JOSHUA BASIN WATER DISTRICT

Proudly providing water from an ancient source ... well into the future.

In accordance with the Governor's Executive Order N-29-20, the public may view or listen to this Citizens Advisory Council (CAC) meeting online.

This meeting will be streamed at https://us02web.zoom.us/j/86973655254

You may also join by phone at 1-253-215-8782, Meeting ID: 86973655254

Members of the public, who wish to comment on any item on the agenda, may submit comments by emailing them to Beverly Waszak at bwaszak@jbwd.com two hours prior to the start of the meeting so the comments may be distributed to the CAC. Written comments shall follow the three-minute prescribed time limit when read during the meeting and will become part of the CAC meeting minutes.

CITIZENS ADVISORY COUNCIL
TUESDAY, SEPTEMBER 8, 2020, AT 6:00 PM
61750 CHOLLITA ROAD, JOSHUA TREE, CA 92252

AGENDA

1. CALL TO ORDER
2. PLEDGE OF ALLEGIANCE
3. DETERMINATION OF QUORUM
4. APPROVAL OF AGENDA
5. PUBLIC COMMENT
6. APPROVE MINUTES OF THE PRIOR MEETING
   - Draft Minutes – June 9, 2020
7. WASTEWATER TREATMENT STRATEGY REPORT – GM Ban – Receive for information only.
8. GENERAL UPDATE AND FUTURE INFORMATION – GM Ban
9. ROUNDTABLE COMMENTS - CAC
10. ADJOURNMENT

INFORMATION

During "Public Comment," please use the podium microphone. State your name and have your information prepared and be ready to provide your comments. The District is interested and appreciates your comments. A 3-minute time limit will be imposed. Any person with a disability who requires accommodation to participate in this meeting should telephone Joshua Basin Water District at (760) 366-8438, at least 48 hours before the meeting to request a disability-related modification or accommodation.

CITIZENS ADVISORY COUNCIL - MINUTES – JUNE 9, 2020

CALL TO ORDER/PLEDGE OF ALLEGIANCE-Karen Tracy called the meeting to order at 6:05pm on ZOOM

IN ATTENDANCE- Karen Tracy, Gayle Austin, Barbara Delph, Shari Long, Frank Coates, Karen Morton, Karyn Sernka, Jane Jarlsberg, David Carrillo, Jeff Dongvillo.

STAFF PRESENT-GM Mark Ban

CONSULTANTS PRESENT – Kathleen Radnich, Public Information Consultant

GUESTS-1

APPROVAL OF AGENDA-Jeff Dongvillo motioned to approve the Agenda with changes. Jane Jarlsberg seconded; motion passed.

PUBLIC COMMENT-None

APPROVE MINUTES OF LAST MEETING-Jane Jarlsberg motioned to approve the minutes as amended, Barbara Delph seconded, motion passed.

WASTEWATER TREATMENT STRATEGY UPDATE-GM Ban received the strategy from Dudek engineering firm and after he reads and amends it, he will present it to the CAC and The Board.

Kathleen Radnich spoke about how the community is divided about what our wastewater strategy should be. Part of the community has said "enough is enough" and they shouldn't have to pay for downtown's wastewater treatment.

Barbara Delph asked about the reserve account that is supposed to help fund our wastewater treatment.

GM Ban explained that anyone who builds on a lot pays about $6,000 and it is in a reserve account for wastewater treatment. He will provide account info and balance to CAC members.

Shari Long asked if we would still develop in different areas at different times

GM Ban said that yes, we will have a phased approach.

GENERAL UPDATE AND FUTURE INFORMATION-GM Ban said that there were no service terminations in April or May and might continue for several months. JBWD lost revenue of $19,579.00 over a 6-month period in service termination fees, but felt it wasn't as bad as it could have been.

Gayle Austin asked if the District could be reimbursed since it involved the Covid-19 state of emergency.

GM Ban stated that it was possible.

Kathleen Radnich talked about the Low-Income Assistance Program. The District has put more funds into the account. 99 customers have been helped so far and the balance in the account is $7,000.

GM Ban said that the District would look favorably on raising the amount of help from $50 to $100. He asked if Gayle Austin would present this recommendation to the finance committee on July 7th and she agreed.

Kathleen Radnich said that the district is going to have another enrollment event at the office in late August.

GM Ban stated that the District is diving into several studies including a resiliency study and an efficiency study. The pipeline project is ongoing. CIRP was down because of pandemic but is back on the job on Saddleback. Geoviewer is a huge plus for the District. Also, the company that the District contracts with to do line location on 811 inquiries was going to raise its rates so high that it would be less expensive for the District to hire another employee, so it will be brought in-house.

Jane Jarlsberg asked if the District was back to full staff.

GM Ban replied yes, but some are still working remotely.

Jane Jarlsberg asked about a problem her neighbor was having with noises coming from the District late at night and was wondering if whatever function caused the noise could be done during the day.

GM Ban said that he thinks it is the "equipment box" and that the emergency generator is starting up because that can happen at any time, day or night. He will look into it and have Jane give the neighbor his phone number.

Gayle Austin said that she thought these kinds of situations should be handled at another time and not at a CAC meeting because it did not concern the CAC.

ROUNDTABLE COMMENTS- CAC

Karen Tracy: Kudos to the District. She drove by the worksite and was happy to see them working.

Shari Long: She didn't get the email about this meeting. Also, she had a newspaper article about JBWD holding a public meeting about fee structure.

GM Ban said that Covid-19 caused them to cancel the meeting, but the newspaper still ran the legal notice. It will be rescheduled and will be in the newspaper again.

Barbara Delph: No Comment

Jane Jarlsberg: Asked about what the protocols would be for our meetings if we met in person.

GM Ban said that hopefully we can meet in person at meeting after next.

Karyn Sernka: She will be reading the Wastewater Treatment Strategy.

Frank Coates: Congratulated Randy on his new job.

David Carrillo: Good to hear everyone's voices.

Karen Morton: Good to get together.

Jeff Dongvillo: His neighbor had a water situation and within an hour, the District was on it. He asked if GM Ban could give a presentation on water theft.

Gayle Austin: Thank you to everyone.

Kathleen Radnich told us that since Water Day was cancelled, JBWD sponsored CMC virtual graduation.

NEXT MEETING-August 11,2020

ADJOURNMENT- Gayle Austin motioned to adjourn the meeting, Barbara Delph seconded, and the motion was carried at 7:04pm

WASTEWATER TREATMENT STRATEGY 2020 UPDATE




SEPTEMBER 2020

Prepared for:
Joshua Basin Water District
61750 Chollita Road
PO Box 675
Joshua Tree, California 92252

Prepared By:
Dudek
605 Third Street
Encinitas, California 92024

WASTEWATER TREATMENT STRATEGY

2020 Update

Prepared for:

Joshua Basin Water District
61750 Chollita Road
P.O. Box 675
Joshua Tree, California 92252

Prepared by:

DUDEK

605 Third Street
Encinitas, California 92024

September 2020

Blank Page

TABLE OF CONTENTS

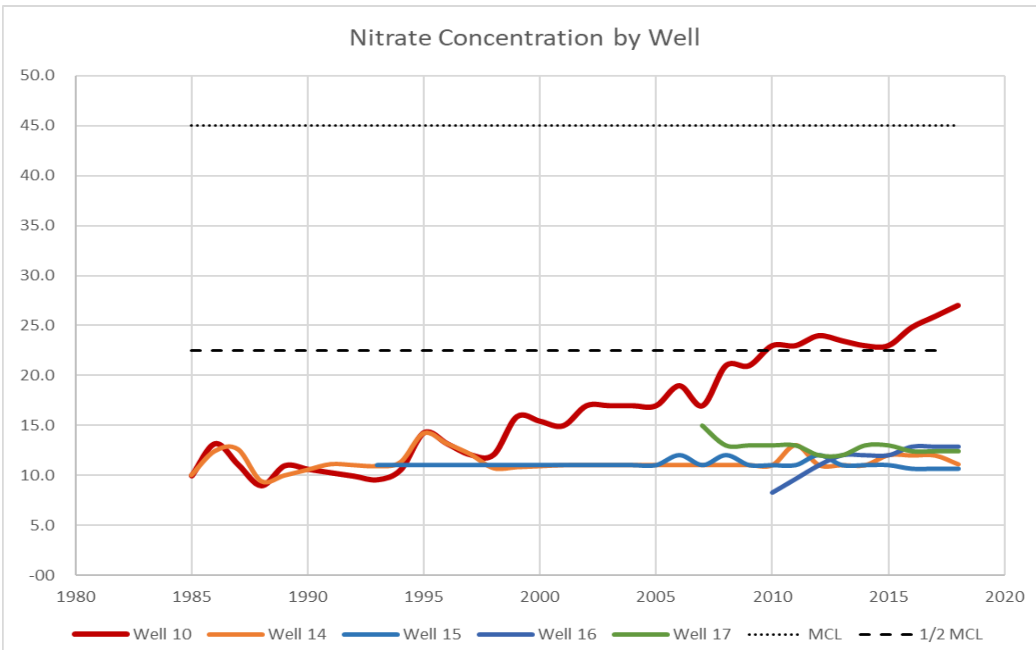
FIGURES

TABLES

Executive Summary

Joshua Basin Water District (District) encompasses an area of approximately 96 square miles, and serves the unincorporated area of Joshua Tree, California. The District relies on local groundwater for its drinking water supply, pumped from two local subbasins of the greater Morongo Groundwater Basin, namely the Joshua Tree and Copper Mountain Subbasins. It has been estimated that recharge from individual septic systems currently represents may exceed 80 percent of the annual recharge within the District's drinking water supply. These septic return flows result in increased nitrate and total dissolved solids degradation of the groundwater. Long-term cumulative impact of wastewater discharges continues to be the primary concern for the District. Gradual prohibition of new individual septic systems will require construction of local treatment facilities that protect the District's local groundwater resources. Figure ES.1 shows the historical increases of nitrate concentrations from the District's wells.

Figure ES.1 Historical Nitrate Concentration at District Wells

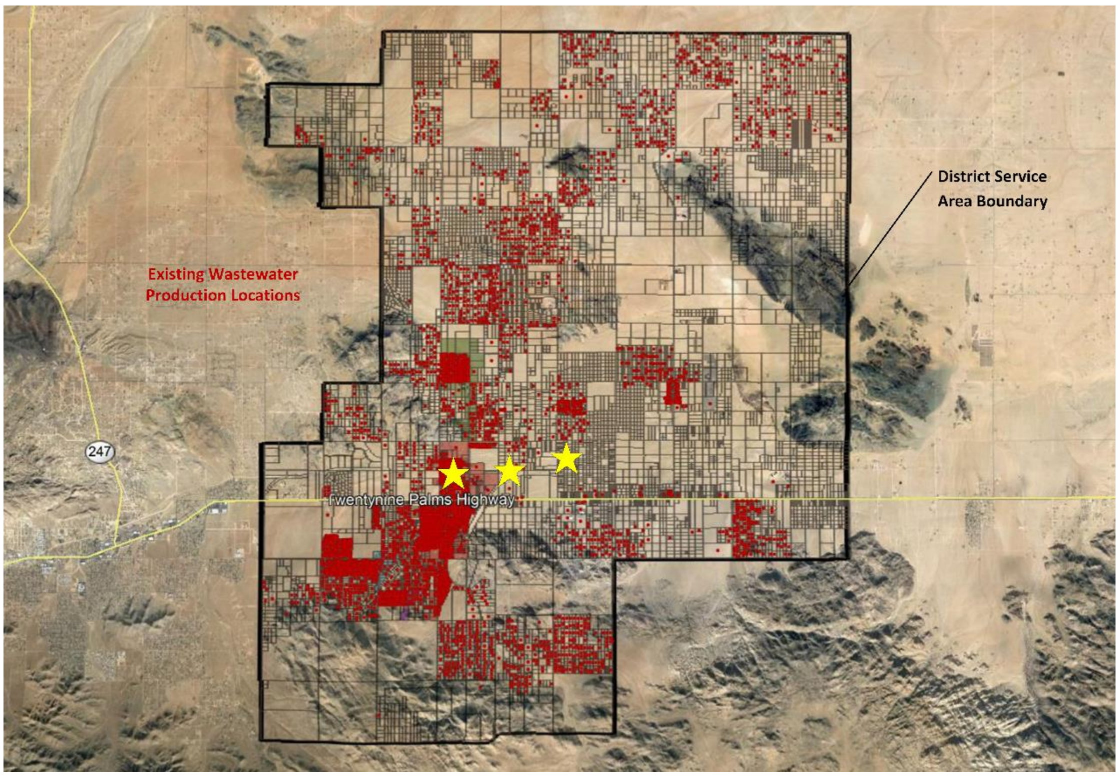


The development and implementation of localized and/or regional wastewater collection, treatment and disposal facilities is not something that is promulgated and constructed quickly. For this reason, the District commissioned development of the Wastewater Treatment Strategy (WTS). Completed in 2009, the WTS identified both the short- and long-term strategies for implementation of needed groundwater protection facilities. Over the last 11 years, the District has experienced continued degradation of its groundwater quality, necessitating review and update of the WTS. Building from the original evaluations, this WTS Update provides an understanding of where nitrate contamination originates, the facilities needed to control nitrate concentrations, and the methodology to plan, implement and fund necessary facilities for long-term protection of the District water supply.

Considering the fact that all District water customers receive water from the same groundwater source, protection of the District water supply is beneficial to all District customers. Therefore, placing the full burden for groundwater protection on only new developments, as outlined in the original WTS, is not sustainable. Therefore, while the study area has been slightly changed to include the densely developed parcels to the north of Joshua Tree Elementary School, the distribution of costs for future wastewater treatment is determined by calculating contributions from all parcels within the study area. A future Assessment District Engineer's Report will determine the exact contribution of each parcel based upon the benefit received. In this manner, a sustainable method of groundwater protection is provided to the community.

Wastewater is generated as the portion of water used that is discharged to a septic system, collection system or treatment plant. Figure ES.2 shows the dispersion of existing wastewater discharges within the District service area.

Figure ES.2 Wastewater Production within District Service Area



The

The northern, eastern and southern portions of the District exhibit highly dispersed wastewater production. However, the downtown regions exhibit dense wastewater generation. These areas of high wastewater production are highlighted in relation to the locations of Wells 10, 14 and 15. These densely grouped wastewater areas are termed Nitrate Concentration Areas (NCAs).

These NCAs represent dense concentration of both residential and non-residential wastewater discharges, as well as direct negative impact on the community's drinking water supply. As such, the NCAs are identified as the Phase 1 focus for groundwater protection, and are the first locations to receive wastewater collection, treatment and disposal improvements. Focusing on the NCAs provides the highest impact to existing nitrate contamination. The District and community receive the highest return on investment by focusing Phase 1 efforts on these identified NCAs.

Phase 2 of the groundwater protection plan is comprised of three additional areas, located adjacent to the identified NCAs of Phase 1. It is projected that the Phase 2 areas will be the most likely to continue to develop, ultimately attaining sufficient development density to require collection and treatment. The Phase 2 areas include both residential and non-residential development, particularly additional commercial development along the highway corridor.

At the present time, the District projects that an Assessment District will be used to fund the Phase 1 groundwater protection facilities. The beneficiaries of the Assessment District would vote, weighted by EDU, for the Phase 1 improvements. The District would secure available grant and loan funding to construct the Phase 1 facilities. Following completion of the Phase 1 construction, the District would conduct a second Assessment District vote for construction of the Phase 2 infrastructure.

Based on the cost sharing methodology, construction costs for groundwater protection facilities are shared equitably between those that directly benefit from the facilities. The projected Phase 1 construction costs include approximately $7,020,000 for treatment facilities and $43,239,000 for collection and conveyance facilities. Phase 2 construction costs include approximately $2,375,000 for treatment facilities and $14,733,000 for collection and conveyance facilities. Annual O&M cost of the treatment plant is also shared by the community members deriving direct benefit from the groundwater protection facilities. Therefore, for Phase 1, the projected annual O&M cost is $730,000 and the Phase 2 annual O&M cost is $240,000. These costs represent an total annual cost of approximately $600 to $800 per equivalent dwelling unit depending on the number of years over which the cost is amortized.

The WTS Update provides the District with a timely strategy for planning is wastewater collection and treatment future. More importantly, the WTS Update establishes the mechanism whereby the District can protect its long-term water supplies from ongoing degradation. The report summarizes the Next Steps for overall implementation of the necessary groundwater protection facilities.

Section 1 Introduction

The Joshua Basin Water District (District) is located in the southern portion of San Bernardino County, approximately 40 miles north of Palm Springs between the Town of Yucca Valley and the City of Twentynine Palms. The District encompasses an area of approximately 96 square miles, and serves primarily the unincorporated area of Joshua Tree, California. Historically, the District has served the water supply needs of its constituency, with wastewater disposal accomplished through the exclusive use of on-site septic systems.

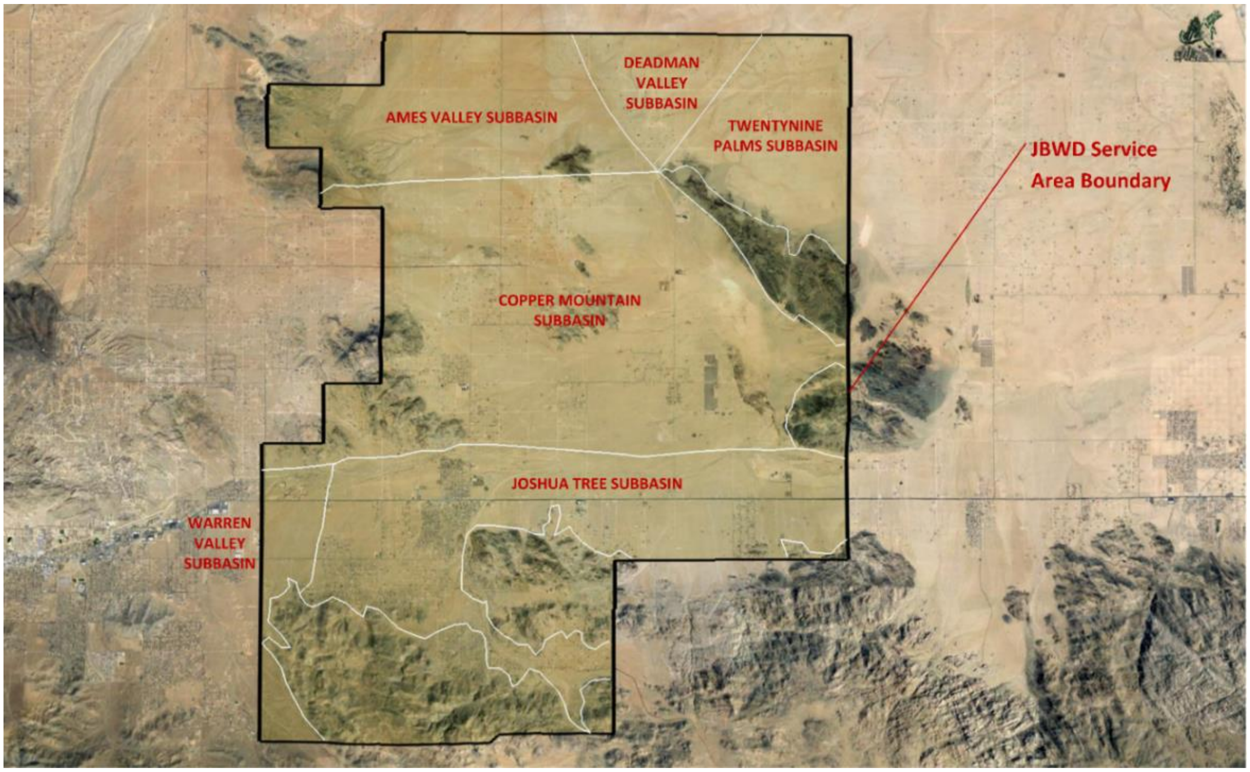
Legislative prohibition of new individual septic systems will necessitate replacement with local package treatment facilities that provide better treatment, thereby improving protection of the District's local groundwater resources. Implementation of localized and/or regional wastewater collection, treatment and disposal facilities is not something enacted quickly. For that reason, the District commissioned the development of the original Wastewater Treatment Strategy (WTS). The WTS identified both short- and long-term strategies for implementation of necessary groundwater protection facilities. The WTS evaluated collection and treatment need for various development sizes and how those treatment facilities might be constructed over time. Regulatory requirements were considered, projected to increase future treatment need.

Funding of WTS-identified collection and treatment facilities was considered, resulting in three funding mechanisms for District consideration, including connection fees, community facility district (CFD) fees and service fees. Under the original WTS, initial collection and treatment facilities are paid for and constructed by individual developers. Ultimately, the WTS projected construction of a regional wastewater treatment facility and interceptor sewer system to limit the proliferation of small package treatment plants. The original WTS proposed connection fees to generate the funding for construction, projecting a connection fee for new development of approximately $5,200 per equivalent dwelling unit.

District customers rely exclusively on local groundwater for its drinking water supply, extracting water from two (2) subbasins within the greater Morongo Groundwater Basin; referred to as the Joshua Tree and Copper Mountain Subbasins. In 2012, the District constructed the Joshua Basin Water District Water Recharge Facility and associated pipeline. These facilities provided the District with the means of accepting regional water allocations from the State Water Project, taking advantage of vail able imported water supplies. With an average annual rainfall of approximately 4.5 inches, protection of local groundwater quality is the primary goal of the District.

The District maintains approximately 4,500 water connections within its service area, each served through the District water distribution system and from groundwater wells extracting water from the Joshua Tree and Copper Mountain Subbasins. Figure 1.1 illustrates the boundaries of the local groundwater basins within the District service area, as well as those surrounding the service area.

Figure 1.3 Local Groundwater Basin Boundaries



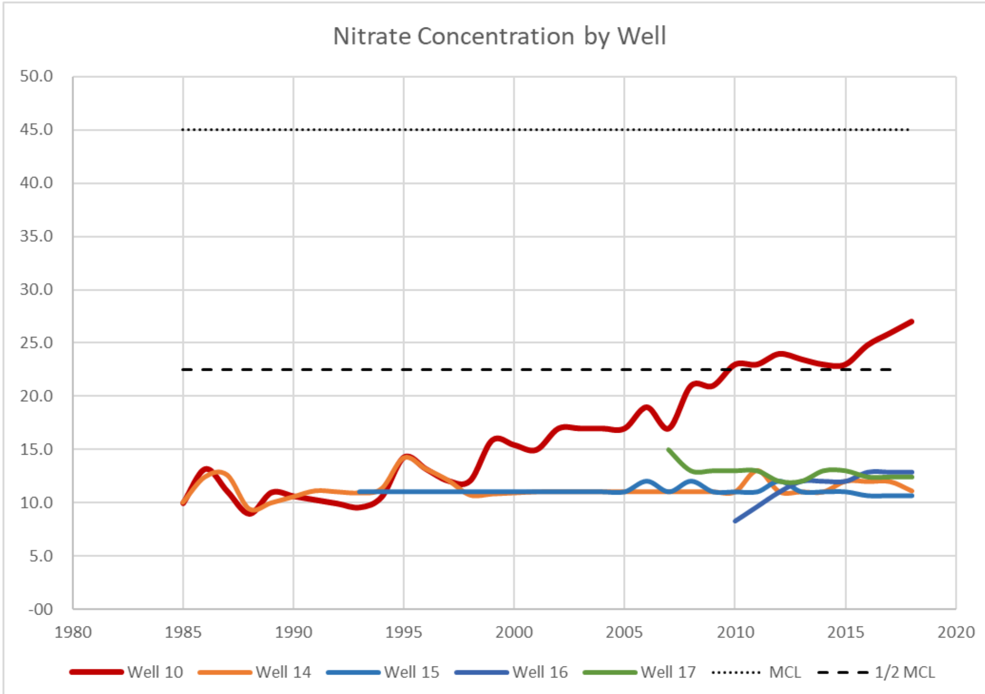
It has been estimated that recharge from individual septic systems may represent approximately 80 percent of the annual recharge within the District's groundwater basins. These septic return flows result in increased nitrate and total dissolved solids (TDS) degradation of the groundwater supply. Past groundwater studies[1,2] have shown that a relatively condensed portion of the District's overall service area is exhibiting localized groundwater impacts from septic discharges. The 2004 USGS study projected that the District would realize nitrate impacts within 10 to 15 years.

Figure 1.2 shows the rise of nitrate concentrations in local groundwater supplies from the currently active District water supply wells. As a result, local groundwater protection agencies have increased regional emphasis on local and regional wastewater treatment to curtail the long-term degradation of regional water supplies. The District has also increased its activity relative to local groundwater supply protection by activating limited wastewater management powers and conducting various local groundwater studies targeted at identifying the impact of local septic discharges.

[1] Groundwater Availability Evaluation - Joshua Basin Water District, Dudek, May 2006

[2] Evaluation of Geohydrologic Framework, Recharge Estimates, and Ground-water Flow of the Joshua Tree Area, San Bernardino County, California; Tracy Nishkawa, et. al.; Scientific Investigations Report 2004-5267; U.S. Department or the Interior, U.S. Geological Survey; 2004

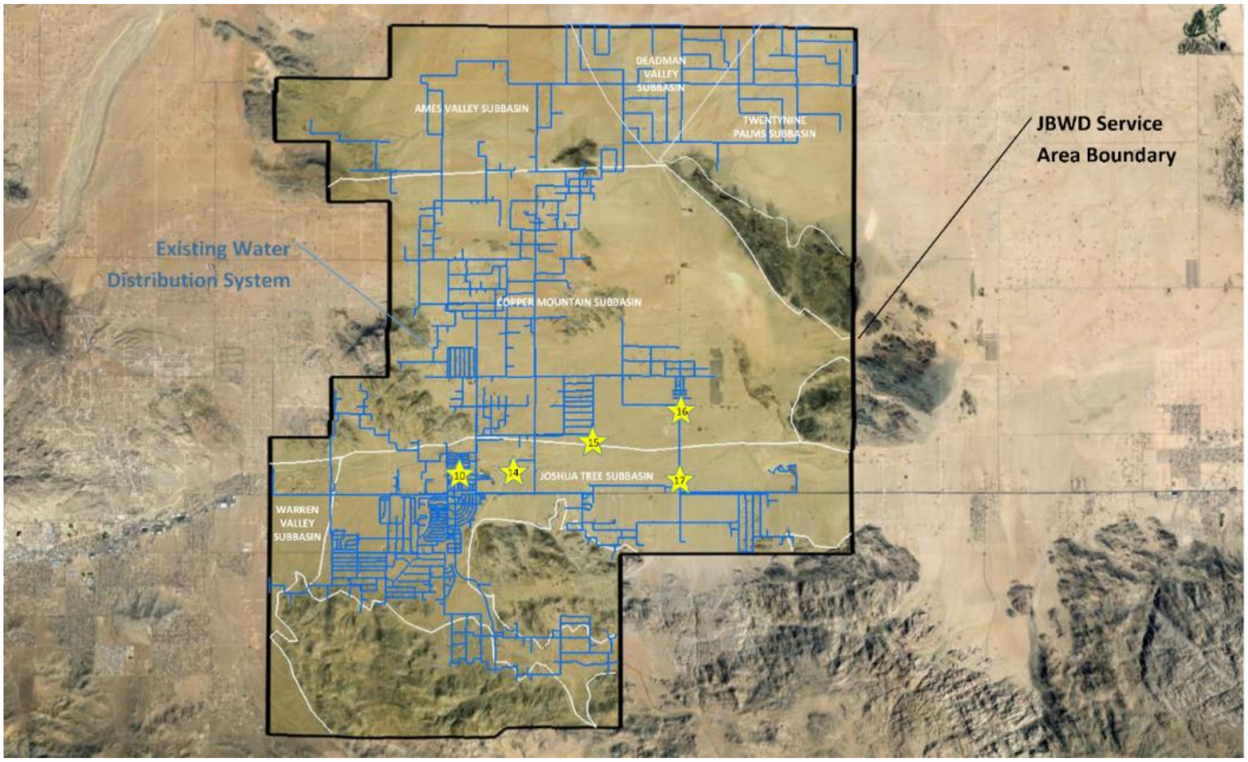
Figure 1.4 Historical Nitrate Concentration at District Wells



From Figure 1.2, Well Production Well #10 (Well #10) shows the highest increase in nitrate concentration since 1985. The maximum contaminant level (MCL) is the regulatory maximum level allowable within the District's drinking water supply. The MCL for nitrate concentration is 45 mg/L (parts per million, ppm). The nitrate concentration levels in Well #10 have already exceeded half of the MCL, and continue to rise. Nitrate concentrations in other District wells exhibit intermittent increases, but have typically returned to the normal groundwater basin value of 10 mg/L (ppm) with time. Figure 1.3 shows the relative location of the five District production wells (Wells 10, 14, 15, 16 and 17) within the District service area. As can be seen on Figure 1.3, the existing water distribution system conveys water from these wells to all District water customers. Wells 16 and 17 supply water to customers in Pressure Zones A and B only. Wells 10, 14 and 15 provide water to all pressure zones throughout the District.

These long-term cumulative impacts on the District groundwater supply continue to be a primary concern facing the District. Unlike the past's relatively low development, the Joshua Tree community has recently experienced increasing local development pressure, primarily related to the growing popularity of Joshua Tree National Park and the vacation rental boom. These increases make implementation of alternative wastewater treatment and disposal strategies critical. Throughout the State of California, prohibitions of new individual septic systems are continuing, and being replaced by small to mid-sized package treatment facilities or collection and treatment systems that provide better control of wastewater contaminants, thus better protecting local groundwater resources. In the long-term, regional wastewater collection, treatment and disposal facilities are likely to be required to assure regional water supply protection.

Figure 1.5 District Production Well Locations



Implementation of local or regional wastewater collection, treatment and disposal is not something that is enacted quickly. Planning, design and construction of these facilities require consistent planning and a significant investment of time and money. To that end, the District commissioned the development of its Wastewater Treatment Strategy (WTS) in June 2009. The primary purpose of the WTS was to identify how the District could, over time, economically implement needed wastewater treatment facilities for protection of its groundwater resources. The District has followed the WTS for the past ten years, understanding that the WTS would require ongoing review and update.

Building from the original WTS, this report reviews results of the WTS implementation, as well as defines potential improvements to assure the long-term preservation of local water quality for District customers. The original WTS identified short- and long-term strategies for implementation of needed groundwater protection facilities, focusing on the strategic requirements of the program and not the specific sizing and location of future required facilities. The original WTS envisioned that, over time, implementation of the WTS would identify the need for specific facilities, leading to an update of the WTS that defines a conceptual plan for implementation of required facilities.

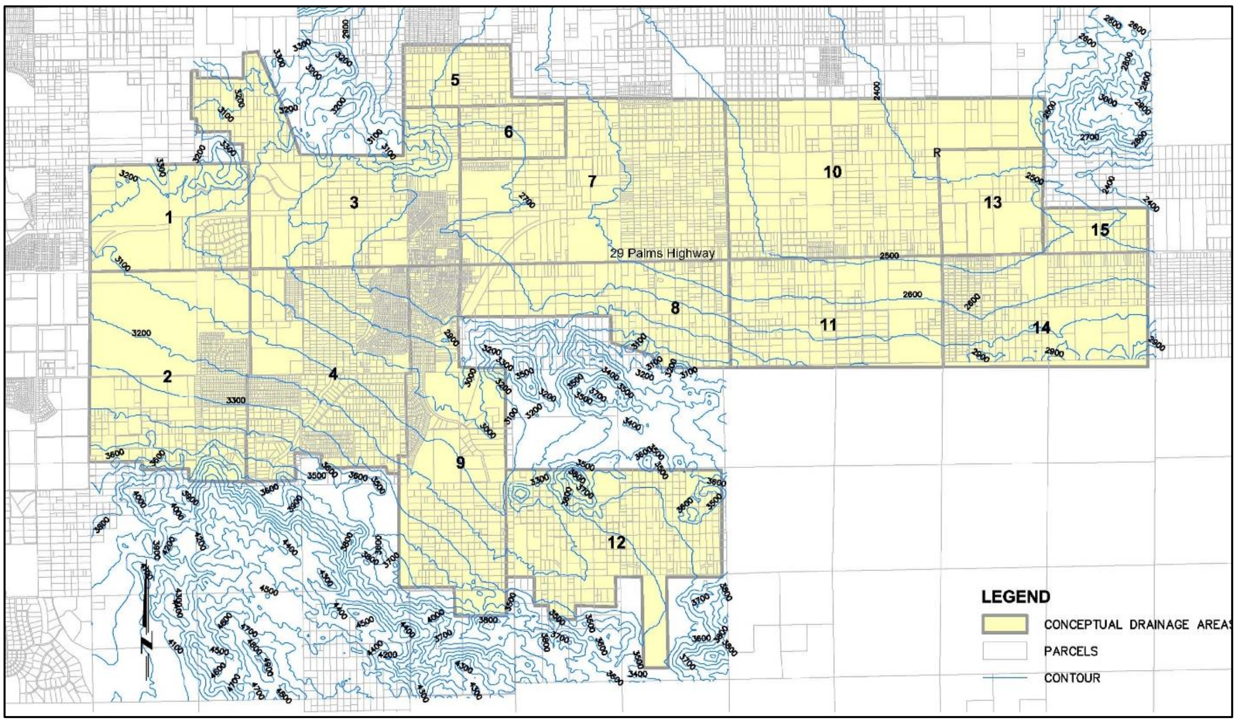
This report represents the 10-year update of the original WTS. Based on data collected during the intervening WTS implementation years, this report provides an update of the ongoing nitrate impacts to the District groundwater supply, an understanding of where the nitrate contamination is coming from, the facilities needed to control nitrate concentrations, and the methodology to plan, implement and fund necessary facilities for long-term protection of the District water supply.

Section 2 Project Study Area

2.1 Original Project Study Area

The study area of the original WTS was located as shown on Figure 2.6, as well as the current parcel map for the District. Based on 2009 information, this areas was identified to have the highest impact on District groundwater supplies. The original WTS study area encompassed approximately 35 square miles, draining predominantly from the west to the east along the Twenty-Nine Palms Highway (highway) corridor. Drainage north of the highway slopes generally south and east, while the areas south of the highway slope north and east. The original study area also included a small area along Rocking Chair Road. For purposes of the original WTS study, the study area was divided into 15 drainage areas, corresponding to the general topography of the land, the major road alignments, and the highway alignment.

Figure 2.6 Conceptual Drainage Areas and Topography



Based on the study area boundary, the original WTS included approximately 7,000 parcels (approximately 3,150 parcels developed and 3,850 vacant or not served by the District). The original WTS study constituted approximately one-third of the District service area. Existing water customers were excluded from the original study, as were development with densities less than 2.0 equivalent dwelling units (EDUs) per acre. An EDU is the equivalent wastewater production of a single family home. As a result, the original WTS placed the full burden of groundwater protection on new development only. The resulting wastewater capacity fees charged to new development alone have not created sufficient funding for a community-wide groundwater protection and nitrate control solution. In fact, the additional charges have pushed developers out of the WTS area and into more rural areas of Joshua Tree, where meter costs are less expensive. This situation not only causes less contributions toward the needed community-wide solution, but also lowers the number of future sewer connections within this area and making wastewater conveyance and treatment options more expensive per connection.

The update of the WTS investigates program revisions that would create more realistic funding opportunities while replacing the existing financial model with an Assessment District approach. The resulting program will charge the full assessment through the Assessment District to everyone receiving benefit, with a construction loan used to build the required facilities.

Existing development within the District is predominantly residential, with smaller areas of commercial and institutional development along the highway corridor. These existing developed parcels use on-site septic systems exclusively for treatment and disposal of wastewater. Vacant undeveloped land within the study area is assumed to eventually become tributary to a near- or long-term wastewater collection and treatment system.

It is noted that septic treatment systems do not last forever. Eventually, septic systems exhaust the percolation capacity of the local soils and can become ineffective. Furthermore, more stringent septic tank monitoring and replacement has been put into place by the SWRCB's On-site Wastewater Treatment System (OWTS) program which is regulated locally under the County of San Bernardino's Local Agency Management Plan (LAMP). As these regulations become more stringent, the owner of the parcel may find it more cost-effective to connect to a local or regional wastewater system (where available), rather than install and monitor a new septic system. As such, potential future wastewater systems will need to have sufficient capacity to accommodate additional participants, as required.

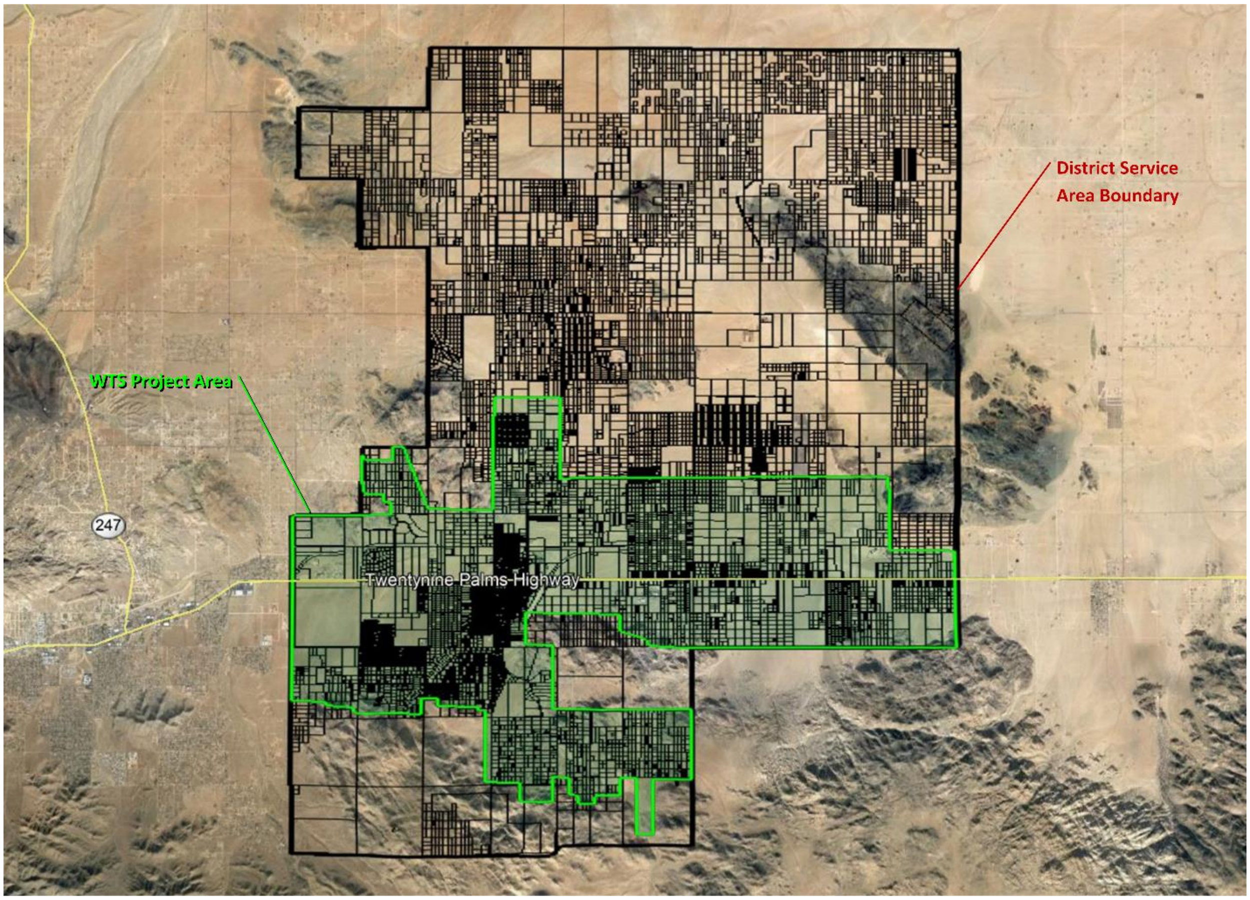
2.2 WTS Update Study Area

Section 2.1 presents the process used to define the study area for the original WTS analysis. Considering the fact that all District water customers receive water from the same groundwater source, protection of the District water supply is pertinent to all District customers. Therefore, placing the full burden for groundwater protection on only new developments does not sustain the protection measures required. Therefore, for the WTS Update, while the study area has been slightly changed to include the densely developed parcels to the north of Joshua Tree Elementary School, the distribution of costs for future wastewater treatment has been determined by calculating contributions from all parcels within the study area. An Assessment District Engineer's Report will need to be developed to determine the exact contribution of each parcel based upon the benefit it will be receiving once a future system is constructed. In this manner, a sustainable method of groundwater protection can be developed. Figure 2.2 illustrates the revised WTS study area within the District boundary.

Based on current District records, there are 13,100 parcels within the District service area. Approximately 4,500 parcels have active water services, leaving 8,600 parcels as vacant or not served by the District. As the District covers approximately 96 square miles, there are numerous vacant or unserved parcels. However, within and surrounding the downtown area, parcels are much more dense, as shown on Figure 2.1.

Within the study area, specific areas have lower potential to be developed. These areas include lands within the Federal Emergency Management Agency (FEMA) flood plains, as well as steeply sloped and rocky areas. There are also smaller areas which would be very difficult to develop. These areas include land that has steep slopes or is covered with large rock outcrops.

Figure 2.7 WTS Updated Study Area



The analyses performed assume that existing vacant land within the study area will not be allowed to use on-site septic systems for wastewater treatment and disposal. It is also projected that larger parcels will eventually become more valuable, and be subdivided. For example, a ten-acre parcel with a total of one EDU may be purchased and subdivided providing a more dense development. In these cases, with denser proposed development, the new development would not be allowed to construct individual on-site septic systems.

Section 3 Wastewater & Nitrate Generation

3.1 Regulatory Considerations

3.1.1 Regional Water Quality Control Board

As shown in Figure 1.1, the District overlies the Joshua Tree hydrologic unit planning area, from which the District derives its water supply. The Regional Water Quality Control Board's (Regional Board's) Basin Plan requires that groundwater designated for use as domestic or municipal water supply comply with Title 22, Chapter 15, Article 4. Biochemical oxygen demand (BOD5) and total suspended solids (TSS) are required to be less than 30 mg/L (ppm) for discharges to the groundwater basin. The Regional Board has an informal policy that conforms to AB 885 and Senate Bill 390, requiring the following:

1. Projects equal to or greater than 10 EDU require a report of waste discharge.
2. Regional Board staff review each project and evaluate for impacts.
3. Following an analysis of site conditions, density and other factors, a permit may be issued.
4. The primary regulated discharge limit parameter is nitrogen.
5. The limit is 10 mg/L (ppm) total inorganic nitrogen (TIN), and there is no waiver process.
6. Individual homes generally do not require permits.

The United States Geological Survey (USGS) analyzed the nature and capacity of the District's local groundwater basin in 2004. That study concluded that nitrogen from septic tanks in the Joshua Basin region will, if untreated, eventually reach the water table. Title 22 requires that nitrogen levels not exceed 45 mg/L (10 mg/L as nitrogen) and TDS not exceed 500 mg/L. Additionally, the State of California adopted regulations for Groundwater Recycled Recharge Projects (Title 22, Division 4, Chapter 3, Article 5.1). These regulations require, for continuing use of groundwater as a drinking water source, protection of groundwater through reducing or eliminating the use of septic system discharges and compliance with Groundwater Recycled Recharge Projects criteria.

The RWQCB, in review of a specific project, will establish the regulations that will govern the nutrient limits for discharge, currently the nitrate effluent limit is 10 mg/L as N. Future nitrogen regulations may be enacted by RWQCB staff. However, recent discussions with RWQCB staff indicate, within the Joshua Tree Basin, the limit will remain below 10 mg/L total inorganic nitrogen (TIN).

3.1.2 County of San Bernardino

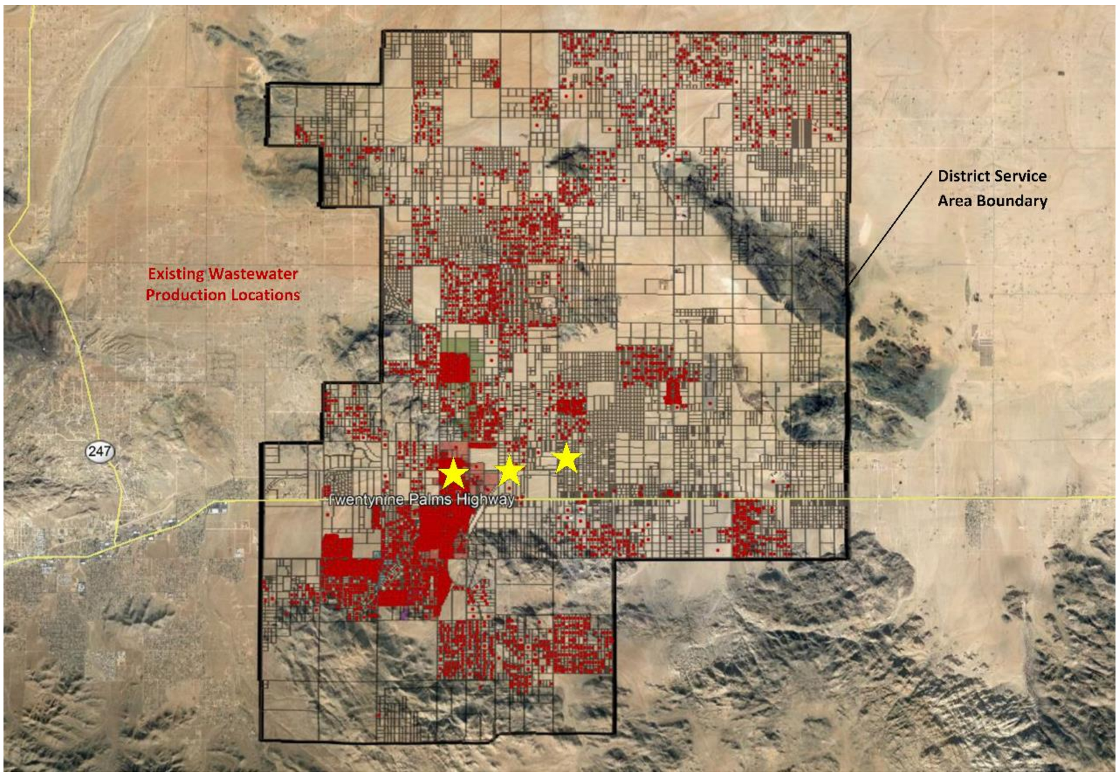
Under the recent Onsite Wastewater Treatment System (OWTS) Policy, regional agencies were allowed to promulgate Local Area Management Plans (LAMPs) for wastewater discharges under 10,000 gallons per day (gpd). For unincorporated portion of San Bernardino County, the County regulates and permits wastewater discharges under 10,000 gpd and septic systems. Above 10,000 gpd, a RWQCB permit is required.

An OWTS includes individual disposal systems, community collection and disposal systems, and alternative collection and disposal systems that use subsurface disposal. The County LAMP may permit discharges up to 10,000 gpd. However, if determined by the County, new or replaced OWTS discharges of 3,500 gallons-per-day (gpd) and greater may require a Notice of Waste Discharge from the RWQCB.

3.2 Wastewater Production

Wastewater is generated as the portion of water used that is discharged to a septic system, collection system or treatment plant. Therefore, identifying parcels within the District service area having water service shows the dispersion of existing wastewater discharges. Figure 3.1 highlights parcels within the District service area with active water accounts.

Figure 2.8 Wastewater Production Locations



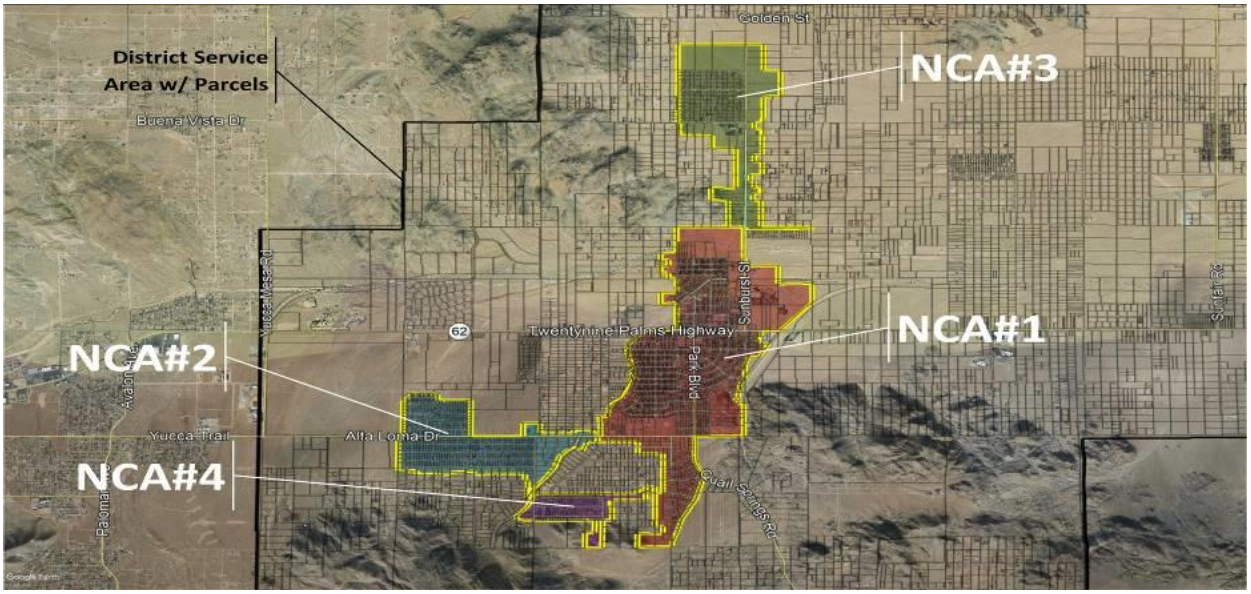
From Figure 3.1, the northern, eastern and southern portions of the District service area exhibit highly dispersed water use and, by extension, wastewater production. However, the downtown region exhibits dense areas of water use and wastewater generation, including the commercial areas along the highway. These densely grouped areas of wastewater production are highlighted in relation to the locations of Wells 10, 14 and 15, the District's highest producing well facilities. As septic systems do not control nitrate generation, these densely grouped wastewater areas are also densely grouped nitrate production areas, or Nitrate Concentration Areas (NCAs).

Figure 3.2 highlights the four largest NCAs. NCA#1 is the largest area, and is positioned in close proximity to Well 10. For reference, Well 10 is the only District well that is currently exhibiting significant increases in nitrate concentration (Figure 1.2). Based on current District information, NCA#1 is comprised of 2,075 parcels, and has 1,320 active water connections (64 percent active). The wastewater generation of NCA#1 is approximately 319,000 gpd, with an average wastewater production of approximately 242 gpd per parcel.

Figure 3.3 illustrates the composition of NCA#1. Considering that this area represents the historical center of the Joshua Basin community, NCA#1 has been contributing nitrate to the Joshua Tree groundwater basin for many years, which is reflected by the nitrate levels from Well 10.

The second largest area of nitrate production is NCA#2 located west of Sunny Vista Road and north of Melton Trail, as shown on Figure 3.4. NCA#2 is comprised of approximately 605 parcels, with 408 parcels currently active (67 percent active). Wastewater production from NCA#2 is approximately 71,900 gpd, representing an average discharge of 176 gpd/parcel. As shown on Figure 3.4, NCA#2 is predominantly densely populated residential, and incorporates the Friendly Hills Elementary School.

Figure 2.4 Nitrogen Concentration Areas



NCA#3 is the third largest nitrate concentration area, located west of Sunburst Street and north of Calle Los Amigos. NCA#3 is comprised of 338 parcels, with 209 parcels currently active (62 percent active). Wastewater generation from NCA#3 is approximately 36,600 gpd (175 gpd/parcel). From Figure 3.5, this area is exclusively residential, including Joshua Tree Elementary School.

NCA#4 is located east of Sunny Vista Road and south of Navajo Trail, comprise of 158 parcels with 120 active parcels (76 percent active). NCA#4 wastewater production is approximately 20,900 gpd (174 gpd/parcel). Figure 3.6 shows that NCA#4 is predominantly residential. Table 3.1 summarizes and compares wastewater production within the District services area, for the revised WTS study area, and the four NCAs.

Table 3.1: Existing Wastewater Production Summary

Area Description	Total Parcels	Active Parcels	Existing Wastewater Flow (gpd)	Buildout Percentage	Average Discharge (gpd/parcel)
District Service Area[3]	13,067	4,488	1,118,505	34%	249
Original WTS Study Area	7,002	3,131	833,009	45%	266
NCA#1	2,075	1,320	319,700	64%	242
NCA#2	605	408	71,900	67%	176
NCA#3	338	209	36,600	62%	175
NCA#4	158	120	20,900	76%	174

[3] Information for District Service Area provided for comparison purposes only.

Figure 2.5 Nitrate Concentration Area #1

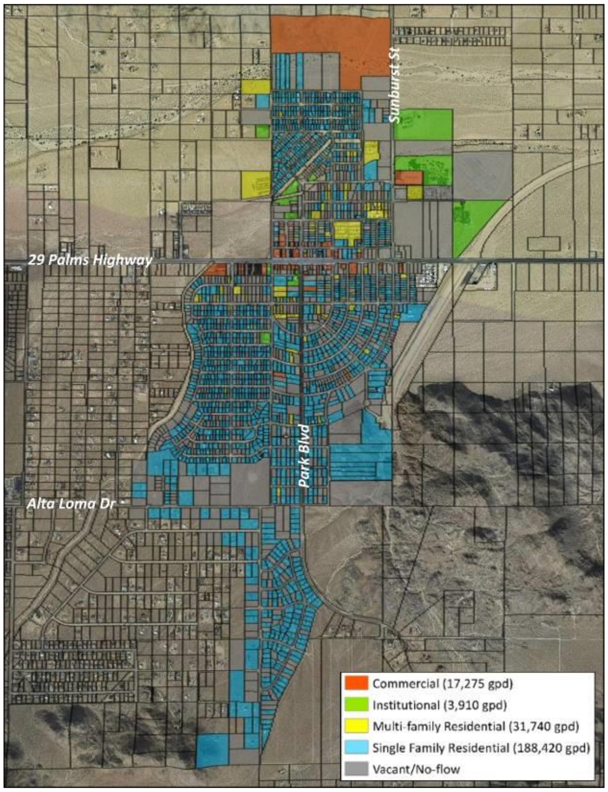


Figure 2.6 Nitrogen Concentration Area #2

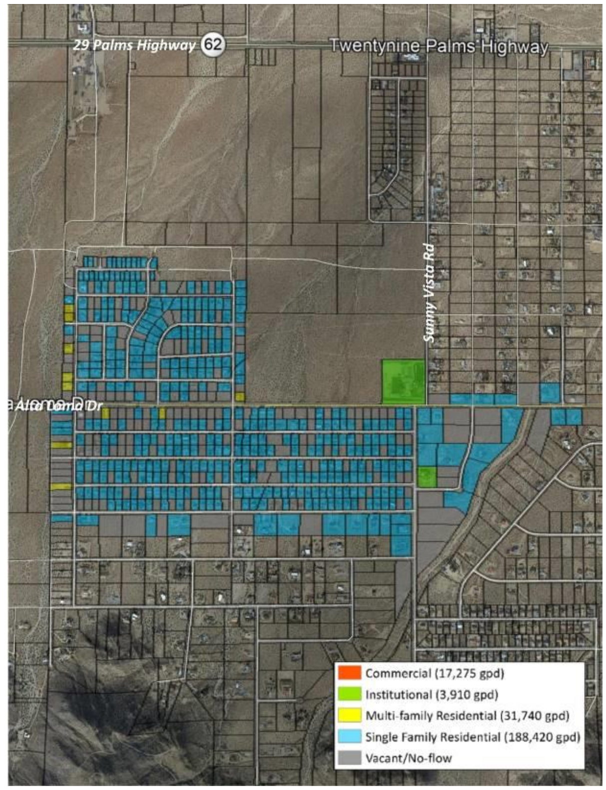


Figure 2.7 Nitrogen Concentration Area #3

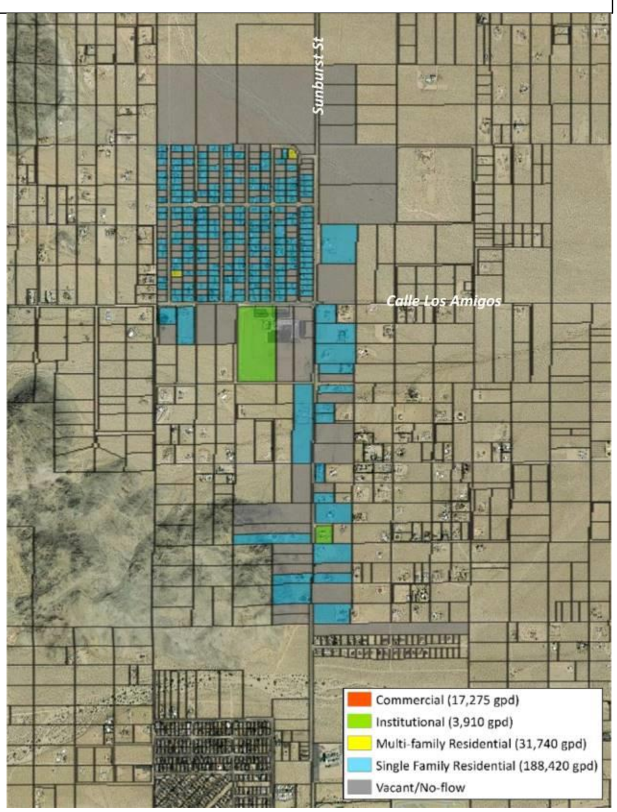
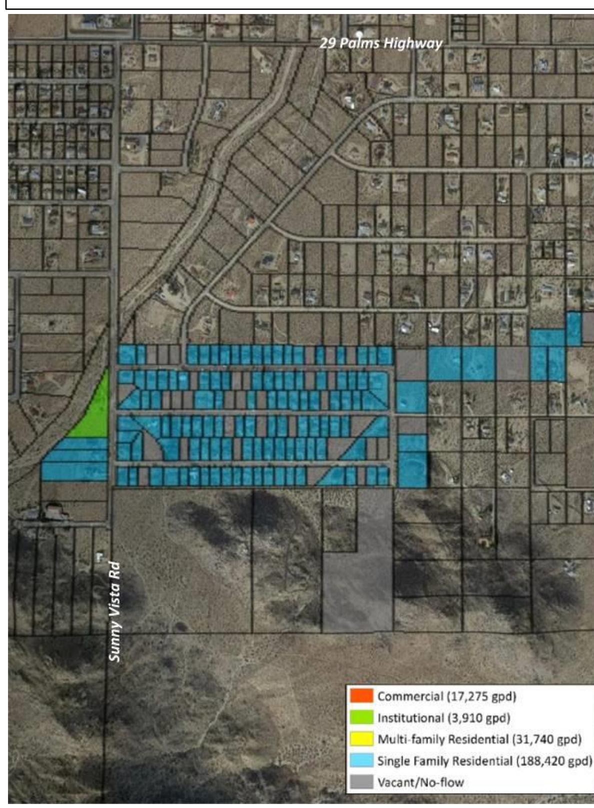


Figure 2.8 Nitrogen Concentration Area #4



As wastewater treatment and disposal is currently provided exclusively through septic systems, direct measurement of wastewater generation is not possible. However, considering the nature of the Joshua Tree community, it is possible to estimate the wastewater generation characteristics for the purposes of this analysis. Considering the natural landscaping that is prevalent throughout the community, little or no water is used for outdoor irrigation. As a result, it is estimated that approximately 90 percent of the water used by a typical single family residence is discharged as wastewater. This assumption results in a wastewater generation rate of 172 gpd per EDU, which is consistent with current values experienced in similar communities throughout southern California.

Non-residential land uses, including commercial and institutional uses, are estimated using the area of the property and a wastewater generation rate per acre of land. As shown in Table 3.2, projected wastewater production throughout the District service area is predominantly associated with single- and multi-family residential uses (approximately 93.6 percent of the total wastewater production). Non-residential land uses contribute approximately 6.4 percent of the total wastewater production. Based on Table 3.2, it can be concluded that residential land uses also contribute the majority of nitrate to the underlying groundwater basin as well.

Table 3.2: District Wide Wastewater Production by Land Use Type[4]

Land Use Description	Wastewater Flow (gpd)	Land Use Percentage
Single Family Residential	878,922	92.5%
Institutional	134,443	4.5%
Multi-Family Residential	73,782	1.1%
Commercial	31,358	1.9%
TOTAL	**1,118,505**	**100.0%**

As part of this analysis, it is necessary to project the needed facilities for the various interim and ultimate treatment and disposal systems. As such, wastewater flow projections must consider both current development, as well as future development. As shown in Figures 3.3 through 3.6, the most densely populated areas of the community (NCAs) are only two-thirds to three-quarters built out, allowing some additional development. Therefore, wastewater production from the NCAs and throughout the District services area must consider the future wastewater generation from currently vacant properties. Table 3.3 summarizes the ultimate wastewater generation for currently active and vacant parcels within the District service area, as well as the NCAs.

[4] Commercial land uses are predominantly located along the SR-62 corridor.

Table 3.3: Ultimate Wastewater Production Summary

Area Description	Total Parcels	Active Parcels	Existing Wastewater Flow (gpd)	Buildout Percentage	Average Discharge (gpd/parcel)
District Service Area[5]	13,067	4,488	1,118,505	34%	249
Original WTS Study Area	7,002	3,131	833,009	45%	266
NCA#1	2,075	2,075	482,000	100%	232
NCA#2	605	605	105,800	100%	175
NCA#3	338	338	58,800	100%	174
NCA#4	158	158	27,400	100%	173

3.3 Wastewater Production Conclusions

Based on the wastewater generation information provided in Section 3.2, the following conclusions are derived regarding current groundwater protection concerns:

1. Wastewater is being produced throughout the District service area, not just within the WTS study area. While future infrastructure improvements concentrate on those areas making the greatest nitrogen contributions to the aquifer, the District may wish to explore the benefit this has on the District as a whole when developing future charges to assist in the operation of these facilities.

2. Wastewater production is analogous to nitrate generation, as the District relies on septic systems for wastewater treatment and disposal. As shown on Figure 3.7, septic system do not control nitrate production, resulting in ongoing contamination of the communities drinking water supply.

3. Nitrate production is greatest within the densely populated downtown area, where septic discharges have been ongoing to many years. USGS studies in 2004 predicted noticeable impacts to District groundwater supplies within 10 to 15 years, and Well 10 is currently exhibiting significant increases in nitrate concentration, exceeding half of the regulated MCL. Without proper treatment and disposal, nitrate concentration will continue to increase.

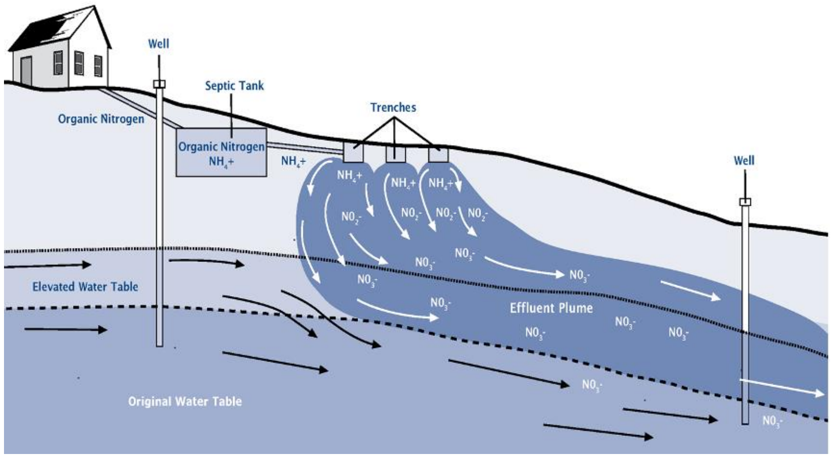
4. Whereas all District water customers receive water from the same groundwater source, groundwater protection is the responsibility of all customers, not just new development. Broadening groundwater protection responsibility will assure long-term drinking water protection.

5. Identification of specific areas of high wastewater and nitrate production defines current focus areas, as well as future focus areas. Development of a phase wastewater treatment and disposal approach is beneficial to all District customers, allowing planning and implementation of needed

[5] Information for District Service Area provided for comparison purposes only.

collection and treatment facilities to curtail ongoing groundwater contamination and planning for future facilities as the Joshua Basin community continues to prosper.

Figure 2.9 Nitrate Production from Septic Systems



6. Commercial and residential development within the downtown area, are continuing to expand to meet growing demand. High development pressure within the downtown area will continue to exacerbate the ongoing nitrate concentration challenges within the groundwater supply. Implementation of a groundwater protection mechanism (i.e. wastewater treatment with nitrogen removal) benefits the community by mitigating groundwater contamination prior to development. Future development will contribute greatly to the cost to expand, operate and maintain the required facilities.

7. An equitable means of proportioning the cost of groundwater protection facilities is required, such that those receiving the groundwater protection benefit participate in planning, design and construction of required facilities. As Joshua Tree is a disadvantaged community, significant effort is required to identify and acquire contributory funding in the form of grants, low interest loans, or other available financial means.

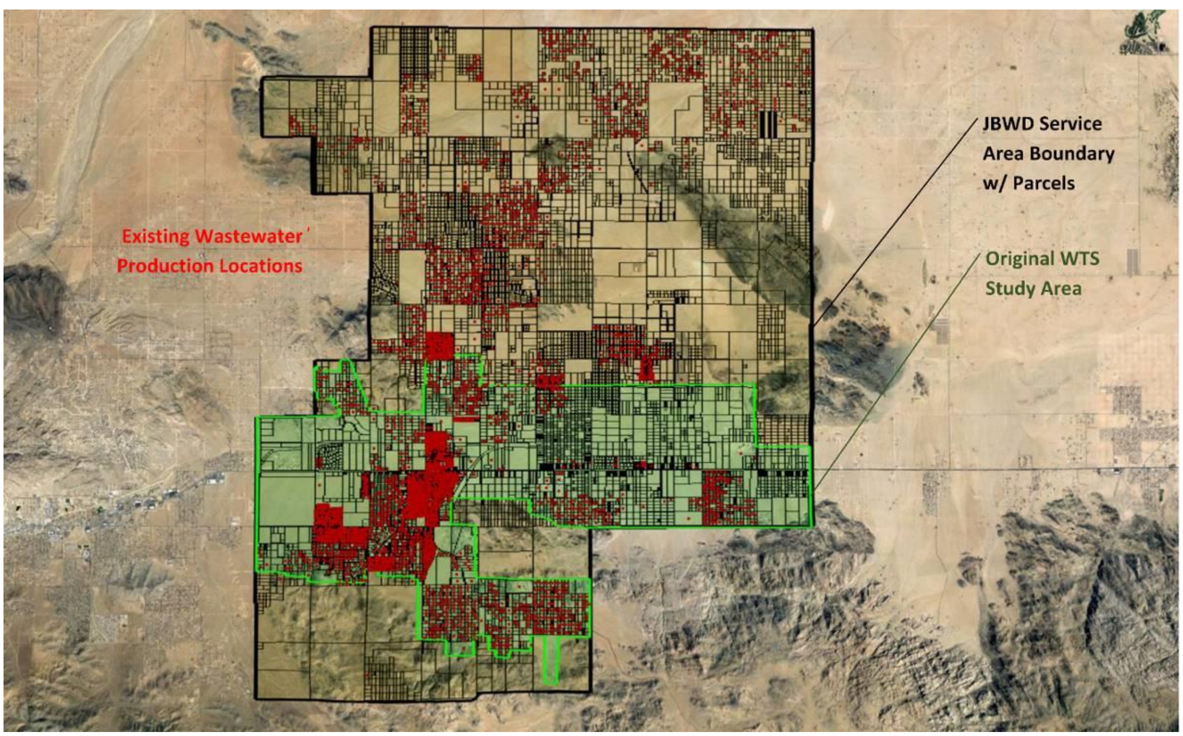
8. It is clear that the original WTS assumption for new development to bear the burden of needed groundwater protection efforts is inequitable. Implementation of individual package treatment facilities for new residential and non-residential developments results in excessively high cost to new development, as well as an excessive number of potential treatment facilities for District management, operation and maintenance. Consolidation of multiple development needs into well planned and constructed groundwater protection facilities provides economy of scale, lowering implementation, operation and maintenance cost for the entire community, while providing the critical long-term protection necessary for the community's water resources.

Section 4 Groundwater Protection Phasing Plan

As shown on Figure 3.1, wastewater generation exhibits a sparse distribution throughout the majority of the District service area, with the exceptions of the Nitrate Concentration Areas (NCAs) identified in Section 3. Figure 4.1 superimposes the wastewater generation locations over the slightly revised original WTS study area. As can be seen, the NCAs are essentially located within the WTS study area. The original WTS study area was defined to capture near- to mid-term location of new developed resulting from proximity to the highway. In addition, wastewater discharges outside the original WTS study area are not located above the Joshua Tree groundwater basin, and thus do not represent a potential direct impact to the communities primary water supply. Therefore, from a phasing perspective, focusing initial planning efforts within the original WTS study area is still reasonable, and the initial phases of implementation will be within the original WTS study area.

Similar to the District's service area, the original WTS study area exhibits areas of dense wastewater generation and areas of more distributed generation. Reviewing the nitrate concentration data for the District production wells (Figure 1.2), it is evident that the eastern portion of the original WTS study area (Wells 14, 15, 16 and 17) has not experienced the elevated nitrate concentrations that Well 10 has shown. This discrepancy is attributable to the sparsity of the wastewater generation sites and the District's groundwater recharge site operations. The eastern portion of the WTS study area, including the Copper Mountain Basin, are much less developed and the District wells may be affected in the future as development continues to increase.

Figure 4.1 Original WTS Study Area / Wastewater Generation Comparison

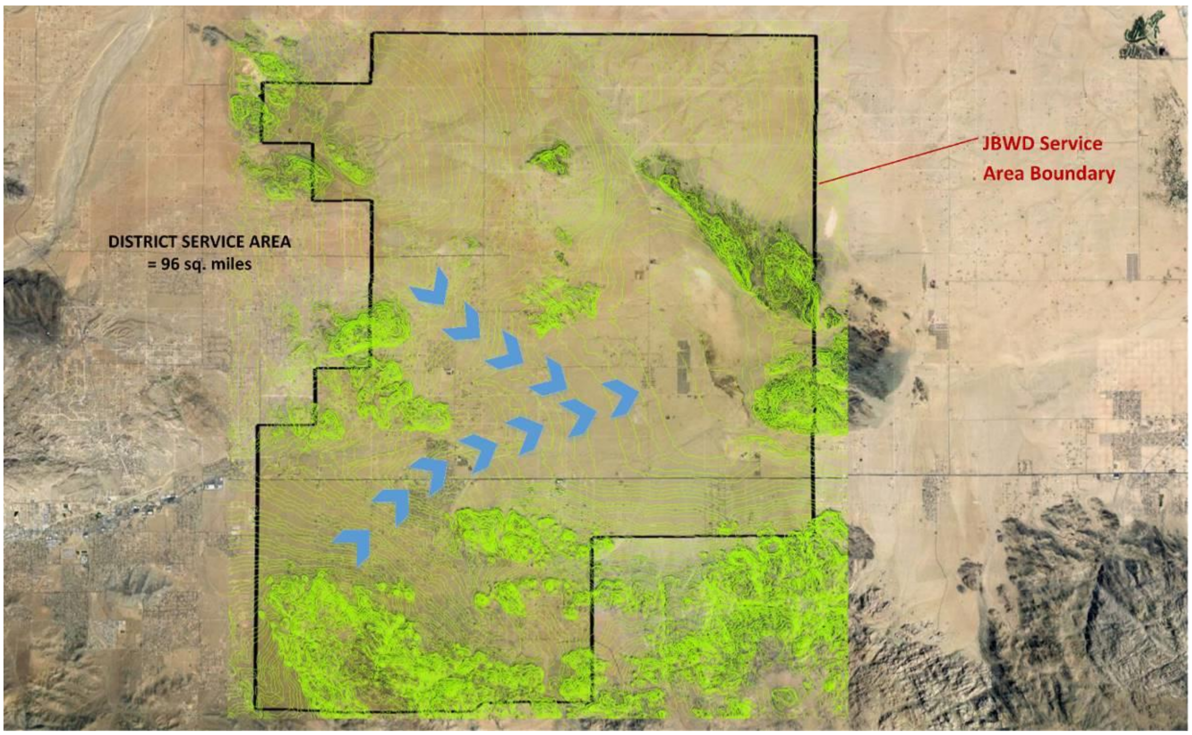


Regional Board regulations are focused on non-degradation of existing background drinking water quality, as well as defining the maximum contaminant level for discharge. Groundwater quality and recharge is largely reliant on how much water the District receives as rain, septic tank discharge or imported recharge. However septic tank discharges can affect the mixing of water sources within different layers of the aquifer.

As a result, the District may not realize the effects of recent septic discharges for up to 20 years, which may provide a false sense of security when it comes to current nitrate levels.

Introduction of low nitrate water at the District groundwater recharge facility dilutes the impact of septic system discharges on the groundwater. Well 10, located west of the recharge site and close to the NCAs, concentrates the impact of historical wastewater discharges within its influence radius. Also, the natural groundwater gradient traverses to the west, further increasing these influences (Figure 4.2)

Figure 4.2 Local Groundwater Gradient



Based on nitrate concentration data from District wells, phasing of the groundwater protection plan is initially focused in the western portion of the original WTS study area. In this portion of the District, it has already been shown that the NCAs are the primary contributors of nitrate to the local groundwater supply. Located adjacent to the NCAs are development areas that have significant wastewater production, with much lower density. These areas will likely be the location of increased development in the near- and mid-term future. While these areas are likely to become new NCAs, they are currently not sufficient to require immediate attention.

4.1 Phase 1 Implementation

As discussed in Section 3, the NCAs represent dense concentration of both residential and non-residential wastewater discharges. The NCAs also represent a direct negative impact on the community's drinking water supply, as exhibited by Well 10. As such, the NCAs are identified as the initial focus of the groundwater protection plan, and will be the first locations to received wastewater collection, treatment and disposal improvements. The reason for identifying these areas as the initial focus is that reduction of the nitrate contribution of these areas will provide the most direct effect to existing nitrate contamination, as well as address growing commercial developments along the highway. The District and community receive the highest return on investment by focusing initial efforts on these identified NCAs.

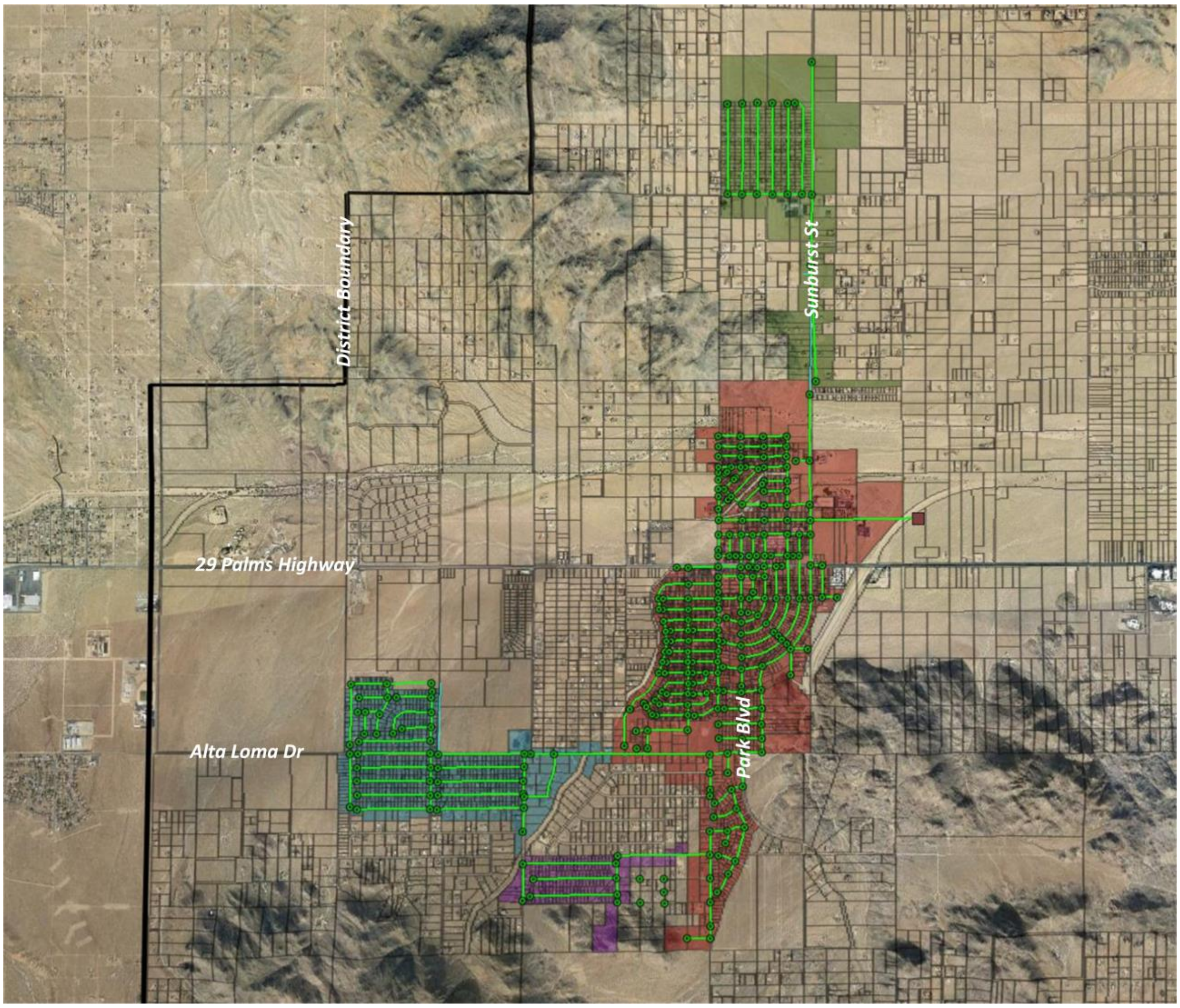
Following Phase 1 implementation, the District will continue to monitor local development patterns, as well as nitrate concentration testing from its five production wells. Based on past USGS reports, discharged wastewater can take as little as 1.5 years and as long as 20 years to reach the groundwater table, depending on the location of the discharge. Of course, water does not travel directly downward, and there are an array of factors that affect the movement of water through the ground. Also, water in the groundwater aquifer is moving to the east with the groundwater gradient (Figure 4.2). Nevertheless, assuming the most conservative transmissivity estimates, impacts on groundwater nitrate concentrations could take up to 20 years to be reflected in the well data. The groundwater table is approximately 400 feet below the ground surface in the Joshua Tree Subbasin. Of course, corrective actions can exhibit themselves sooner based on USGS estimates. In any case, the sooner that nitrate concentrations are controlled, the sooner long-term nitrate improvements will be realized. As implementation of Phase 1 is completed, it is projected that nitrate concentration data from Well 10 will gradually level off and then begin to decrease.

As discussed in Section 3, the NCAs are comprised of four (4) specific areas of densely populated residential and non-residential development. Therefore, implementation of Phase 1 of the groundwater protection plan will be subdivided into specific stages of construction to systematically address nitrate contamination rehabilitation. The largest of the NCAs, NCA #1, will be the first NCA to be addressed. The necessary wastewater collection facilities will be sized to accommodate collection and conveyance of the remaining NCAs (NCA#2, NCA #3 and NCA #4), and the treatment facility will be constructed to accommodate the wastewater generation from each NCA, including both active and vacant parcels. In this manner, the Phase 1 facilitates will accommodate continued growth within the NCA areas, as well as be expandable to accommodate the long-term needs of the community. Table 4.1 summarizes the current and future wastewater flows of the Phase 1 implementation.

As shown in Table 4.1, NCA#1 constitutes the majority of the existing Phase 1 implementation wastewater flow at approximately 320,000 gpd, ultimately projected to be 482,000 gpd. Totaling all NCAs for the Phase 1 implementation, it is projected that the initial collection and treatment facilities would require an existing capacity of approximately 450,000 gpd, with an ultimate projected capacity of approximately 674,000 gpd. A total of approximately 390,000 feet of collection pipeline, ranging in size from 8 to 15 inches in diameter is projected for the Phase 1 system, as illustrated on Figure 4.3.

The Phase 1 treatment capacity is primarily dependent on the anticipated rate of development. Current wastewater production is approximately 450,000 gpd. Good engineering practice would require that the Phase 1 treatment capacity be sufficient to accommodate current wastewater generation, but not so great as to complicate operation and maintenance of the plant. Also, it is typical that the headworks of a new plant be constructed to a capacity to accommodate both near- and mid-term capacity expansions, thereby limiting future capacity expansion complexity. With a projected ultimate Phase 1 capacity of approximately 674,000 gpd (representing a 50 percent increase in capacity), construction of the treatment capacity up to 50 percent greater than existing wastewater generation is considered typical. The decision with regard to treatment capacity will be determined during preliminary design of implementation, when more plant and process specific information is defined, as well as information about the number of process trains to be constructed and the appropriate sizing of each process train. Long-term expansion of the treatment facility will also be addressed during preliminary design. For the purposes of this analysis, a Phase 1 capacity of 675,000 gpd is used for planning and cost development purposes, assumed to be constructed as three separate process trains of 225,000 gpd each.

Figure 4.3 Phase 1 Wastewater Collection System



Conveyance of NCA#3 will require construction of a pump station along the Sunburst Street alignment. NCA#3 can be gravity conveyed southward along Sunburst Street, to approximately of Dennis Avenue. South of Dennis Avenue, the topography rises to approximately Crestview Drive, where gravity flow can be reinstituted. The force main will be approximately 3,200 feet in length, with a elevation difference of 100 feet. Based on the projects ultimate wastewater projection from NCA#3 of approximately 60,000 gpd, the force main would be wither 4 or 6 inches. The current wastewater generation of NCA#3 is approximately 36,000 gpd, so this area would be the last of the NCAs to be served, as the cost of service is higher because of the required pump station. As a result of the amount of development and the school within this area, costs to provide wastewater service should be more thoroughly explored to determine if its inclusion within Phase I or II benefits the public in terms of affordability. That being said, the nitrate production of NCA#3 is significant and should be considered within one of the future phases of construction if not included within Phase I.

Table 4.1: Phase 1 Implementation Wastewater Generation Summary

		Parcels	Area (ac)	Unit Flow	Flow (gpd)
NCA#1	Commercial	49	84	1,060	88,500
	Intitutional	15	---	355	5,300
	Multi-Family	69	---	314	21,700
	Single Family	1,187	---	172	204,200
	Subtotal	1,320			319,700
	Vacant	755	---	215	162,300
	Total	2,075			482,000
NCA#2	Commercial	-	-	1,060	-
	Intitutional	2	---	355	700
	Multi-Family	10	---	314	3,100
	Single Family	396	---	172	68,100
	Subtotal	408			71,900
	Vacant	197	---	172	33,900
	Total	605			105,800
NCA#3	Commercial	-	-	1,060	-
	Intitutional	2	---	355	700
	Multi-Family	2	---	314	600
	Single Family	205	---	172	35,300
	Subtotal	209			36,600
	Vacant	129	---	172	22,200
	Total	338			58,800
NCA#4	Commercial	-	-	1,060	-
	Intitutional	1	---	355	400
	Multi-Family	-	---	314	-
	Single Family	119	---	172	20,500
	Subtotal	120			20,900
	Vacant	38	---	172	6,500
	Total	158			27,400
Phase 1 Totals	Commercial	49	84	1,060	88,500
	Intitutional	20	---	355	7,100
	Multi-Family	81	---	314	25,400
	Single Family	1,907	---	172	328,000
	Subtotal	2,057			449,000
	Vacant	1,119	---	200	224,900
	Total	3,176			673,900

4.2 Phase 2 Implementation

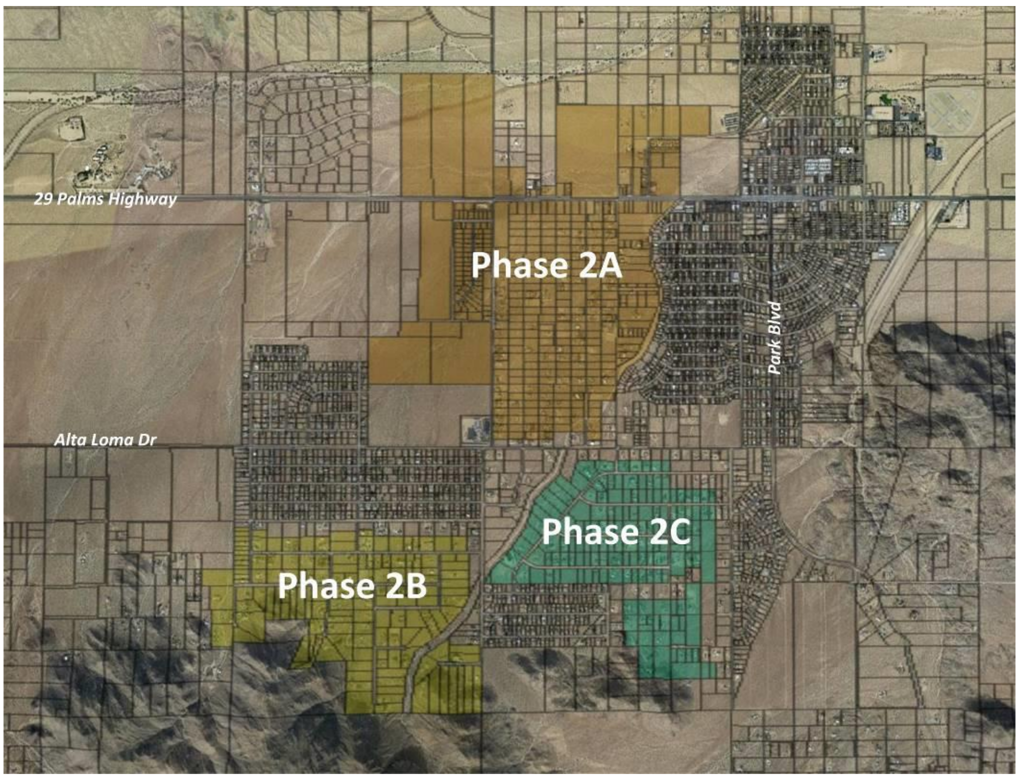
The rate of development within the Joshua Tree community has been and will continue to be variable. However, with the increased and growing popularity of Joshua Tree National Park, development pressure has increased significantly in recent years. As a result, it is difficult to identify a specific timeline when Phase 2 of the groundwater protection plan will be required. District staff will continue to monitor development patterns and groundwater quality to identify when additional facilities are required. Nitrate control implemented in Phase 1 of the plan will likely accommodate the community for many years. Only when nitrate concentrations are identified to increase within the District production wells will additional collection and treatment need to be planned.

The ability of the Phase 1 facilities to protect the entire community is a result of the fact that all water customers, regardless of location throughout the District service areas, receive water from the same existing production wells. Therefore, groundwater protection measures can be implemented to control nitrate tributary to the wells in an efficient and cost effective manner. However, as development pressure increases, implementation of the Phase 2 facilities will be needed.

Phase 2 of the groundwater protection plan is comprised of three separate areas, located adjacent to the currently identified NCAs of Phase 1. It is projected that the Phase 2 areas will be the most likely to continue to develop, ultimately attaining sufficient development density to requires collection and treatment. The Phase 2 areas include both residential and non-residential development, particularly additional commercial development along the highway corridor. Figure 4.4 illustrates the three areas that comprise the Phase 2 areas (Phase 2A, 2B and 2C).

As shown in Table 4.2, Phase 2 is projected to be implemented as each of the three subareas (2A, 2B and 2C) further develop, with increased wastewater discharges. Phase 2 implementation can accommodate one or more of the Phase 2 areas, depending on the nitrate considerations at the time. As shown in Table 4.2, the projected ultimate wastewater generation for Phase 2 is approximately 150,000 gpd. As the Phase 1 treatment plant is proposed to include three treatment trains of 225,000 each, the District would expand the plant by one treatment train to accommodate Phase 2 wastewater flows.

Figure 4.4 Phase 2 Wastewater Service Area



The resulting treatment facility would have a total capacity of 900,000 gpd, providing a capacity buffer of 75,000 gpd (50 percent of the projected Phase 2 capacity requirement). Based on the proposed treatment plant phasing, the headworks could be constructed to the full 900,000 gpd capacity or a minimum of 675,000 gpd. The final decision for plant phasing will be defined during the preliminary design portion of the plan.

It is projected that an additional 85,000 feet of 8-inch pipeline will be required to collect and convey Phase to wastewater to the treatment plant site. Computer modeling of the proposed Phase 1 and 2 collection systems was conducted to define the largest pipeline to be 15-inch diameter to accommodate the ultimate projected flow of 825,000 gpd.

Table 4.2: Phase 2 Implementation Wastewater Generation Summary

		Parcels	Area (ac)	Unit Flow	Flow (gpd)
Phase 2A	Commercial	13	19	1,060	19,600
	Intitutional	6	---	355	2,100
	Multi-Family	4	---	314	1,300
	Single Family	131	---	172	22,500
	Subtotal	154			45,500
	Vacant	228	---	215	49,000
	Total	382			94,500
Phase 2B	Commercial	-	-	1,060	-
	Intitutional	-	---	355	-
	Multi-Family	-	---	314	-
	Single Family	93	---	172	16,000
	Subtotal	93			16,000
	Vacant	53	---	172	9,100
	Total	146			25,100
Phase 2C	Commercial	-	-	1,060	-
	Intitutional	-	---	355	-
	Multi-Family	-	---	314	-
	Single Family	90	---	172	15,500
	Subtotal	90			15,500
	Vacant	69	---	172	11,900
	Total	159			27,400
Phase 2 Totals	Commercial	13	19	1,060	19,600
	Intitutional	6	---	355	2,100
	Multi-Family	4	---	314	1,300
	Single Family	314	---	172	54,000
	Subtotal	337			77,000
	Vacant	350	---	200	70,000
	Total	687			147,000

Implementation of Phase 2 will be based on the development pressure within the Phase 2 areas. As can be seen in the Phase 1 areas, development to greater than 50 percent of the land area appears to result in significant concentration of wastewater discharges, which have a detrimental effect on the underlying groundwater basin. Also, the type of development that occurs, particularly along the highway where commercial establishments will likely be congregated, will dictate implementation of the Phase 2 improvements.

Therefore, development density or wastewater generation will determine the need for the Phase 2 facilities. For example, if one or more large hotels or restaurants were developed along the highway, the District would negotiate with those establishments with regard to extending the collection system for wastewater service. This negotiation would also include any improvements or expansions to the wastewater treatment facility. The developers would be responsible for the cost of making these needed improvements for wastewater service.

Single and multi-family development would be considered on a case by case basis, depending on the proximity to existing wastewater facilities and the size of the proposed development. Small single family developments may be allowed to install septic system, but required to design a bypass to allow the home to be efficiently connected to the collection system when it is available. Larger developments will be required to extend the collection system, and potentially expand the treatment facility, to accommodate their wastewater service needs. Each instance will be handled on a case by case basis, in accordance with District policies.

4.3 Phase 3 Implementation

The remainder of the revised study area has highly distributed wastewater generation sites, with considerably less overall impact on the community water supply. Also, the distances involved in providing wastewater collection sufficient to convey outlying discharges to the identified treatment facility would be unsupportable, particularly with the current low rate of wastewater generation. However, additional nitrate concentration areas may develop within distant portions of the District service area. In fact, considerable develop has already begun in the eastern portion of the District service area near Copper Mountain College, east of Cascade Road, and in the vicinity of Sunfair Road and 4th Street. The location of these outlying areas preclude cost effective collection and transport of wastewater to the identified treatment plant site. The District will continue to monitor these developing areas, and a supplement to the existing groundwater protection plan may be needed in the future if significant nitrate contamination is realized.

As discussed in Section 3, water delivered throughout the District water distribution system is derived from the existing production wells, and as such all water system customers will participate in the groundwater protection facilities. Customers located within the Phase 3 portion of the District will not be directly connected to the treatment facility. However, through the construction of Phase I and Phase II facilities, these properties will benefit to the extent that other properties that have connected to the system are protecting their drinking water while providing the backbone of the infrastructure that will aid in their future connection when applicable. For this reason, Phase 3 customers should participate in the cost to construct and maintain the collection and treatment facilities. The benefit vs. cost allocation will be determined through the formulation of a future funding plan. Beyond participation in groundwater protection, no additional facilities will be required in the near-term for Phase 3.

As outlined in the original WTS, individual developer, depending on their proposed location, may continue to be required to implement localized package treatment systems, assuming that they are not within the proposed Phase 1 or 2 service areas. In these cases, the District will review the proposed project or development, and define the appropriate treatment method for implementation. These facilities will be handled on a case by case basis, and will not preclude implementation of the proposed facilities discussed in this report.

Section 5 Groundwater Protection Facilities Costs

The following discussion establish the projected planning, design, construction and annual operating costs required to protect the community's drinking water supplies.

5.1 Conveyance System Criteria

A computerized sewer model was constructed based on parcel information developed from the District's GIS database and billing information. The number of parcels and density within the WTS study area comprised the basis for development of tributary wastewater flows.

Traditional sewer system design requires a minimum velocity of at least 2.0 feet per second (fps) within the collection system. The subject areas exhibit a substantial slope from west to east. This analysis assumes a minimum sewer size of 8 inches in diameter.

Collection systems are typically sized to flow ½ full for sewers 12 inches and smaller, and ¾ full for sewers larger than 12 inches in diameter. However, considering the phased development approach for the District system, it is important to anticipate the maximum sizing of downstream facilities (assuming that can be installed without operational deficiencies) to assure that parallel sewers are not required in the future. Projected sewer sizes range between 8 and 15 inches in diameter. \

5.2 Raw Wastewater Characteristics

As a result of water conservation, many agencies have experienced significantly reduced wastewater flow. The resulting strength of the raw wastewater is proportionately increased as less water is used to transport the same amount of waste material. The District's 2006 Wastewater Study estimated Biological Oxygen Demand (BOD) and Total Suspended Solids (TSS) loadings of 250 mg/L. As water conservation is increased, flow estimates has reduced and wastewater strength has correspondingly increased. Therefore, District treatment facilities need to be designed for the flow rates identified herein (based on the reduced unit flow of 172 gpd/EDU) and increased influent BOD and TSS concentrations of at least 300 mg/L (ppm), each. Wastewater strength will be revisited during preliminary design to verify wastewater strength based on sample testing. It is noted that many southern California wastewater agencies have experienced a significant increase in nitrogen in their plant influent flows. As the amount of water within the collection system decreases, strength increases in terms of BOD, TSS and nitrogen. Increases in BOD and TSS are experienced, but increases in plant nitrogen loading are significantly increased and have a direct impact on the secondary treatment requirements (tankage volume and process air requirements). Therefore, it will be important to collect samples of local wastewater discharges to establish the proper design criteria for local treatment facilities.

5.3 Conventional Treatment Options (Primary and Secondary)

To protect the District groundwater supplies, treatment facilities will be required, particularly with the ability to denitrify the effluent prior to discharge. The resulting treated effluent must be suitable for discharge, as regulated by the County of San Bernardino and/or Regional Board. There are multiple acceptable levels of wastewater treatment, based on the proposed effluent uses. In general, typical wastewater treatment facilities include the following treatment processes:

- Preliminary Treatment – consists of bar screens, mechanical screens, flow measurement, grit removal, and often pumping, to lift the wastewater into downstream treatment processes.

- Primary Treatment – includes primary clarifiers, and primary sludge pumping. Primary treatment often reduces the influent TSS by 50 to 60 percent, and can reduce the BOD by 30 to 35 percent. Little or no nitrogen reduction is accomplished during primary treatment. Depending on the secondary process, primary treatment may or may not be required.

- Secondary Treatment – typically includes a secondary BOD removal process, such as an aeration basin, followed by a solids removal step, usually a secondary clarifier. The secondary treatment process functions as TSS, BOD and nitrogen removal process through recycling sludge settled in the secondary clarifier. The secondary treatment portion of the plant typically lowers BOD and TSS remaining after primary treatment down to the regulated level, i.e. BOD and TSS less than 30 mg/L.

- Nitrogen Removal – Removal of nitrogen is accomplished by processes which are part of secondary treatment process – nitrification and denitrification. Nitrification converts ammonia to nitrate. Denitrification treats nitrate in an anoxic or anaerobic zone, where nitrate is converted by denitrifying organisms to nitrogen gas.

- Tertiary Treatment – Tertiary treatment is used to create Title 22 recycled water, which is approved for full body contact recreation, and use in lakes for boating and fishing. Tertiary treatment consists of coagulation and filtration, followed by disinfection with chlorine or ultraviolet light. Title 22 requires disinfection for irrigation of parks and schools to produce a bacteria and virus kill to a level of 2.2 coliform bacteria per 100 ml of water.

- Advanced Treatment – Membrane Bioreactors (MBRs) are a technology that accomplishes the production of high quality tertiary water, both secondary and tertiary treatment in a single process. The MBR process uses an aeration basin operating at a much higher mixed liquor suspended solids (MLSS) level of 8,000 to 12,000 mg/L. The MBR process has ultrafiltration membranes. The effluent from an MBR is higher quality than conventional Title 22 effluent, and, because the TSS is very low, disinfection is more effective.

Under the State OTWS Policy, the County of San Bernardino maintains the right to permit treatment facilities under 10,000 gpd, through the Local Area Management Plan or LAMP. Treatment facilities under 10,000 gpd are typically associated with a single commercial use or small residential development. Based on the original WTS, a variety of treatment processes have been allowed for these developments. The Morongo Oasis Center Crisis Residential Treatment (CRT) is a short-term, 16-bed residential facility in Joshua Tree offering recovery-based treatment services and interventions in a home-like setting. The CRT is a County-owned facility, with a 10,000-gpd on-site treatment plant, permitted under the County LAMP. Hi-Desert Medical Center (HDMC), a regional hospital in the Joshua Tree area, has a 52,000 gpd activated sludge treatment facility permitted by the Regional Board, owned by the hospital and operated/maintained by the District. Joshua Tree Brewery is a small local brewer with a small treatment process currently in testing and startup, also permitted under the County LAMP. Each of these developments were individually reviewed by the District, with specific decision process on the allowable treatment process for implementation.

From a District operation and maintenance perspective, it is desirable to use the same or similar treatment processes for local facilities, thereby minimizing staff training and maintenance costs. However, smaller (lower capacity) treatment facilities may be better suited to particular treatment processes, while larger (higher capacity) treatment plants may favor other alternatives. Also, economies of scale are attained with larger treatment facilities, thereby minimizing the overall number of small capacity package treatment facilities within the community. As the cost of a treatment facility is significant, small business owners and residential developers can be unfairly burdened with requirements to design and construct individual treatment facilities. The community, in general, benefits more when a single treatment facility is used to provide service to a larger number of properties.

Smaller "package" treatment facilities may range in size from 5,000 gpd up to 200,000 gpd. The smallest package plants are typically constructed of steel tanks that rest on a below grade slab. Larger wastewater treatment facilities (200,000 gpd and larger) are typically constructed of cast-in-place concrete tanks, and are permanent facilities. MBR facilities, similar to that recently constructed in Yucca Valley, typically have larger ultimate capacities, as the cost and complexity of these facilities are excessive for smaller facilities.

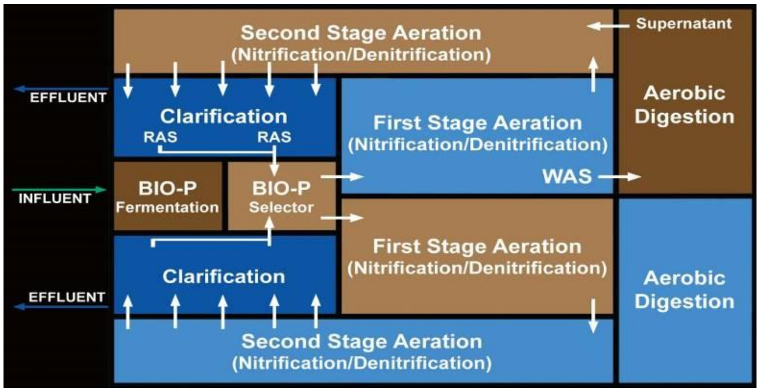
There are a number of potential manufacturers of "package" extended aeration treatment plants. For the purposes of this evaluation, the specific manufacturer is not of specific concern as this will be identified during preliminary design. As the District is faced, at this time, with the need to construct an expandable downtown treatment facility for is groundwater protection needs. For the purposes of identifying construction and annual operating costs, it is necessary to identify the general type of treatment process, the current and future tributary wastewater flow, and the method of handling and disposal of treatment residuals (sludge).

The 52,000-gpd (ultimately 104,000-gpd) HDMC treatment facility has been successfully operating for the past nine years, and it employs a conventional activated sludge process, discharging non-disinfected secondary effluent with sludge hauled to a larger facility for disposal. However, non-disinfected secondary must be discharged below grade to meet Regional Board requirements. As the proposed downtown treatment facility will produce several times more effluent than the HDMC facility, below grade discharge will not be achievable. Effluent discharge will require percolation ponds, requiring disinfection. Again, an MBR facility is not required, as the effluent does not require tertiary treatment and recycled water is not be created for irrigation purposes. The primary discharge requirements for the treatment plant will be TSS and BOD concentrations of less than 30 mg/l and total nitrogen concentration of less than 10 mg/l. Therefore, the treatment facility will be required successfully nitrify and denitrify (NDN) the wastewater prior to discharge.

Treatment facility capital and annual costs are proportional to treatment capacity. As discussed in Section 4, the District's proposed downtown treatment facility will have an initial tributary flow of approximately 450,000 gpd, growing to 675,000 gpd as the Phase 1 service area is built out. Ultimately, the tributary flow is projected to reach approximately 900,000 gpd, with buildout of the Phase 2 service areas (expanded over time as growth occurs). The Phase 1 treatment plant is proposed to include three treatment trains of 225,000 gpd each, providing an excess of capacity to allow for variations is wastewater production and potential additional unanticipated development. The proposed treatment facility would require expansion by one treatment train to accommodate identified Phase 2 wastewater flows.

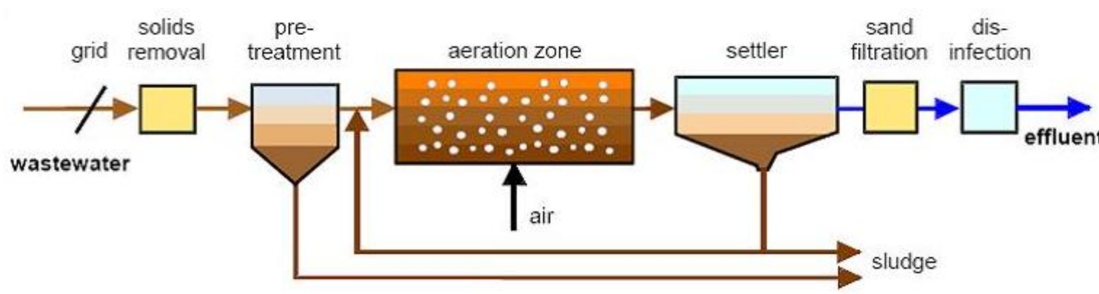
Aero-Mod Biological Nutrient Removal (BNR) Process (typically from 50,000 gpd to over 1.0 mgd). Aero-Mod has a selector, first stage aeration nitrification, second stage sequencing aeration and denitrification, and a secondary clarifier. The process also has an available optional effluent filter, if tertiary treatment is required. The Sequox process is modular, with modular flow rates of 50,000 gpd up to 500,000 gpd. The Aero-Mod package plant also includes aerobic digestion to stabilize the sludge. The Aero-Mod basic design is for providing equipment into a cast-in-place concrete tank, and is most competitive in plant flows greater than 50,000 gpd. (Figure 5.1)

Figure 5.1 Typical Aero-Mod Process Schematic



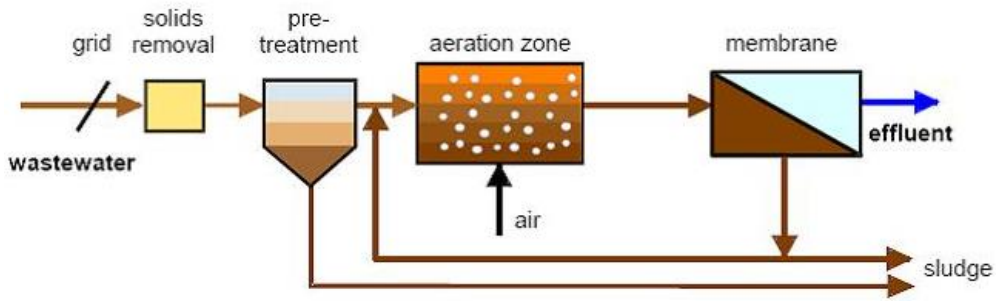
Conventional Activated Sludge/Oxidation Ditches. For wastewater flows between 500,000 gpd to greater than 1.0 mgd, it is more likely that a conventional activated sludge process is used. Conventional activated sludge requires an aeration detention time of between 4 to 6 hours. Extended aeration Oxidation Ditches requires 24 hours. The Oxidation Ditch plant is easier to operate, but because of the huge aeration basin, have a higher capital cost and land requirement. A conventional activated sludge process can be more difficult to operate as compared to an Aero-Mod process, but it is much more efficient than an oxidation ditch with regard to NDN. (Figure 5.2)

Figure 5.2 Typical Conventional Activated Sludge Process



Membrane Bioreactor (MBR). MBR is a combination of a membrane process, like microfiltration or ultrafiltration, with an activated sludge process. MBR processes can produce effluent of high quality enough to be discharged to coastal, surface or brackish waterways (not allowed in the District's case) or to be reclaimed for urban irrigation (not required for the District). Other advantages of MBRs over conventional processes include small footprint, often used to retrofit and upgrade treatment plants with limited land availability. MBR filtration performance decreases with filtration time, with deposition of soluble and particulate materials onto and into the membrane. This drawback and process limitation remains the most challenging operational issue, along with high operating cost and operational complexity. (Figure 5.2)

Figure 5.3 Typical MBR Process Schematic



5.4 Treatment Plant Cost Comparisons

Based on the analyses performed in Section 4, the District is anticipated to construct the proposed downtown treatment facility in two phases, with an initial capacity of 675,000 gpd and an ultimate capacity of 900,000 gpd (for the Phase 1 and 2 buildout). This phasing plan results in a treatment capacity buffer of 75,000 gpd to accommodate additional or unpredicted development patterns.

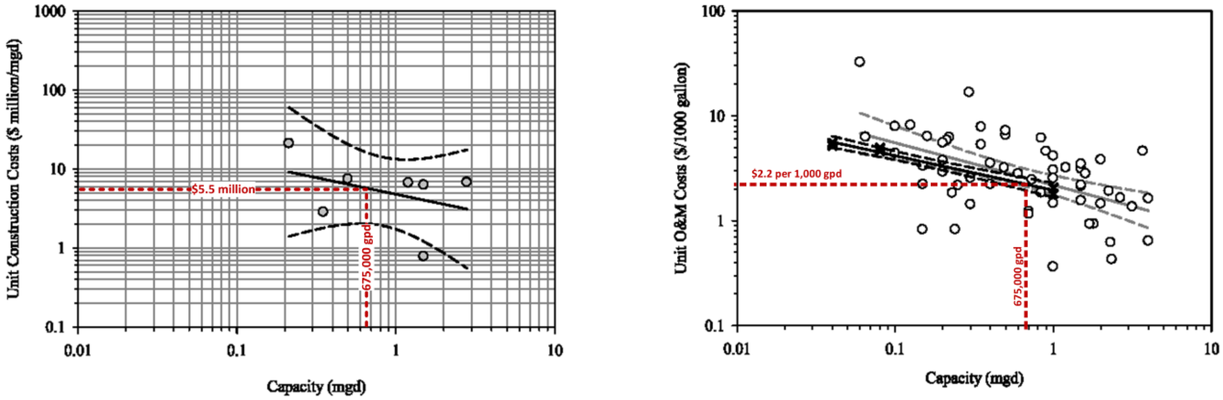
In 2010, the WateReuse Research Foundation (Foundation) published the results of a study titled "*Low-Cost Treatment Technologies for Small-Scale Water Reclamation Plants*." The mission of the Foundation is to conduct and promote applied research on the reclamation recycling, reuse and desalination of water. The Foundation's research advances the science of water reuse and supports communities across the United States and abroad in their efforts to create new sources of high quality water, while protecting public health and the environment. The main goal of the study was to identify and evaluate established and innovative technologies that provide economical treatment for flows less than 1,000,000 gpd (1.0 mgd). A range of conventional treatment processes, innovative unit treatment processes, and package systems were evaluated. The cost and operability data from existing small-scale water reuse facilities were compiled. From that analysis, the cost and maintenance issues for various types of treatment technologies are compared and contracted. This study is used to develop the comparative costs for treatment construction, operation and maintenance. The costs have been updated from 2010 to 2020 values using the 20-City Average Engineering News Record Construction Cost Index (ENR-CCI). The 20-City ENR-CCI for January 2010 is 8,660, and for January 2020 is 11,392. The cost information provided below are accurate for this analysis, and more accurate cost opinions will be developed during preliminary design.

5.4.1 Aero-Mod Treatment Plant Costs

Within the WateReuse study, Aero-Mod treatment facilities are categorized as intermittent cycle extended aeration systems (ICEAS). Figure 5.4 illustrates the unit construction and O&M costs of ICEAS treatment facilities as surveyed for the study.

From Figure 5.4, the 2010 construction cost of a 675,000-gpd Aero-Mod treatment facility was approximately $5.5 million. In 2020 dollars, this represents a cost of approximately $7.5 million. Similarly, the annual operation and maintenance (O&M) cost for ICEAS plant has unit O&M cost of approximately $2.2 per 1,000 gpd, or approximately $1,500 per day in 2010 dollars. In 2020 dollars, O&M cost is approximately $2,000 per day or $730,000 per year.

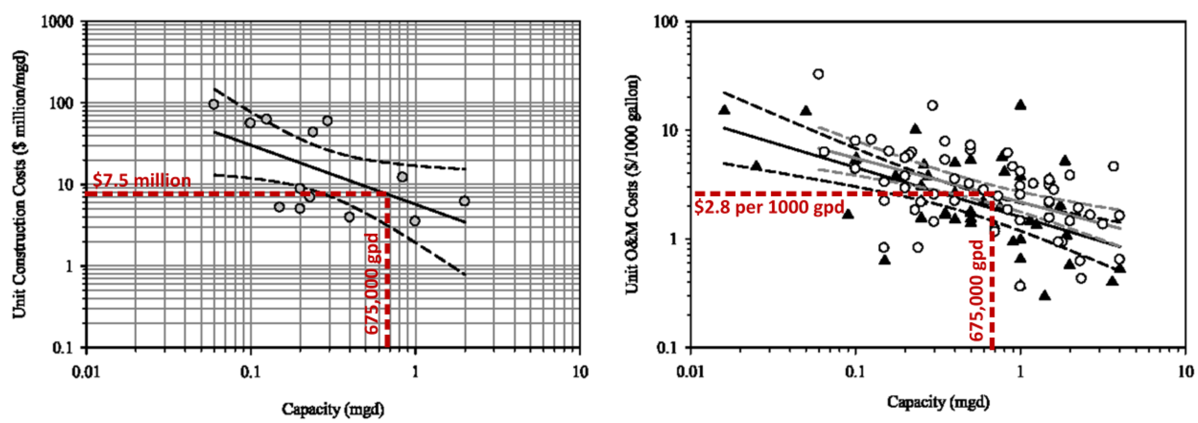
Figure 5.4 ICEAS Unit Construction and O&M Costs



5.4.2 Conventional Activated Sludge/Oxidation Ditch Treatment Plant Costs

Similarly, from the WateReuse study, conventional activated sludge and oxidation ditch treatment facilities were also studied to determine total construction cost and annual O&M cost. Figure 5.5 provides the construction and O&M cost information for conventional activated sludge and oxidation ditch treatment facilities. From Figure 5.5, the 2010 construction cost of a 675,000-gpd conventional activated sludge/Ox Ditch treatment facility was approximately $7.5 million. In 2020 dollars, this represents a cost of approximately $9.8 million. Similarly, the annual operation and maintenance (O&M) cost for these types of plants has a unit O&M cost of approximately $2.8 per 1,000 gpd, or approximately $1,900 per day in 2010 dollars. In 2020 dollars, O&M cost is approximately $2,500 per day or $910,000 per year.

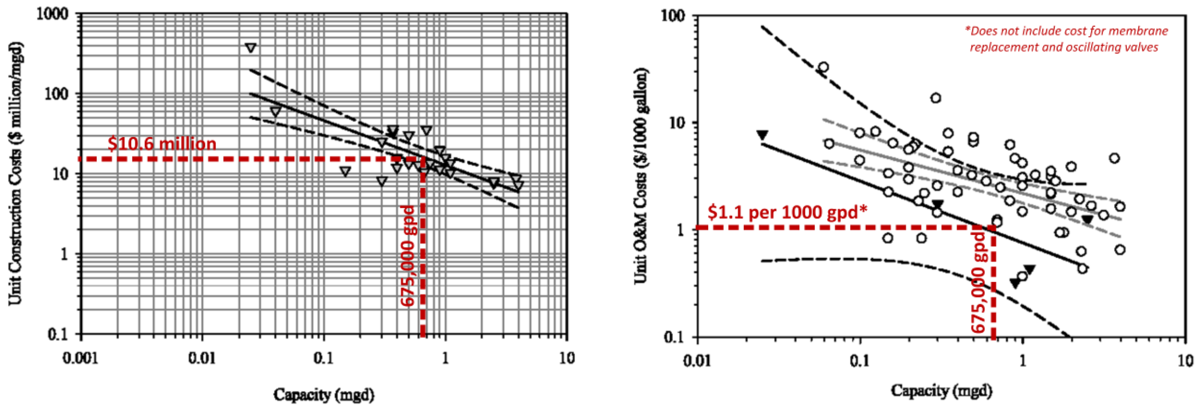
Figure 5.5 Conventional Activated Sludge/OD Unit Construction and O&M Costs



5.4.3 Membrane Bioreactor (MBR) Treatment Plant Costs

From the WateReuse study, MBR treatment facilities were also studied to determine total construction cost and annual O&M cost. Figure 5.6 provides the construction and O&M cost information for MBR treatment facilities. From Figure 5.6, the 2010 construction cost of a 675,000-gpd MBR treatment facility was approximately $10.6 million. In 2020 dollars, this represents a cost of approximately $14.0 million. From the WateReuse study, the annual operation and maintenance (O&M) cost for these types of plants identified a unit O&M cost of approximately $1.1 per 1,000 gpd, or approximately $750 per day in 2010 dollars. In 2020 dollars, O&M cost is approximately $1,000 per day or $365,000 per year.

Figure 5.6 MBR Unit Construction and O&M Costs



However, this O&M cost does not reflect the cost of replacing membranes and oscillating valves, as these are typically proprietary costs. Therefore, the annual O&M cost for an MBR treatment plant can be significantly greater. Based on our experience, annual membrane and other replacements can be as much as $200,000 to $300,000 per year, with annual operating costs approaching $650,000 to $700,000. Additional costs for MBR include the additional time and experience of the operations staff, required to operate and maintain the more complex MBR plants.

5.4.4 Treatment Cost Summary

Table 5.1 summarizes the construction and annual O&M cost for the three treatment plant options evaluated. Therefore, based on the analyses performed, an Aero-Mod Activated Sludge treatment plant (or similar process from an alternate manufacturer) represents the most cost effective facility for the District, based on the projected treatment capacity required. This type of treatment facility is amenable to phased construction, is not complex to operate, and has been used throughout southern California for many years.

Table 5.1: Treatment Plant Construction and Annual O&M Cost Summary

Process Description	*Construction Cost*	*Annual O&M Cost*	*Present Worth*[1]
Aero-Mod Activated Sludge	$7.5 million	$0.73 million	$16.6 million
Conventional Activated Sludge / Ox Ditch	$9.8 million	$0.91 million	$21.1 million
Membrane Bioreactor	$14.0 million	$0.70 million	$22.7 million

[1]Present worth based on 20 years at a discount rate of 5 percent.

5.5 Collection System Costs

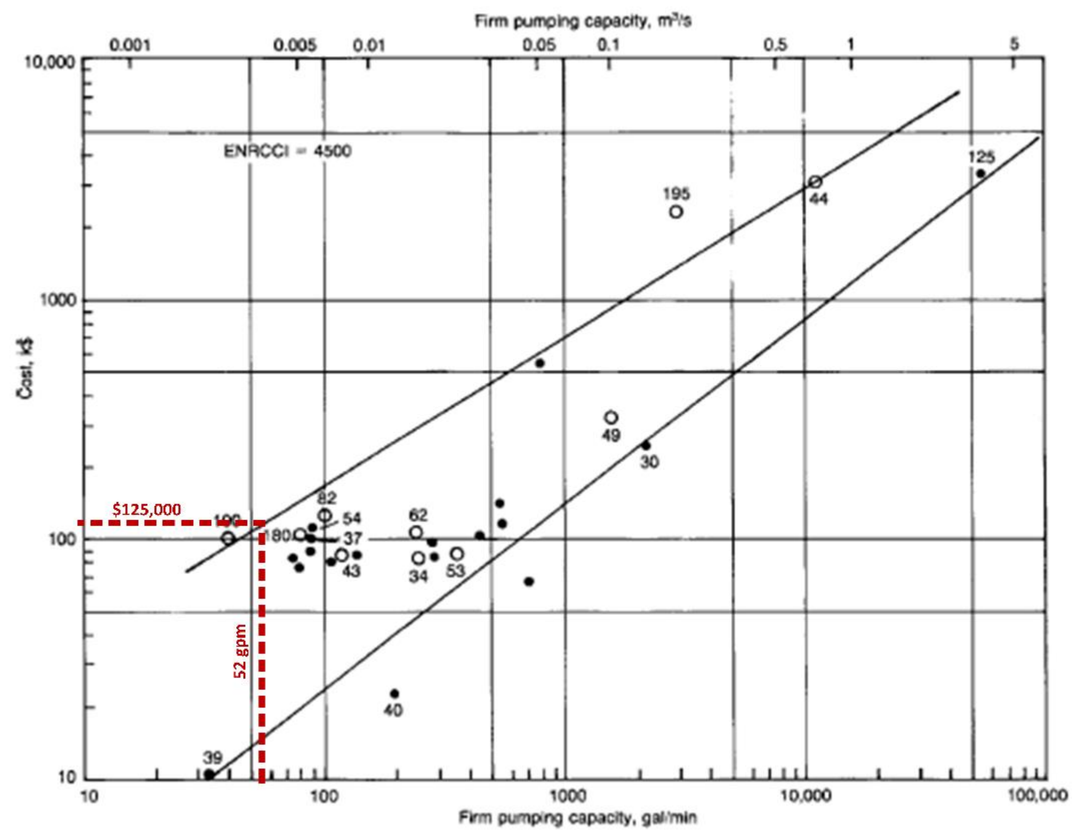
From Section 4, Phase 1 construction will require construction of a collection system comprised of approximately 390,000 feet of 8 to 15 inch PVC pipe, a 3,200-foot 6-inch PVC force main, and a pump stating with an initial capacity of 36,500 gpd and ultimate capacity of 58,800 gpd. Phase 2 construction will add an additional 85,000 feet of 8-inch PVC collection pipe. Table 5.2 summarizes the collection pipeline costs for Phase 1.

Collection of the wastewater flows from NCA#3 require a 60,000 gpd (42 gpm) pump station and 3,200 feet of 6-inch PVC force main. The force main cost is similar in cost to additional gravity pipelines, at a cost of approximately $325,000. For the pump station construction cost, we have referenced a book by Robert Sanks, titled "*Pump Station Design*." Chapter 29 of this referenced contains construction cost curves for specific types of water and wastewater pump stations. For the District purposes, the proposed small pump station would require a submersible pump station, preferably with onsite standby power. Figure 5.7 provides the construction cost curve from the reference, with an ENR-CCI index of 4500.

Table 5.2: Phase I Collection System Pipeline Cost Summary

Pipe Diameter	*Pipe Length (ft)*	*Construction Cost*
15-inch	3,077	$692,000
12-inch	3,392	$611,000
8-inch	383,531	$46,024,000
TOTAL	390,000	$47,327,000

Figure 5.7 Construction Costs of Submersible Wastewater Pump Stations



Based on the January 2020 ENR-CCI of 11,392, the construction cost for the proposed pump station is approximately $320,000 in 2020 dollars. Therefore, the projected cost of the pump station and force main is approximately $645,000.

The Phase 2 collection system includes an additional treatment train for the plant and additional collection pipelines. The larger pipelines necessary to convey the Phase 2 flows will already be installed during Phase 1. Approximately 85,000 feet of 8-inch PVC pipe will be required to service the Phase 2 system. Using the same cost estimating criteria, the Phase to collection system is projected to be approximately $10,000,000. The fourth treatment train for the treatment plant is projected to be approximately $1,250,000. Annual operating costs for the treatment plant will increase with tributary flow, increasing from $730,000 to $970,000 (increase of $240,000 per year).

Combining the two phases, the total collection system cost for Phase 1 and 2 implementation is estimated to be approximately $57,972,000 in 2020 construction dollars.

5.6 Effluent Disposal Options

Consideration of the long-term effluent disposal needs of the District is a critical to groundwater and drinking water supply protection. With septic system use, effluent is discharged through individual leach fields, subsequently percolating into the underlying aquifer. The nitrate concentrations in the effluent contaminates the community's drinking water supply over time.

The availability of effluent disposal options is limited within high desert communities, typically involving the use of percolation or infiltration basins to accomplish disposal goals. In these basins, treated effluent is discharged and allowed to percolate into the ground. The effluent, receiving the higher levels of treatment to remove harmful nitrates, is no longer harmful to the underlying groundwater basin. Percolation of treated effluent is considered a beneficial reuse of the District's water resources.

Another option for the District is direct non-potable reuse of the treated effluent. This option would involve the development of a secondary non-potable water distribution system, through which the District would provide non-potable water for landscape irrigation purposes. However, the development of a secondary distribution system is costly, both in capital construction costs as well as long-term operation and maintenance. Yet, the availability of treated water for non-potable uses may represent a valuable resource to the District in the future.

Based on current understanding of the District's water use patterns, it is anticipated that percolation basins will be used for effluent disposal. The proposed treatment facility, regardless of capacity, will be required to provide sufficient area for percolation and disposal of its treated effluent. Based on recent information developed from the District's groundwater recharge facility, a percolation capacity of 3.0 to 4.0 feet per day is achievable for percolation pond design. However, site specific evaluations will be required to fully identify the percolation area needs on a case by case basis. Based on the ultimate plant capacity of 900,000 gpd, the District will require approximately 30,000 square feet of percolation area to dispose of treated effluent. Considering that percolation basins require periodic cleaning and maintenance, it is recommended that this area be doubled to provide redundancy and operational flexibility (60,000 square feet or approximate 1.4 acres). Also, the percolation basins are recommended to be organized into multiple smaller basins, allowing for cleaning of some basins while other basins remain active.

5.7 Biosolids Handling & Disposal

Biosolids constitute the residual material resulting from the wastewater treatment process. It is traditionally accepted that on-site treatment of wastewater biosolids is only cost-effective for treatment capacities greater than approximately 1.0 mgd. As a result, the District's proposed treatment installation is not anticipated to cost effectively handle biosolids treatment on-site. The alternative is the storage and hauling of biosolids to off-site facilities.

Based on the ultimate 900,000 gpd plant capacity and using the Aero-Mod treatment process, it is projected that the District would produce approximately 270 dry tons of sludge per year. The concentration of solids removed from aerobic digestion is approximately one percent, so dewatering will be required to minimize the cost of hauling. Recent advances in screw press technology allow approximately 20 percent solids from these facilities. Therefore, at 20 percent solids, the District would generate up to 1,350 wet tons of sludge per year, or 2,700,000 wet pounds per year. A typical sludger hauling truck can carry approximately 20,000 wet pounds. Therefore, at ultimate treatment capacity, the District would need 135 trucks per year to dispose of its solids. This equates to changing the truck every three days. However, the initial flow will be up to 450,000 gpd, resulting in half of the sludge production. Under the initial conditions, the District would be projected to require sludge to be hauled approximately once per week.

The facilities required to support the solids handling needs of the proposed treatment facility include a small screw press, with associated sludge storage and truck loading facilities. These facilities will be further defined during preliminary design. Additional site and treatment process requirements may be added based on the location, size and proximity of the facilities to local residents.

Section 6 Wastewater Facilities Financing Options

A primary District objective is the development of a sound financial plan that allows the District to successfully generate or acquire the needed funding for near- and long-term facilities construction and O&M. Section 5 discusses the approximate cost of the needed facilities over the near- and mid-term planning horizons. Sizing and cost of the overall wastewater collection and conveyance facilities were also discussed in Section 5.

The District will need to identify and secure the funding necessary to construct the required facilities, and also define a methodology by which the community will repay that funding as well as accommodate annual operation and maintenance of the facilities. The following discussions identify options available to the District for financing the construction and ongoing maintenance of its future wastewater collection and treatment facilities. This section provides descriptions of viable financing options, relevant state statues involved, how the financing options are implemented, and the relative advantages and disadvantages of the options. The financing options considered include Assessment Districts, Community Facilities Districts (CFDs - otherwise known as "Mello-Roos Districts"), Connection Fees, Parcel Taxes, Sewer Rates, Revenue Bonds, Certificates of Participation (COPs), and State and Federal Financial Assistance.

6.1 Assessment Districts

Assessment Districts are special benefit districts that are formed to pay for certain public facilities, such as water distribution and treatment, and wastewater collection, transmission and treatment. An assessment lien is attached against the properties within the district based upon the benefit that each property receives from those public facilities. The majority of Assessment Districts for public facilities are formed under the Municipal Improvement Act of 1913. If bonds are issued in conjunction with the Assessment District, they are usually issued under the Improvement Bond Act of 1915. To form an Assessment District, an Engineer's Report must be prepared, assessment ballots must be mailed out to property owners within the district, and the ballots must be tabulated. The Assessment District is approved if 50 percent or greater of the ballots are in favor of the assessment, with the ballots being weighted according to the proportional financial obligation of the affected property.

An advantage of forming an Assessment District is that the costs of the public facilities can be financed over an extended period of time, typically 30 years, using tax-exempt bonds with relatively lower interest rates than standard bonds. Since the costs of the public facilities are financed, the District's costs are lower and theoretically these savings could result in a lower repayment costs for the community.

One of the disadvantages in forming an Assessment District is that the District is subject to the benefit nexus requirements of Articles XIIIC and XIIID of the California Constitution (Proposition 218). Each property can only be assessed for the special benefit that it receives from the public facilities. An Engineer's Report must be prepared that develops an assessment methodology that spreads the costs of the public facilities to each property based upon the special benefit that the property receives. Only special benefits are assessable, and the agency must separate the general benefits from the special benefits conferred upon the property.

If bonds are issued, that creates some additional duties. The District would be responsible for annual disclosure requirements regarding the District and the bonds. Additionally, the District would be responsible for managing delinquency issues. If delinquencies become extreme, then bond delinquency covenants may call for the District to proceed with foreclosure proceedings to cure the delinquencies. Agencies frequently hire third party consultants to handle these various additional duties. In any case, the bonds are limited obligations, and the District is not directly liable for payment of debt service.

6.2 Community Facilities Districts

A community facilities district ("CFD") is a financing tool that may be used to pay for the cost of, among other things, public facilities with a useful life greater than five years. A CFD imposes a "special tax" upon a property, as opposed to an assessment lien imposed by an assessment district. Bonds may be issued in conjunction with a CFD.

CFDs are authorized to be formed under the Mello-Roos Community Facilities Act of 1982 (the "Act"). The Act was passed to give agencies an alternative financing tool to fund certain public facilities and/or services. The Act allows for the formation of a CFD to finance the purchase, construction, expansion, improvement, or rehabilitation of any real property with an estimated useful life of five years or longer, or may finance the planning and design work related to such real property. The CFD can also be used to pay for incidental expenses, such as costs associated with the creation of the district, issuance of bonds, determination of the amount of taxes, and collection of taxes. Bonds are usually issued in conjunction with a public facility CFD to pay for the public facility improvements.

To provide funds to make the bond payments and pay for incidental expenses, a special tax lien is placed on the taxable properties within the district. A document called the Rate and Method of Apportionment (the "RMA") dictates which properties are taxable and specifies how the annual special tax requirement (the amount necessary to service the bond payments and pay for incidental expenses) is spread among taxable property within the District. The RMA specifies the annual maximum special tax rates for each class of property, as well as the method of apportionment used to allocate the special tax requirement among the different property classes.

However, the District would have some constraints in setting the maximum special tax rates. Bond underwriting requirements, and the Act, state that revenues from special taxes must be sufficient to provide at least 110 percent coverage for debt service requirements, throughout the life of the bonds. That is, the maximum special tax rates and the method of apportionment must allow the issuer the ability to collect at least 10 percent more than is necessary for the bond payments and the incidental expenses.

The District would receive the proceeds from the sale of the bonds, and would be able to use the proceeds to pay for public facilities. A Notice of Special Tax Lien would be filed with the County Recorder, placing a special tax lien upon the taxable property within the District. Each fiscal year, the special tax requirement for the District would be determined and the amount of special taxes to be levied on each class of property would have to be calculated. The special taxes would be collected by the County on the property tax bills, and the proceeds of these taxes would be delivered to the District. The District would in turn use the special tax proceeds to pay for the debt service on the bonds and to pay for the incidental expenses associated with the District.

6.3 Connection Fees

The use of development impact fees is a common method of ensuring that new development pays for the costs of its needed infrastructure. Sewer connection fees are development impact fees that are charged to new connection to the facilities to mitigate the costs to the District for new wastewater treatment capital needs. Sewer connection fees are paid by users and developers typically when a building permit is issued. These fees are authorized by the Mitigation Fee Act, contained in Government Code Sections 66000 through 66025.

Sewer connection fees only need a majority vote of the legislative body for adoption. However, the Mitigation Fee Act requires five statutory findings for the District to adopt the fees. The five statutory findings are as follows:

- Identify the purpose of the fee.
- Identify the use to which the fee is to be put.
- Determine how there is a reasonable relationship between the fee's use and the type of project on which the fee is imposed.
- Determine how there is a reasonable relationship between the need for the public facility and the type of project on which the fee is imposed.
- Determine how there is a reasonable relationship between the amount of the fee and the cost of the public facility attributable to the project on which the fee is imposed.

The District may levy connection fees on users and developers for the construction of the treatment plants and related capital facilities that serve new connections. They are typically not allowed for maintenance and operation of the facilities, although there is one exception to this rule. A connection fee may be utilized for operations and maintenance of wastewater facilities if the improvement is to serve only the specific users on which the fee is imposed and the improvement serves 19 or few lots or units. The caveat with this approach is that the District would have to make findings, citing substantial evidence that it is infeasible or impractical to form an assessment district.

6.4 Parcel Taxes

A parcel tax is a special tax that may be passed for a wide range of general services or may be specific to public projects, such as wastewater treatment facilities. Similar to a CFD, a parcel tax is considered a special tax, as opposed to an assessment lien associated with an Assessment District. Revenues generated from the tax can be used for any District purpose, capital, operational or debt service, as specified in the ballot language for the tax. Registered voters within District boundaries would be eligible to vote on the tax measure.

Parcel taxes are authorized under Government Code Section 37100.5. The taxes are primarily levied on a flat per-parcel rate (thus the term "parcel tax"). However, a parcel tax can also be levied on a variable rate based upon land use, size of the parcel, or the number of units on the parcel. Parcel taxes may be excise taxes that are based on the use or availability of facilities and/or services. Parcel taxes may also be subject to a proportionality requirement. This concept requires a tax to be based upon a measure that reflects the proportion of the taxed activity that is actually carried on within the jurisdiction. A parcel tax can be levied for a predetermined number of years, although it is possible to adopt a permanent parcel tax.

6.5 Sewer Rates

Sewer rates are fees that are charged by the District for wastewater utility services. They are charges that are paid on an ongoing basis by the users of the Districts wastewater systems. Most costs associated with the operation of the wastewater system can be factored into the sewer rates, including capital expenditure costs, operation & maintenance costs, and debt servicing. These fees or rates are supported by a cost of service study showing the revenue requirement that will be met through the collection of the fees as well as the method for reasonably apportioning the revenue to customers.

Fees for sewer service in California are considered to be property-related and therefore the substantive and procedural requirements of Article XIIID of the California Constitution (Proposition 218) apply. For the District to impose new or increased sewer rates to finance wastewater operations and capital needs, the Proposition 218 noticing and public hearing requirements are required. Notices of the proposed new rates or rate increase must be sent to all affected customers. The notice must also announce the date, time and place for a public hearing regarding the rate increase. If more than 50 percent of the affected customers protest the rate increase *in writing*, the increase must be abandoned. If there is not a majority protest, the District would be able to adopt the new rates. If the sewer rates were designed to pay all or a portion of revenue bonds, the procedural requirements of the Revenue Bond Law of 1941 would apply as well.

6.6 Revenue Bonds

Revenue bonds, issued pursuant to the Sewer Revenue Bond Act of 1933 (Health and Safety Code Section 4950 et seq) or the Revenue Bond Law of 1941 (Government Code Section 54300 et seq), are issued to acquire, construct or expand public projects, including wastewater systems, for which fees, charges or admissions are charged. In the case of the District, the sources of bond repayment could be wastewater service charges, connection fees, leases, rents and standby charges identified for purposes of debt service related to the financed facilities. Because the debt service is directly paid from the income generated by the financed facilities, such debt is considered self-liquidating and generally does not constitute debt of the District. To authorize a revenue bond issue, the District would be required to pass a resolution or ordinance and hold a public hearing to set rate or fees to support the debt service. Additionally, many types of revenue bonds require majority voter approval to authorize the size and purpose of the bond issue. Voter approval is not required if statutes specifically permit, or in certain cases if bonds are sold through joint powers authorities. It is our understanding that the District would require voter approval prior to issuing debt under either statutory authority.

6.7 Certificates of Participation (COPs)

This financing technique provides long-term financing through a lease or installment sale agreement that does not require voter approval. COP financing is based upon the same theory as non-profit corporation financing, which is, providing long-term financing through a long-term lease arrangement. COPs represent a proportionate interest of the holder's right to receive a portion of each payment made by the public agency (District) under the installment sale agreement or lease between the District and a third party.

The issuance of COPs is not subject to the statutory requirements applicable to the issuance of revenue bonds of a non-profit corporation. COPs are not considered debt under the California Constitution and voter approval is not required as may be the case with revenue bonds. The project and site are leased to the obligator and, in exchange for the right to use the project and the site, the obligator makes lease payments to a lessor. Bonds are payable solely from these payments made by the obligator. Similar to revenue bonds, reserves are typically required with COPs and may take the form of a reserve fund account. Reserves are typically required with COPs and may take the form of a reserve fund account.

6.8 State and Federal Financial Assistance

There are several sources of state and federal financial assistance for wastewater system design and construction. The two more popular options available to the District are: 1) State Revolving Fund Loans and 2) USDA Rural Utilities Service Loans and Grants. There are also other available grant funding options regarding septic to sewer conversions and other that may apply. Additional investigation during preliminary design will be needed to define the specific grant and loan options available to the Dsitrict at the time, as these programs change frequently.

6.8.1 State Revolving Fund Loans

The Clean Water State Revolving Fund (SRF) programs operate like banks. Federal and state contributions are used to set up the programs. These assets, in turn, are used to make low interest loans for projects such as wastewater collection and treatment facilities. Funds are then repaid to the SRF over terms as long as 20 years. Repaid funds are recycled to fund other water quality projects. These SRF resources can help supplement the limited financial resources currently available for decentralized treatment systems. The sources of repayment by the District would need to be identified prior to application. Such sources may include District property tax revenue, sewer rates, assessment or tax funds, and connection fees.

6.8.2 USDA Rural Utilities Service

USDA Rural Utilities Service Water and Wastewater Disposal Loans and Grants are available to develop water and wastewater disposal systems in rural areas and towns with a population of less than 10,000. The grant funds are available to reduce water and waste disposal costs to a reasonable level for rural users. Grants may be made for up to 75 percent of eligible project costs in some cases. The Rural Utilities Service also guarantees water and waste disposal loans made by banks and other eligible lenders. The facilities financed must be owned and controlled by the borrower/grantee. Financed decentralized systems within the District would have to be owned and managed by the RUS borrower/grantee.

Section 7 Wastewater Facilities Cost Sharing Methodology

As discussed throughout this analysis, the District is faced with the immediate need to implement groundwater protection measures to assure the community's drinking water is protected. The original WTS approach excluded existing customers and customers that were not located within the original WTS study area. However, over the last 10 years, the District has experienced a continuing degradation of its groundwater quality, particularly related to nitrate contamination. As such, it is clear that the drinking water supply is impacted by existing, as well as potential future, residents.

It is notes that all customers within the District service area receive drinking water from the Joshua Tree Subbasin. As such, it benefits all District water customers to protect this groundwater basin from ongoing nitrate contamination. As such, all District customers should share proportionately to the benefit obtained in constructing, operating and maintaining facilities necessary to protect the Community's drinking water supply.

This report (Section 4) defines the areas of development that pose the most direct and ongoing impact to the groundwater supplies. Section 5 defines the facilities and costs necessary to provide groundwater protection for the District. Section 6 defines the financial tools available to the District to fund the needed protect facilities. In this section, we define a specific cost sharing methodology, whereby the community shares proportionately in the cost of the facilities, in specific relation to the benefit each customer receives.

As discussed in Section 4, the revised WTS study area constitutes approximately one-third of the District service area, but currently contributes approximately 74.5 percent of wastewater generation. The identified Phase 1 service area (NCAs 1 through 4) are projected to contribute approximately 80.9 percent of the revised WTS service area discharges (674,000 gpd). The Phase 2 service areas (Areas 2A, 2B and 2C) are projected to ultimately contribute another 17.7 percent (147,000 gpd). Together, the Phase 1 and 2 service areas total approximately 821,000 gpd of wastewater flow. The remainder of the revised WTS services area (Phase 3) does not currently contribute significantly to groundwater contamination.

At the present time, the District projects that an Assessment District (AD) will be used to fund the Phase 1 groundwater protection facilities. The beneficiaries of the AD would vote, weighted by EDU, for the Phase 1 improvements. Approximately one (1) year after project completion, the cost allocation would be as follows:

Implementation Phase	Assessment Description
Phase 1 Parcels	Assessed the full benefit.
Phase 2 Parcels	Assessed a partial benefit based on oversizing of pipelines and treatment facilities, but built within Phase 1 to convey or treat Phase 2 flows.
Phase 3 Parcels	Assessed a partial benefit as a "deferred" parcel. The remaining parcels within the revised WTS study area are included based on the fact that they are benefiting from wastewater treatment for Phase 1 parcels, while continuing to discharge from septic systems. As there is timeline in place for construction of Phase 3 facilities, these parcels would receive a "deferred" classification.

The District would secure available grant and loan funding to construct the Phase 1 facilities. Following completion of the Phase 1 construction, the District would conduct a second AD vote to include the Phase 2 and Phase 3 parcels for construction of the Phase 2 infrastructure. Phase I parcels would not receive an increase to their assessment, as they are already paying the full assessment for their infrastructure. Phase II parcel assessments would increase to approximately what the Phase I parcels pay at 100 percent benefit.

7.1 Construction Costs Sharing Methodology

The cost of constructing collection and treatment facilities is significant, particularly when shared between limited benefit groups. For the proposed District downtown treatment plant, the fact that all water customers receive drinking water from the same groundwater basin identifies the beneficiaries of the proposed groundwater protection facilities. As the vast majority of the District is comprised of single family residential customers, cost sharing is based on an equivalent dwelling unit (EDU) basis. In this manner, a single family residential unit is defined as one EDU, and commercial and institutional establishments are then defined as multiple EDUs, depending on their wastewater production.

For collection system construction, the constructed facilities convey wastewater from the production sources to the treatment plant. Different from the treatment plant, the collection system serves those wastewater customers discharging directly thereto. Therefore, the collection system should be proportionately shared by wastewater customers based on the EDU system discussed above.

Based on the above construction cost sharing methodology, construction costs for groundwater protection facilities are shared equitably between those that directly benefit from the facilities. From Section 6, the projected Phase 1 construction costs include approximately $7,020,000 for treatment facilities and $43,239,000 for collection and conveyance facilities. Phase 2 construction costs include approximately $2,375,000 for treatment facilities and $14,733,000 for collection and conveyance facilities.

These costs represent only the construction cost of the facilities, and other costs, including soft costs, financing costs and contingencies are required to develop the projected capital cost of the facilities. At this early phase of the analysis, these additional cost are projected to be approximately 45 percent of the construction costs.

The revised WTS study area has approximately 3,918 parcels, and Phase 2 has approximately 1,308 parcels. Dividing the Phase 1 capital cost ($72,876,000) by the parcels receiving benefit (3,918 parcels) yields a per parcel construction cost of approximately $18,600. Assuming this cost is amortized over 30 years yields a cost of $620 per parcel per year, or approximately $52 per month for 30 years. If a 40 year amortization is available, these numbers reduce to $470 per EDU per year or $39 per EDU per month.

Dividing the Phase 2 capital cost ($24,807,000) by the parcels receiving benefit (1,308 parcels) yields a per parcel capital cost of approximately $18,966. Assuming this cost is amortized over 30 years yields a cost of $630 per parcel per year, or approximately $53 per month for 30 years. If a 40 year amortization is available, these numbers reduce to $470 per EDU per year or $39 per EDU per month.

It is understood that more detailed cost opinions will be developed during preliminary design. However, these calculations show that the cost can be equitably shared throughout the community, between those who directly benefit sharing in the cost.

7.2 Annual Cost Sharing

Similar to the construction cost discussion, the annual O&M cost of the treatment plant is also shared by the community members that benefit from groundwater protection. As with the construction cost, community members deriving direct benefit from the groundwater protection facilities. Therefore, for Phase 1, the same 3,918 EDUs share the projected cost of the annual O&M cost of $730,000. By division, each parcel would contribute an annual cost of $186 per EDU for the Phase 1 plant capacity. Similarly, for Phase 2, the 1,308 EDUs would chare the annual O&M cost of $240,000 yielding a cost of $184 per EDU.

7.3 Projected Total Annual Cost (per EDU)

Based on the sharing methodology discussed above, the total annual cost for Phase 1 participants is approximately $806 per year over 30 years and $656 per year over 40 years. Similarly, the total annual cost for Phase 2 participants is approximately $814 per year over 30 years or $654 per year over 40 years. As can be seen, the total annual cost for Phases 1 and 2 correlate closely.

The Phase 1 plant flow is defined to be approximately 675,000 gpd. At a unit flow of 172 gpd per EDU, a total of 3,925 EDUs are capable of contributing wastewater to the plant. The total wastewater production, at buildout, for the Phase 1 service area is 674,000 gpd. The Phase 2 plant expansion will add 225,000 gpd to the plant capacity, providing capacity for an additional 1,308 EDUs. Therefore, the total EDUs over which the total capital cost would be shared is approximately 5,233 EDUs. Sharing of the Phase 1 and 2 capital cost is approximately $18,667 per EDU ($622 per EDU per year for 30 years or $467 per year for 40 years).

This value is an estimate based on current cost projections. During preliminary design, the cost opinions will be further detailed, as will the actual financing costs. However, the calculations herein identify that the cost of needed groundwater protection yields a reasonable cost for the community.

7.4 Groundwater Protection Charge Considerations

As noted, the above calculations do not account for the benefit derived by the Phase 3 (deferred) participants in the revised WTS study area, or the other water customers within the entire District service area. As all water customers receive water from the Joshua Tree Subbasin, all customers receive a benefit from the groundwater protection provided by the wastewater collection, conveyance and treatment facilities. As such, the water customers should participate in protection of the groundwater supply.

The District could promulgate a Groundwater Protection Charge (GPC) to account for the benefit the water customers receive. To develop the cost component of the GPC, the District must consider the impact on the water users if the wastewater facilities were not constructed. In this scenario, nitrate concentrations would continue to increase to the point that State regulators would require treatment of the water supply to remove nitrates. Nitrate removal would most likely be accomplished by ion exchange wellhead treatment, at a capital cost of approximately $72 per EDU and an annual operating cost of approximately $172 per EDU per year. These costs represent the avoided cost to the water customers, which could become the basis of a GPC. As there are currently approximately 6,500 EDUs of wastewater production in the District, the annual GPC, based on the avoided cost of ion exchange wellhead treatment would be approximately $175 per EDU per year or $14.60 per month.

Section 8 Next Steps

Implementation of the groundwater protection facilities defined in this document involve a series of additional actions, or Next Steps, to prepare necessary documentation. The following is a general list of actions to be taken to move forward with designing and constructing the Phase I facilities:

1. Discuss the proposed groundwater protection plan with the Board of Directors and the Citizens Advisory Council (CAC) to inform them about the overall project need and the anticipated cost and timeline of the implementation.
2. Perform community outreach through workshops held at the District and other community gatherings. Utilize the CAC to help identify and reach out to various groups and residents.
3. Utilizing CAC and public feedback, obtain approval from the Board of Directors to finalize the WTS Update.
4. Continually identify and apply for potential grant opportunities that would assist in planning and construction of the needed groundwater protection facilities.
5. Petition LAFCO for activation of the District's full wastewater authority, such that the collection system and treatment plant can be implemented. Preliminary discussions with LAFCO staff indicate that they are in favor of the proposed plan and will work with the District to provide the needed authorities.
6. Prepare a Preliminary Design Report (PDR) to provide a detailed layout and preliminary design of the required facilities, including but not limited to more detailed investigation of the treatment process and supporting equipment necessary to construct the facilities, more detailed cost analyses, contact the Regional Board to define discharge requirements, identification of grant funding and low interest loan opportunities, more information on financial mechanisms, and other required information.
7. Complete Value in Engineering study to obtain considerations from outside influences to ensure the most efficient and affordable project.
8. Identify available loan terms from the State Water Resources Control Board Clean Water State Revolving Fund.
9. Prepare Assessment District Engineer's Report followed by an Assessment District vote to secure State Revolving Fund loan for design and construction (must obtain 50 percent + 1, minor majority vote).
10. Prepare Title 22 Engineer's Report and other documents necessary to obtain Wastewater Discharge Requirements (WDR) permit from the Regional Board. Apply for WDR.
11. Prepare final design and bid documents for bidding and construction of the collection system and treatment facilities.
12. Bid and construct the collection and treatment facilities followed by private property connections and start-up of the system.

While these "next steps" provide some of the large milestones associated with the completion of the groundwater protection project outlined within this WTS Update, there are a number of intermediate discussions, reports and efforts needed to move between each step. A more exhaustive list and schedule will be created upon the approval of the WTS Update.

8.1 Timeline Considerations

From Figure 1.2, it can be projected that, at the current rate, nitrate concentrations in Well 10 may exceed the 45 mg/L maximum contaminant level (MCL) by approximately 2050. As it has been identified that water takes approximately 15 to 20 years to reach the Joshua Tree groundwater basin and the current nitrate concentration is approximately 22.5 mg/L, it is projected that the groundwater protection facilities will need to be fully functioning before 2035 to avoid potential potable water treatment requirements. At the current levels of nitrate contamination, the District will be required to begin monitoring and reporting of nitrate concentrations to the Regional Board and Department of Water Resources in approximately five years, once the nitrate concentration reaches 25 mg/L. These regulatory requirements provides the District with a timeline for groundwater protection implementation of approximately 10 to 12 years.

Starting from the fall of 2020, it will take approximately one year to get the Phase 1 PDR complete and have LAFCO activate the District's necessary authorities. Financial arrangements are projected to require approximately 1.5 years to complete. Final design of the Phase 1 facilities are projected to require approximately 1.5 years to complete. Bidding and construction of the collection and treatment facilities is estimated to require 2 to 3 years. Retrofit of Phase 1 connections to the collection system is projected to require approximately 1 to 2 years. Therefore, starting in September 2020, the facilities would be operational in approximately 8 to 9 years. Therefore, to effectively control nitrate concentration increases in the groundwater, it is becoming critical to start this process within the next year for implementation of Phase 1 facilities. Implementation of the Phase 2 facilities would not be initiated until Phase 1 facilities are in full operation.