

**Amended Plan for Services For Water and  
Wastewater Services Submitted by  
City of San Bernardino  
Municipal Water Department**

**Attachment 3**

This is a revised plan for service for submission to the Local Agency Formation Commission (LAFCO), in support of the City of San Bernardino's application for annexation, for the proposed water, wastewater, irrigation and recycled water systems planned for the Arrowhead Springs Development (Development). A prior plan for service was submitted to LAFCO, titled, "*Arrowhead Springs Plan For Service*," and dated December 20, 2005, by Stanley R. Hoffman Associates, Inc. The data found in that report was utilized to prepare this revised plan for service, along with data found in the Arrowhead Springs Specific Plan, January 2005.

## **WATER, WASTEWATER, IRRIGATION AND RECYCLED WATER SYSTEMS**

**Service Provider:** Water, wastewater collection<sup>1</sup> and treatment, irrigation and recycled water services will be provided by the City of San Bernardino Municipal Water Department (SBMWD). Assurances from the owner of the property regarding financing of the improvements needed for the Development will be secured through a Declaration of Covenants, Conditions and Restrictions for Public Water and Wastewater System Improvements (Exhibit "A"). An assessment of the water rights held by the Development and water supply availability, which is independent of the question of water rights, will be required of the owner or its successors-in-interest before design of the water supply system, for reasons that will be more fully explained below.

The water demands, supply and delivery/storage systems and the wastewater, irrigation and recycled water demands for the Development are described in detail in the Arrowhead Springs Specific Plan.

**Domestic Water - Level and Range of Service:** The primary source of supply for the Development is proposed to be the on-site supply owned, in whole or in part, by the Development. To the extent that the Development has sufficient water rights, however, there must be an additional analysis of whether there is sufficient multiple dry-year supply in the streams and groundwater basins to which the Development has rights. Even assuming that there is sufficient water supply available to serve the Development in full build out, there will need to be redundancy to provide supply in the event of a short-term or long-term outage. For the purposes of this analysis, and to take the most conservative approach, the assumption made herein is that there is insufficient water supply on-site to serve the Development at full build out.

The source of supply for the Development will come from sources within the Bunker Hill Groundwater Basin. The Arrowhead Springs Project is estimated to require 1,993 acre-feet of water per year per the Specific Plan. The primary source of supply will be two to three new groundwater extraction wells to be drilled within the Bunker Hill Groundwater Basin in the SBMWD service area. This source of supply will require off-site improvements, including hydraulic lifts in the form of pump stations, reservoirs, and transmission mains to

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<sup>1</sup> At this time, the City of San Bernardino's Public Services Department has jurisdiction over sewer collection. Either the City of San Bernardino or the SBMWD, through a delegation of authority by the City, would have responsibility for operation and maintenance of the sewer collection system.

push the water uphill to the Development. This source of supply is readily available with the appropriate capital improvements.

A secondary source of supply can be an intake on Coldwater Creek, which has been a source of water to the existing Development for many years in conjunction with a turnout from the San Bernardino Municipal Water District's (Muni) Foothill Pipeline. Strawberry Creek, at the junction of Coldwater Creek is on the Project property and is a third source of supply. These sources of supply will require a surface water treatment plant that will treat water to State of California Department of Health Services Surface Water Treatment Rule standards. Furthermore, and as stated above, verification of existing water rights for Coldwater Creek and Strawberry Creek will be required in order to utilize these two sources of supply.

The rate of domestic water consumption varies with the type of land use. Table 1 below contains these demands, based on information provided in the draft Arrowhead Springs Specific Plan, dated January 2005. The estimated average annual daily domestic water requirement is about 1.6 million gallons per day for all uses in the Development. The supply of water is estimated at about 3.9 million gallons per day and requires a minimum of two (2) off-site wells located in the Bunker Hill Basin. This assumes both wells deliver 2,000 gallons per minute (gpm) operating for 18 hours per day per well and a 10 percent down time factor.

**TABLE 1  
ARROWHEAD SPRINGS ANNEXATION – PLAN FOR SERVICE  
PROJECTED DOMESTIC WATER REQUIREMENTS**

Land Use	Gallons Per Day (Average Daily Demand) (GPD)
Residential	792,320
Commercial/Office	227,200
Hotel/Conference Center	760,320
<b>Total</b>	<b>1,779,840</b>

**Domestic Water Improvements:** Domestic water will be distributed throughout the project through a series of pump stations, reservoirs, pressure reducing stations, and pipelines through metered services to the various customers in the project. The reservoirs will maintain a capacity of water for fire suppression, daily operational storage, and emergency storage. The pump stations will be designed to pump the maximum day demand over an 18-hour period to take advantage of Southern California Edison time of use schedules for power cost reductions. A minimum of two (2) new off-site groundwater extraction wells would be constructed at Bunker Hill Basin south of the Development.

The Development Owner will be responsible for funding the design and construction of the water distribution system improvements within the project as well as all off-site water system improvements. All water system improvements will be designed and constructed to SBMWD standards.

**Irrigation Water - Level and Range of Service:** The SBMWD will provide irrigation (combination of recycled water and surface water) to the Development via a separate

irrigation water distribution system. The estimated requirement for irrigation water is 2,042 acre-feet per year. Water for irrigation purposes will come from two sources: to the extent possible, one source will be from recycled water from a wastewater treatment plant located on the property serving the Development. It is estimated that 977 acre-feet of treated wastewater will be available annually at build-out of the project. A second source of water will be from Waterman Canyon Creek (West Twin Creek). Flows from Waterman Canyon Creek have averaged 2,491 acre-feet annually, based on unconfirmed source material. Again, the water rights of the West Twin Creek will require verification in order to utilize this source of supply for irrigation water purposes for the Development.

If West Twin Creek water rights are not available, nor are any other surface water rights available to the Development, the balance of the irrigation demands over and above what the wastewater treatment plant can provide will be made up from the domestic water system. Proper cross-connection and backflow prevention measures will be taken when connecting the domestic water system to the irrigation water system. It is anticipated that a majority of the irrigation demands will be met either by surface water sources or the domestic water system in the early stages of development due to low wastewater flows until full build out.

**Irrigation Water Improvements:** Irrigation water will be distributed via a separate irrigation water system to users through a system of booster stations, reservoirs, and pipelines to metered irrigation services. Irrigation reservoirs will allow gravity feed of the irrigation water and all irrigation reservoir overflow elevations will be set at lower elevations than those of the domestic reservoirs serving the same general area. This will increase the safety factor for cross-connection control between the domestic and irrigation water systems.

The Development Owner will be responsible for funding the design and construction of the irrigation water distribution system improvements within the project. All irrigation water system improvements will be designed and constructed to SBMWD standards.

**Wastewater - Level and Range of Service:**

**A. General Considerations**

The present development within the Study Area is being provided wastewater collection, conveyance, treatment and disposal by facilities on-site. The treatment is through an Imhoff Tank-style treatment plant that provides primary treatment and the effluent is discharged into adjacent ponds for evaporation/percolation. The discharge from this plant is regulated by Board Order No. 86-100, issued by the Santa Ana Regional Water Quality Control Board. The Board Order permits a discharge of up to 300,000 gallons per day. This plant has served the hotel and support structures for many years, but the capacity of the tank and type of effluent provided may not comply with the size and style of proposed development. The SARWQCB, in discussions with San Bernardino Municipal Water Department staff, has indicated that this type of discharge will not be permitted for increased wastewater flows.

When additional capacity is deemed necessary, it is planned to convey the raw wastewater to a treatment facility in the southerly part of the project area, where the influent will operate by gravity in most situations, obviating the need for an energy lift to the plant. However, it

may be necessary to install wastewater lift stations due to the mountainous terrain in which the project is situated. The facility will meet requirements for unrestricted use.

The nearest existing wastewater facilities are southerly and below the proposed development, belonging to the City of San Bernardino. It is infeasible to collect wastewater on site and transport it to the San Bernardino wastewater treatment facility. Sewers are of minimum diameter and do not have adequate capacity to provide service to the development. A second alternate to a wastewater system would be on-site disposal. The only feasible alternate is to provide on-site treatment and disposal. It is entirely possible that a discharge permit may need to be obtained from the SARWQCB, in the event that wastewater flows exceed on-site demands, even with some provision for storage. In the event that it is necessary, the requisite discharge permit will be obtained from the SARWQCB.

The current policy of the Santa Ana Regional Water Quality Control Board is to allow properties with septic tanks and underground disposal systems to be constructed at a density of no more than two single-family homes per acre. Should the development of Arrowhead Springs require higher density, the use of single family on-site disposal systems will not be allowed. The only feasible alternate is to provide a regional treatment and re-use/disposal facility. It is entirely possible that a discharge permit may need to be obtained from the SARWQCB, in the event that wastewater flows exceed reuse demands, even with some provision for storage. In the event that is necessary, the requisite discharge permit will be obtained from the SARWQCB.

The amount of wastewater to be generated from the development is a function of the number of people and the amount of wastewater discharged by each person, and the amount of commercial area to be constructed. The criteria used to develop the quantity of wastewater follows.

#### **DESIGN CRITERIA**

(Daily Contributions)

Contribution per person	100 gallons
Occupancy per dwelling unit	3.2 people
Equivalent Dwelling Unit (EDU)	320 gallons per day

The summation of the above criteria will result in an average daily discharge of about 0.9 MGD over an annual basis. During the day, the flows will vary with higher and lesser flows than the average daily flow. The higher flows are computed as "Peak Flows" and calculated by a factor that is dependent on the average daily flow at that point in the collection system. The least flow is calculated as fifty (50) percent of the average daily flow. The peak flow is calculated, based on the following table:

#### **PEAKING FACTORS**

Average Daily Flow (MGD)	Peaking Factor
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0.00-0.01	4.0
0.05	3.4
0.10	3.2
0.20	3.0
0.30	2.8
0.50	2.7
0.80	2.6
1.00	2.5
1.50	2.4

As may be seen above, the larger the flow, the less the peaking factor will be.

The single-family unit, or residence, with occupancy of 3.2 people, will contribute 320 gallons of wastewater per day.

To place all land uses within the Arrowhead Springs Development on an equal design basis, the domestic water requirements have been converted to "Equivalent Dwelling Units" in Table 3-1, Section 3 herein. With wastewater quantities closely following the domestic water requirements, the Equivalent Dwelling Units developed for domestic water will be used for determining wastewater quantities. A summary of the "Equivalent Dwelling Units" as shown on Table 3-1 herein is shown below:

#### SUMMARY OF EQUIVALENT DWELLING UNITS

Residential	1,238
Commercial	355
Hotel/Conference Center	<u>1,188</u>
TOTAL	2,781

The quantity of wastewater to be generated by the study area is estimated as follows:

2,781 EDU x 320 gallons per day per EDU, average  
daily flow = 889,920 gpd or 0.90 million gallons  
per day, with influent flow rates ranging from 0.45 MGD to 2.34 MGD based on  
minimum flow and peaking factor estimates.

#### B. Collection System

A wastewater collection system will consist of a network of interceptor, collector, lateral and service connection sewers, all designed and constructed in accordance with the standards of the City of San Bernardino<sup>2</sup>. In general, most of the areas will conduct wastewater in sewers by gravity flow. In all likelihood, there will be areas in the mountainous terrain where a wastewater lift station will be required. This lift station will collect the gravity flow in a receiving chamber and pumps will lift the wastewater to the elevation where it can flow by gravity to the wastewater treatment facility.

Sewers will be constructed within paved roads where available and only within easements when necessary for structure service. All sewers and manholes shall be available for immediate access by maintenance people and equipment. This is necessary for routine maintenance and emergency conditions. All federal, state and local safety-related laws, regulations and conditions, including OSHA, shall be designed into the wastewater system and all safety orders followed.

#### C. Wastewater Treatment

The ultimate wastewater flows have been estimated at 0.9 million gallons per day, average daily flow

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<sup>2</sup> At this time, the City of San Bernardino's Public Services Department has jurisdiction over sewer collection. Either the City of San Bernardino or the SBMWD, through a delegation of authority by the City, would have responsibility for operation and maintenance of the sewer collection system.

(MGD, ADF) when the project is fully constructed and occupied. Several factors must be taken into account when determining treatment strategies. They include:

- Development of design parameters for wastewater loadings for wastewater treatment plant (WWTP) design;
- WWTP treatment process and required redundancy in the design;
- WWTP phasing according to the absorption schedule from development phasing;
- Spray irrigation processes for effluent reuse and effluent parameter limitations;
- Calculation of the area required for spray irrigation reuse and necessary spray irrigation reuse infrastructure including storage capacity;
- Recommended wet weather wastewater influent storage capacity;
- Other design considerations such as noise abatement, odor control, power requirements, lighting, disposal of treatment residuals, chemical treatment, etc.

The concept for treatment and effluent disposal is to treat the wastewater sufficiently to obtain an effluent, which will meet Title 22, California Code of Regulations.

In addition to wastewater flows, an estimate of wastewater influent loading is necessary for the design of the wastewater treatment plant. The standards for calculating biochemical oxygen demands (BOD) and total suspended solids (TSS) for residential development are listed below:

**Design Criteria For Wastewater Influent Loading  
Residential Developments**

Parameter	Influent Design Value
Biological Oxygen Demand (BOD)	12 lbs/day/1000 ft <sup>3</sup> of Unit Volume (300 mg/l)
Total Suspended Solids	12 lbs/day/1000 ft <sup>3</sup> of Unit Volume (300 mg/l)

**D. Irrigation**

Effluent requirements for treated wastewater are under the jurisdiction of several state and local agencies. Federal and California state laws for permitted reuse are outlined in the State of California Water Code. The State of California Department of Health Services (DOHS) has mandated reuse water quality standards under Section 13521 of the Porter-Cologne Act (Water Code Section XXXX et seq.). DOHS has developed comprehensive reuse regulations that establish treatment processes, water quality criteria and treatment reliability requirements to ensure public health and safety. These regulations are in the California Code of Regulations (CCR) Title 22. The Santa Ana Regional Water Quality Control Board (SARWQCB) is responsible for enforcing these regulations to the wastewater producers and users.

Effluent will be reused by spray irrigation methods on common areas of the development, including parks, golf course, open areas and aesthetic plantings, to the maximum extent possible. This type of

effluent is described as Landscape Irrigation in CCR Title 22, Article 4. Since the effluent will be reused in close proximity of human contact and habitation, a tertiary treated effluent must be obtained for use in spray irrigation.

Tertiary treated wastewater shall be at all times adequately disinfected, oxidized, coagulated, clarified and filtered. Effluent limitations are listed in the table below:

**Effluent Limitations for Spray Irrigation  
Landscape Irrigation**

<b>Parameter</b>	<b>Effluent Design Value</b>
Median Number of Coliform Organisms	2.2 per 100 milliliters as determined from the bacteriological results of the 7 days for which the analysis have been completed.
Number of Coliform Organisms	No more than one sample above 23 per 100 milliliters in any month, and no single sample above 240 MPN per 100 milliliters.
Biological Oxygen Demand (BOD)	20 mg/l
Total Suspended Solids (TSS)	20 mg/l
Turbidity	2 NTU

The proposed WWTP will be designed to meet limitations in accordance with Regional Water Quality Control Board, Santa Ana Region, requirements.

WASTEWATER TREATMENT PROCESS AND REDUNDANCY

a. General

The treatment process being considered for this project is a micro-filtrate membrane bioreactor, commonly called micro-filtration. This process was considered because of the compact nature of the plant and reasonably simple maintenance and operation to provide the quality of effluent for unrestricted irrigation. Typically, the entire process can be housed within a structure architecturally appropriate to fit into the neighborhood and provide sound and odor control. The process units can be constructed in phases to accommodate the progress of development and construction.

b. Treatment Process

An influent lift station will place wastewater at an elevation to enter the WWTP headworks, which will contain influent fine screens with a minimum 3/8" opening and an aerated grit chamber prior to entering the nitrification/de-nitrification chamber.

Effluent will flow to the tertiary filters and disinfection units and after disinfection, the effluent will accumulate in an effluent basin where it will be pumped to a place of use.

The WWTP will have redundancy so that, if any unit fails, there is a standby unit that will automatically come online. There will be standby generator (s) ready to provide electrical energy if the normal power source fails. An operator will automatically be notified if any unit (s) fail or the effluent or process requires attention. During wet weather, when irrigation demand falls, the effluent must be stored rather than used for irrigation. A thirty (30) day storage facility is required. In this case, a storage facility to hold 33,000,000 million gallons, or 101.26 acre-feet of effluent must be provided. Normally, the storage facility is an open pond near the treatment plant so the effluent can be reclaimed and put to irrigation/fire suppression use. Alternatively, a discharge permit may be obtained.

## **WASTEWATER COLLECTION**

A wastewater collection system will be constructed to collect sewage from the various structures throughout the development and conduct the raw sewage in closed conduits through house connection sewers, lateral sewers, main sewers and interceptor sewers to the treatment plant. The sewers will be designed with a minimum flow of 2-feet per second at minimum flow to prevent sedimentation and solids from falling out and a maximum of 10 feet per second to prevent scouring of the sewers. When constructed, all sewers will be tested for tightness with air and manholes tested with water to minimize leakage into the surrounding soil.

When necessary, wastewater lift stations will be constructed and only then when no alternative solution is available. The wastewater will be received in a chamber and allowed to accumulate until a pre determined level is reached and then the wastewater will be pumped to a higher elevation, allowing it to flow by gravity. The mechanical units of the lift station will be located above ground and have a secondary source of energy to pump the sewage if the primary source of energy or the pump on-call does not operate. The switch over must be instantaneous without delays. At the same time, a SCADA System will notify an on-duty wastewater operator for immediate action.

The use of low spots such as an inverted siphon is discouraged. To simply maintain a shallower depth of the sewer by installing such a device, will not be a reason for its installation. Close attention to design of the sewers will be necessary to minimize the possibility of overflows, spills and stoppages that could contaminate the watersheds, streams and visual aesthetics of the adjacent areas.

## **PERMITTING**

The planning for the wastewater effluent is to use the water for irrigation. There are areas of potential use on the property such as:

- Golf Course
- Landscapes
- Roadscapes
- Parks Open Space
- Natural Open Space

- Combustion areas for perimeter fire protection

There appears to be adequate area that will require regular irrigation, which will utilize the effluent produced and additional water from the properties. Within Section 5, entitled Irrigation Water, the water requirements will be examined and quantities determined.

A Report of Waste Discharge will be required from the Santa Ana Regional Water Quality Control Board and an approval of an "Engineering Report for the Production, Distribution and Use of Recycled Water". The approval will be from the State of California, Department of Health Services, Drinking Water Division, and the Recycled Water Unit of the Technical Branch, State of California, department of Health Services, Drinking Water Division. The Environmental Impact Report for the project which includes the treatment facility will be approved with the Specific Plan and the other approvals/permits will come from:

#### **FUNDING RESPONSIBILITY AND CONDITIONS OF SERVICE**

The design and capital construction costs of the water, wastewater, irrigation and recycled water systems improvements required are the responsibility of the Development Owner, and will be the subject of the Declaration of Covenants, Conditions and Restrictions for Public Water and Wastewater System Improvements. The SBMWD will be responsible for the operation and maintenance costs for these systems within the annexation area and will set water rate structures in keeping with a recovery of cost principle and in accordance with state law. Operations and maintenance costs are covered primarily through monthly service charges that will be paid by future users within the project area.

In addition to funding the infrastructure improvements, the Development Owner will be responsible for the following conditions of approval:

- Funding the development of a master plan for the water, wastewater, irrigation and recycled water systems.
- Assessment and transfer of all available water rights attached to the Development to the SBMWD.
- Assessment of the actual water supply available during wet and dry years.
- Construction of all infrastructure improvements in accordance with all of SBMWD's design and construction standards.

#### **CONFORMING CHANGES TO PREVIOUSLY SUBMITTED PLAN FOR SERVICE**

This document supercedes or modifies those portions of the Arrowhead Springs Specific Plan Annexation Study: Plan for Service City of San Bernardino (December 20, 2005), previously submitted by the City of San Bernardino in support of the application for annexation, which conflict with this revised Plan for Service, including, but not limited to, the following sections:

Table 2-2;  
Section 3.5;  
Section 3.6.

This document supercedes or modifies those portions of the Arrowhead Springs Specific Plan Fiscal Impacts of Annexation City of San Bernardino (December 20, 2005), previously submitted by the City of San Bernardino in support of the application for annexation, which conflict with this revised Plan for Service. Please note that a fiscal analysis of impacts to the City of San Bernardino Municipal Water Department's Water and Sewer funds has not been conducted. The assumptions contained herein are that the costs of service will be calculated in a reasonable and standardized fashion and will be assessed through appropriate rates structures to be adopted in conformity with state law.