike's, a dry cleaner drive thru, a hot tub franchisee, a smoothie franchisee and possibly a mid-sized sporting goods store. This mix of retail already favors fast food and drive thru services. Which the neighbors have asked to have limited for a more efficient mix of retail. Which will also mitigate the impact on air quality, traffic, lighting, noise. If this part goes commercial we have potential to have more of the same and what you have is a fast food, drive thru court. That's essentially what we have and what we have the potential to have. We already have a tremendous amount already going in there with lots of variety, so I don't believe we need another one.

Jinx Dabney – I am an attorney; I have been living in the Boulders for about 10 years and in St. George 25 years. I have been here this whole time and I am getting tired of coming over here and talking about this same piece of property. I would like a developer who would come here and say we have a plan, and it makes sense to us, and it's not going to rip up the general plan and rip it in half. But we've got a plan to use this and get pretty good use out of it and it makes sense and it's not going to affect much traffic, lighting and noise and other things. This is our plan and we're so comfortable in this that we will make a deal with you, you approve this plan which we think is a good one and if you don't approve it then we're done, you're never going to see us again. We'll put anything int there you want us to put there, we're done. That would have saved me and a lot of others a lot of trips over here discussing this with the Planning Commission and the City Council. Those of us that live in the Boulders have been very actively involved in this and we are getting tired of this. They should have been able to do something better because every time there is a change of owners, everything changes. I do not understand how that little piece of professional office and then the commercial how that modification, from the one that was turned down by the City Council, how that is substantially different from the plan they were turned down by the City Council. I understand words, that's how I make my living and if it's not substantial then you should approve it. Do you really think this is substantial?

Walt Baker – Showed where he lives. From my perspective the ship has probably sailed on can we just have Medium Density Residential here. The houses in the Boulders sit 50 to 60 ft higher and their back yards are toward this development. We sit right next to this with the block wall. All our homes are ground level without second stories. I am really concerned about an office building overlooking our homes. The access is a concern. You go to Summit Athletics, and it is really busy. You take your life in your hands trying to cross to the trail system. I think the City should consider a light there.

Lois Howard – I live next to Walt Baker. Our home is behind where it says commercial. I am a little concerned about the open space on the hillside and nothing next to our wall. Something needs to be done here because it is a mess. The tumble weeds were surrounding us from last night and it's all coming from this open field. I think we need to plan some green space between and if commercial goes in to plan it, so it isn't just parking lots and lights and lots of cars and things that would decrease our standard of living, having it right behind us. That wall isn't really 8 feet, I can kind of look over it so it's more like 6.5 ft. Those are our concerns. We just feel like we are caught in a crunch here if these changes go forward. I would really love to see it stay medium density residential and put in some more homes. Or at least do a combination of that and the professional buildings. I think they work well across the street where they've done that. It would be great to get a Whole Foods store something other than fast food.

Don Kitchen – I am new here. One of the reasons we bought the house is because of the lovely view. We asked the real estate agent what the zoning was for the land that we are talking about, and she told us it was low density housing, and the Villas seem to be no problem. We don't want to lose our view, which would probably lower our

house values. I guess if worse came to worse, the professional office buildings, I liked Mr. Kemp's proposal to run the professional office building west to east because it's low-density traffic and usually closed on the weekends. The commercial we don't know what that is going to be but if it's fast food with drive thru, I opened some apartment buildings in California and I could tell what time of day it was by the smell in the air. The Boulders will get that also as well as the light pollution. I am for the housing; I'm opposed to the commercial and professional building.

Lon Reber – I am more supportive of low-density housing in that whole piece, however if they flip that office building east to west it will be better than it sits today. The problem we've got right now is in the rush hour traffic and with Summit Health Club people will not be able to come out and go west. If they want to go west and get to River Road they will have to go through Boulder Springs. That traffic comes down that road at 50 or maybe 55 mph to catch the left turn arrow. That is an unintended consequence that will get infinitely worse. It is really bad today coming out of Summit Health Club today.

Neil Walter – Couple of things I think are important to note. The drive thru locations on the north were approved after Covid. Many of those drive thru uses are not fast food. There is a financial institution and a dry cleaner. The property has been vacant for 17 years, that is because we are trying to come up with uses that make sense. We think that this particular plan is substantial in its efforts to remediate the impacts that have been described including the smell, light pollution, views, and traffic. Specifically, two of the comments about the Summit Athletic Club traffic, it is substantial and right now it cannot turn left onto 1450 South. But it actually will be able to make a right hand turn onto River Road and exit properly, which will reduce the impact and I think that it would be important, by connecting that cul-de-sac to River Road that will actually improve the traffic flows in this area and improve some of the safety from individuals trying to make that left hand turn or else using the neighborhood to circumvent traffic. As far as uses we are talking to apparel and grocery, we are not ready to make an announcement, I think those are desirable uses in the community. We are trying to enhance the buffer, enhance the space and be sensitive about the impact that might be closest to the neighbors there. It was just a couple of months ago that this Planning Commission approved a commercial general plan that was approved unanimously. This is a lesser impact than the one that this Planning Commission approved last time.

Chair Draper closed the public hearing.

Commissioner Anderson – Is 1490 East Circle a public street or is it private? I was a little concerned about this when it came through last time. The substantial comment, I don't think it is from what they turned in before. I am concerned about the buffer between the Villas, I think that's a valid point. I think there could be some kind of a compromise in that if they come off of that middle access connect to 1490 East Circle make that a public road and maximize that to the commercial but then leave the rest where you could do an extension of the Boulder Springs, I think you'd have a lot better transition, that's my opinion.

Commissioner Andrus – To answer your question, it is public. I disagree, looking at the general plan, I think commercial makes more sense in this space. And I think that because we have two neighborhoods that are there are already separated there is no connection between them, there is height difference, there is walls, that accesses onto River Road. I think that commercial will create more flow and more connectivity I think it would just fit better in this space. I appreciate the comments about buffer, I think that is also important, especially with that east side where it is closer to the same level, but I think that commercial makes a lot more sense. I also appreciate the comment from the broker, he said that those turns that would be going into Boulder Springs would now have an access to River Road to be able to turn right on to River Road.

Commissioner Anderson – They would have an access either way if you put that road all the way through. And you could even front commercial on both sides of that road. And then just do one street of residential behind it. I don't think you are losing any commercial.

Chair Draper – I would hope that they will only do a 2 story not a 4-story office building where the PO is. Those houses are very low, and I wouldn't want to walk out of my backyard and see that there.

Commissioner Anderson – Isn't it fair though if you buy a house and the zoning is low density that it will stay low density.

Chair Draper – If anything I have learned being on this committee for a number of years is that anything can change.

Commissioner Fisher – The issue here is just the general plan, what makes sense in this area. It would be nice to go back in time and tell the homeowners that this might be commercial, we can't. If you want to protect a view then you have to buy what is around your house.

Commissioner Anderson – I'm not here to protect the view. I just struggle to make that. Do you think it's a substantial change?

Commissioner Fisher – I think that it wouldn't be in front of us if staff didn't think it was substantial. It is subjective. I think changing it to PO is substantial. It's pockets like this that help us actually reduce traffic. The reality is this, it is medium density right now except for the sliver that is R-1-10. So that means if they did it in a cluster then they could have 3 story apartments there. Then we would be hearing complaints on the height and what apartments would bring.

Commissioner Anderson – It's the highest and best use and we need affordable housing so I think that apartments would be the highest and best use.

Commissioner Fisher – In this case I think it make sense for our city to have commercial here. I agree that there are traffic problems. I think providing commercial here will help reduce it.

Commissioner Kemp – What is the reasonable distance between traffic lights.

Wes Jenkins – The minimum is 1300 feet.

Commissioner Chapman – To say that this is a neighborhood bubble of commercial is disingenuous. The back portion I agree with Austin it should be apartments. We will hear about the height and the element which I don't agree with. However, if we approve that for a commercial or a professional office, I understand that we would hope they wouldn't go 50 ft, but they can. I think you would have to take that into consideration, you would hope they wouldn't, but they can. I don't know if it's possible to give them, it seems to me to perhaps bring the commercial line down a little bit to line up with across the road. Although I don't know because there is going to be a barrier there evidently. Maybe it comes down a little bit, but I don't think commercial is the best use there. I think the density that is there is.

Commissioner Andrus – To speak to your point about neighborhood commercial, it's not neighborhood commercial. And I don't think that it should be. I think that River Road and 1450 South are going to be two of the biggest roads in town and so this isn't neighborhood commercial, this is full on we're serving everybody that's coming from the freeway to the temple to the Southern Parkway and everywhere in between and I think that this is a good spot for commercial to service that kind of traffic that is going to be going in on that intersection.

Commissioner Kemp – Speaking to the point that was made about how are people making the movement from the Summit Athletic Club, right now how do they make that movement? She's right, they weave their way over through Boulder Springs and they get as far away from the intersection as they can so that they can buy enough time to make a left-hand turn. If they could come out of this cul-de-sac and come over to a full intersection, now granted they can't turn left because eventually there will be a raised median there, but a full intersection they then can make a right hand turn and they will have an opportunity at the light to do a U turn and go the other way. If

you have professional office as your buffer, it's open 9:00 to 5:00 and closed on weekends generally speaking. I would prefer a professional office all the way along the bottom there. From a commercial developer's perspective, the drive thru businesses are going to want to be as close to the major roads as they can get. Then you can have some of those other things. They will still need to come forward with a zone change where we will get another chance to guide the development.

John Willis – A lot of these are obviously zone change items, not general plan discussion. We will see those later. There are a lot of locations you can put medium density residential but commercial only operates in a high traffic area on major roads. Keep that in mind when you are making your decision, what are the major roads where it will thrive.

MOTION: Commissioner Kemp made a motion to approve the general plan amendment that they essentially go 50/50 with the PO and Commercial and wrap the PO around the residential.
SECOND: Commissioner Fisher
Commissioner Fisher – Would you consider less than 50%
Commissioner Kemp – I've been looking at the numbers and I don't think if you go less than 50%
John Willis – So it is a bubble, those details could be considered at the time of the zone change.
Commissioner Chapman – He is talking about going all the way to the cul-de-sac.
Jami Bracken – Again this is just a general amendment so the motion would be to allow PO on a 50% portion to the south and east and 50% commercial to the north and west with the open space strip as presented.
Commissioner Fisher – I think what he is saying is that the professional office would border the residential.
Commissioner Kemp – I'm trying to come to a quantifiable number.
Richie Webb – I thought it would be helpful to give our perspective, from what I'm hearing the neighbors to the east aren't particularly excited.
Jami Bracken – We have a motion on the table, it's not appropriate to make comment at this time.
Richie Webb – Can I ask is there an option to withdraw this request and come back with something that is more consistent with comments?
Jami Bracken – Yes, so prior to a vote, if you would like them to continue this matter, the motion maker can withdraw the motion. A continuation keeps your application alive and allows you to change things. If the change is substantial to what was presented then it would need to be noticed with a new public hearing. If the change is not substantial you can consider the comments made tonight.
Richie Webb – Then we would request a continuation.
Commissioner Kemp – I withdraw my motion.
MOTION: Commissioner Anderson made a motion to continue this item to a later date.
SECOND: Commissioner Chapman
ROLL CALL VOTE:
AYES (6)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Nathan Fisher
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (1)
Commissioner Emily Andrus
Motion Carries unanimous recommend approval

3. ZONING CHANGE AMENDMENT (ZCA) (*Public Hearing*) Legislative

A. Consider a request for an amendment to the Desert Color PD (Planned Development). The application is a request for approval of a zone change amendment in order to construct the next phase of Sage Haven in the Desert Color development. This proposed phase is 4.90 acres. This phase would create 100 new units of multi-family housing. The location of the proposed pod is in the north-east portion of Sage Haven on the north-east corner of Silver Birch Drive and Emerald Point Drive. Case No. 2022-ZCA-017 (Staff – Mike Hadley)

Mike Hadley presented the following:

Mike Hadley – This is a PD-R zone, there are currently 2 phases approved and this is the final phase for this particular area. With this development the required civic space is 5% for the entire pod. They do have a total of 7.29% of civic space for the entire pod. It will meet the parking requirements in the Desert Color Zone Plan.

Bob Hermandson – This development will have access to the amenities of Desert Color.

Commissioner Kemp – How far is it from this to the existing clubhouse?

Bob Hermandson – 1500 to 2000 feet. They do have access to it.

Commissioner Chapman – So the street parking is valid for guest parking?

Bob Hermandson – Yes it can be counted toward the parking in the Desert Color Zone Book.

Chair Draper opened the public hearing.

Chair Draper closed the public hearing.

Commissioner Chapman – That is not enough parking.

MOTION: Commissioner Fisher made a motion to recommend approval of Item 3A a zone change amendment to Desert Color PD Sage Haven.
SECOND: Commissioner Anderson
ROLL CALL VOTE:
AYES (7)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Nathan Fisher
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval

B. Consider a request for a zone change amendment to the Humane Society Planned Development Commercial (PD-C) zone. The applicant is seeking approval of their design for their medical clinic and pet resource center on

approximately 2.35 acres. This property is generally located at the northwest corner of 2860 E. and 850 North Street. The applicant is Humane Society of Utah, and the representative is Vaughn Maurice. The project will be known as Humane Society Medical Clinic and Pet Resource Center. Case No. 2022-ZCA-018. (Staff – Carol Davidson)

Carol Davidson presented the following:

Carol Davidson – I believe everyone remembers about a year ago they came through for a zone change to get their use permitted. Now they are ready to get their site plan and elevations approved. They are going to have a medical clinic and also a pet resource center. They will not have any entrances off of 850 North. The entrances will be off of the private drive. The public entrance will be across from the climbing gym. Up towards the north will be the entrance for the employees up at the far west side. Their locations all require a fence around the perimeter, the purpose of the fence is in case there is an animal that gets loose, they can shut the fences and the animal will be safe while they find it and bring it back to safety. They may have to work with public works on the location of their access, but we can address that with the site plan review. They are proposing 2 phases in case they can't find the funding for both phases. They would like to get the medical clinic done first. Neither phase will be taller than 20 feet. Carol showed elevations from the direction of the streets. They will have some outdoor areas for the dogs. When this was brought before, when they changed it to a PD, one of the conditions that was put on this is that the outdoor area be a courtyard as opposed to just being exposed out to the street. The landscaping in the photos is sparse, they will be required to meet our landscaping ordinance. There photometric plan does meet our regulations. Staff does recommend approval.

Vaughn Maurice – The proposed facility will house about 30 dogs and 50 cats at any time. We are projecting about 700 adoptable dogs and 450 adoptable cats each year. We will be employing about 27 employees. It will cost about 1.3 million dollars in employee expenditures. Our total budget will be about 3 million dollars. It will generally serve all of Washington County. As the human population grows so does the pet companion population. Over the next 20 years Washington County is projected to grow 149% and we have designed our pet resource center to meet the needs of the growing community over these next 20 years. After the City approves our proposal we will have a better idea of what the funding that will be needed for this facility. We already have over a million dollars ready to go on the project. Once we know that we can go on the project we will start a capital campaign and depending on how fast we can raise the funds, we have a phased approach, but hopefully doing everything all at once so that we can serve the community right away.

Chair Draper opened the public hearing.

Laurie Shultzen – We own the property across the street, our notice came a week after the hearing last time this was here, but this time the notice came yesterday. I don't think this fits with the area. I just wanted to make note that we aren't getting our notices in a timely fashion, public notice of the meeting. The traffic is bad. The traffic patterns need looked at. There is a 4-way stop there that has helped a lot with the number of accidents, but as that area grows we will need a light at that corner for sure and potentially where you come from Pine View, I wanted to make note to check what the number of traffic is there particularly at lunch and the number of accidents or near accidents. Whether it's with this facility or something else in this area, we've already seen an increase quite a bit with the climbing facility here, but this corner of the 4-way, I wish we could count how many times we see accidents outside our window. That is more of what I wanted to address versus what is actually going there. I do feel like it's not a great fit for the area, I don't like looking at the big jail fence right there, but I'm not necessarily opposed.

Chair Draper closed the public hearing.

Commissioner Kemp – My only comment is that the north entrance will need to be lined up with Cal Ranch.

Commissioner West – It's a beautiful building and I like the pictures of the animals.

MOTION: Commissioner West made a motion to recommend for approval to City Council the zone change amendment seeking approval of the design for the medical clinic and pet resource center.
SECOND: Commissioner Fisher
ROLL CALL VOTE:
AYES (7)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Nathan Fisher
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval

Chair Draper announced a short break.

4. ZONE CHANGE (ZC) *(Public Hearing)* Legislative

Consider a request to amend and extend the existing hillside overlay zone in your area (see attached map). The zone change would apply the hillside overlay zone to approximately 24 acres. The property is located generally north and west of the Red Hills Parkway and Middleton Drive intersection. The applicant is St. George City. The project is known as Hillside Overlay Amendment. Case No. 2022-ZC-013 (Staff –Wes Jenkins)

Wes Jenkins presented the following:

Chair Draper excused Commissioner Fisher from the rest of the meeting.

Wes Jenkins – We have done some research and looked back on why this ridge area wasn't included in the hillside overlay. Staff thinks it was just an oversight. You can still develop in the overlay zone; you are limited on what you can disturb in greater than 20% slopes. Anyone who develops property in slopes that are greater than 20% would need to go through the Hillside Review Board process.

Chair Draper – Why do you have to have that whole section in the overlay zone instead of just the over the 20%?

Wes Jenkins – We talked about that, we felt like it should just follow the property line, because again it wouldn't impact any of the less than 20%. If they were going to develop and they showed that they were not impacting anything greater than 20% they would not have to go to hillside. If they were proposing to develop into that ridgeline, then that would trigger it.

Chair Draper – So it's not going to stop anybody from developing anything on that property?

Wes Jenkins – No it won't. They can disturb some of the 20% a little of the 30% and none of the 40%. And really that what it's meant to protect more than anything, to protect those ridgelines and the hillside that are worth protecting. That's why we felt like this one was worthwhile. You can see the contours of the ridgeline that would then be protected. If there were areas of it that could be disturbed it allows the Hillside Review Board, Planning Commission and City Council to look at it and make sure whatever disturbance is happening, that the appropriate mitigation is provided instead of just scarring it and then walking away from it.

Commissioner Anderson – It looks like some of it has been disturbed already.

Wes Jenkins – Yes there may be some that was disturbed previously.

Commissioner Anderson – So if that was disturbed years ago would they have to deal with that now by doing this?

Wes Jenkins – No, you would have to make the argument that it was disturbed and that it was non-contiguous to the overall hillside. It's something we would have to look at. It is something we deal with quite a bit.

Jami Bracken – They wouldn't have to correct it, but if they came in to develop it or redevelop it then they would have to comply.

Wes Jenkins - It is on a case-by-case basis. It is really there to protect these demographic features and if any disturbance does occur decide what mitigation needs to occur. We couldn't find it or verify it, but we thought it was just an oversight and should have been included.

Jami Bracken - The language of the hillside itself refers to that hillside and that ridge in the actual language. But the map didn't show it, that is where the inconsistency was for staff.

Commissioner Chapman – So the line is just following the property line?

Wes Jenkins – Yes, and again if the property there is not over the 20% they wouldn't need to go to the Hillside Review Board. They would need to bring in a slope map to determine it.

Commissioner Chapman – So if I have a property that is not in that hillside overlay do I have to bring in that slope map?

Wes Jenkins – No you would not.

Chair Draper opened the public hearing.

Evan Moilan – I happen to be a person that lives behind the proposed line changes that you have in here. As you look at this we already have this supposed water park that is going in here which is nothing more than a container storage area right now. My neighbors and myself are concerned about how much of this mountain will be taken out, the other concern is that we will have a city road going through here. I'd like to see a lot more detail before anything gets approved. To approve this on one drawing with some lines on it is totally inappropriate.

Joseph Prete – I am here representing Red Development Investment. We submitted a written objection and I do want to make sure everybody has received a copy of that. You've all had a chance to review that letter, I won't review the background. Our argument first off is this should not be approved mainly from a legal rights in the development that is ongoing and has been since 2016/2017. The project has been moving forward, not as fast as we'd like but it has been steady and consistent without breaks. There have been a lot of things involved in this project including moving roads and a number of other things. We believe it is not lawful and the analysis could stop there. But it is also not ethical, it does not pass the smell test to lead a developer along for years and years granting approvals, working with the developer and then to change the rules along the way. This is the second rule change in the last couple of months. One is the moratorium to revisit the water issue that has held up our project and also this change with the hillside. Both of which delay the project, cause our client to go through a number of hoops. The City's position is there are no vested rights, that simply isn't the case. We have been steadily moving forward with this since 2017. I would also recommend to the commission that it is not wise to do this when the development is ongoing. It is always a bad idea and high-risk proposition for Cities to pass ordinances adversely affecting developers' rights who are in the midst of a big project. It just raises all sorts of flags, potential litigation. We've laid out the background, there are a number of things that suggest targeting, that suggest retaliatory action. It is just not a smart fight to pick. The developer is on the edge of considering litigation. I'm trying to get things resolved to avoid that, so I would recommend that this fight not be picked.

Bud Brown – Our property is on the east of that. If we do any type of development there then we need additional approval from the hillside board, is that correct.

Chair Draper – If it's over 20%.

Commissioner Kemp – You would have to have your slope analysis.

Bud Brown – So our ground is pretty flat, so there wouldn't be nothing there.

Jami Bracken – You would turn in the slope analysis and since you don't have anything greater than 20% then you wouldn't need to do anything else.

Bud Brown – Ok, so I'm for this.

Danika Moilan – I agree that this should be passed. I've been concerned in how much they are taking out there because they have had their tractor there taking out the mountain. This is going to cause settling; this is going to cause damage to my house. This has been an eyesore, a junkyard, there was piles of tires, old water slide tubes, all kinds of equipment, people are putting trash out there. It just doesn't seem like it's been an organized project but to allow someone to just dig out a mountain without proving that you're not going to harm someone's home is not ethical to me. We are right there on the preserve. I think it should be approved.

Trace Taggart – I'm glad that the planning Commission is taking a look at this. I am glad we are learning lessons from the past where our hillsides and our beautiful areas have been destroyed by development and later we say, "Oh my gosh, how did that ever happen?" Hopefully we are learning as we are growing, and I know we are quickly growing. I am in favor of this, I know my neighbors would be in favor of this. It is not preventing development; it is just making sure that it fits in with the community and neighborhood. We'd love to see the place developed and be in better shape, be in better use. I feel for the landowner. I think that my neighbors do agree this needs to be developed, but it needs to be developed responsibly and that's what we need to continue to do.

Joseph Prete – Yes it has been a pain that it has taken so long, but they are ready to move forward, the roads are in, the project is ready to happen. This is probably the best way to make that area move forward quickly is to not make this change today. Second, the digging into the mountain is not being contemplated at all in the project, any extraction that has happened so far has happened but there isn't further digging to do. They want to use that area but not dig into the hillside. Finally, I kind of find it incomprehensible the way that this is being proposed, my clients land, much of which is outside of the hillside, they are separate parcels, that have nothing to do with the hillside, they've got 4 different parcels here, it does appear to be targeting. And the map that show the slope does not reflect where the ridgeline really is, it makes it look much, much larger than the ridge is. The ridge is almost straight down and the area that appears to be sloped is flat land.

Commissioner Anderson – Is the developer cutting into the ridge that sticks out that is pretty substantial? That is not being developed by your owner.

Joseph Prete – They do intend to put a slide up here, but not to cut into the hill.

Janet Neve – They have dug out from that hill; there are several bucket loads of dirt across the street from that hill. It is on the more northeastern face. They moved the dirt across the street, and it is in piles. There are houses quite close to the edge. They have dug out the hill. Personally, I think it was inappropriate to even approve the project.

Jan Harmon – We sit right above there on Colorado about 49 houses. They are going into the mountain; I work from home, and we feel then going into the side of the mountain. There is a lot of rock, you can see them debasing that. We would like to be for that.

Chair Draper closed the public hearing.

Chair Draper – I don't think anyone is targeting anyone with this. It isn't going to hurt, in my opinion, to have this change like Wes has got drawn here because they can still build on any of that property that is buildable. My question to the commission is why is this going to be a problem if we approve this? I don't see where it's going to hurt a developer

Commissioner Kemp – I see it being a challenge because landowner is going to have to come forward and prove that their property is not 20% or greater. What I would propose is that we say let's redraw the map, show 20% or greater and that becomes the new ROZ line.

Commissioner Anderson – I agree with Steve, if we are saying we want to protect that little nub, then the map should reflect the language.

Jami Bracken – So the map would be amended to include the parcels up to the old Middleton Drive and then not the others?

Commissioner Kemp – To include anything over the 20%.

Commissioner Anderson – To include the ridge.

Jami Bracken – I don't know what the topo is and what the slopes are, but you would go down to where the 20% is? You can certainly make that recommendation to go down as far as whatever. And Wes is right, if you look at the entire hillside map it goes by property boundaries.

Discussion continued on why the flat land would be included and where the boundary should be.

Wes Jenkins – Basically when you develop a piece of property you have to contour it anyway because you going to determine what your cuts and fill are for the grading. You have to do a geotechnical report anyway because you have to determine what your bearing and the pressures of your soil are and what they can support. To me it doesn't seem like it's an issue anyway.

Commissioner Kemp – Would you be opposed to do a slope analysis right now and say here's what's 20% or above, draw the line there and we're done.

Wes Jenkins – I think if you really have some angst about it I would say from Middleton northward because that's where you get into the slope and if you want to draw that as a line, that's great we can do that too.

Commissioner Kemp – The ground on the north side has been disturbed multiple times and it is below 20%.

Wes Jenkins – You do have a little bit, but like I said, when they develop that property they will contour it anyway, all you have to do is add the colors on your map to say what's greater than 20 what's greater than 30.

Discussion continued on the topo of the area and how much a developer would need to show of the topo.

MOTION: Commissioner Andrus made a motion to recommend approval of an amendment to the Hillside overlay zone to include what is north of Middleton Drive.
SECOND: Commissioner West
ROLL CALL VOTE:
AYES (4)
Chairman Ray Draper
Commissioner Emily Andrus

Commissioner Austin Anderson Commissioner Elise West NAYS (2) Commissioner Steve Kemp Commissioner Lori Chapman Motion Carries unanimous recommend approval

5. <u>ZONING REGULATION AMENDMENT (ZRA) (*Public Hearing)* Legislative</u>

Consider a request to amend portions of the city zoning ordinance, Title 10, as it relates to the St. George Arts District Overlay Zone (Section 10-13E). The applicant is the City of St. George. Case No. 2022-ZRA-001 (Staff – Carol Davidson)

Carol Davidson presented the following:

Carol Davidson – Staff had discussion about our Arts District and our Landmark Designation with City Council. We are proposing two changes tonight. One is to change the criteria to become a local landmark and the other is the Conditional Use Permit Designation. The first change is to letter B, it used to say that the building must be constructed before 1970 we are proposing to change it to 100 years old. That is stricter than most cities and the national designation they are 50 years. The second part is to change the Conditional Uses, we are only changing number 1 to the requested use is limited to low impact professional office, or retail or restaurant use and does not include short-term rentals or hotel.

Commissioner Andrus – Was the 100-year staff's recommendation or City Council's?

Carol Davidson – It was City Council's.

Commissioner Chapman – I wonder if there are any homes left in the downtown that could be considered.

Jami Bracken – There are actually quite a few from the 1920's and 30's that will soon be 100 years old.

Commissioner Kemp – You mentioned that you are hiring a consultant to do a reconnaissance level survey. Why don't you just start with the county and have them query their system.

Jami Bracken – We got a grant to do the survey.

Commissioner Kemp – I doubt there are many that will be over 100 years old.

Jami Bracken – There is another factor that we haven't talked about, the housing market is a big deal, affordable housing is a big deal. There was a study done that shows how many houses are being taken off the market for short term rentals. The amount is staggering.

Discussion continued on the survey.

Carol Davidson – I also wanted to add on the survey, the Arts District, which is the geographical area we are talking about, right now it does not qualify to become a national historic district. With the reconnaissance level survey in that area that is the first step and then we need to get another survey done and then we can actually apply for that to be a national historic landmark, the actual district. With that, it will give tax incentives for rehabilitation to those buildings, for the owners. That is a positive for us for getting the survey.

Chair Draper opened the public hearing.

Chair Draper closed the public hearing.

MOTION: Commissioner Kemp made a motion to recommend to City Council Item 5 as written by staff.
SECOND: Commissioner Anderson
ROLL CALL VOTE:
AYES (6)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval

6. PRELIMINARY PLAT (PP) Administrative

A. Consider a request for a nineteen (19) lot residential subdivision known as Stonebridge Estates located south of the intersection of Crimson Cliffs Way and 2450 South. The property is 16.47 acres and is zoned RE-20/RE-37.5. The applicant is Bush & Gudgell, representative Rick Meyer. Case No. 2022-PP-011. (Staff – Wes Jenkins)

Wes Jenkins presented the following:

Wes Jenkins – You recently saw this come forward for the zone change. They will be required to improve 2450 on the south and 3450 and Medallion Drive here. They will be dedicating a portion to the City for the irrigation and storm drain line.

Commissioner Chapman – I can see on the west side that the road is made so they can connect it to the next are but on the other side it looks like it doesn't connect, is it not connectable to what is already there?

Wes Jenkins – That is the boundary line between St. George and Washington.

MOTION: Commissioner Andrus made a motion to recommend approval of Item 6A a 19-lot subdivision of Stonebridge Estates.
SECOND: Commissioner Anderson
ROLL CALL VOTE:
AYES (6)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval

B. Consider a request for a seventy-seven (77) lot residential subdivision known as Tonaquint Ridge Phases 4-6 located at approximately 1900 West and 2400 South. The property is 33.2 acres and is zoned R-1-10. The applicant is DSG Engineering, representative Logan Blake. Case No. 2022-PP-012. (Staff – Wes Jenkins)

Wes Jenkins presented with no further comment.

MOTION: Commissioner West made a motion to recommend approval to the City Council Item 6B a 77-lot residential subdivision known as Tonaquint Ridge phases 4 through 6.
SECOND: Commissioner Anderson
ROLL CALL VOTE:
AYES (6)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval

C. Consider a request for a four (4) lot commercial subdivision known as Kipp/Seint Commercial Condominium located at 84 West and 1470 South. The property is .86 acres and is zoned C-2. The applicant is Brown Consulting, representative Marc Brown. Case No. 2021-PP-014. (Staff – Wes Jenkins)

Wes Jenkins presented the following:

Wes Jenkins – They constructed a building where the tennis courts used to be and they will be creating a 4-lot commercial development and then the rest will be common area, the parking and so forth will be common area to the development.

Commissioner Kemp – Will the access be from the sides? The east and the west?

Dave Kipp – We're going to be off 1470.

Commissioner Kemp – No I mean the accesses to the building. The doors.

Dave Kipp -Yes, the accesses are on the east and west.

Commissioner Kemp – So one large lot on the west and 3 smaller lots on the east?

Dave Kipp – Correct.

Discussion on what the buildings look like and who may occupy them.

MOTION: Commissioner Anderson made a motion to recommend approval of Item 6C a request for a 4-lot commercial subdivision known as the Kipp/Seint Commercial.
SECOND: Commissioner Andrus
ROLL CALL VOTE:
AYES (6)
Chairman Ray Draper

Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval

7. MINUTES

Consider a request to approve the meeting minutes from the March 22, 2022, meeting.

MOTION: Commissioner Kemp made a motion to approve the minutes from the March 22, 2022, meeting.
SECOND: Commissioner West
ROLL CALL VOTE:
AYES (6)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Austin Anderson
Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval

8. CITY COUNCIL ACTIONS

John Willis the Community Development Director will report on the items heard at City Council from the April 7, 2022, meeting.

1. ZCA Goodboro Townhomes
2. ZCA Grandview Townhomes
3. CUP Camping World
4. PP White Dome Commercial Plaza
5. PP White Dome Apartments
6. PP Goodboro Townhomes

9. Adjourn

MOTION: Commissioner West made a motion to adjourn at 8:19 pm
SECOND: Commissioner Andrus
ROLL CALL VOTE:
AYES (6)
Chairman Ray Draper
Commissioner Steve Kemp
Commissioner Emily Andrus
Commissioner Austin Anderson

Commissioner Lori Chapman
Commissioner Elise West
NAYS (0)
Motion Carries unanimous recommend approval