Water Basis of Design Report

Shadow Ridge North

Prepared for:

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EXPIRES 06/30/2023

291104122
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1.0 INTRODUCTION

1.1 PROJECT DESCRIPTION

Shadow Ridge North, the "project", is a proposed 19-lot single family residential subdivision located on approximately 29.0 acres at the southwest corner of E. Ranch Gate Road and N. 128th Street in Scottsdale, Arizona. The project lies within a portion of the northeast quarter of Section 11, Township 4 North, Range 5 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. More specifically, the project is bounded by 128th Street to the east, Ranch Gate Road to the north, with single family residential subdivisions to the west, east, and south, and undeveloped land to the north. The existing zoning is R1-130, and the proposed zoning is R1-43 ESL (17 lots) and R1-130 ESL (2 lots). Refer to **Figure 1** in **Appendix A** for the Vicinity Map.

The purpose of this water report is to support the proposed Shadow Ridge North residential development.

1.2 SCOPE OF WATER PLAN

This report presents the basis of design criteria that will be used for the engineering design of the proposed Shadow Ridge North development. This report will establish the final water system demands for the project and the water system infrastructure required to serve the development.

All design criteria that is presented in this report will conform to the City of Scottsdale Design Standards & Polices Manual (DS&PM) and the 2015 International Fire Code (IFC).

2.0 EXISTING SITE CONDITIONS AND WATER SYSTEMS

2.1 SITE CONDITIONS

The project is undeveloped natural upper desert. Based on a review of City Quarter Section maps; no city water infrastructure exists on-site. Many washes and rock features of varying sizes characterize the site. The on-site washes vary in size and depth, but generally flow from the southwest to the northeast through the site at approximately 14%.

2.2 ADJACENT WATER SYSTEMS

Directly to the west of the project is the development of Sereno Canyon. An existing zone 13 booster pump station (BPS 145) is located at Alameda Road and the 122th Street alignment, near the west edge of Sereno Canyon. An existing booster pump station was installed with the Sereno Canyon project to serve the area. BPS 145 is comprised of three 500 gpm pumps and a 1,750 gpm fire flow booster pump, connected to a 12,000-gallon tank. One of the pumps is required to be kept as a redundant pump.

An existing 12-inch waterline, within pressure zone 13, exists in the Alameda Road Alignment in Sereno Canyon Phase III "Tract B".

2.3 EXISTING PRESSURE ZONES

Based on site elevations City of Scottsdale DS&PM, the Shadow Ridge North site falls within City of Scottsdale pressure zone 12 and 13. Sereno Canyon to the west primarily operates in pressure zone 13. There is a planned pressure reducing valve (PRV) on the 12-inch line in 128th Street just southeast of the project, which reduces the line to pressure zone 12.

3.0 PROPOSED WATER SYSTEM

3.1 PROPOSED DSITRIBUTION SYSTEM

In order to serve the project, the existing 12” water line in Alameda Road, to the south of the site, will be cut at two locations and tied into the proposed 8” DIP waterline system with a 12” x 8” tee. This proposed 8-inch water main will follow the adjacent parcels’ property line and extend onsite between Lots 15 and 16 as well as through Lot 15. From there, it will follow the roadway alignment to provide a domestic water service connection for each lot and fire hydrants spaced no more than 600-feet apart.

The connection to the existing 12-inch water main will require tees to be cut into the water main with isolation valves per the DSPM. The existing 12-inch water main has sufficient valves located to isolate the waterline during construction (see QS 45-58). All waterlines will be 8” DIP Class 350, with 3-foot of minimum cover. The proposed wash crossing will be contained in the road and the waterline will be dipped below the storm drains to protect them from the washes. The end of the proposed cul-de-sacs will have a fire hydrant to allow for flushing the waterline. If needed, dip sections under the proposed storm drain will be realigned per COS STD DTL 2370. All waterlines will be located within water/sewer facility easements. Since the existing 12” water line is in pressure zone 13, Shadow Ridge North will operate entirely in pressure zone 13.

Refer to **Exhibit 2** for a water system layout.

4.0 METHODOLOGY AND CALCULATIONS

4.1 GENERAL DISCUSSION

The proposed water distribution system for Shadow Ridge North has been designed to provide the calculated domestic and fire flow demands for the project, while maintaining required operating pressures. The proposed water distribution system for the project was modeled with the existing conditions of booster pump station (BPS) 145. The data of BPS-145 was provided from the City of Scottsdale. The design criterion is based on requirements described within the City of Scottsdale Design Standards and Policies Manual (DS&PM).

4.2 WATER DEMANDS, FIRE FLOWS, PRESSURES

Per Figure 6-1.2 of the *City of Scottsdale Design Standards & Policies Manual,* the average day demand (ADD) for residential land use (<2 du/acre) is 0.69 gallons per minute per unit (gpm/du). Maximum Day Demand (MDD) is calculated as 2.0 times the ADD and Peak Hour Demand (PHD) is calculated as 3.5 times the ADD. Refer to **Table 1** below for a summary of domestic water demands.

Table 1: Domestic Water Demands

	Land Use	Dwelling Units (du)	Average Daily Demand (gpm/du)	ADD (gpm)	MDD (gpm)	PHD (gpm)
Proposed Shadow Ridge North Site	<2 du/ac	19	0.69	13.11	26.22	45.89

Per Table B105.1(1) of the *2015 IFC*, the required fire flow for single family residential dwellings is 1,000 gpm for a 1-hour duration.

The following design criteria will be utilized for this project, per DSPM Section 6-1.407 for pressure-reducing and regulating valves:

Table 1: Design Parameters

Design Criteria	ADD	PHD	MDD + Fire Flow
Minimum Pressure (psi)	50	50	30
Maximum Pressure (psi)	120	120	120
Maximum Velocity (ft/sec)	5	5	10

4.3 RESULTS

The following scenarios were computed in relation to BPS-145 to evaluate the existing and proposed water infrastructure, and demonstrate compliance with the design parameters identified in this report:

- Average Day Demand
- Peak Hour Demand
- Maximum Day Demand + Fire Flow Demand

The existing conditions of BPS-145 can be found in Table 3 below.

Table 3: Existing BPS-145 Results

Analysis Point	Elevation	Head (TDH)	Pressure (psi)	HGL Elevation
BPS-145	2,719.9	245	106.06	2964.9

Based on the results of the data given from the City for BPS-145, the proposed water distribution system can provide the required domestic and fire flow water demands to the project while maintaining required operating pressures. The 8-inch distribution system with a 12-inch line located in Alameda Road provides adequate flow for both domestic and fire flow scenarios. The proposed hydrant elevations for the site range from 2689 to 2713 and will be served by pressure zone 13. This ensures that all proposed pads and hydrants will have all the required flows and pressures. See **Table 4** below for a summary of the proposed Shadow Ridge North development water results.

Table 4: Water Results

	Analysis Point	Elevation	Average Daily Pressure (psi)	Max Day Pressure (psi)	Peak Hour Pressure (psi)	Max Day + Fire Pressure (psi)
Proposed Shadow Ridge North	Lowest Hydrant	2,689	119.4	119.0	117.2	58.7
Proposed Shadow Ridge North	Highest Hydrant	2,713	109.0	108.6	106.8	48.3
Proposed Shadow Ridge North	Lowest Pad	2,687.80	119.9	119.5	117.7	59.2
Proposed Shadow Ridge North	Highest Pad	2,719	106.5	106.1	104.3	45.8

The proposed hydrant locations and elevations were considered to show the proposed development will still have adequate pressures after elevation head loss.

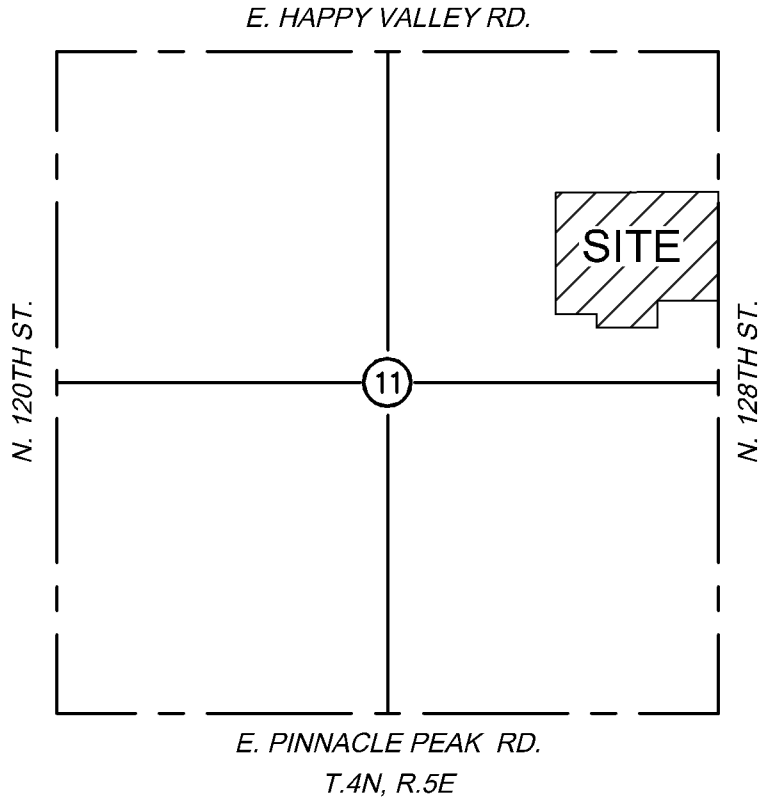
5.0 CONCLUSION

Based on the results presented in this report, the existing water infrastructure has the capability to support the proposed development while conforming to the City of Scottsdale's design criteria. An 8-inch water main is proposed onsite which will connect to an existing 12-inch water line south of the project along Alameda Road.

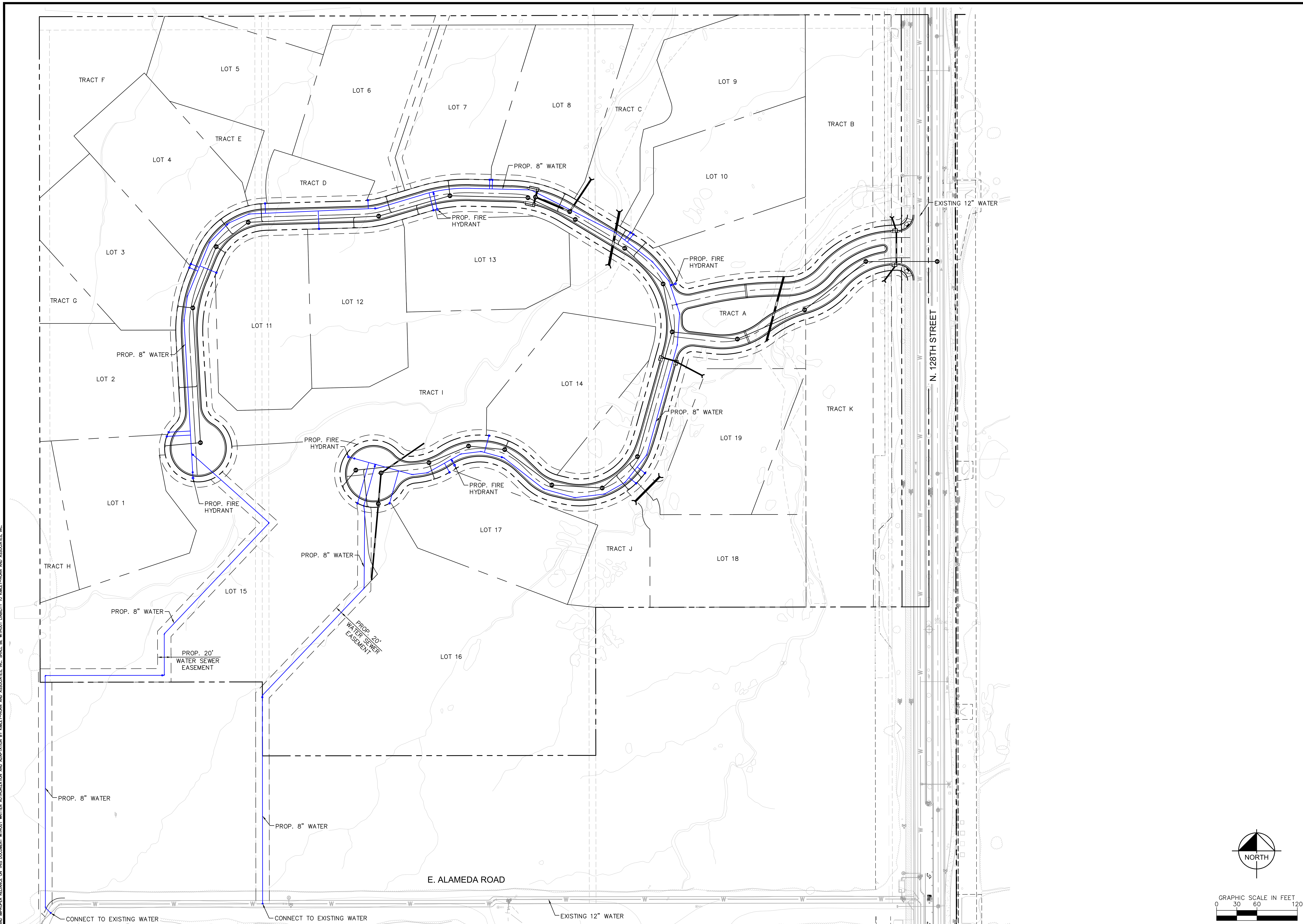
APPENDIX A: Exhibits

Exhibit 1 – Vicinity Map

Exhibit 2 – Water System Layout



PROJECT NO. 291104122 DRAWING NAME OF		SHADOW RIDGE NORTH EXHIBIT 1 VICINITY MAP SCOTTSDALE, AZ	SCALE (H): NTS SCALE (V): NTS DESIGNED BY: MML DRAWN BY: BAV CHECKED BY: CLB DATE: 12/22/2021	Kimley»Horn 7740 North 16th Street, Suite 300 Phoenix, Arizona 85020 (602) 944-5500	NO.	REVISION	DATE


TRACT F
LOT 5
LOT 6
LOT 7
LOT 8
TRACT C
LOT 9
TRACT B
TRACT E
LOT 4
TRACT D
PROP. 8" WATER
LOT 10
EXISTING 12" WATER
PROP. FIRE HYDRANT
LOT 3
LOT 13
PROP. FIRE HYDRANT
TRACT G
LOT 12
TRACT A
LOT 11
N. 128TH STREET
PROP. 8" WATER
LOT 2
TRACT I
LOT 14
TRACT K
PROP. 8" WATER
PROP. FIRE HYDRANT
LOT 19
PROP. FIRE HYDRANT
LOT 1
PROP. FIRE HYDRANT
LOT 17
TRACT J
LOT 18
PROP. 8" WATER
TRACT H
LOT 15
PROP. 8" WATER
PROP. 20' WATER SEWER EASEMENT
PROP. 20' WATER SEWER EASEMENT
LOT 16
PROP. 8" WATER
PROP. 8" WATER
E. ALAMEDA ROAD
CONNECT TO EXISTING WATER
CONNECT TO EXISTING WATER
EXISTING 12" WATER
NORTH
GRAPHIC SCALE IN FEET
0 30 60 120

NO.	REVISION	DATE	BY	APPR.

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SCALE (H): 1"=60'
SCALE (V): N/A

DESIGNED BY: MML
DRAWN BY: BAV
CHECKED BY: CLB

DATE: 05/06/2022

SHADOW RIDGE NORTH
EXHIBIT 2
WATER SYSTEM LAYOUT
SCOTTSDALE, ARIZONA

Registered Professional Engineer (Civil)
CERTIFICATE NO. 71092
MEGAN LE
Date Signed 05/06/22
ARIZONA, USA
EXPIRES 06/30/2023

PROJECT NO.
291104122

DRAWING NAME

OF