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Civil Engineering
Surveying
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Water & Wastewater Engineering
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Environmental Sciences
Landscape Architecture
Land Planning

CONCEPTUAL WATER REPORT FOR THE PLATEAU DEVELOPMENT

Carson City, Nevada

Prepared for:

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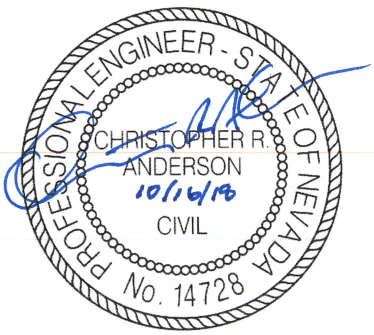
Job No. TIVCCNV01
October 16, 2018



Exp:12/31/18

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ABBREVIATIONS

ADD	Average Daily Demand
ac	Acre
ac-ft	Acre-feet
bgs	Below ground surface
CCMC	Carson City Municipal Code 2005
cfs	Cubic feet per second
EDU	Equivalent dwelling unit
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
ft	Foot
ft^3	Cubic foot
fps	Feet per second
GIS	Geographical Information System
gpm	Gallons per minute
gpd	Gallons per day
Max.	Maximum
MDD	Maximum Daily Demand
MG	Million gallons
NV	Nevada
PHD	Peak Hourly Demand
PRV	Pressure reducing valve
PVC	Polyvinyl Chloride
vel.	Velocity
yr	Year

1 INTRODUCTION

1.1 Purpose of Study

This report presents the data, methodology, and results of a conceptual water design report for the Plateau Development tentative map and zone change to remainder parcels. Adjacent remainder parcels that are being rezoned to multi-family and General Commercial are included in the analysis.

Future Final Maps and final designs will incorporate detailed water modeling, technical reporting, and design.

This report documents the existing and proposed water demand conditions of the proposed project:

- Existing and proposed water infrastructure
- Existing and proposed water demands
- Compliance with Carson City Municipal Code 2005 (CCMC) and/or other applicable ordinances

1.2 Project Location and Description

The Plateau Development project site is in eastern Carson City, south of U.S. Highway 50 around Drako Way, located in Township 15 North, Range 20 East in portions of Sections 1 and 12.

Water infrastructure does not currently exist at the subject site. The nearest water line is a 12-inch PVC line in the 4880-Basin Pressure Zone at the east end of Morgan Mill Road. Prior buildout scenarios show water lines planned under Drako Way, Astro Drive, Unicorn Drive, and Carabou Drive in the General Industrial zoned area (Black & Veatch, 2010).

Figure 1-1 shows the location of the project site. The site is not located in a FEMA flood zone. Relevant FEMA flood maps define the area as *outside the 0.2% annual chance flood.* Exhibit 1 shows the FEMA flood zone mapping adjacent to the Plateau Development and the remainder parcels.

Exhibit 2 shows the existing water system and pressure zones at the site.

Figure 1-1: Location Map

[Google Maps: https://www.google.com/maps/search/google+maps/@39.1897644,-119.7016629,4292m/data=!3m1!1e: accessed 10/10/2018]

2 METHODOLOGY AND ASSUMPTIONS

The existing zoning at the Plateau Development site is General Industrial. The proposed zone change and tentative map include the following land uses for the Plateau Development and the remainder parcels:

- 270 Single Family Residential lots on 67.89 acres
- 18.53 acres Multi-Family
  - Estimated 250 EDUs
- 13.81 acres General Commercial

Water system modeling is not included in this conceptual design report. Water system modeling will be performed as part of the final design and plans. Water line sizes shown on the tentative map and report exhibits are conceptual and based on the buildout water line sizes in the 2010 *Integrated Water Supply and Facility Plan* (Black & Veatch, 2010).

Existing and proposed conditions water demands are estimated based on the Carson City Will-Serve Letter requirements effective July 1, 2015. Ac-ft are converted to average daily demand.

Demand estimates are calculated using the unit demands in Table 2-1.

Table 2-1: Water Unit Average Demand Rates

Land Use Category	*Average Demand*	*Units*
Single Family Residential (SFR)=	1	ac-ft/yr/EDU (>12,000 sq. ft.)
Single Family Residential (SFR)=	0.6	ac-ft/yr/EDU (<12,000 sq. ft.)
Apartments/Multi-Family (MF)=	0.3	ac-ft/yr/EDU
Commercial/Industrial=	1	ac-ft/yr/ac
Landscaping=	4	ac-ft/yr/ac (grass)
Landscaping=	2	ac-ft/yr/ac (desert)
Landscaping=	0	ac-ft/yr/ac (desert)

The following peaking factors are used.

- MDD=2.05 x ADD
- PHD=2.0 x MDD

2.1 Pipe Sizing Criteria

Water main sizing and system design will conform to the Carson City Municipal Code Division 15.3 and NAC 445A.65505 to 445A.6731, inclusive.

2.2 Water Storage

Water storage for operating, emergency, and fire supply use the following criteria.

2.2.1 Fire Storage

Fire storage estimates for existing and proposed conditions are based on the following:

- Single Family Residential and Multi-family: 1,500 gpm for two (2) hours
- General Commercial: 2,500 gpm for four (4) hours
- Industrial: 4,000 gpm for four (4) hours

2.2.2 Operating and Emergency Storage

Operating and emergency storage estimates are based on the criteria in

Table 2-2.

Table 2-2: Required Operating and Emergency Storage

Storage Category	*24-Hour Requirement*
Operating	25% MDD
Emergency	ADD

3 CONCEPTUAL WATER DESIGN

This section discusses the results of the existing and proposed conditions water demand, fire storage, and conceptual design.

3.1 Water Demands

The estimates for the existing zoning, the proposed Plateau Development, and remainder parcel demands are contained in Appendix A. The methodology and assumptions are included in the calculated estimates.

Table 3-1 summarizes the existing zoning and proposed conditions water demands.

Table 3-1: Existing Zoning Water Demands

	Water Demands (gpd)		
Land Use Category	*ADD*	*MDD*	*PHD*
General Industrial	106,326	217,968	435,935

Table 3-2 summarizes the proposed water demand values.

Table 3-2: Proposed Plateau Development and Remainder Parcel Zone Change Water Demands

	Water Demands (gpd)		
Land Use Category	*ADD*	*MDD*	*PHD*
Single Family (SF6)	152,480	312,585	625,170
Multi-Family	66,956	137,259	274,518
General Commercial	12,150	24,908	49,816
Open Space	0	0	0
Total	**231,586**	**474,752**	**949,504**

The proposed conditions will increase the average daily demands by 125,261 gpd.

3.2 Water Storage

The existing General Industrial zoning is estimated to have the following storage requirements per

Table 3-3.

Table 3-3: Existing Water Storage Requirement

Storage Category	*Requirement*	*Volume (gal)*
Operating	25% MDD	54,492
Emergency	ADD	106,326
Fire	4,000 gpm for 4 hrs	960,000
	Total	**1,120,818**

The proposed tentative map and remainder parcels are projected to have the following storage requirements per table. The storage values assume the larger fire flow for the mixed-use category of General Commercial.

Table 3-4: Proposed Water Storage Requirement

Storage Category	*Requirement*	*Volume (gal)*
Operating	25% MDD	114,662
Emergency	ADD	223,730
Fire	2,500 gpm for 4 hrs	600,000
	Total	**938,392**

Water storage near the Plateau Development and remainder parcels is provided from the Highway 50 Tank and the East Carson Tank. Manhard Consulting has no information on the available storage in these tanks. Tank capacities are 2.538 MG for the East Carson Tank and 3.025 MG for the Highway 50 tank.

3.3 Conceptual Water Design

The Plateau Development and re-zoned remainder parcels fall on a split between the 4880-Basin and the East Valley Pressure zones as illustrated on Exhibit 2. The East Carson tank does not have enough pressure to serve the entire Plateau Development. The conceptual design incorporates water connections to the 16-inch line that serves the Highway 50 Tank in the East Valley Pressure Zone. The conceptual design utilizes two (2) connections and PRV stations with a connection to the 4880-Basin Pressure Zone. The PRV stations are conceptually placed to meet the pressure requirements per CCMC and NAC 445A. The tentative map reserves a lot for a potential future booster

station adjacent to the pressure zone boundary. Water main connections through the Common Open Space areas will have easements dedicated to Carson City.

Exhibit 3 shows the conceptual water system design and proposed pipe sizes.

4 CONCLUSIONS AND RECOMMENDATIONS

4.1 General Considerations

This study is intended to be a conceptual water report and design in support of the Plateau Development tentative map and remainder parcel zone changes. Further progress towards a final design of the Plateau Development site will include a master technical water report and water modeling specific to the final site design.

4.2 Regulations

The conceptual improvements and the analyses presented herein are in accordance with Carson City Municipal Code 2005 and NAC 445A.

4.3 Impacts to Adjacent Properties

There are no impacts to adjacent properties regarding potable water transmission and distribution. Adjacent properties will benefit from increased fire protection water and future development requiring potable water.

4.4 Standards of Practice

This study was prepared using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable professional engineers practicing in this and similar localities.

5 REFERENCES

Black & Veatch. (2010). *Integrated Water Supply and Facility Plan*. Job No. BV PN 166932. Carson City, NV

Carson City Municipal Code. (2005). https://library.municode.com/nv/carson_city/codes/code_of_ordinances?nodeId=CANEMUCO2005

Exhibit 1: FEMA FIRM

NOTES TO USERS

use in administering the National Flood Insurance Program. It arily identify all areas subject to flooding, particularly from local s of small size. The **community map repository** should be ssible updated or additional flood hazard information.

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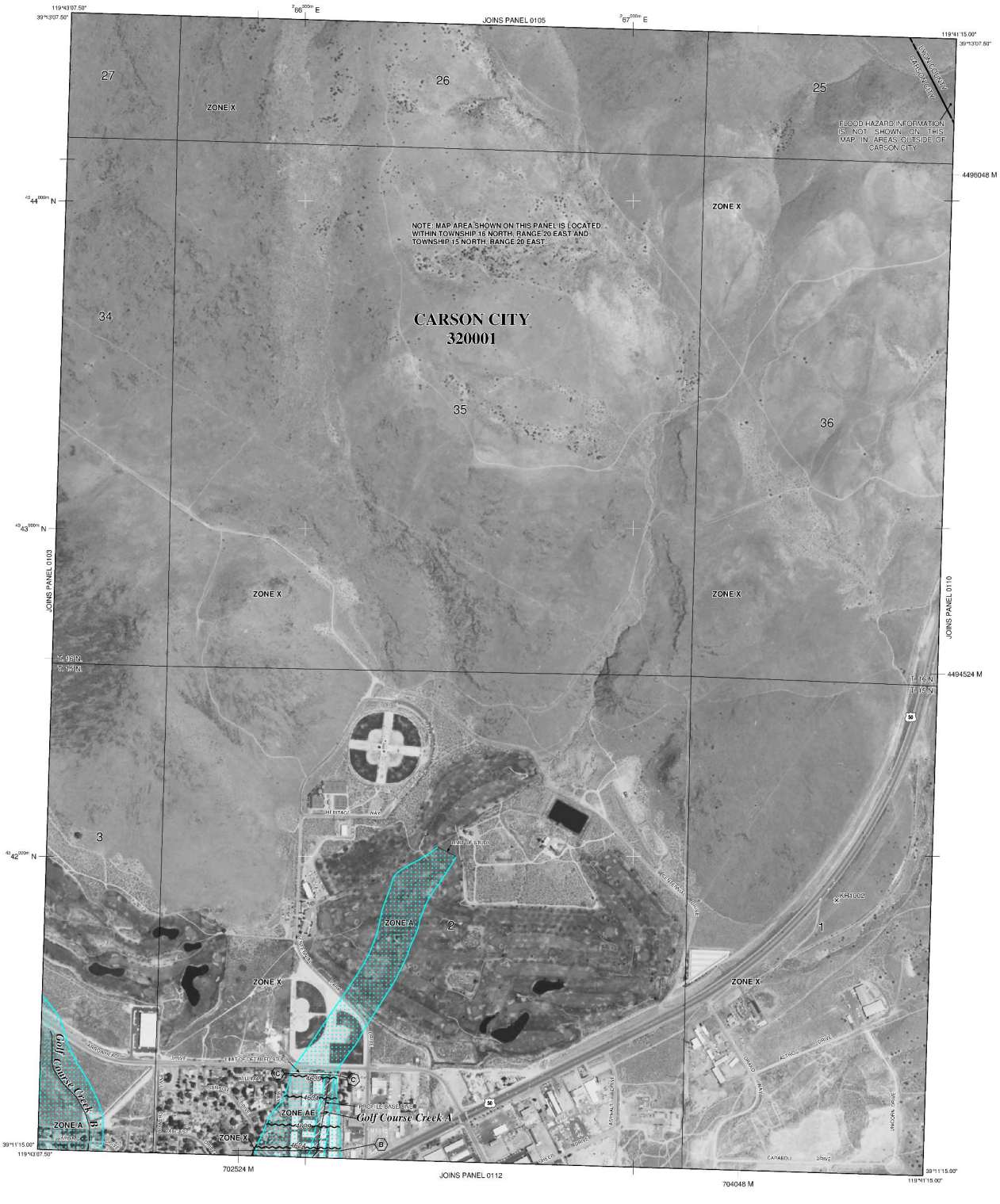
estions about this map or questions concerning the National Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) A website at http://www.fema.gov/.



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 (NAVD 88)

A — A	Cross section line
23 — 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN	1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 M	5000-foot grid ticks: Nevada State Plane coordinate system, west zone (FIPSZONE 2703), Transverse Mercator
DX5510	Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5	River Mile

MAP REPOSITORY
Carson City Planning Dept, 2621 Northgate Lane, Suite 62, Carson City, Nevada 89706 (Maps available for reference only, not for distribution.)

INITIAL NFIP MAP DATE
May 24, 1974
FLOOD HAZARD BOUNDARY MAP REVISIONS
January 7, 1977
FLOOD INSURANCE RATE MAP EFFECTIVE
March 4, 1986
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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

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0104E

FIRM
FLOOD INSURANCE RATE MAP

CARSON CITY, NEVADA
INDEPENDENT CITY

PANEL 104 OF 275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CARSON, CITY	320001	0104	E

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
3200010104E

MAP REVISED
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Federal Emergency Management Agency

NOTES TO USERS

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PANEL 0110E

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INDEPENDENT CITY

PANEL 110 OF 275
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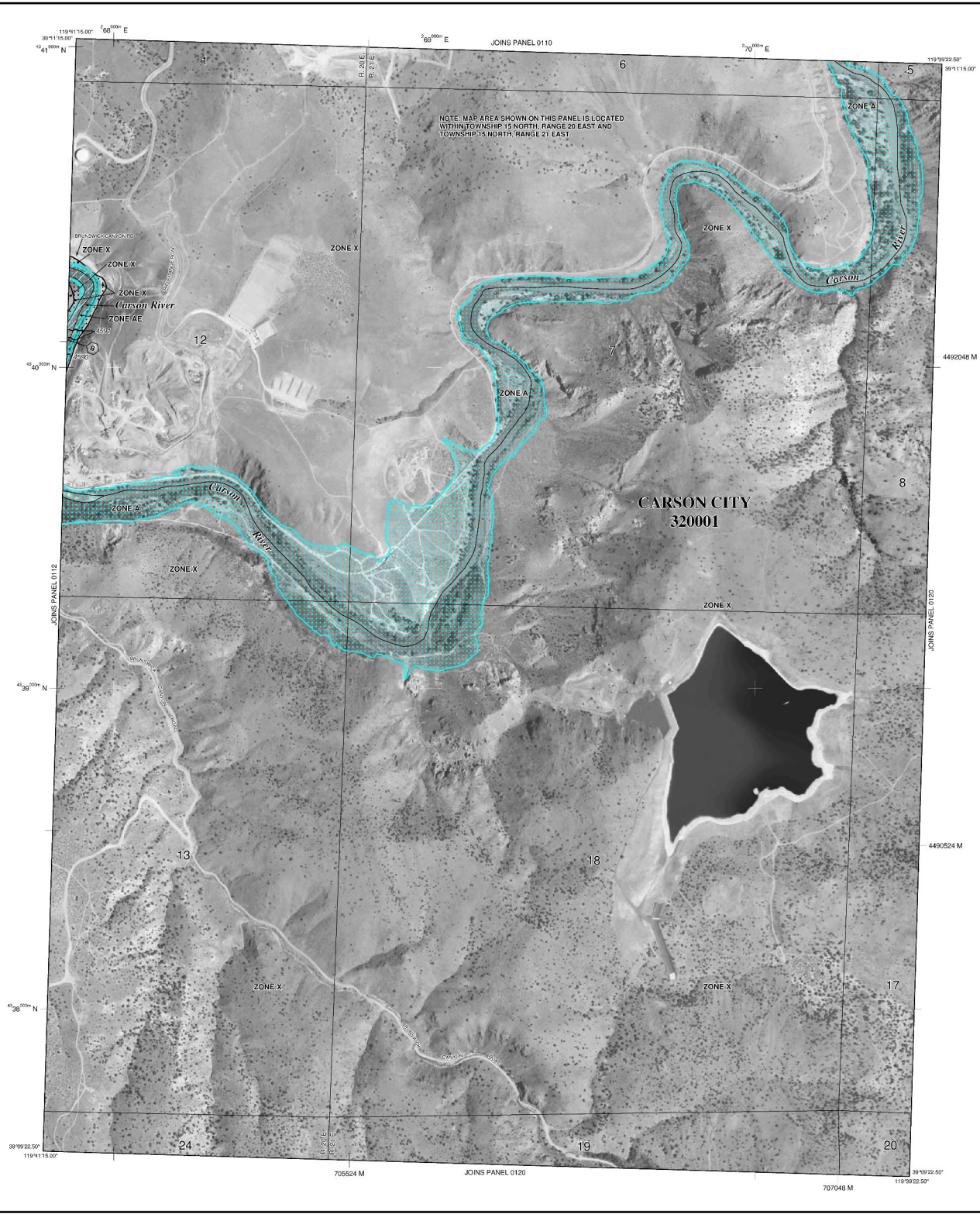
MA Map Service Center at 1–800–358–9616 for information on s associated with this FIRM. Available products may include ed Letters of Map Change, *a Flood Insurance Study report,* rsions of this map. The FEMA Map Service Center may also be at 1–800–358–9620 and its website at http://www.msc.fema.gov/.

estions about this map or questions concerning the National Program in general, please call **1–877–FEMA MAP** (1–877–336–2627) A website at http://www.fema.gov/.



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 (NAVD 88)

A — A Cross section line
23 — 23 Transect line
97°07'30", 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275000mN 1000-meter Universal Transverse Mercator grid ticks, zone 11
6000000 M 5000-foot grid ticks: Nevada State Plane coordinate system, west zone (FIPSZONE 2703), Transverse Mercator
DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)
M1.5 River Mile

MAP REPOSITORY
Carson City Planning Dept, 2621 Northgate Lane, Suite 62, Carson City, Nevada 89706 (Maps available for reference only, not for distribution.)

INITIAL NFIP MAP DATE
May 24, 1974
FLOOD HAZARD BOUNDARY MAP REVISIONS
January 7, 1977
FLOOD INSURANCE RATE MAP EFFECTIVE
March 4, 1985
FLOOD INSURANCE RATE MAP REVISIONS
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January 16, 2009 –to add and update roads and road names, to update map format, to change Special Flood Hazard Areas based on updated topographic information, to convert to a new vertical datum, and to incorporate previously issued Letters of Map Revision.

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

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0116E

FIRM
FLOOD INSURANCE RATE MAP

CARSON CITY, NEVADA
INDEPENDENT CITY

PANEL 116 OF 275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CARSON, CITY	320001	0116	E

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
3200010116E
MAP REVISED
JANUARY 16, 2009

Federal Emergency Management Agency

NOTES TO USERS

use in administering the National Flood Insurance Program. It arily identify all areas subject to flooding, particularly from local s of small size. The **community map repository** should be ssible updated or additional flood hazard information.

e detailed information in areas where **Base Flood Elevations** oodways have been determined, users are encouraged to consult es and Floodway Data and/or Summary of Stillwater Elevations within the Flood Insurance Study (FIS) report that accompanies rs should be aware that BFEs shown on the FIRM represent flood elevations. These BFEs are intended for flood insurance only and should not be used as the sole source of flood ation. Accordingly, flood elevation data presented in the FIS be utilized in conjunction with the FIRM for purposes of or floodplain management.

Flood Elevations shown on this map apply only landward American Vertical Datum of 1988 (NAVD 88). Users of this e aware that coastal flood elevations are also provided in the tillwater Elevations table in the Flood Insurance Study report on. Elevations shown in the Summary of Stillwater Elevations used for construction and/or floodplain management purposes igher than the elevations shown on this FIRM.

floodways were computed at cross sections and interpolated ections. The floodways were based on hydraulic considerations equirements of the National Flood Insurance Program. Floodway er pertinent floodway data are provided in the Flood Insurance this jurisdiction.

t in Special Flood Hazard Areas may be protected by **flood res.** Refer to Section 2.4 "Flood Protection Measures" of ance Study report for information on flood control structures on.

used in the preparation of this map was Universal Transverse zone 11. The **horizontal datum** was NAD83, GRS1980 nces in datum, spheroid, projection or UTM zones used in f FIRMs for adjacent jurisdictions may result in slight positional nap features across jurisdiction boundaries. These differences e accuracy of this FIRM.

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

Services

Survey

Highway
20910-3282

elevation, description, and/or location information for **bench marks** map, please contact the Information Services Branch of the tic Survey at **(301) 713-3242,** or visit its website at aa.gov/.

ation shown on this FIRM was provided in digital format by the griculture Imagery Program (NAIP). This information etrically compiled at a scale of 1:12,000 from aerial photography

more detailed and up-to-date **stream channel configurations** n on the previous FIRM for this jurisdiction. The floodplains hat were transferred from the previous FIRM may have been nform to these new stream channel configurations. As a d Profiles and Floodway Data tables *in the Flood Insurance hich contains authoritative hydraulic data*) may reflect stream s that differ from what is shown on this map.

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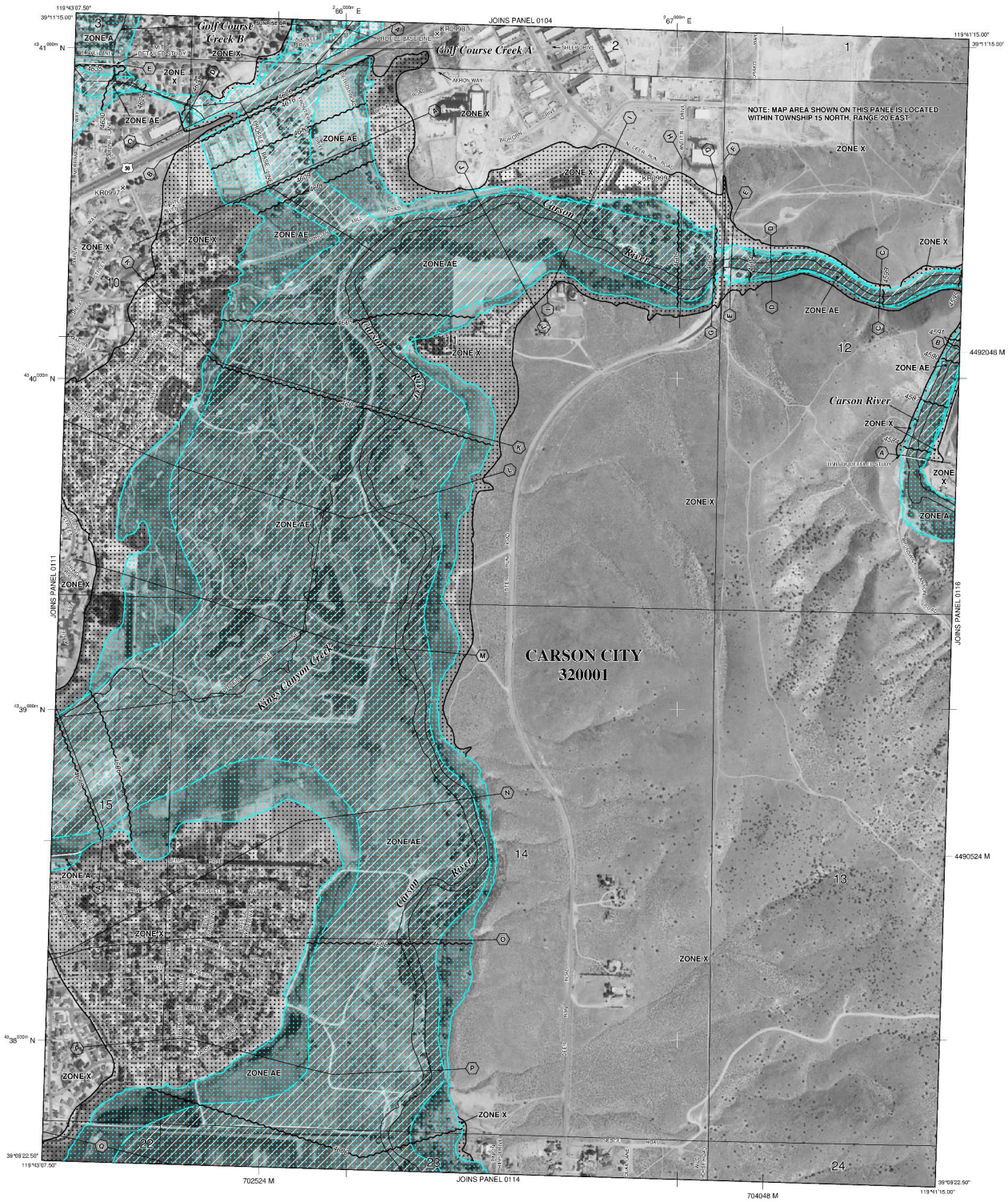

LEGEND

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- 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 (NAVD 88)

- A — A — Cross section line
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- 97°07'30", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
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- 6000000 M — 5000-foot grid ticks: Nevada State Plane coordinate system, west zone (FIPSZONE 2703), Transverse Mercator
- DX5510 — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- M1.5 — River Mile

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150 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0112E

FIRM
FLOOD INSURANCE RATE MAP

CARSON CITY, NEVADA
INDEPENDENT CITY

PANEL 112 OF 275
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
CARSON, CITY	320001	0112	E

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MAP NUMBER
3200010112E

MAP REVISED
JANUARY 16, 2009

Federal Emergency Management Agency

Exhibit 2: Existing Water System Infrastructure

Manhard CONSULTING

Legend

- Plateau Development and Remainder Parcel Boundary
- Plateau Tentative Map Layout

HIGHWAY 50 TANK

EAST VALLEY PRESSURE ZONE

4880-BASIN PRESSURE ZONE

EAST CARSON TANK AND HIGHWAY 50 BOOSTER STATION

Eagle Valley Golf Course

Centennial Park

New Empire

Brunswick

US Highway 50 E

P:\Tlvccnv01\GIS\MXD\TlVCCNV01_ConceptualWater_20181005.mxd

Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, © OpenStreetMap contributors, and the GIS User Community

EXHIBIT 2: EXISTING WATER SYSTEM INFRASTRUCTURE

Plateau Development
Carson City | Nevada

Date Created: 10/15/2018

N

0 1,750 3,500 Feet

Prepared for:
Mr. Keith Serpa
Tahoe IV, LLC.
P.O. Box 1724
Carson City, Nevada 89702

Exhibit 3: Conceptual Water Design

Appendix A: Water Demand Estimates

Manhard CONSULTING LTD
241 Ridge Street, Suite 400, Reno, Nevada 89501
(775)746-3500

Project: Plateau TM
Subject: Water Demand Estimate
Client: Tahoe IV LLC
Job Code: TIV.CCNV01.00
Date: 10/8/2018
By: CAnderson
Checked: Rwenziger

PLATEAU TENTATIVE MAP

Goal:

Estimates of water demand for Plateau based on the Tentative Map layout

Estimates of water demand for Pleateau based on the existing master plan designation.

Assumptions:

Based on Carson City Will Serve Letter Requirements

Land Use Average Demand				
Single Family Residential (SFR)=	1	ac-ft/yr/EDU (>12,000 sq. ft.)	MDD PF=	2.05
Single Family Residential (SFR)=	0.6	ac-ft/yr/EDU (<12,000 sq. ft.)	PHD PF=	2.00
Apartments/Multi-Family (MF)=	0.3	ac-ft/yr/EDU		
Commercial/Industrial=	1	ac-ft/yr/ac		
Landscaping=	4	ac-ft/yr/ac (grass)		
Landscaping=	2	ac-ft/yr/ac (desert)		
Landscaping=	0	ac-ft/yr/ac (desert)		

Existing Plateau Zoning

APN	Acres	Lots (EDUs)	Description	Zoning	EDUs	AC-FT/YR [1]	ADD [2] GPD	MDD [3] GPD	PHD [4] GPD
General Industrial	119.1	N/A		General Ind.		119	106,326	217,968	435,935
						119	**106,326**	**217,968**	**435,935**

Plateau TM Estimate

Proposed Zoning	Acres	Lots (EDUs)	Description	Zoning	EDUs	AC-FT/YR [1]	ADD [2] GPD	MDD [3] GPD	PHD [4] GPD
Landscaping (Park/Open Space)	17.85	N/A	Desert Landscaping	Park		0	0	0	0
Single Family Residential (SFR)	N/A	248	SF6 (<12,000)		248	149	132,840	272,322	544,644
Single Family Residential (SFR)	N/A	22	SF6 (>12,000)		22	13	11,784	24,158	48,315
Apartments/Multi-Family (MF)	18.53	250			250	75	66,956	137,259	274,518
Commercial/Industrial	13.61		General Commercial			14	12,150	24,908	49,816
					251	**223,730**	**458,647**	**917,294**	

Calculations

[1] Ac-ft/year for Land Use per Water Rights Calculation

[2] Ac-ft/year(325,851 gal/ac-ft)/(365 days/year*1,440 min/day)

[3] MDD*PHD PF

[4] ADD*MDD PF

Will Serve Letter Requirements

(7/1/2015 updated with rate changes)

Water

Lots > 12,000 sf = 1 ac-ft/yr

Lots < or = 12,000 sf = 0.6 ac-ft/yr

Apartments = 0.3 ac-ft/yr

Commercial/Industrial = 1 ac-ft/yr/acre

Landscaping (grass) = 4 ac-ft/yr/acre

Landscaping (desert) = 2 ac-ft/yr/acre

Existing Water Storage Requirement		
Category	Requirement	Volume (gal)
Operating	25% MDD	54,492
Emergency	ADD	106,326
Fire	4,000 gpm for 4 hrs	960,000
		1,120,818

Proposed Water Storage Requirement		
Category	Requirement	Volume (gal)
Operating	25% MDD	114,662
Emergency	ADD	223,730
Fire	2,500 gpm for 4 hrs	600,000
		938,392

Manhard CONSULTING LTD
241 Ridge Street, Suite 400, Reno, Nevada 89501
(775)746-3500

Project: Plateau TM
Subject: Water Demand Estimate
Client: Tahoe IV LLC
Job Code: TIV.CCNV01.00
Date: 10/8/2018
By: CAnderson
Checked: Rwenziger

Assumption:
- Total of 270 EDUs total for TM

MDD PF= 2.05
PHD PF= 2.00

Plateau Development Tentative Map						
Lot Count	Square Feet	Acres	AC-FT/Yr [1]	ADD (GPM)[2]	MDD (GPM)[3]	PHD (GPM)[4]
1	7,402	0.17	0.60	0.37	0.76	1.53
2	7,402	0.17	0.60	0.37	0.76	1.53
3	6,000	0.14	0.60	0.37	0.76	1.53
4	6,000	0.14	0.60	0.37	0.76	1.53
5	6,000	0.14	0.60	0.37	0.76	1.53
6	6,055	0.14	0.60	0.37	0.76	1.53
7	7,254	0.17	0.60	0.37	0.76	1.53
8	6,893	0.16	0.60	0.37	0.76	1.53
9	6,893	0.16	0.60	0.37	0.76	1.53
10	6,893	0.16	0.60	0.37	0.76	1.53
11	6,893	0.16	0.60	0.37	0.76	1.53
12	6,893	0.16	0.60	0.37	0.76	1.53
13	6,336	0.15	0.60	0.37	0.76	1.53
14	6,000	0.14	0.60	0.37	0.76	1.53
15	6,000	0.14	0.60	0.37	0.76	1.53
16	6,000	0.14	0.60	0.37	0.76	1.53
17	6,532	0.15	0.60	0.37	0.76	1.53
18	6,764	0.16	0.60	0.37	0.76	1.53
19	6,708	0.15	0.60	0.37	0.76	1.53
20	7,129	0.16	0.60	0.37	0.76	1.53
21	7,269	0.17	0.60	0.37	0.76	1.53
22	6,045	0.14	0.60	0.37	0.76	1.53
23	6,362	0.15	0.60	0.37	0.76	1.53
24	8,680	0.20	0.60	0.37	0.76	1.53
25	7,997	0.18	0.60	0.37	0.76	1.53
26	9,314	0.21	0.60	0.37	0.76	1.53
27	8,233	0.19	0.60	0.37	0.76	1.53
28	9,930	0.23	0.60	0.37	0.76	1.53
29	9,875	0.23	0.60	0.37	0.76	1.53
30	9,635	0.22	0.60	0.37	0.76	1.53
31	9,395	0.22	0.60	0.37	0.76	1.53
32	11,545	0.27	0.60	0.37	0.76	1.53
33	13,272	0.30	1.00	0.62	1.27	2.54
34	17,138	0.39	1.00	0.62	1.27	2.54
35	10,064	0.23	0.60	0.37	0.76	1.53

Plateau Development Tentative Map						
Lot Count	Square Feet	Acres	AC-FT/Yr [1]	ADD (GPM)[2]	MDD (GPM)[3]	PHD (GPM)[4]
36	15,733	0.36	1.00	0.62	1.27	2.54
37	17,085	0.39	1.00	0.62	1.27	2.54
38	13,145	0.30	1.00	0.62	1.27	2.54
39	11,693	0.27	0.60	0.37	0.76	1.53
40	8,402	0.19	0.60	0.37	0.76	1.53
41	8,400	0.19	0.60	0.37	0.76	1.53
42	8,400	0.19	0.60	0.37	0.76	1.53
43	8,400	0.19	0.60	0.37	0.76	1.53
44	9,811	0.23	0.60	0.37	0.76	1.53
45	9,830	0.23	0.60	0.37	0.76	1.53
46	9,380	0.22	0.60	0.37	0.76	1.53
47	9,380	0.22	0.60	0.37	0.76	1.53
48	9,100	0.21	0.60	0.37	0.76	1.53
49	9,100	0.21	0.60	0.37	0.76	1.53
50	9,100	0.21	0.60	0.37	0.76	1.53
51	9,100	0.21	0.60	0.37	0.76	1.53
52	9,100	0.21	0.60	0.37	0.76	1.53
53	9,100	0.21	0.60	0.37	0.76	1.53
54	9,100	0.21	0.60	0.37	0.76	1.53
55	9,709	0.22	0.60	0.37	0.76	1.53
56	14,700	0.34	1.00	0.62	1.27	2.54
57	8,734	0.20	0.60	0.37	0.76	1.53
58	7,700	0.18	0.60	0.37	0.76	1.53
59	16,416	0.38	1.00	0.62	1.27	2.54
60	15,972	0.37	1.00	0.62	1.27	2.54
61	11,790	0.27	0.60	0.37	0.76	1.53
62	11,775	0.27	0.60	0.37	0.76	1.53
63	17,950	0.41	1.00	0.62	1.27	2.54
64	11,612	0.27	0.60	0.37	0.76	1.53
65	8,745	0.20	0.60	0.37	0.76	1.53
66	6,803	0.16	0.60	0.37	0.76	1.53
67	7,022	0.16	0.60	0.37	0.76	1.53
68	7,205	0.17	0.60	0.37	0.76	1.53
69	9,608	0.22	0.60	0.37	0.76	1.53
70	10,715	0.25	0.60	0.37	0.76	1.53
71	12,782	0.29	1.00	0.62	1.27	2.54
72	13,835	0.32	1.00	0.62	1.27	2.54
73	9,941	0.23	0.60	0.37	0.76	1.53
74	8,147	0.19	0.60	0.37	0.76	1.53
75	6,820	0.16	0.60	0.37	0.76	1.53
76	8,791	0.20	0.60	0.37	0.76	1.53
77	7,172	0.16	0.60	0.37	0.76	1.53
78	6,720	0.15	0.60	0.37	0.76	1.53
79	6,720	0.15	0.60	0.37	0.76	1.53
80	6,720	0.15	0.60	0.37	0.76	1.53

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81	6,263	0.14	0.60	0.37	0.76	1.53
82	7,693	0.18	0.60	0.37	0.76	1.53
83	6,875	0.16	0.60	0.37	0.76	1.53
84	7,573	0.17	0.60	0.37	0.76	1.53
85	7,550	0.17	0.60	0.37	0.76	1.53
86	7,130	0.16	0.60	0.37	0.76	1.53
87	7,428	0.17	0.60	0.37	0.76	1.53
88	7,794	0.18	0.60	0.37	0.76	1.53
89	8,093	0.19	0.60	0.37	0.76	1.53
90	8,624	0.20	0.60	0.37	0.76	1.53
91	6,844	0.16	0.60	0.37	0.76	1.53
92	7,789	0.18	0.60	0.37	0.76	1.53
93	6,234	0.14	0.60	0.37	0.76	1.53
94	10,035	0.23	0.60	0.37	0.76	1.53
95	8,260	0.19	0.60	0.37	0.76	1.53
96	9,056	0.21	0.60	0.37	0.76	1.53
97	8,013	0.18	0.60	0.37	0.76	1.53
98	7,042	0.16	0.60	0.37	0.76	1.53
99	7,040	0.16	0.60	0.37	0.76	1.53
100	7,040	0.16	0.60	0.37	0.76	1.53
101	7,040	0.16	0.60	0.37	0.76	1.53
102	7,040	0.16	0.60	0.37	0.76	1.53
103	7,040	0.16	0.60	0.37	0.76	1.53
104	7,040	0.16	0.60	0.37	0.76	1.53
105	7,040	0.16	0.60	0.37	0.76	1.53
106	7,116	0.16	0.60	0.37	0.76	1.53
107	11,373	0.26	0.60	0.37	0.76	1.53
108	6,400	0.15	0.60	0.37	0.76	1.53
109	6,400	0.15	0.60	0.37	0.76	1.53
110	6,400	0.15	0.60	0.37	0.76	1.53
111	6,400	0.15	0.60	0.37	0.76	1.53
112	6,400	0.15	0.60	0.37	0.76	1.53
113	6,400	0.15	0.60	0.37	0.76	1.53
114	6,400	0.15	0.60	0.37	0.76	1.53
115	6,400	0.15	0.60	0.37	0.76	1.53
116	7,181	0.16	0.60	0.37	0.76	1.53
117	8,743	0.20	0.60	0.37	0.76	1.53
118	10,684	0.25	0.60	0.37	0.76	1.53
119	6,400	0.15	0.60	0.37	0.76	1.53
120	6,714	0.15	0.60	0.37	0.76	1.53
121	8,905	0.20	0.60	0.37	0.76	1.53
122	12,064	0.28	1.00	0.62	1.27	2.54
123	9,170	0.21	0.60	0.37	0.76	1.53
124	7,961	0.18	0.60	0.37	0.76	1.53
125	8,022	0.18	0.60	0.37	0.76	1.53

Plateau Development Tentative Map						
Lot Count	Square Feet	Acres	AC-FT/Yr [1]	ADD (GPM)[2]	MDD (GPM)[3]	PHD (GPM)[4]
126	6,214	0.14	0.60	0.37	0.76	1.53
127	10,334	0.24	0.60	0.37	0.76	1.53
128	9,757	0.22	0.60	0.37	0.76	1.53
129	6,512	0.15	0.60	0.37	0.76	1.53
130	6,090	0.14	0.60	0.37	0.76	1.53
131	6,550	0.15	0.60	0.37	0.76	1.53
132	6,791	0.16	0.60	0.37	0.76	1.53
133	6,607	0.15	0.60	0.37	0.76	1.53
134	6,090	0.14	0.60	0.37	0.76	1.53
135	6,512	0.15	0.60	0.37	0.76	1.53
136	9,605	0.22	0.60	0.37	0.76	1.53
137	12,961	0.30	1.00	0.62	1.27	2.54
138	8,349	0.19	0.60	0.37	0.76	1.53
139	7,024	0.16	0.60	0.37	0.76	1.53
140	7,823	0.18	0.60	0.37	0.76	1.53
141	8,790	0.20	0.60	0.37	0.76	1.53
142	8,193	0.19	0.60	0.37	0.76	1.53
143	7,199	0.17	0.60	0.37	0.76	1.53
144	7,746	0.18	0.60	0.37	0.76	1.53
145	7,200	0.17	0.60	0.37	0.76	1.53
146	9,234	0.21	0.60	0.37	0.76	1.53
147	13,542	0.31	1.00	0.62	1.27	2.54
148	12,741	0.29	1.00	0.62	1.27	2.54
149	15,024	0.34	1.00	0.62	1.27	2.54
150	14,028	0.32	1.00	0.62	1.27	2.54
151	10,401	0.24	0.60	0.37	0.76	1.53
152	9,945	0.23	0.60	0.37	0.76	1.53
153	10,969	0.25	0.60	0.37	0.76	1.53
154	12,093	0.28	1.00	0.62	1.27	2.54
155	12,026	0.28	1.00	0.62	1.27	2.54
156	7,963	0.18	0.60	0.37	0.76	1.53
157	9,547	0.22	0.60	0.37	0.76	1.53
158	7,906	0.18	0.60	0.37	0.76	1.53
159	7,000	0.16	0.60	0.37	0.76	1.53
160	6,902	0.16	0.60	0.37	0.76	1.53
161	7,599	0.17	0.60	0.37	0.76	1.53
162	7,599	0.17	0.60	0.37	0.76	1.53
163	6,852	0.16	0.60	0.37	0.76	1.53
164	6,000	0.14	0.60	0.37	0.76	1.53
165	6,000	0.14	0.60	0.37	0.76	1.53
166	6,000	0.14	0.60	0.37	0.76	1.53
167	6,000	0.14	0.60	0.37	0.76	1.53
168	6,000	0.14	0.60	0.37	0.76	1.53
169	6,000	0.14	0.60	0.37	0.76	1.53
170	6,000	0.14	0.60	0.37	0.76	1.53

Plateau Development Tentative Map						
Lot Count	Square Feet	Acres	AC-FT/Yr [1]	ADD (GPM)[2]	MDD (GPM)[3]	PHD (GPM)[4]
171	6,000	0.14	0.60	0.37	0.76	1.53
172	6,005	0.14	0.60	0.37	0.76	1.53
173	6,412	0.15	0.60	0.37	0.76	1.53
174	6,849	0.16	0.60	0.37	0.76	1.53
175	8,937	0.21	0.60	0.37	0.76	1.53
176	8,249	0.19	0.60	0.37	0.76	1.53
177	8,393	0.19	0.60	0.37	0.76	1.53
178	8,400	0.19	0.60	0.37	0.76	1.53
179	8,400	0.19	0.60	0.37	0.76	1.53
180	8,400	0.19	0.60	0.37	0.76	1.53
181	8,400	0.19	0.60	0.37	0.76	1.53
182	8,400	0.19	0.60	0.37	0.76	1.53
183	8,400	0.19	0.60	0.37	0.76	1.53
184	8,400	0.19	0.60	0.37	0.76	1.53
185	8,400	0.19	0.60	0.37	0.76	1.53
186	8,373	0.19	0.60	0.37	0.76	1.53
187	7,694	0.18	0.60	0.37	0.76	1.53
188	6,993	0.16	0.60	0.37	0.76	1.53
189	7,155	0.16	0.60	0.37	0.76	1.53
190	5,988	0.14	0.60	0.37	0.76	1.53
191	6,000	0.14	0.60	0.37	0.76	1.53
192	6,000	0.14	0.60	0.37	0.76	1.53
193	6,000	0.14	0.60	0.37	0.76	1.53
194	6,000	0.14	0.60	0.37	0.76	1.53
195	6,000	0.14	0.60	0.37	0.76	1.53
196	6,000	0.14	0.60	0.37	0.76	1.53
197	6,000	0.14	0.60	0.37	0.76	1.53
198	6,000	0.14	0.60	0.37	0.76	1.53
199	6,000	0.14	0.60	0.37	0.76	1.53
200	6,000	0.14	0.60	0.37	0.76	1.53
201	6,000	0.14	0.60	0.37	0.76	1.53
202	6,000	0.14	0.60	0.37	0.76	1.53
203	6,714	0.15	0.60	0.37	0.76	1.53
204	7,414	0.17	0.60	0.37	0.76	1.53
205	8,000	0.18	0.60	0.37	0.76	1.53
206	9,070	0.21	0.60	0.37	0.76	1.53
207	8,027	0.18	0.60	0.37	0.76	1.53
208	8,027	0.18	0.60	0.37	0.76	1.53
209	8,027	0.18	0.60	0.37	0.76	1.53
210	8,027	0.18	0.60	0.37	0.76	1.53
211	8,027	0.18	0.60	0.37	0.76	1.53
212	8,137	0.19	0.60	0.37	0.76	1.53
213	7,674	0.18	0.60	0.37	0.76	1.53
214	7,109	0.16	0.60	0.37	0.76	1.53
215	6,826	0.16	0.60	0.37	0.76	1.53

Plateau Development Tentative Map						
Lot Count	Square Feet	Acres	AC-FT/Yr [1]	ADD (GPM)[2]	MDD (GPM)[3]	PHD (GPM)[4]
216	6,800	0.16	0.60	0.37	0.76	1.53
217	6,800	0.16	0.60	0.37	0.76	1.53
218	8,160	0.19	0.60	0.37	0.76	1.53
219	8,160	0.19	0.60	0.37	0.76	1.53
220	8,160	0.19	0.60	0.37	0.76	1.53
221	8,160	0.19	0.60	0.37	0.76	1.53
222	8,160	0.19	0.60	0.37	0.76	1.53
223	8,160	0.19	0.60	0.37	0.76	1.53
224	8,134	0.19	0.60	0.37	0.76	1.53
225	6,914	0.16	0.60	0.37	0.76	1.53
226	6,800	0.16	0.60	0.37	0.76	1.53
227	6,800	0.16	0.60	0.37	0.76	1.53
228	6,800	0.16	0.60	0.37	0.76	1.53
229	6,800	0.16	0.60	0.37	0.76	1.53
230	6,800	0.16	0.60	0.37	0.76	1.53
231	6,800	0.16	0.60	0.37	0.76	1.53
232	8,160	0.19	0.60	0.37	0.76	1.53
233	8,160	0.19	0.60	0.37	0.76	1.53
234	8,160	0.19	0.60	0.37	0.76	1.53
235	8,160	0.19	0.60	0.37	0.76	1.53
236	8,160	0.19	0.60	0.37	0.76	1.53
237	10,406	0.24	0.60	0.37	0.76	1.53
238	14,179	0.33	1.00	0.62	1.27	2.54
239	14,457	0.33	1.00	0.62	1.27	2.54
240	12,249	0.28	1.00	0.62	1.27	2.54
241	9,448	0.22	0.60	0.37	0.76	1.53
242	8,507	0.20	0.60	0.37	0.76	1.53
243	6,520	0.15	0.60	0.37	0.76	1.53
244	6,330	0.15	0.60	0.37	0.76	1.53
245	6,985	0.16	0.60	0.37	0.76	1.53
246	6,776	0.16	0.60	0.37	0.76	1.53
247	6,579	0.15	0.60	0.37	0.76	1.53
248	6,602	0.15	0.60	0.37	0.76	1.53
249	6,604	0.15	0.60	0.37	0.76	1.53
250	6,606	0.15	0.60	0.37	0.76	1.53
251	6,608	0.15	0.60	0.37	0.76	1.53
252	6,610	0.15	0.60	0.37	0.76	1.53
253	6,060	0.14	0.60	0.37	0.76	1.53
254	6,053	0.14	0.60	0.37	0.76	1.53
255	6,000	0.14	0.60	0.37	0.76	1.53
256	6,000	0.14	0.60	0.37	0.76	1.53
257	6,000	0.14	0.60	0.37	0.76	1.53
258	6,000	0.14	0.60	0.37	0.76	1.53
259	6,000	0.14	0.60	0.37	0.76	1.53
260	8,730	0.20	0.60	0.37	0.76	1.53

Plateau Development Tentative Map						
Lot Count	**Square Feet**	**Acres**	**AC-FT/Yr [1]**	**ADD (GPM)[2]**	**MDD (GPM)[3]**	**PHD (GPM)[4]**
261	8,974	0.21	0.60	0.37	0.76	1.53
262	8,830	0.20	0.60	0.37	0.76	1.53
263	5,999	0.14	0.60	0.37	0.76	1.53
264	6,000	0.14	0.60	0.37	0.76	1.53
265	6,000	0.14	0.60	0.37	0.76	1.53
266	8,313	0.19	0.60	0.37	0.76	1.53
267	7,402	0.17	0.60	0.37	0.76	1.53
268	6,920	0.16	0.60	0.37	0.76	1.53
269	8,120	0.19	0.60	0.37	0.76	1.53
270	8,656	0.20	0.60	0.37	0.76	1.53
TOTAL	**2,205,149**	**50.62**	**171**	**105.89**	**217.08**	**434.15**

[1] Ac-ft/year for Land Use per Water Rights Calculation

[2] Ac-ft/year(325,851 gal/ac-ft)/(365 days/year*1,440 min/day)

[3] MDD*PHD PF

[4] ADD*MDD PF

Will Serve Letter Requirements

(7/1/2015 updated with rate changes)

Water

Lots > 12,000 sf = 1 ac-ft/yr

Lots < or = 12,000 sf = 0.6 ac-ft/yr

Apartments = 0.3 ac-ft/yr

Commercial/Industrial = 1 ac-ft/yr/acre

Landscaping (grass) = 4 ac-ft/yr/acre

Landscaping (desert) = 2 ac-ft/yr/acre