PRELIMINARY Basis of Design Report

☐ ACCEPTED

☑ ACCEPTED AS NOTED

☐ REVISE AND RESUBMIT

CITY OF SCOTTSDALE

SCOTTSDALE WATER

9379 E San Salvador Dr.
Scottsdale, AZ 85258

Disclaimer: If accepted; the preliminary approval is granted under the condition that a final basis of design report will also be submitted for city review and approval (typically during the DR or PP case). The final report shall incorporate further water or sewer design and analysis requirements as defined in the city design standards and policy manual and address those items noted in the preliminary review comments (both separate and included herein). The final report shall be submitted and approved prior to the plan review submission.
For questions or clarifications contact the Water Resources Planning and Engineering Department at 480-312-5685.

BY jcampo DATE 3/6/2024

Must determine if a domestic booster station is required to meet pressure at finished floor in plan check final submittal.

PRELIMINARY WATER E
DESIGN REPORT

Headwaters Scottsdale
Scottsdale, Arizona

Registered Professional Engineer (Civil)
CERTIFICATE NO.
47183
STERLING
MARGETTS
Date Signed 02/13/24
ARIZONA, U.S.A.
Expires 12/31/24

Prepared for:

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291753000
March 2023

Headwaters Scottsdale

PRELIMINARY WATER BASIS OF DESIGN REPORT

MARCH 2023

Prepared By:

Kimley»Horn

Kimley»Horn

Contents

Appendices

1.0 INTRODUCTION

Kimley-Horn and Associates, Inc. has prepared this Wastewater Basis of Design Report for the proposed minimal residential healthcare living development at the southeast corner of 100th Street and Frank Lloyd Wright Boulevard in Scottsdale, Arizona. This report will demonstrate that the proposed project conforms to the City of Scottsdale design requirements.

Headwaters Scottsdale, the "project", encompasses approximately 6.71 net acres and contains a 203,929 gross square foot three-story and 5 one-story minimal care facility with 217 parking spaces. The three-story building has 162 units, and the 5 one-story buildings have 10 units. The project has a total of 172 units. The project lies within a portion of the Southwest Quarter of Section 8 and a Portion of the Northeast Quarter of Section 17, Township 3 North, Range 5 East of the Gila and Salt River Base and Meridian in Maricopa County, Arizona. More specifically, the project is bound by East Frank Lloyd Wright Boulevard to the north, Belmont retirement community to the east, single-family to the south, and North 100th Street to the west. See **Appendix A** for the Vicinity Map.

2.0 DOMESTIC WATER ANALYSIS

2.1 INTENT AND SCOPE

The intent of this section is to evaluate the potable water infrastructure for the proposed development. As a result of this analysis, it will be determined if the potable water infrastructure is capable of satisfying the projected water demands for the proposed development in accordance with the City of Scottsdale Design Standards & Policies Manual (**Reference 1**) and the 2018 International Fire Code (**Reference 2**) for fire prevention.

2.2 GENERAL THEORY

The water system modeling program Water CAD, developed by Haestad Methods, is used to model the water system servicing the proposed development. The program uses the fluid mechanic head loss theory known as the Hazen-Williams method. This is the typical method used to evaluate water distribution systems.

2.3 DOMESTIC WATER SUPPLY

There is an existing 10-inch ACP water main located in North 100th Street, west of the site. The existing main is connected by an 8-inch DIP water main on Frank Lloyd Wright and an 8-inch water main connects the two through the site in a private access drive. Portions of the on-site 8-inch main will need to be removed to accommodate the proposed Headwaters development. The existing water/sewer easement will be abandoned.

The existing 8-inch on-site main has a stub that will be used to reroute the on-site main to the connection at the north start and Frank Llyod Wright around the proposed development. New fire hydrants, building fire riser, and domestic service for the Headwaters development will be provided from the rerouted looped on-site water main. The new water main will be located within a 20’ wide water/sewer easement. Refer to Appendix B for the Preliminary Utility Plan.

Residual and static pressures were obtained from a flow test performed on two fire hydrants (one flow and one pressure) in the western driveway, by EJ Flow Tests on May 16, 2022. The tested fire hydrants were selected due to the proximity to the proposed building. See **Appendix D** for the Fire Flow Test results.

2.4 INTERNATIONAL FIRE CODE, 2018

According to the City of Scottsdale Fire Department, the 2018 International Fire Code (IFC) with City of Scottsdale Amendments is currently the governing code with respect to fire protection requirements. The IFC evaluates the building construction type, occupancy descriptions, and square footage to set minimum fire flow requirements with regards to a particular development.

The proposed building and casitas are Construction Type V-A. Per Table B105.1(2) of **Reference 2**, the required fire flow is 8,000 gallons per minute. A reduction in fire-flow of 75% percent is allowed when the building is equipped with an approved fire sprinkler system. The multifamily building and casitas will be equipped with an approved fire sprinkler system. The minimum fire flow requirements per the IFC 2018 and COS DS&PM 6-1.501 for the proposed building are shown in Table 1. Table 1 also shows the required building fire flow based upon a maximum fire flow reduction of 75% allowed by the IFC 2018. The reduced fire flow shall not be less than 1,500 gpm. See **Appendix C** for IFC 2018 Requirements.

Table 1 Required Building Fire Flows

Building	Building Construction Type	Area (sf)	Required Fire Flow per IFC 2018 (gpm)	Reduction	Required Fire Flow per IFC with Reduction (gpm)
Multifamily	V-A	203,929	8,000	75%	2,000
TOTAL	-	203,929	8,000*	75%	2,000

*Maximum required fire flow prior to automatic sprinkler system reduction per IFC 2018 Table B105.1(2) and B105.2 is 8,000 gpm.

2.5 WATER DEMANDS

According to the guidelines provided in Figure 6-1.2 of **Reference 1**, the proposed development will add the following demands to the existing water system for Average Day Demand (ADD), Maximum Day Demand (MDD), and Peak Hour Demand (PHD):

Table 2: Domestic Water Demands

Building	Building Area (sf)	# DUs	Total Demand[1] (GPM/DU)	ADD (GPM)	MDD[2] (GPM)	PHD[3] (GPM)
Building	203,929	172	0.27	46.44	92.88	162.54

Notes:

1. For high density multifamily land use, average day demand is 185.3 gpd/du or 0.27 gpm/du.
2. Maximum day demand defined as 2 times the average day demand.
3. Peak hour demand defined as 3.5 times the average day demand.

Three water analyses were performed to evaluate the existing adjacent off-site water infrastructure and the proposed on-site water system:

1. Average Day Demand
2. Peak Hour Demand
3. Maximum Day Demand + Fire Flow

The system was analyzed for the worst-case scenario to ensure that the existing and proposed public water infrastructure can maintain a minimum pressure of 50 psi for the Peak Hour demand, and 30 psi for the Maximum Day plus Fire Flow demand. See **Appendix D** for water model layout to identify nodes and pipes.

See **Appendix D** for the Fire Flow Test and Water CAD Analysis and Layout. A summary of the water analysis results for the project is tabulated below:

Table 3 Domestic Water Model Result Summary

Criteria	Peak Hour Demand	Constraint	Peak Hour Pressure at Demand	Node with Minimum Pressure
Minimum Pressure	140 gpm	50 psi	71 psi	J-16 & J-17
Meets Criteria?	Yes	Yes	Yes*	Yes

*The hydraulic water model was analyzed at the ground floor elevation of the proposed high-rise building. Reference plumbing calculations for any internal booster pump systems to provide adequate water pressures to the higher floors of the building.

Table 4 Max Day + Fire Flow Water Model Result Summary

Criteria	Max Day + Fire Flow Demand	Constraint	Max Day + Fire Flow Pressure at Demand	Node with Minimum Pressure
Minimum System Pressure	2,080 gpm	30 psi	39 psi	BLDG FIRE
Meets Criteria?	Yes	Yes	Yes*	J-16

*The hydraulic water model was analyzed at the ground floor elevation of the proposed high-rise building. Reference plumbing calculations for any internal booster pump systems to provide adequate water pressures to the higher floors of the building.

Table 5 Fire Hydrant Flow Water Model Result Summary

Criteria	Fire Flow Demand	Constraint	Fire Flow Pressure at Demand	Meets Criteria?
Hydrant 3	2,000 gpm	20 psi	27 psi	YES
Hydrant 4	2,000 gpm	20 psi	61 psi	YES
Hydrant 5	2,000 gpm	20 psi	26 psi	YES
Hydrant 6	2,000 gpm	20 psi	25 psi	YES
Hydrant 7	2,000 gpm	20 psi	30 psi	YES
Hydrant 8	2,000 gpm	20 psi	30 psi	YES
Residual	2,000 gpm	20 psi	25 psi	YES
Riser	2,000 gpm	20 psi	23 psi	YES

4.0 CONCLUSION

The proposed and existing on-site water system as outlined by this analysis appears adequate and sufficient to meet the required fire flow demand to the first floor of the proposed Headwaters Scottsdale development near the southeast corner of 100th Street and Frank Lloyd Wright Boulevard in Scottsdale, Arizona. The proposed building may require a domestic booster system to provide adequate water pressures to the top floors of the building based on plumbing calculations.

Will a domestic booster station be required to meet finished floor?

5.0 REFERENCES

1. City of Scottsdale, *Design Standards and Policies Manual.* 2018.

2. International Code Council, *2018 International Fire* Code. December 2019.

Appendices are missing from report. Included fire flow test from cycle #1 report as appears nothing has changed from prior submittal.

Flow Test Summary

Project Name:	EJFT 22242
Project Address:	13880 N Frank Lloyd Wright Blvd, Scottsdale, AZ 85260
Date of Flow Test:	2022-05-16
Time of Flow Test:	7:30 AM
Data Reliable Until:	2022-11-16
Conducted By:	Caleb Crabbs & Steven Saethre (EJ Flow Tests) 602.999.7637
Witnessed By:	Vince Cusumano (City of Scottsdale) 480.312.5761
City Forces Contacted:	City of Scottsdale (480.312.5761)
Permit Number:	C68759

Raw Flow Test Data

Static Pressure:	80.0 PSI
Residual Pressure:	54.0 PSI
Flowing GPM:	2,110
GPM @ 20 PSI:	3,314

Data with a 10 % Safety Factor

Static Pressure:	72.0 PSI
Residual Pressure:	46.0 PSI
Flowing GPM:	2,110
GPM @ 20 PSI:	3,068

Hydrant F_1

Pitot Pressure (1):	35	PSI
Coefficient of Discharge (1):	0.9	
Hydrant Orifice Diameter (1):	4	inches

Additional Coefficient 0.83 on orifice #1

Static-Residual Hydrant

Flow Hydrant

Distance Between F_1 and R
604 ft (measured linearly)

Static-Residual Elevation
1489 ft (above sea level)

Flow Hydrant (F_1) Elevation
1477 ft (above sea level)

Elevation & distance values are approximate

EJ Flow Tests, LLC
21505 North 78th Ave. | Suite 130 | Peoria, Arizona 85382 | (602) 999-7637 |
John L. Echeverri | NICET Level IV 78493 SME | C-16 FP Contractor ROC 271705 AZ | NFPA CFPS 1915
www.flowtestsummary.com

Flow Test Summary

Static-Residual Hydrant

Flow Hydrant (only hydrant F1 shown for clarity)

Approximate Project Site

Water Supply Curve $N^{1.85}$ Graph