SECTION 2
SYSTEM ANALYSIS

2.0 GENERAL STATEMENT

The water facilities design shall include planning to meet present and future demands, population projections, per capita consumption, industrial expansion, area population densities, and fire requirements. These factors must then be considered to size the mains from the various sources of supply to every point in the proposed system. Other design elements are: piping materials selection (after water and soil corrosiveness considerations), the water main pressure requirements, water main location with reference to property lines, sizing of service lines, locations of line valves, fire hydrants, special valves, and booster pumps. All water system designs shall be prepared by, or under the direction of, a Professional Civil Engineer licensed in the State of California.

Legislation, effective in January 2002, Senate Bills 221 and 610, require that a water supply assessment be prepared to document the sufficiency of an available water supply for the City and the proposed project. The new laws require the water purveyor to furnish substantial evidence that adequate water supply is available to meet the water demands of existing and new customers, through normal, single dry and multiply dry years for the next 20 years. The laws apply to developments of 500-unit subdivisions or larger.

Developer’s Engineer shall provide data and calculations such that the SBMWD may prepare a Water Supply Assessment Report in accordance with SB 221 and SB 610 requirements and distribute it to City Planning for use in Environmental document preparation when necessary.

The report shall include existing and future population and water demand for the next 20 years, water supply and consumption for the previous 10 years, projected water demand for the proposed project, and shall include an assessment of SBMWD’s water rights and entitlements.

2.1 WATER SYSTEM ANALYSIS

The Developer's Engineer shall prepare a Water System Analysis Report that shall include service zone identification, project water demand projections, proposed water supply, system pumping requirements, hydraulic system analysis, and water system storage requirements. Each is discussed in the following paragraphs:

2.1.1 SERVICE ZONE IDENTIFICATION

Using the data presented by the Developer (e.g. topographic mapping with project limits), SBMWD shall determine the appropriate pressure zone/zones to provide water service to the project. SBMWD shall notify the Developer's Engineer of the following:

- Service Zones Name/Names
- Upper and Lower Limit Elevations
- Storage Location
- Water Source Location
- Zones Transmission Facilities to be Modeled
- Zone Water Supply Capacity

2.1.2 PROJECT WATER DEMAND

Developer shall prepare water demand projections for the project. Demand projections shall utilize the amounts of development to be constructed and the average day demand unit factors presented below:

General Plan Land Use Classification	Description	Average Day GPM Per Acre
CCS-1	Commercial	1.95
CCS-2	Commercial	1.95
CCS-3	Commercial	1.95
CG-1	Commercial General	1.95
CG-2	Commercial General	1.95
CG-3	Commercial General	1.95
CG-4	Commercial General	1.95
CG-4SP	Commercial General	1.95
CG-5	Commercial General	1.95
CH	Commercial Heavy	1.95
CN	Commercial Neighborhood	1.95
CO-1	Commercial Office	1.95
CO-2	Commercial Office	1.95
CR-1	Commercial Regional	1.95
CR-2	Commercial Regional	1.95
CR-3	Commercial Regional	1.95
CR-4	Commercial Regional	1.95
IE	Industrial Extractive	1.42
IE-SP	Industrial Extractive	1.42
IE-SP11	Industrial Extractive	1.42
IE-SP2	Industrial Extractive	1.42
IH	Industrial Heavy	2.84
IHSP	Industrial Heavy	2.84
IL	Industrial Light	1.42
OIP	Office Industrial Park	1.95
PCR	Public	2.07
PF	Public Facilities	2.07
PFC	Public Flood Control Areas	0.00
PP	Public Parks	2.07
RE	Residential Estate	0.93
RH	Residential High	5.72
RL	Residential Low	2.08
RL-3P5	Residential 35	2.68
RM	Residential Medium	3.61
RMH	Residential Medium High	3.78
RMH/20	Residential Medium High 20	5.72
RS	Residential Suburban	2.68
RU-1	Residential Urban	2.08
RU-2	Residential Urban	2.08

Maximum Day Demand = 1.69 x Avg Day Demand

Peak Hour Demand = 2.0 x Max Day Demand

2.1.3 WATER SUPPLY

Using the demand projections, SBMWD shall determine water supply requirements for the project. If the additional system load exceeds the current system supply capacities, SBMWD shall condition the developer to develop added supply by construction of infrastructure. Infrastructure may include construction of wells, pumping facilities, transmission mains or reservoirs as determined by SBMWD.

2.1.4 SYSTEM PUMPING REQUIREMENTS

Required water supply pumping facilities shall be equal to maximum day demand plus the maximum required fire flow. If, based on SBMWD's Master Plan or discussions with operations personnel, excess pumping capacity is available in the pressure zone serving the development, then the pumping requirement amount may be reduced, as determined by SBMWD.

Pumping stations shall have 100 percent redundancy in the event that one or more pumping units fail and shall be equipped with on-site portable generators to operate during a blackout or emergency conditions. If the pumping station will be a regional facility (i.e., designed to pump to other developments other than the Developers), the pump station site shall be designed for ultimate build out; however, the minimum number of pumping units shall be two (2) of equal capacity, with piping designed and constructed for future pump and motor installation by others.

2.1.5 HYDRAULIC SYSTEM ANALYSIS

Hydraulic system analysis shall include project distribution system analysis and off-site transmission system analysis within the service pressure zones servicing the project. The Developer will provide the project distribution system layout; off-site transmission system

requirements will be determined by Developer's Engineer and approved by SBMWD. Requirement and components of the hydraulic system analysis are presented in the following paragraphs:

2.1.5.1 SYSTEM PRESSURE REQUIREMENTS

In general, SBMWD's pressure zones are designed to maintain a maximum static pressure of 120 psi to 140 psi. The maximum static water pressure allowed for any service shall not exceed 120 psi.

In areas where a static pressure in excess of 80 psi is realized, individual pressure reducing valves are required to be installed and maintained by the Owner/Developer in accordance with the Uniform Plumbing Code. The Developer's Engineer shall identify on the water plans the services requiring individual pressure reducing valves.

Design parameters for the minimum water pressure in the various pressure zones, during various flow conditions on the customer's side of the meter, are as follows:

A.	Static Pressure	50 psi
B.	Maximum Day	40 psi
C.	Peak Hour	30 psi
D.	Maximum Day plus Fire Flow	20 psi

2.1.5.2 WATER DISTRIBUTION MAIN SIZES

All water mains shall be sized based on flow demands and pressure requirements.

The minimum water main size to be installed in SBMWD's System shall be eight (8) inches in diameter unless otherwise approved by SBMWD. Additionally, SBMWD may establish minimum water main diameters based on road width or other criteria.

Departures from the minimum requirements will be considered only in special circumstances. Any departure from minimum requirements identified above shall be justified by a network hydraulic analysis.

2.1.5.3 FIRE PROTECTION

The system shall be designed to provide fire flows and facilities in accordance with the requirements of the City of San Bernardino Fire Department (Fire Department). All systems must be designed with a minimum residual pressure of twenty (20) psi on the customer's side of the meter and/or backflow assembly during a maximum day demand with required fire flow.

Required fire flows, both on-site and off-site, shall be identified on the plans as specified by the Fire Department. Developer shall provide documentation from the Fire Department indicating fire flow requirements.

The minimum water main size for providing fire protection and serving fire hydrants shall be eight (8) inches in diameter. Larger diameter mains will also be utilized, if necessary, to meet the required minimum fire flow while maintaining minimum residual pressure. A fire hydrant shall not be connected to a main which does not have sufficient fire flow capacity as demonstrated by the system hydraulic analysis.

A maximum water velocity of twenty (20) fps will be utilized when designing for fire flows and/or other emergency conditions.

Fire suppression sprinkler systems shall be designed per the fire codes of the Fire Department. The design shall also take into consideration the pressure loss(es) associated with the lateral, meter, backflow assembly, etc.

Fire hydrants shall conform to the SBMWD Standards. All public fire hydrants shall be located where right-of-way or an easement exists or is provided. Fire hydrants shall be located

inside the right-of-way when easements cannot be obtained, and must meet the minimum Americans with Disabilities Act (ADA) requirements.

All water plans must have the approval of the Fire Department PRIOR to Agency approval.

2.1.5.4 OVERSIZING

SBMWD may require the Developer to oversize some, or all, of the proposed water main. If so, the Developer shall enter into an agreement with SBMWD to define cost sharing responsibilities and funding of the system.

2.1.5.5 SUBMITTAL OF HYDRAULIC ANALYSES FOR REVIEW AND APPROVAL

The hydraulic analysis report may be submitted with the project design for review. However, for larger projects, more than 25 units or 20,000 square feet of industrial and/or commercial developments, submitting a hydraulic analysis report prior to water plan submission will be required.

Two (2) copies of the hydraulic analysis report must be submitted. Listed below are general requirements and specific elements that must be addressed in the hydraulic analysis submittal. The Engineer is encouraged to contact SBMWD for guidance in preparing the report.

2.1.5.6 REPORT REQUIREMENTS

The report shall include the following:

A. GENERAL

- The hydraulic analyses must be signed and sealed by a professional engineer licensed in the State of California.

- Provide the name, address, telephone number and fax number of the Developer and Developer’s contact person on the cover of the report.

- Each page of the submittal must be numbered.

- All system analysis shall be performed using H2ONET software, so that it will be compatible with SBMWD's master hydraulic model.

B. PROJECT DESCRIPTION

- A project description section that includes a written description of the type of project, location, and existing facilities.

- Include a site map showing the project boundaries.

- Provide development information including gross acreage, land use, number of units, anticipated fire flow requirements, development schedule, and phasing requirements. Separate analyses will be required for each development phase.

- If the project is part of an oversizing agreement, indicate so in the report, and use the Developer required pipeline diameter when modeling the project.

- Include a node map clearly delineating the pipeline alignments and diameters, layout and names of streets/roadways in which the pipelines will be installed, the pipe and node numbers used in the analyses, and all fire hydrant locations, if known.

- The text and node maps shall use a minimum font size of 10 points.

C. SOURCE HYDRAULIC GRADE LINE AND DEMAND CALCULATIONS

- Clearly show the source node provided by the SBMWD and use the SBMWD issued

HYDRAULIC GRADE LINE (HGL) for that node in the analyses. Enclose a copy of the letter sent by SBMWD issuing the HGL.

- Provide the type and location of meters, backflow assemblies, etc., and account for the associated losses.

- Calculate on-site demands using demand factors presented above. Use the factor that produces the greater total demand for each development. Show calculations.

D. INPUT DATA TABLES

- Provide input data tables for all pipes modeled. Pipe data tables shall include, at a minimum, pipe numbers as shown on the node map, beginning and ending nodes, lengths in feet, diameters in inches, coefficient of friction, and other pertinent information.

- Provide input data tables for all nodes modeled. Junction node data tables shall at a minimum, include node numbers as shown on the node map, elevation in feet for all nodes using the appropriate datum, node demand in gpm, connecting pipes, and other pertinent information.

E. ANALYSIS

- Separate analyses for Maximum Day, Maximum Day plus Fire Flow, and Peak Hour conditions are required for each phase of the development, as well as for the entire project.

- Explain any assumptions made as part of conducting the analyses; provide any comments that may ease and expedite the review of the analyses.

F. OUTPUT DATA TABLES

- Output results for pipes shall include, at a minimum, flow rate in gpm, flow velocity in fps, head loss in feet per 1000 feet, and other pertinent information for each pipe.

- Output results for nodes shall include, at a minimum, hydraulic grade in feet, node pressure in psi, elevation, demand, and other pertinent information for each node.

- Provide a summary table, for each phase of development, showing the minimum and maximum residual pressures for each condition, and minimum and maximum static pressures.

G. MISCELLANEOUS

- The roughness factors to be used in the analyses should be as follows:

  C= 120 for pipe $\leq$ 12″ in diameter
  C= 130 for pipe $\geq$ 14″ in diameter

- When identifying the fire flow available in a network hydraulic analysis use the hydrant located at the development's weakest point, generally the highest point in the development and/or the last hydrant on dead end main. A junction node should be placed at the appropriate location in the model to represent the fire hydrant.

- The elevation in the hydraulic analyses should preferably be based on a project grading plan or the anticipated final elevation. If a grading plan deviates significantly from the elevations used in the analyses, a revised analysis will be required.

2.1.6 OFF-SITE TRANSMISSION IMPROVEMENTS REQUIREMENTS

SBMWD will determine off-site transmission system components to be modeled with the development system. If results of the modeling reveal that off-site system must be upgraded to adequately serve the project, then SBMWD will condition developer to do so. SBMWD will require that the off site transmission improvements be constructed as specified by the SBMWD system Master Plan. Construction of these improvements by the Developer's Contractor will require a Developer Installed Agreement with SBMWD.

2.1.7 SYSTEM STORAGE REQUIREMENTS

Water storage requirements shall include operational, emergency, and fire flow storage for the development. Operational storage shall be 25 percent of maximum day demand. Emergency storage shall be 100 percent of maximum day demand for 24 hours. Fire flow storage shall be the maximum fire flow as requested by City Fire Department times the required fire flow duration (e.g., 1500 gpm @ 4 hours).

SBMWD will distribute the hydraulic analysis report to all appropriate SBMWD staff (Principal Engineer, Water Utility (W.U.) Distribution Superintendent or W.U. Operations Superintendent or W.U. Production & Treatment Supervisor, or any SBMWD personnel that have been involved with or done any work at or adjacent to the property in question). SBMWD shall meet with each member until approval from each has been obtained. The final approved Water System Hydraulic Analysis shall be distributed to the Developer and their representatives.

SBMWD will file all appropriate backup documentation for later use.

SECTION 2

EXAMPLE - SYSTEM HYDRAULIC ANALYSIS

WATER DISTRIBUTION ANALYSIS
FOR
[PARCEL MAP/TRACT MAP XXXXX]

Prepared by:

[Engineer]
[Address]
[Phone No.]

[Engineer's Seal]

Prepared For:

San Bernardino Municipal Water Department
195 North "D" Street
San Bernardino, CA 92402

Engineering Project No. (EPN) 2005-XXX

[Month, Day, Year]

[PARCEL MAP/TRACT MAP XXXXX]
WATER DISTRIBUTION ANALYSIS

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Exhibits

Appendices

I. INTRODUCTION

The proposed [PROJECT] is located on the southwest corner of [ ] and [ ] in the [PROVIDE DETAILED SITE DESCRIPTION] as can be seen on **Exhibit I** . This site is a portion of the [ ] Quarter of Section [ ], Township [ ] South, Range [ ]East, M.D.M., San Bernardino County, California. The Assessor's Parcel Numbers for the project are [ ], [ ],..

II. EXISTING AND PROPOSED WATER SYSTEM CONDITIONS

The site is located in the San Bernardino Municipal Water Department's (SBMWD) service area within the [ ] Pressure Zone. A [ ]-inch waterline extends north and south along [INSERT DESCRIPTION OF EXISTING MAIN WITH RESPECT TO PROJECT, IF ONE EXISTS]. [PROVIDE A DETAILED DESCRIPTION OF WHERE THIS PROJECT WILL CONNECT TO THE EXISTING SBMWD SYSTEM]. This should provide the minimum required fire and domestic service to the proposed development. See **Exhibit II**, pipe and node layout, for additional information.

A request for Hydraulic Grade Lines (HGL) was sent to the SBMWD on [DATE] for the proposed project. SBMWD responded on [DATE] with the following source node and HGL:

Intersection of [ ] Road and [ ] Avenue

Maximum Day	[ ] feet
Maximum Day Plus Fire Flow	[ ] feet
Peak Hour	[ ] feet

III. DESIGN CRITERIA

The criteria for this analysis were obtained from the *Standards For Design and Construction for Water System Improvements*, Section 2.0, *System Analysis*. The analysis simulates maximum day potable water consumption, fire demands plus maximum day potable water consumption, and peak hour potable water consumption. On-site usage demands, including both maximum day and peak hour, for the proposed project were determined as per SBMWD standards. The fire flow was determined as per San Bernardino City Fire Department Standards and requirements for the project.

Off-Site Demand

Because the source point for the provided HGL's were found at quite a distance from the proposed development, off-site demands had to be taken into account for developments currently under construction and existing demands from existing development provided by SBMWD. [OTHER PROJECT], a [ ] unit development, and [OTHER PROJECT] a [ ] unit development, were both taken into consideration. Off-site demands were determined using Single Family Residential demand factors per the Unit Flow Rate By Land Use Type table in **Exhibit III**.

Estimated off-site usage demands in gallons per minute (gpm) are summarized below. (See **Exhibit II** for the node map).

[OFF SITE PROJECT 1]
[ ] Acres/Land Use Category [ ]
Max Day – Land Use Category [ ]
[ ] Acres x [ ]gpm/acre = [ ] gpm
Peak Hour
[ ] Acres x [ ] gpm/acre = [ ] gpm

[OFF SITE PROJECT 2]
[ ] Acres/Land Use Category [ ]
Max Day – Land Use Category [ ]
[ ] Acres x [ ]gpm/acre = [ ] gpm
Peak Hour
[ ] Acres x [ ] gpm/acre = [ ] gpm

[COPY THE ABOVE FOR DIFFERENT LAND USE CATEGORIES OR GENERATE A TABLE CALCULATING THE OFFSITE DEMANDS]

[NOTE: OFFSITE PROJECTS CAN BE FUTURE PROJECTS OR EXISTING CUSTOMERS DEPENDING ON LOCATION OF HGL PROVIDED BY SBMWD AND WHERE SBMWD REQUIRES MODEL TO BEGIN]

The total demands for the node were [ ] gpm for Max Day and [ ] gpm for Peak Hour, as shown. For demand at node [ ], [OFF SITE PROJECT 1] and [OFF SITE PROJECT 2] were used. The total demands were [ ] gpm for Max Day and [ ] gpm for Peak Hour. This was attained by the addition of [OFF SITE PROJECTS 1 & 2] [ ] gpm Max Day and [ ] gpm Peak Hour flows.

On-Site Demand

On-site demands were determined based on Single Family Residential demand factors per the Average Water Consumption of Various Types of Development Table (**Exhibit III**). Estimated on-site usage demands in gallons per minute (gpm) are summarized below. (See **Exhibit II** for the node map).

[ ] Acres/[LAND USE TYPE]
Max Day
[ ] Acres x [ ] gpm/acre* = [ ] gpm
Peak Hour
[ ] Acres x [ ] gpm/acre* = [ ] gpm

*Obtained from **Exhibit III**

Estimated usage demands in gallons per minute (gpm) and distribution are summarized in **Table I** below. See **Exhibit II** (Node Map) for locations of nodes and pipes.

Table I: Water Demands Per Node

Node Number (description)	Maximum Day Consumption (gpm)	Max Day + Fire (gpm)	Peak Hour Consumption (gpm)
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (residence)	[ ]	[ ]	[ ]
J-[XX] (on-site FH)		1,000	

IV. SYSTEM ANALYSIS

The [H2ONet – PREFERRED SOFTWARE] program was used to analyze all conditions examined in this report. This type of analysis has been used in the past and is a generally accepted methodology. Minor losses were accounted for by using a Hazen-Williams coefficient (C_{hw}) of 130 for all new pipes and existing pipes 14 inches or larger. A (C_{hw}) of 120 was used for existing pipes with diameters 12 inches or smaller.

This analysis includes peak hour, maximum day, and maximum day plus fire flow demands for this project. The critical scenario is the maximum day plus fire flow with a total demand of [ ] gpm ([ ] gpm on-site, [ ] gpm off-site and [ ] gpm fire flow). **Table II** below summarizes the approximate pressures that can be obtained on-site with the proposed improvements. The results for the maximum day plus fire flow demand (**Appendix II**) show that the minimum residual pressure requirement of 20-psi at the fire hydrants can be met on-site by constructing the proposed improvements. The results for the maximum day demand (**Appendix I**) and peak hour

demand (**Appendix III**) show that minimum pressures of 45-psi and 40-psi, respectively, are also met on-site.

Table II: Summary of Results

Demand	Node Number	Maximum Residual Pressure (psi)	Node Number	Minimum Residual Pressure (psi)
Max Day*	J-[ ]	[ ]	J-[ ]	[ ]
Max Day + Fire**	J-[ ]	[ ]	J-[ ]	[ ]
Peak Hour***	J-[ ]	[ ]	J-[ ]	[ ]

* Obtained from Appendix I
** Obtained from Appendix II
*** Obtained from Appendix III

IV. SUPPLY, STORAGE AND PUMPING ANALYSIS *[CONTACT SBMWD TO INQUIRE ON REQUIREMENTS OF THIS SECTION]*

Using the demand projections listed herein, the ultimate effect of the additional project demands regarding water supply, pumping and reservoir storage requirements are analyzed below:

Water Supply: If the additional system demands due to the [PROJECT] exceed the current system supply capacities, SBMWD shall condition the Applicant to develop additional supply by the construction of infrastructure including, but not limited to, additional well(s), pumping facilities, transmissions mains or storage reservoirs as determined by SBMWD.

The following is the supply impacts due to the [PROJECT] water demands (all demands max day):

- Exiting [Zone] In-Zone Supply (gpm): [PROVIDED BY SBMWD]
- Available Supply from Upper Zone ([ ] Zone): [PROVIDED BY SBMWD]
- Total Available Supply (gpm): [PROVIDED BY SBMWD]
- Additional [PROJECT] Demands (gpm): [ ]

Based on the information provided by SBMWD, the project [will] [will not] require additional infrastructure to supplement the water supply [deficit] [surplus] within the [ ] pressure zone.

Pumping Capacity Requirements: Water supply pumping facilities, when required, shall be equal to maximum day demand plus the maximum required fire flow. If, based on SBMWD's Master Plan, excess pumping capacity is available in the pressure zone serving the project, then

the pumping requirement for the development may be reduced or eliminated as determined by SBMWD. All pumping stations, if required, shall have 100 percent redundancy in the event of one or more pumping units fail and shall be equipped with on-site, portable generators to operate during blackout periods.

The [ ] pump station and [ ] pump station boost water from the [ ] zone to the [ ] zone where the project is to be served. The total combined pumping capacity that currently boosts water to the zone where the project exists is [ ] gpm with the largest unit out of service.

The following is the pumping requirements due to the [PROJECT] water demands (all demands max day):

- Existing Zone Pumping Capacity: [ ] gpm [PROVIDED BY SBMWD]
- Current Allocated Pumping Capacity: [ ] gpm [PROVIDED BY SBMWD]
- Additional [PROJECT] Pumping Required: [ ] gpm [PROVIDED BY SBMWD]
- Excess/Deficit of Pumping Capacity: [ ] gpm [PROVIDED BY SBMWD]

Storage Capacity Requirements: Storage facilities, when required, shall include operational, emergency, and fire flow storage for the [PROJECT]. Operational storage shall be equal to 25 percent of maximum day demand, emergency storage shall be 100 percent of maximum day demand for 24 hours and fire storage shall be the maximum required fire flow mandated by the City Fire Department for duration of 4 hours. If, based on SBMWD's Master Plan, excess storage capacity is available in the pressure zone serving the project, then the storage requirement for the development may be reduced or eliminated as determined by SBMWD.

The [ ] reservoir(s) and [ ] reservoir(s) currently provide floating storage for the [ ] zone where the project is to be served. The total combined reservoir storage capacity is [ ] million gallons (mg).

The following is the storage requirements due to the [PROJECT] water demands (all demands max day):

- Existing Zone Reservoir Capacity: [ ] mg [PROVIDED BY SBMWD]
- Allocated Reservoir Capacity: [ ] mg [PROVIDED BY SBMWD]
- Additional [PROJECT] Storage Required: [ ] mg [PROVIDED BY SBMWD]
- Excess/Deficit of Storage Capacity: [ ] mg [PROVIDED BY SBMWD]

V. CONCLUSION

Based on the proposed improvements by the developer, the results of the water distribution analysis indicate that the minimum required pressures for all demand situations could be achieved and all required minimum pipeline velocities are maintained in accordance with SBMWD's Standards for Design and Construction, Section 2.0. In addition, the supply, pumping and storage analysis supplied by the SBMWD indicates that the development [does] [does not] require additional water infrastructure improvements [if required, in the form of…EXPAND IF NECESSARY]. The water system should provide adequate fire and domestic service to [PROJECT].

EXHIBIT I
Vicinity Map

EXHIBIT II

Water Distribution Node Map

EXHIBIT III

Average Water Consumption of Various Types of Development

Exhibit III
Unit Flow Rate By Land Use Type
Average Day Demands

General Plan Land Use Classification	Description	Average Day GPM Per Acre
CCS-1	Commercial	1.95
CCS-2	Commercial	1.95
CCS-3	Commercial	1.95
CG-1	Commercial General	1.95
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IE-SP	Industrial Extractive	1.42
IE-SP11	Industrial Extractive	1.42
IE-SP2	Industrial Extractive	1.42
IH	Industrial Heavy	2.84
IHSP	Industrial Heavy	2.84
IL	Industrial Light	1.42
OIP	Office Industrial Park	1.95
PCR	Public	2.07
PF	Public Facilities	2.07
PFC	Public Flood Control Areas	0.00
PP	Public Parks	2.07
RE	Residential Estate	0.93
RH	Residential High	5.72
RL	Residential Low	2.08
RL-3P5	Residential 35	2.68
RM	Residential Medium	3.61
RMH	Residential Medium High	3.78
RMH/20	Residential Medium High 20	5.72
RS	Residential Suburban	2.68
RU-1	Residential Urban	2.08
RU-2	Residential Urban	2.08

Maximum Day Demand = 1.69 x Avg Day Demand
Peak Hour Demand = 2.0 x Max Day Demand

EXHIBIT IV

Service Zone Identification From SBMWD

APPENDIX I

Maximum Day Simulation

APPENDIX II

Maximum Day Plus Fire Flow Simulation

APPENDIX III

Peak Hour Simulation