Appendix VII-A: Disadvantaged Communities Tapestry Mapping

This appendix contains complete tapestry mapping, which was completed as part of the DAC Outreach Program.

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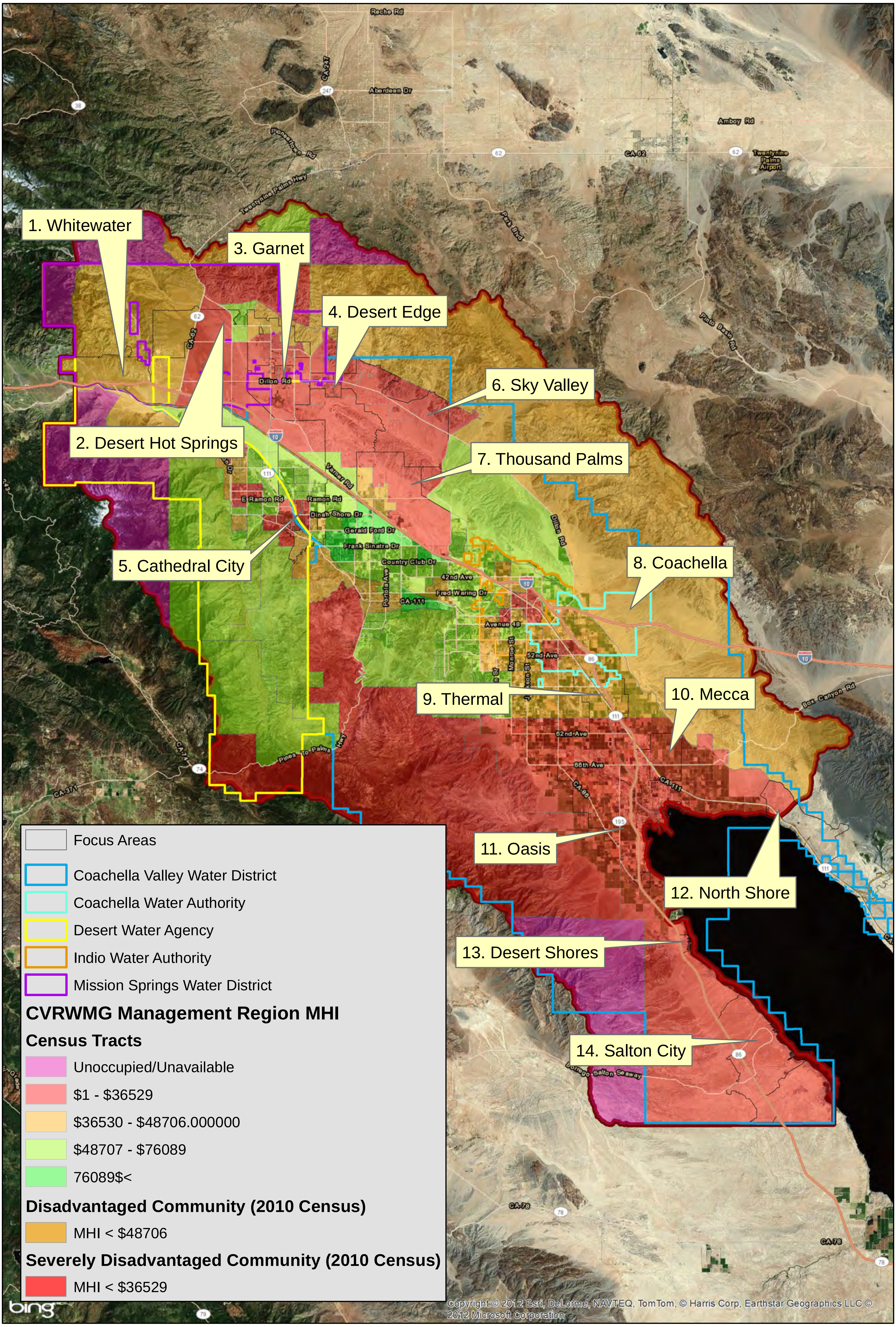
CVRWMG Median Household Income by Tract



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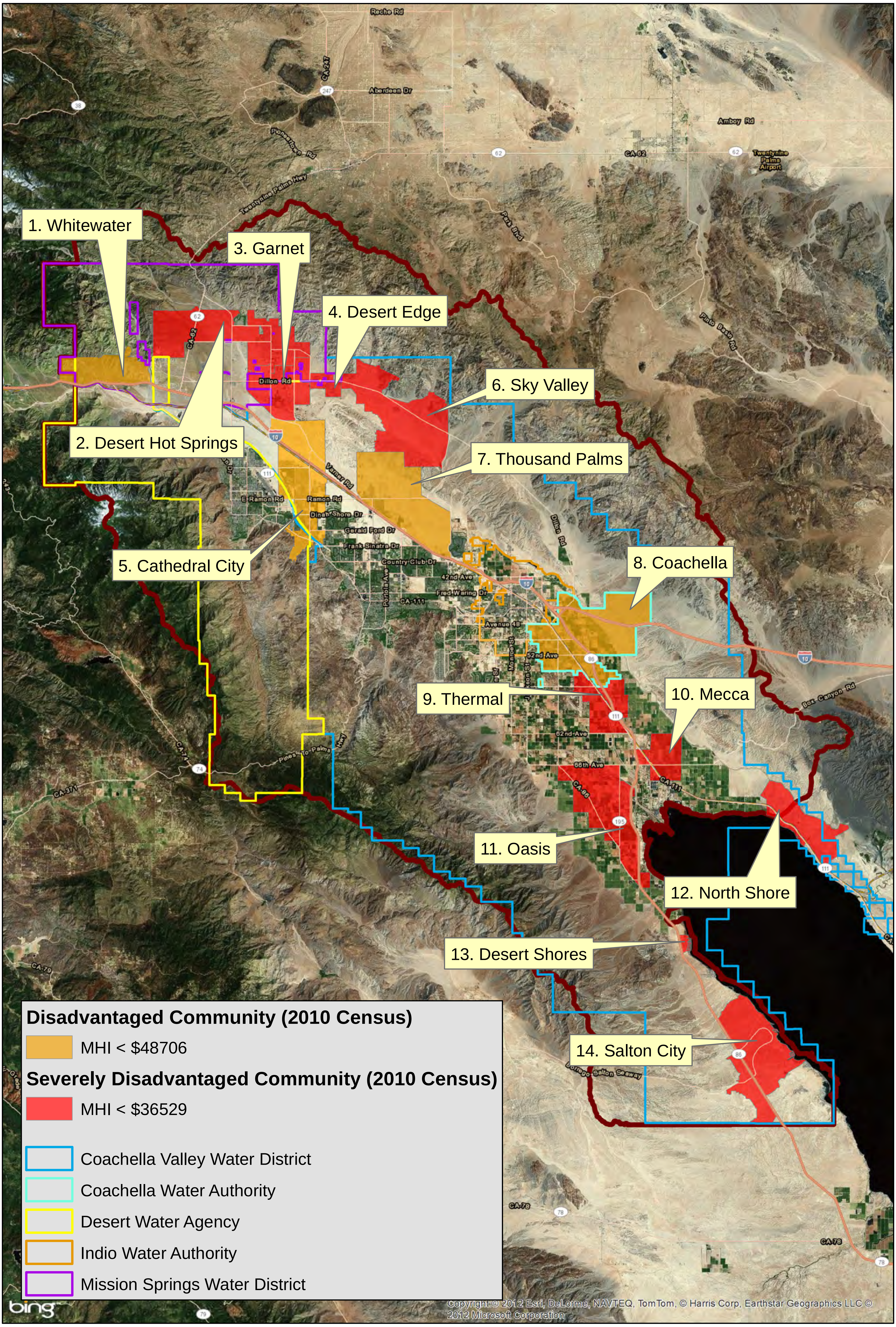
Integrated Planning and Management Inc.
Generating Value Through Integration

INTPLN GIS
NOV 2012
Sources:
Bing Maps
Census.gov
ESRI

0 3.25 6.5 13 19.5 26
Miles

CVRWMG Disadvantaged Community Index



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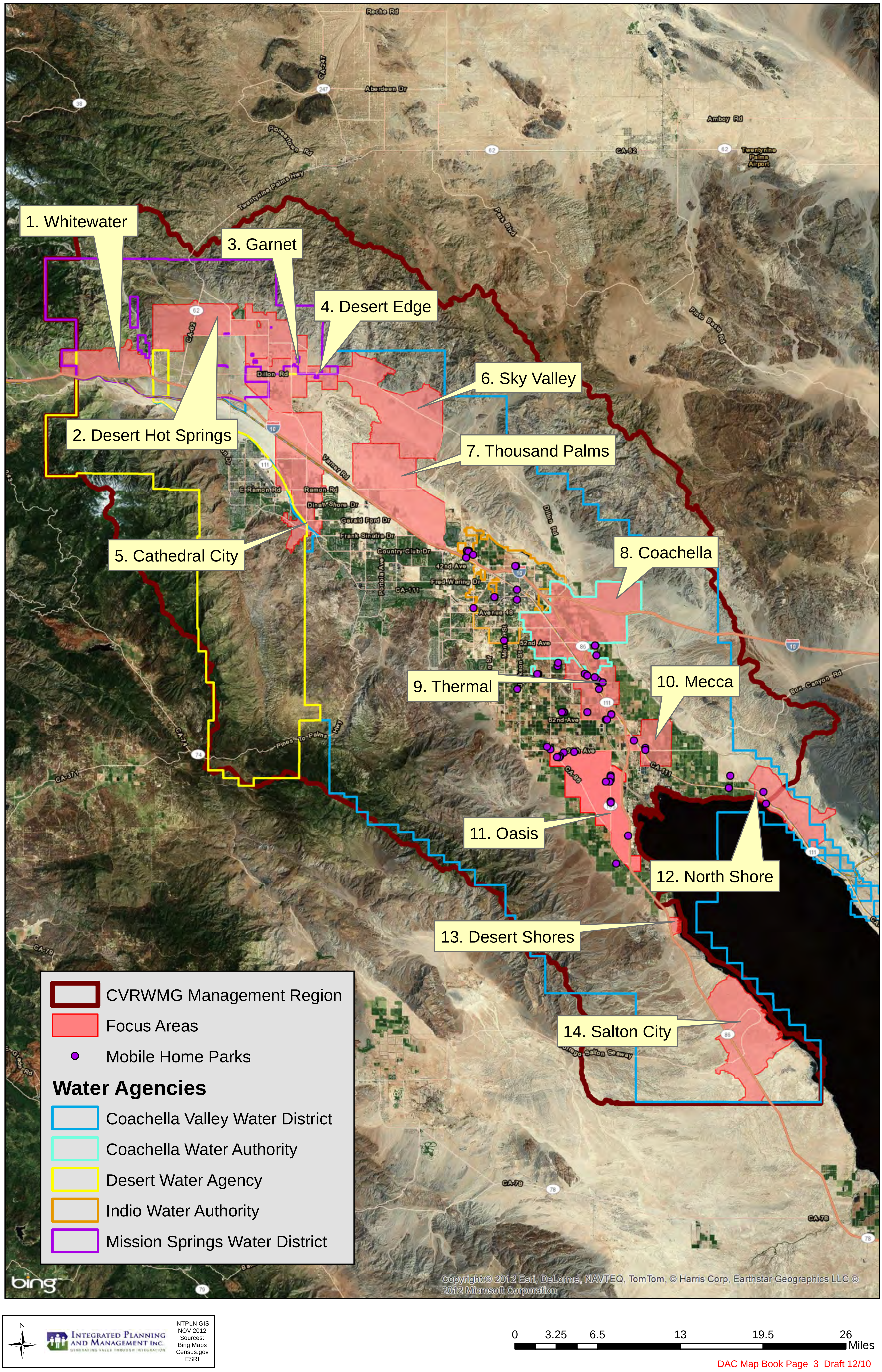
0 3.25 6.5 13 19.5 26
Miles

CVRWMG Focus Area Index



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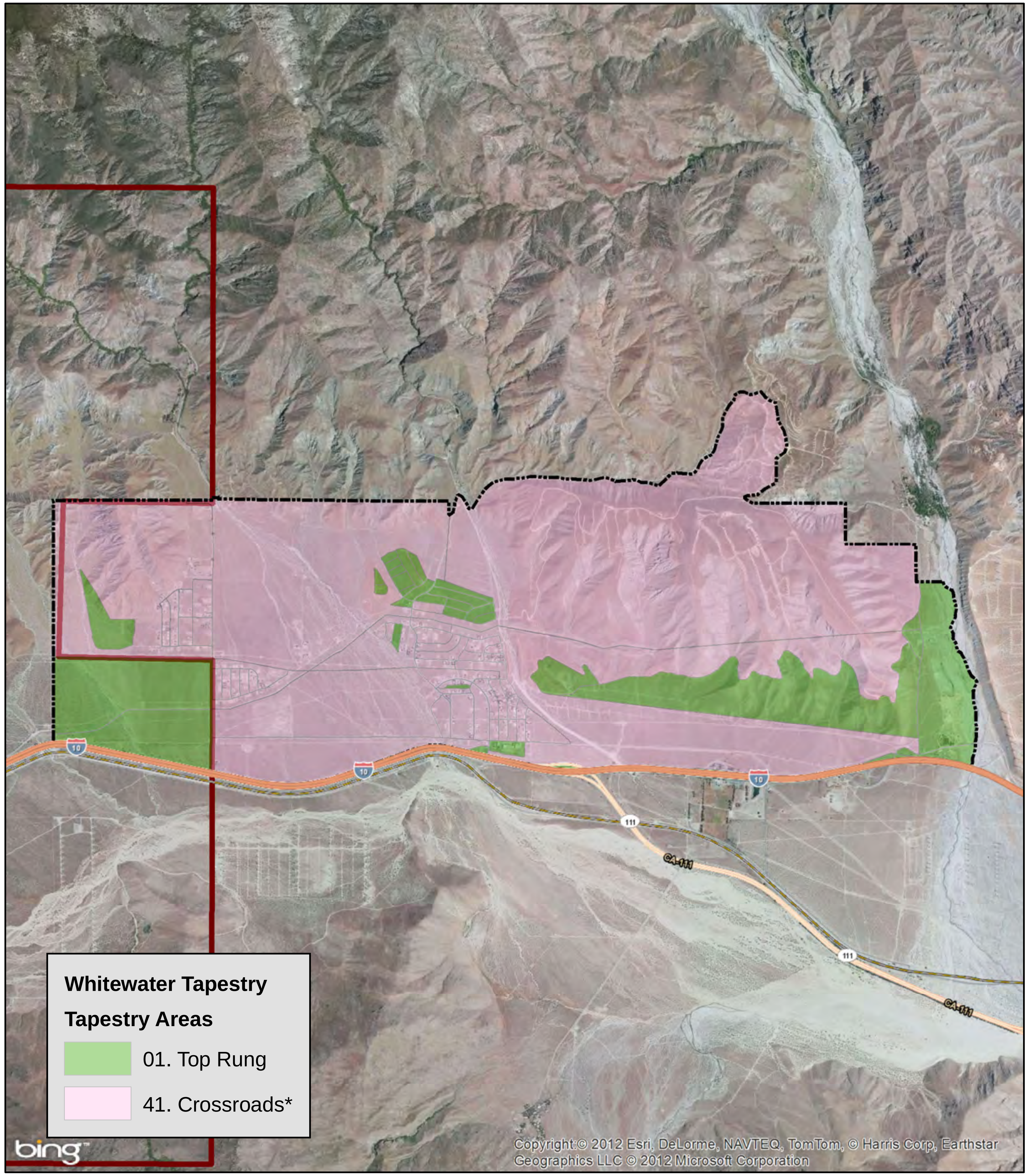
Sources:
Bing Maps
Census.gov
ESRI

1. White Water Focus Area



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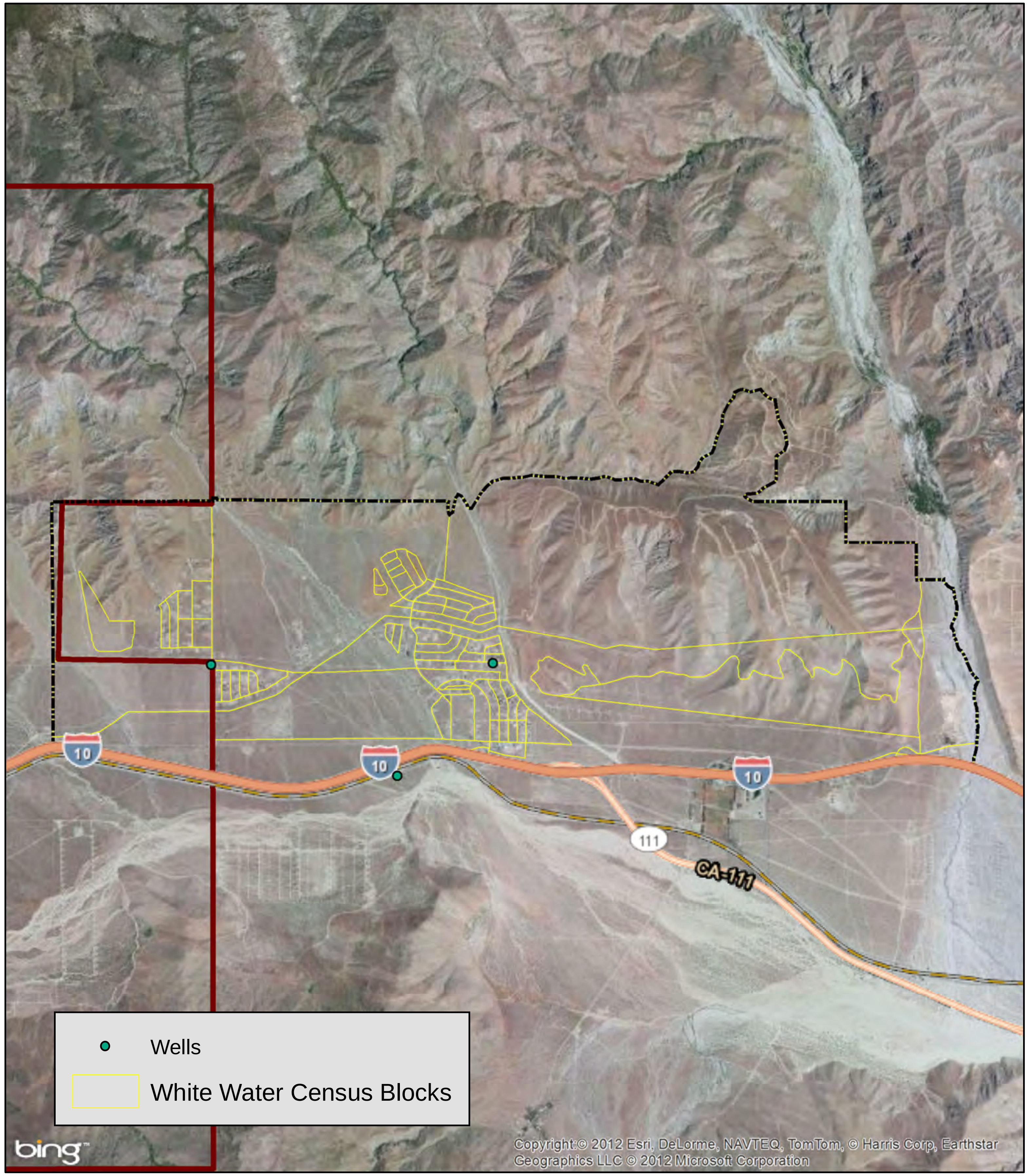

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* = DAC Characteristics

0 0.5 1 2 3 4 Miles

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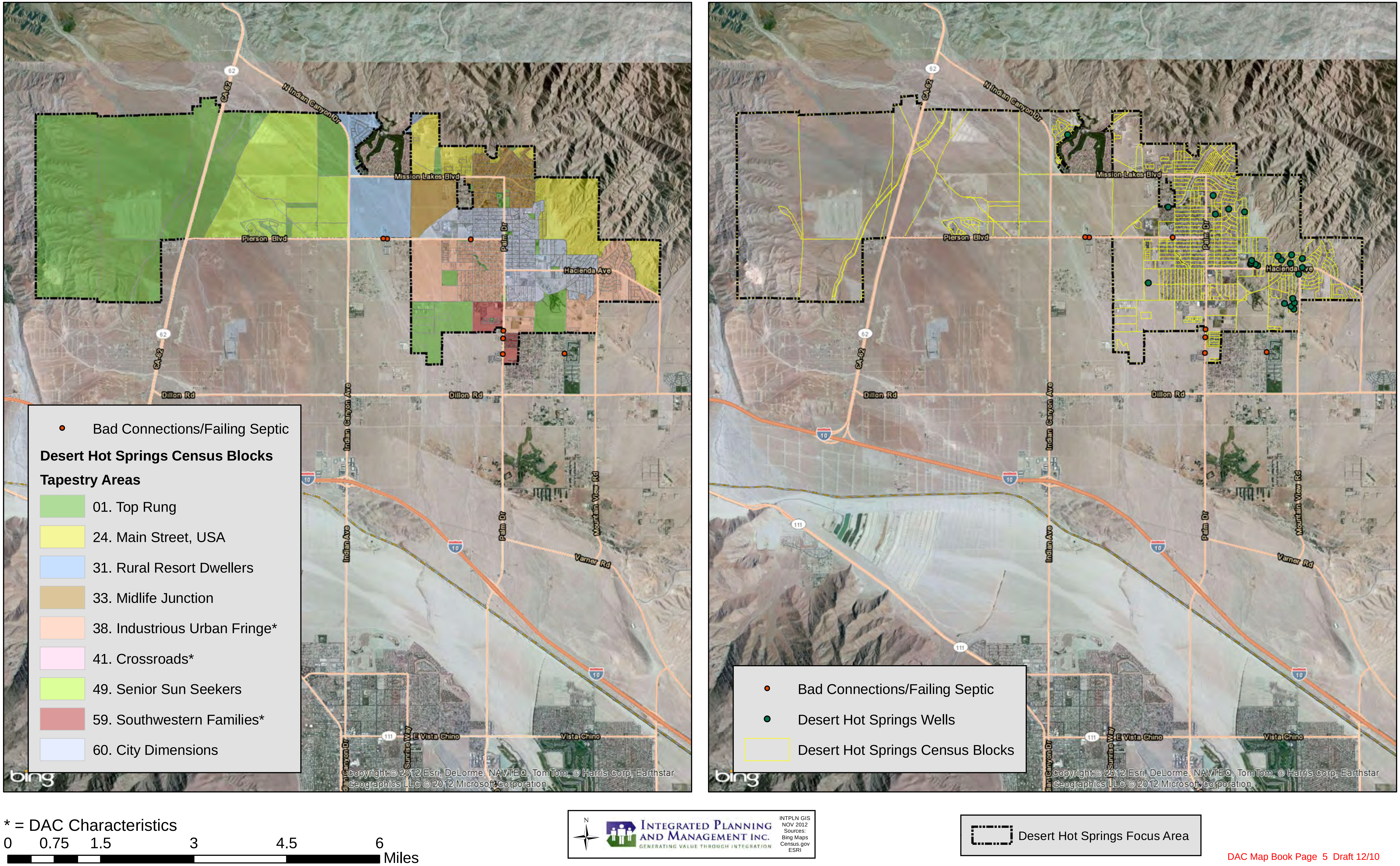
Sources:
Bing Maps
Census.gov
ESRI

🟥 CVRWMG Management Region
☐ White Water DAC

2. Desert Hot Springs Focus Area



* = DAC Characteristics

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INTPLN GIS
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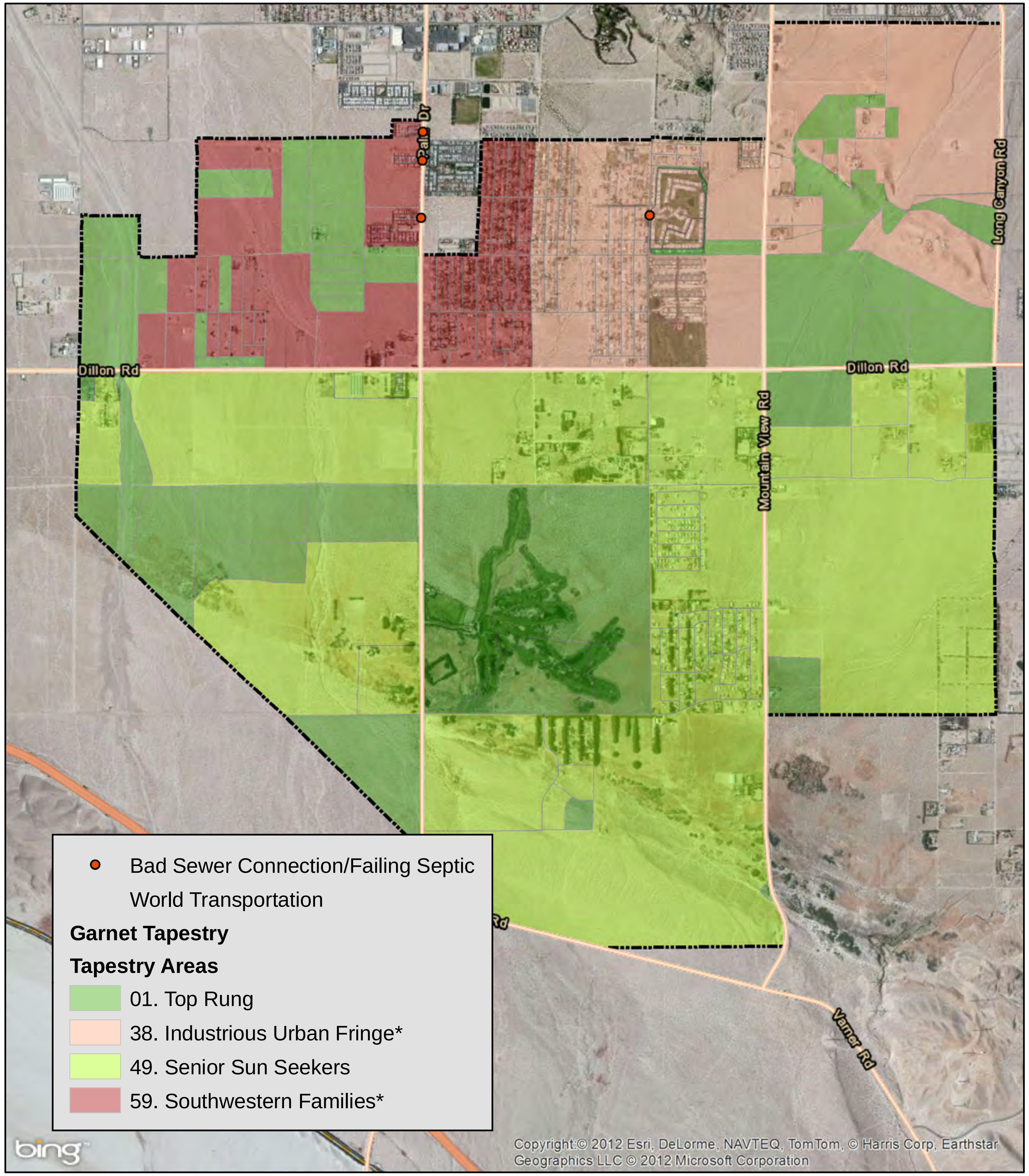
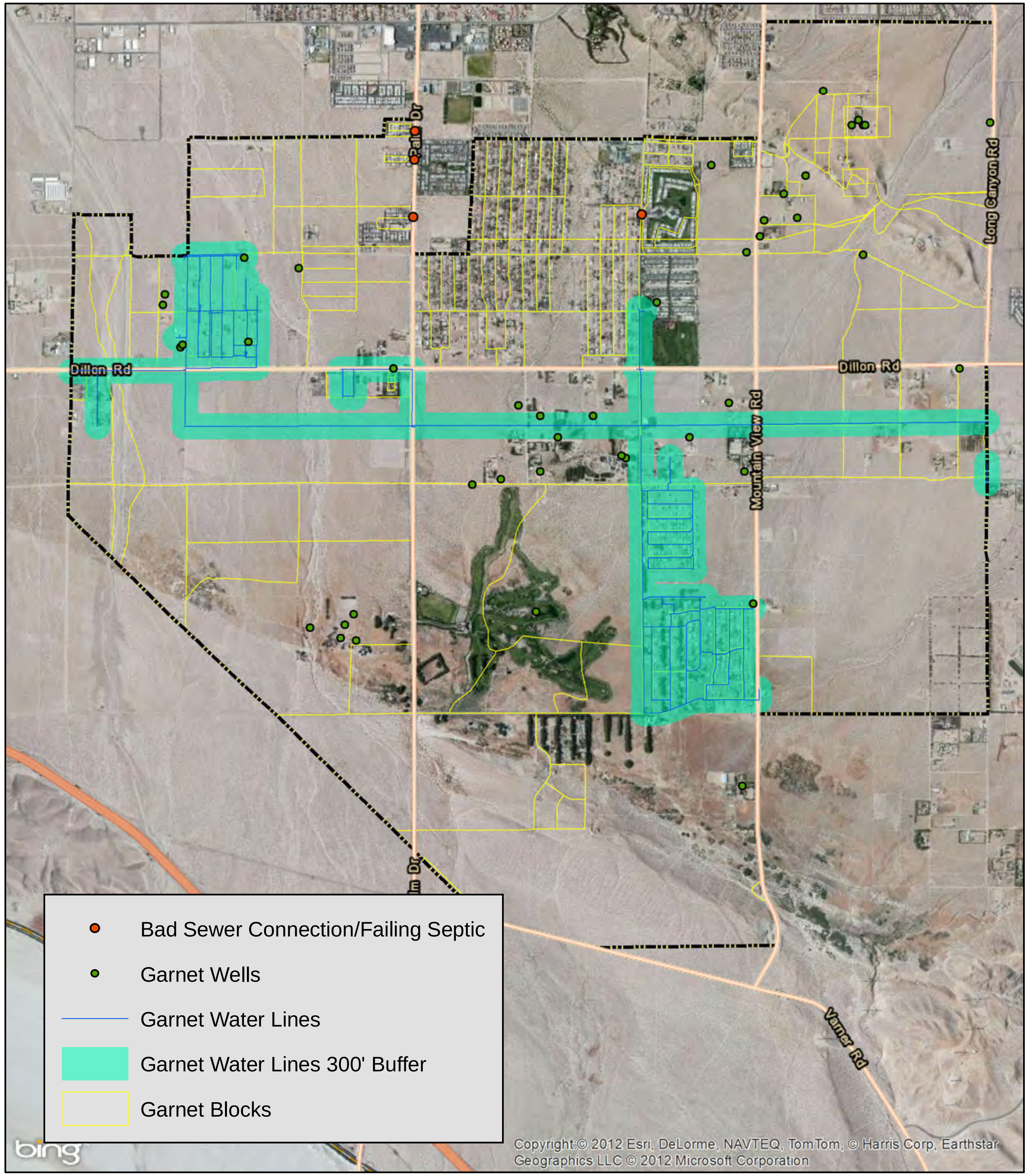
Sources:
Bing Maps
Census.gov
ESRI

3. Garnet Focus Area





* = DAC Characteristics

0 0.375 0.75 1.5 2.25 3 Miles

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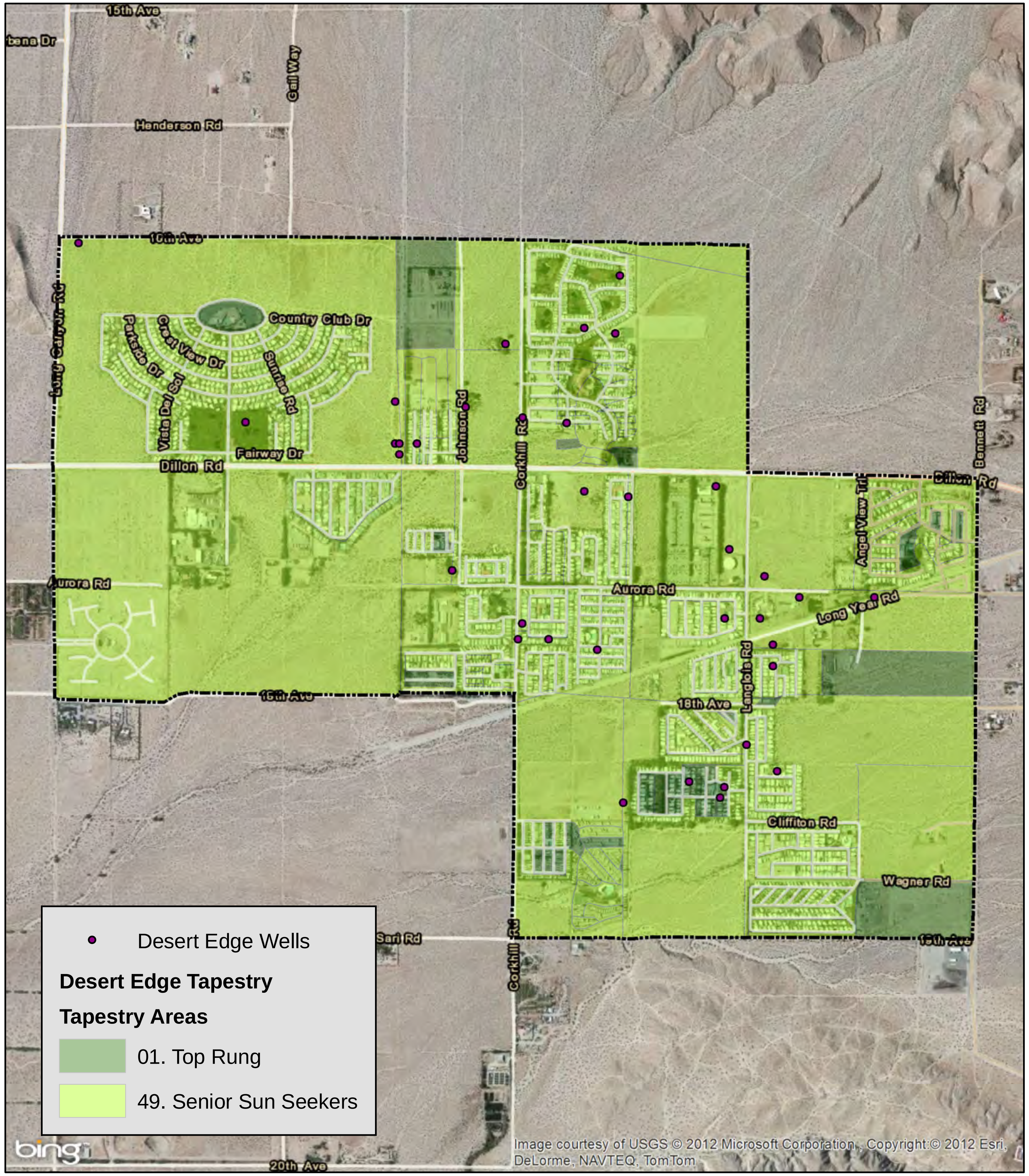
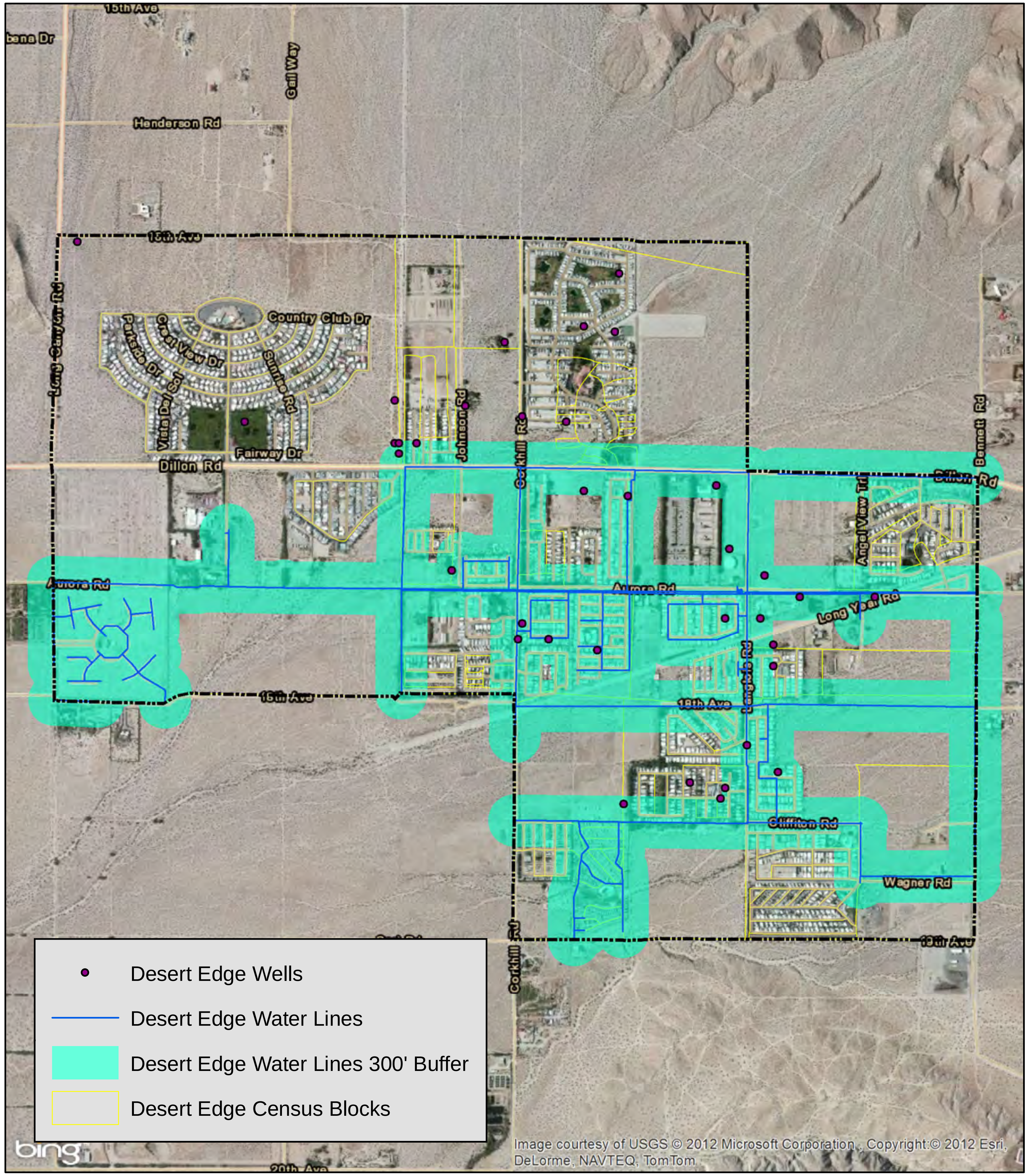
NOV 2012
Sources:
Bing Maps
Census.gov
ESRI

Garnet

4. Desert Edge Focus Area





0 0.125 0.25 0.5 0.75 1 Miles

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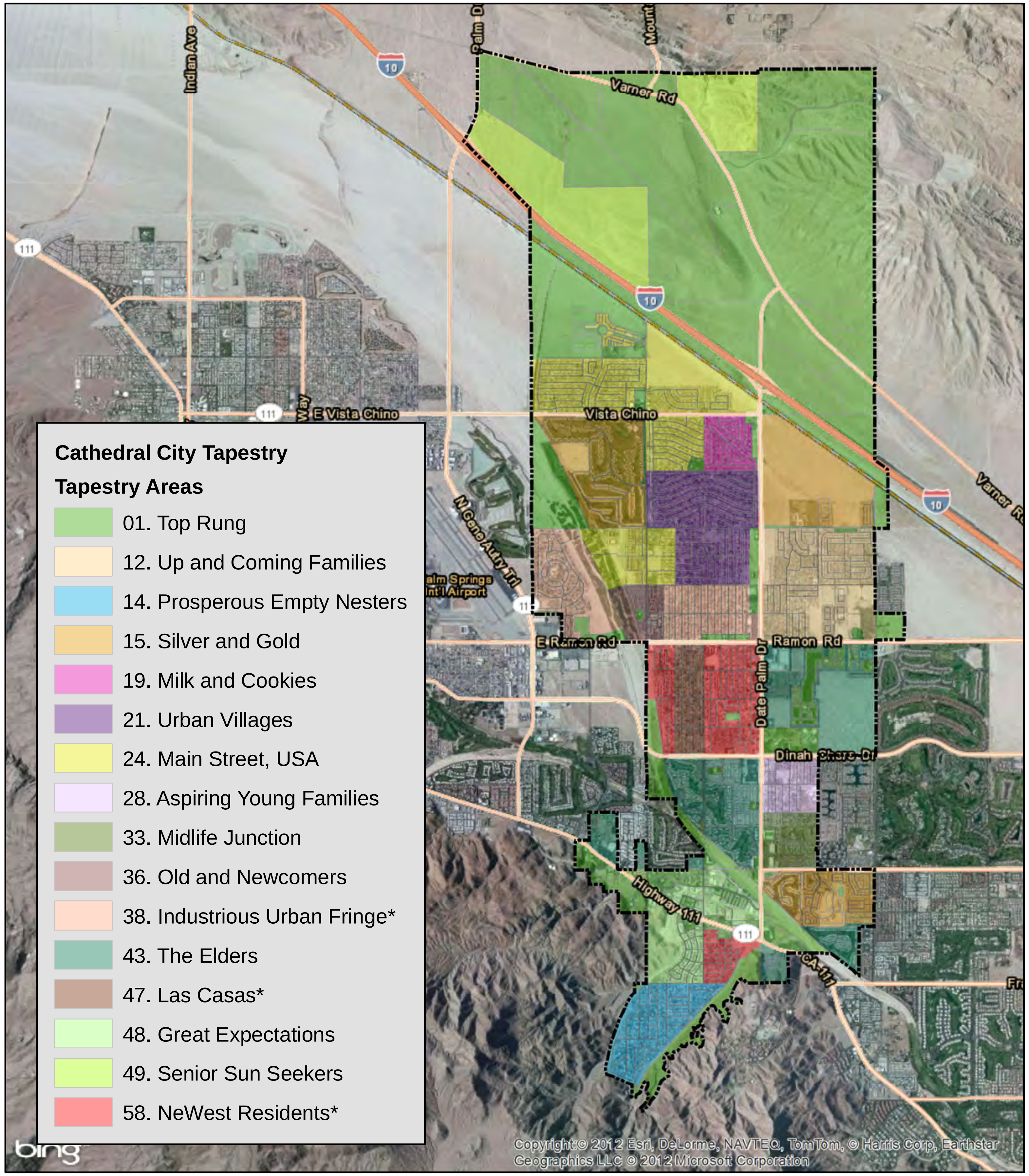
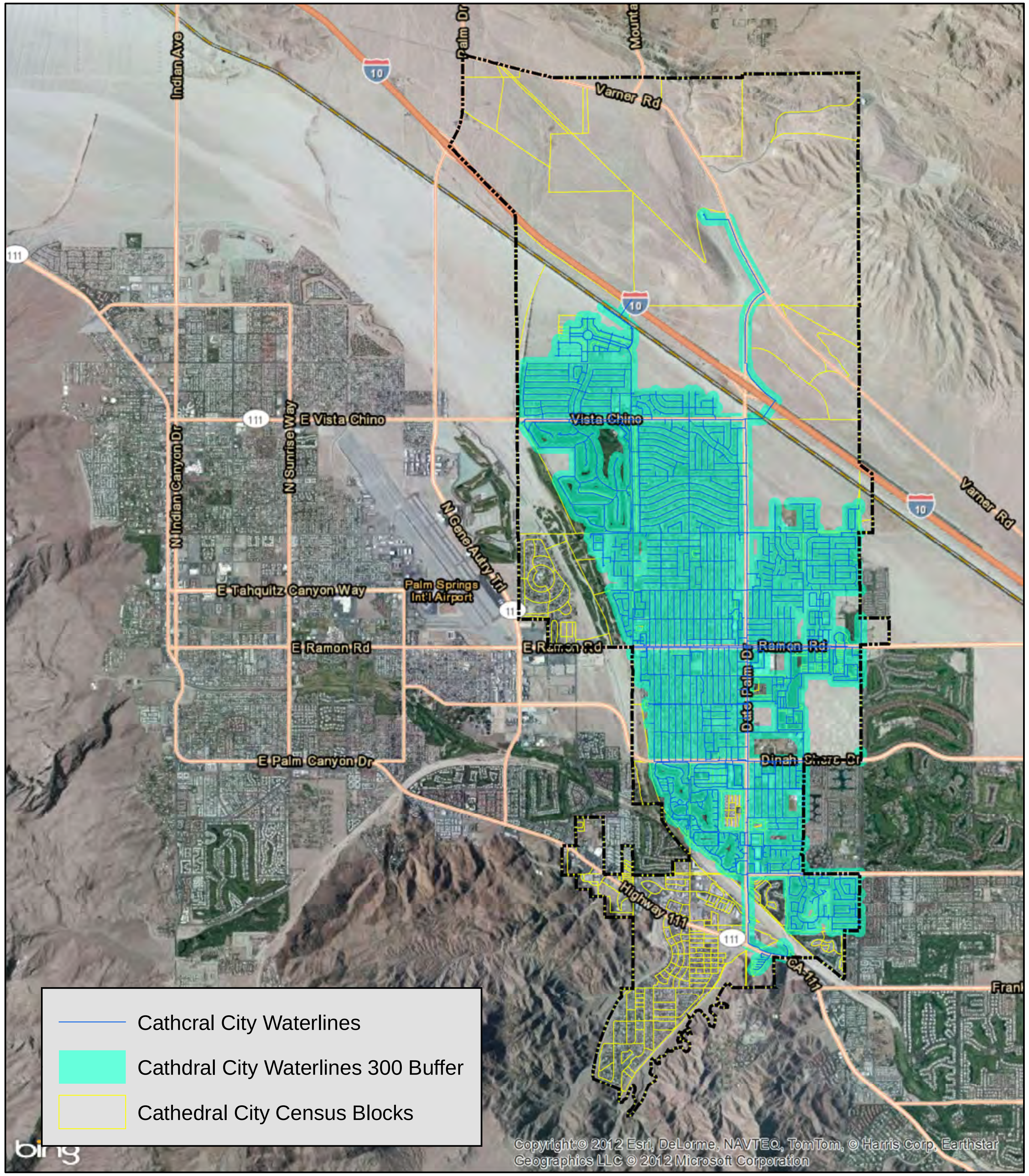
INTPLN GIS
NOV 2012
Sources:
Bing Maps
Census.gov
ESRI

⬚ Desert Edge CDP

5. Cathedral City Focus Area





* = DAC Characteristics

0 0.5 1 2 3 4 Miles

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INTPLN GIS
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Sources:
Bing Maps
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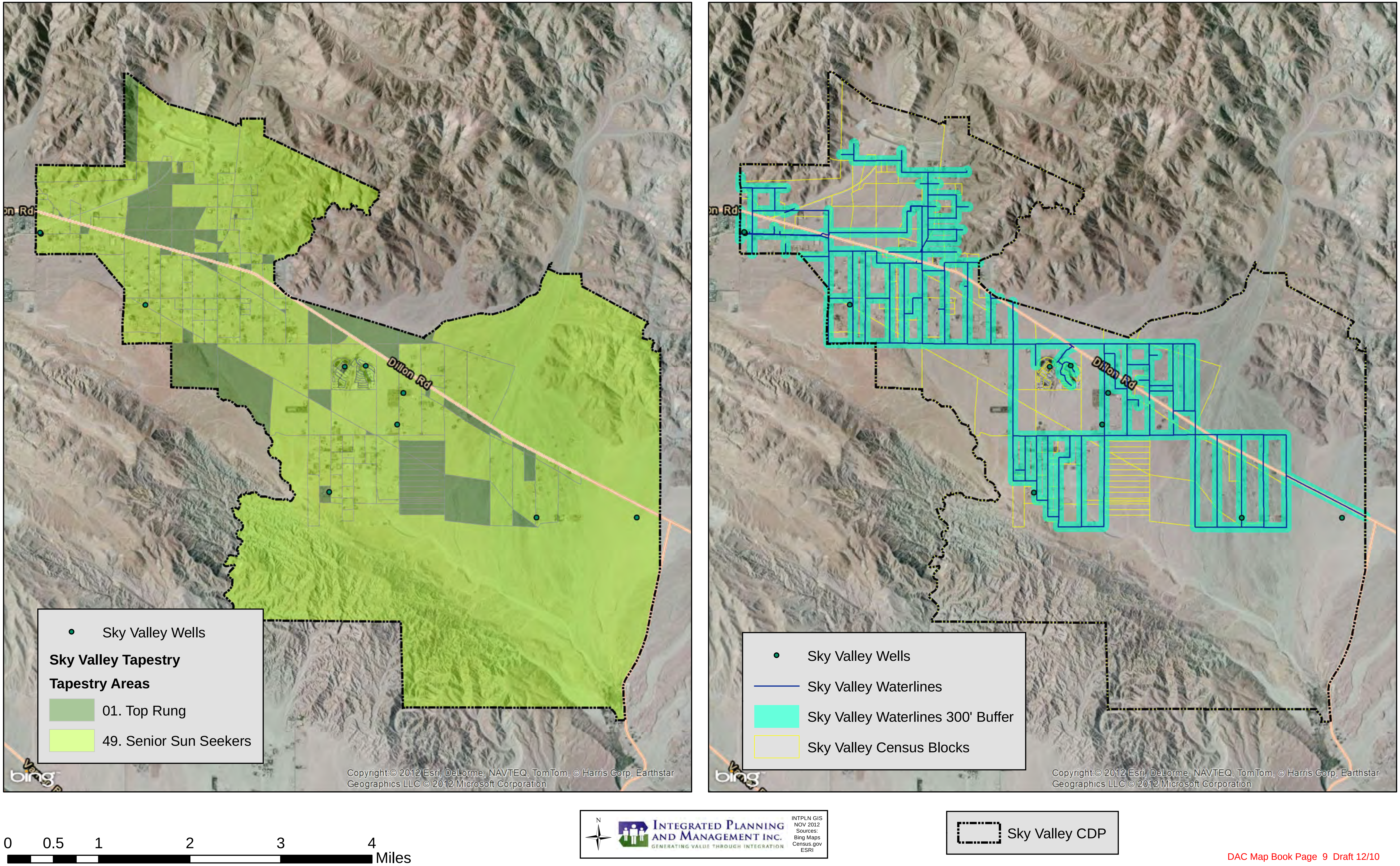
ESRI

— Cathedral City DAC

6. Sky Valley Focus Area



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Sources:
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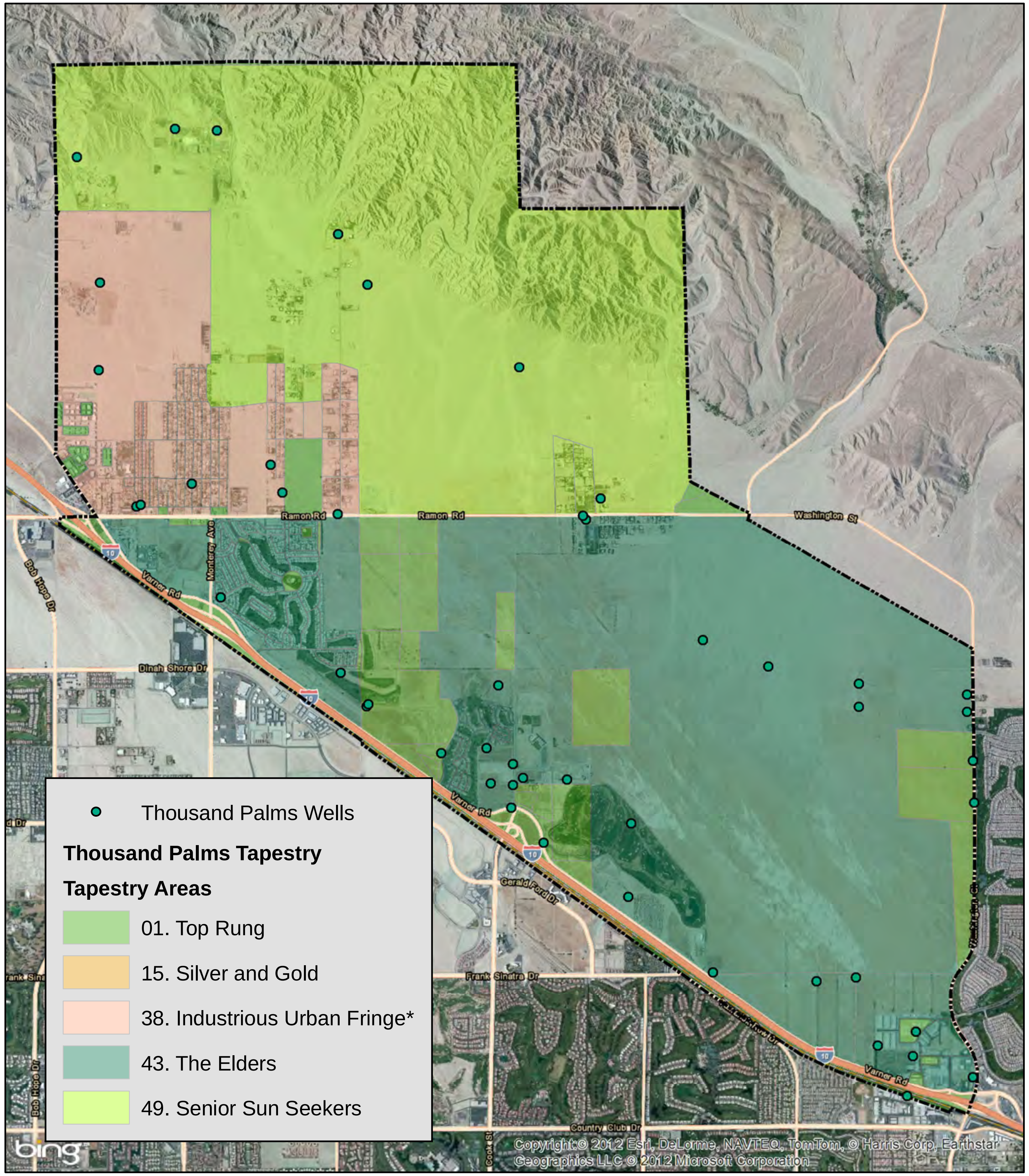
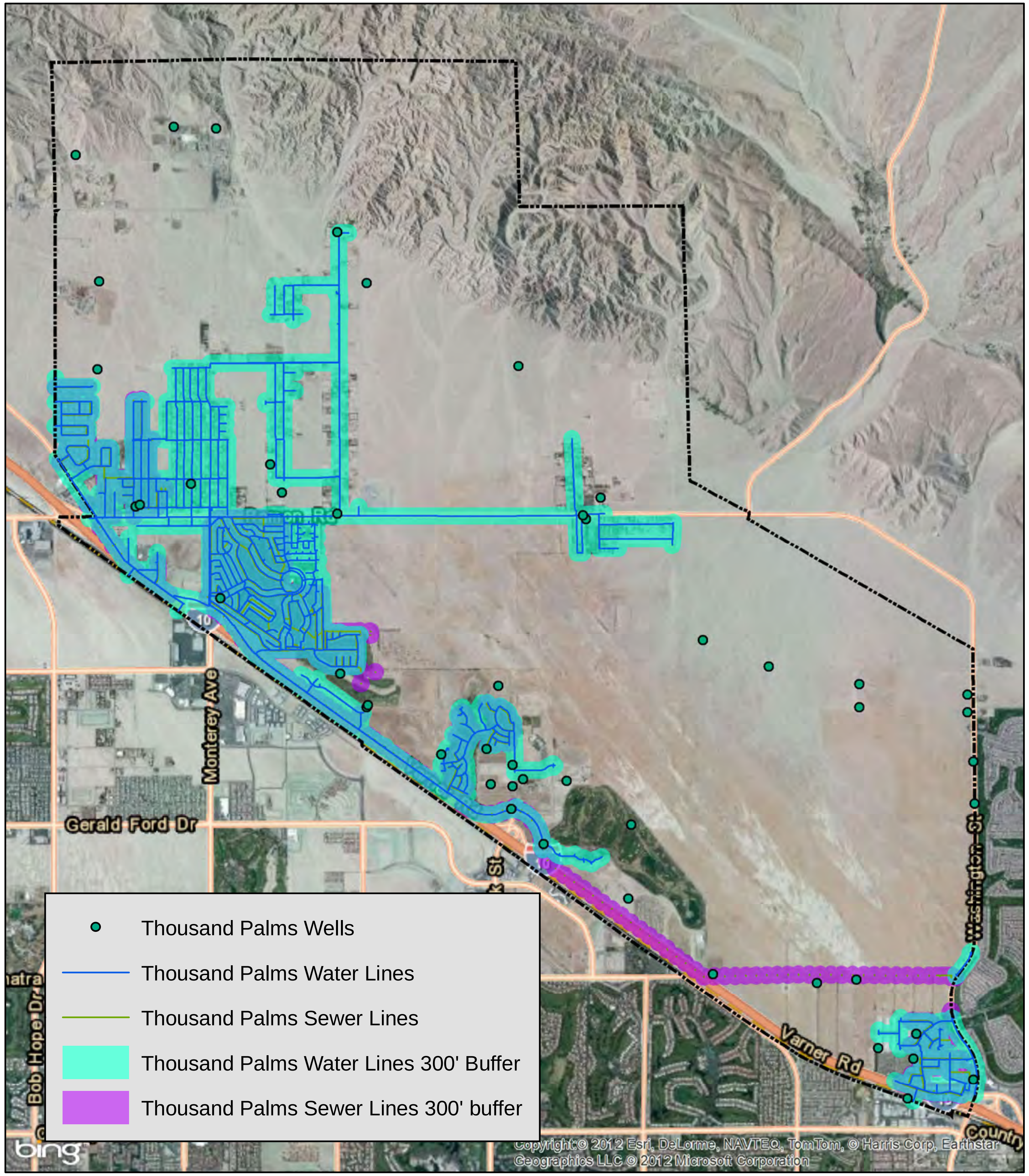
ESRI

7. Thousand Palms Focus Area





* = DAC Characteristics

0 0.5 1 2 3 4 Miles

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INTPLN GIS
NOV 2012
Sources:
Bing Maps
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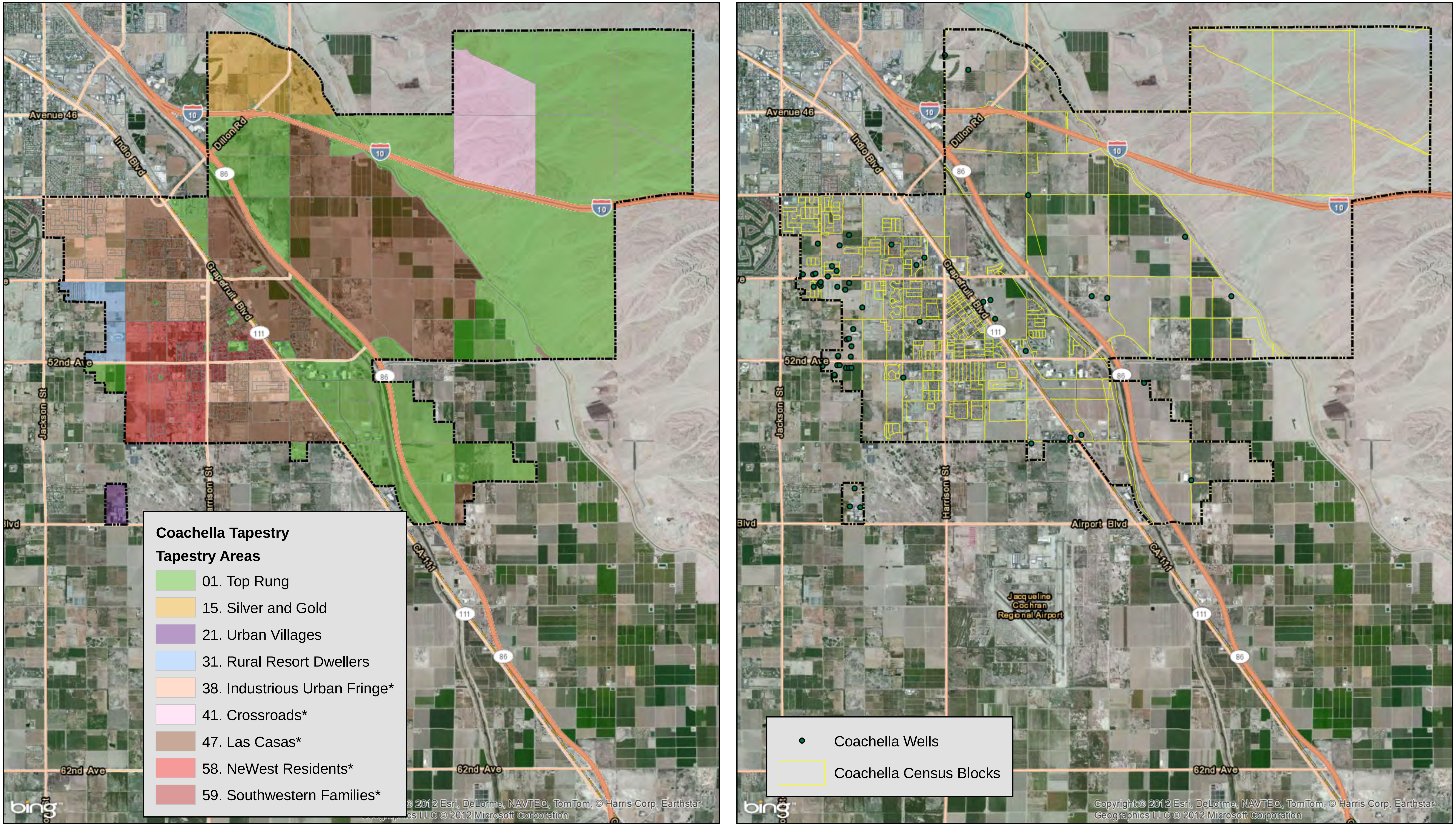
ESRI

Thousand Palms

8. Coachella Focus Area



* = DAC Characteristics

0 0.5 1 2 3 4 Miles

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INTPLN GIS
NOV 2012
Sources:
Bing Maps
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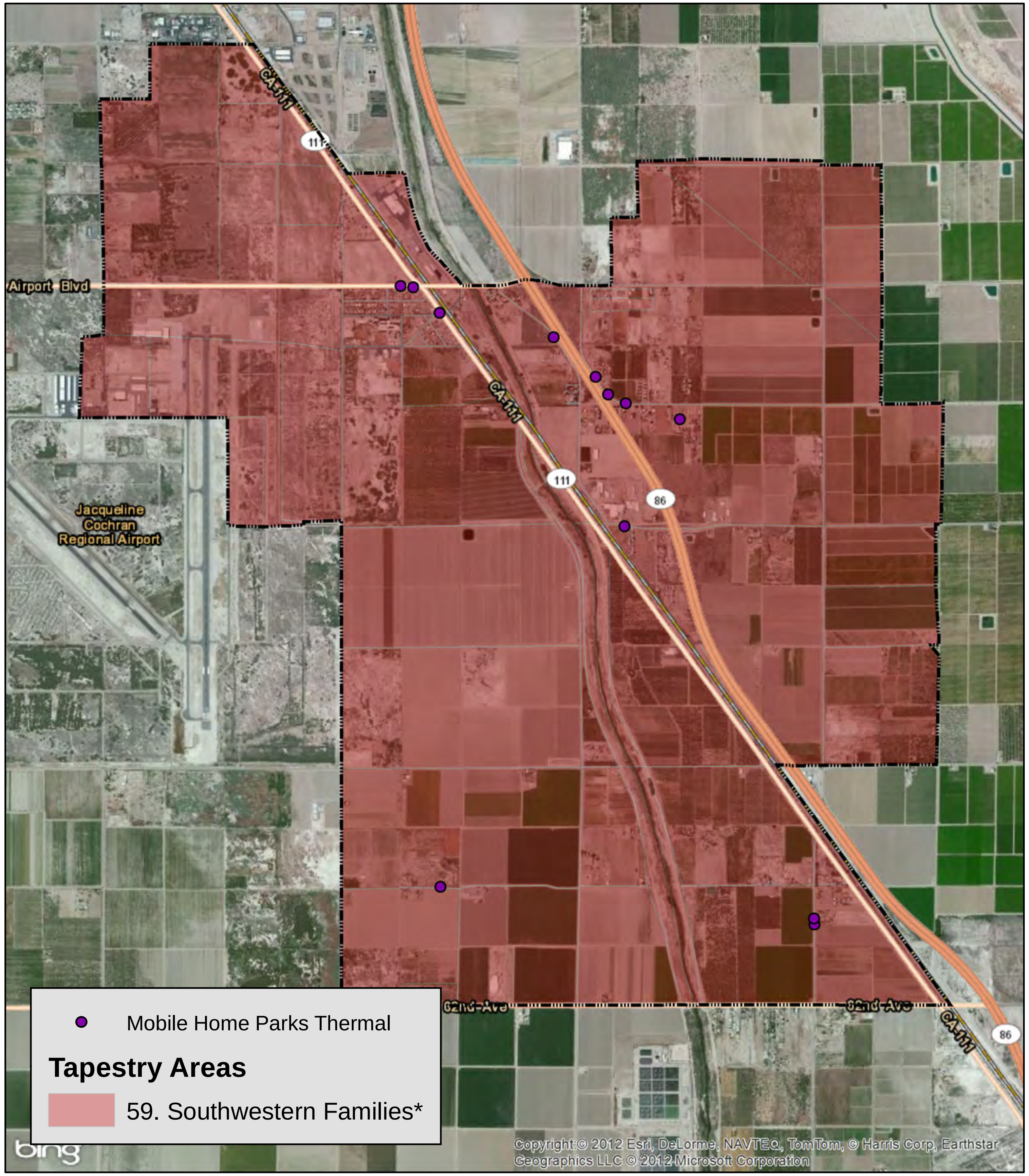
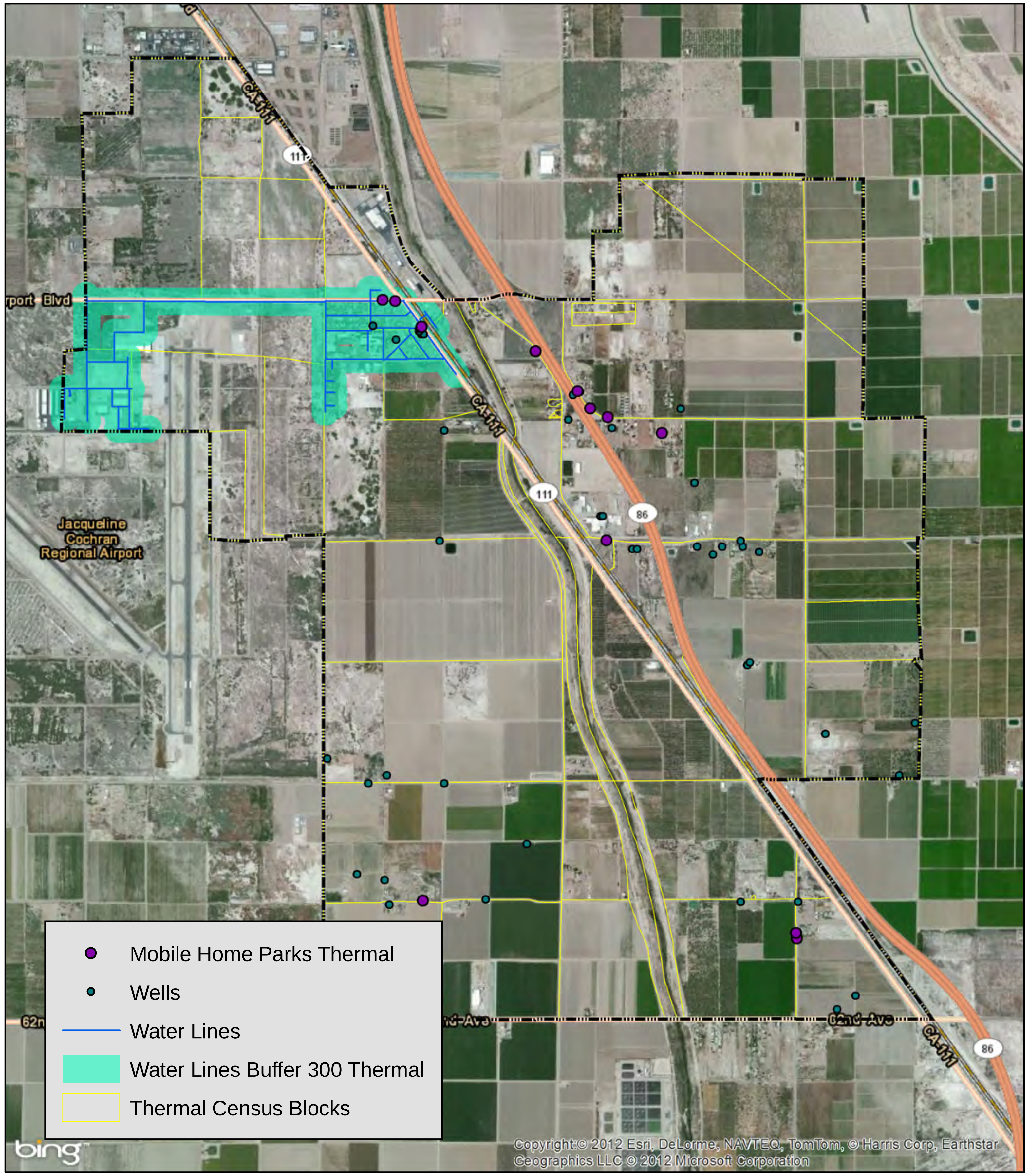
ESRI

Coachella DAC

9. Thermal Focus Area





* = DAC Characteristics

0 0.375 0.75 1.5 2.25 3 Miles

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INTPLN GIS
NOV 2012
Sources:
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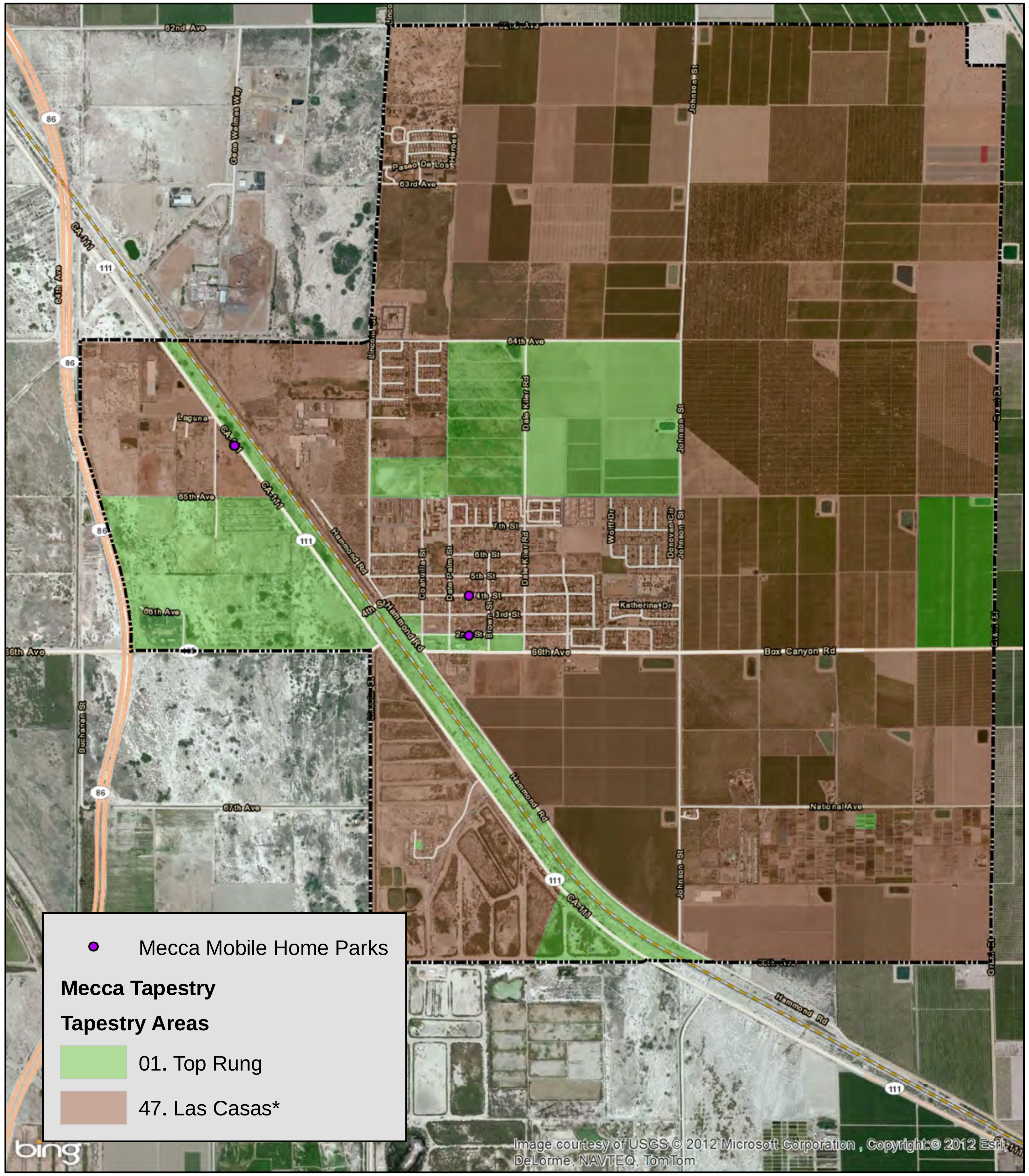
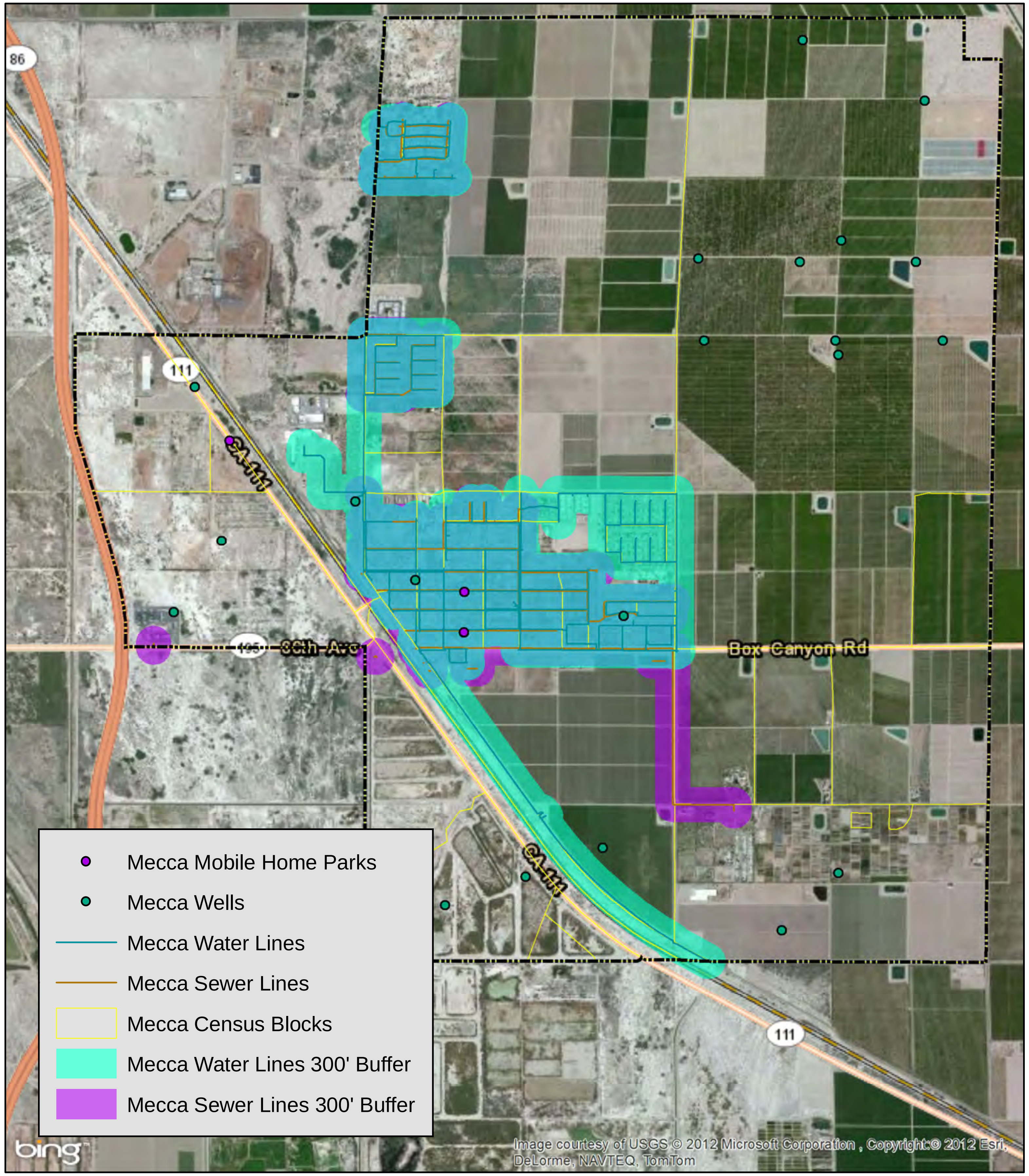
Census.gov
ESRI

Thermal Focus Area

10. Mecca Focus Area





* = DAC Characteristics

0 0.25 0.5 1 1.5 2 Miles

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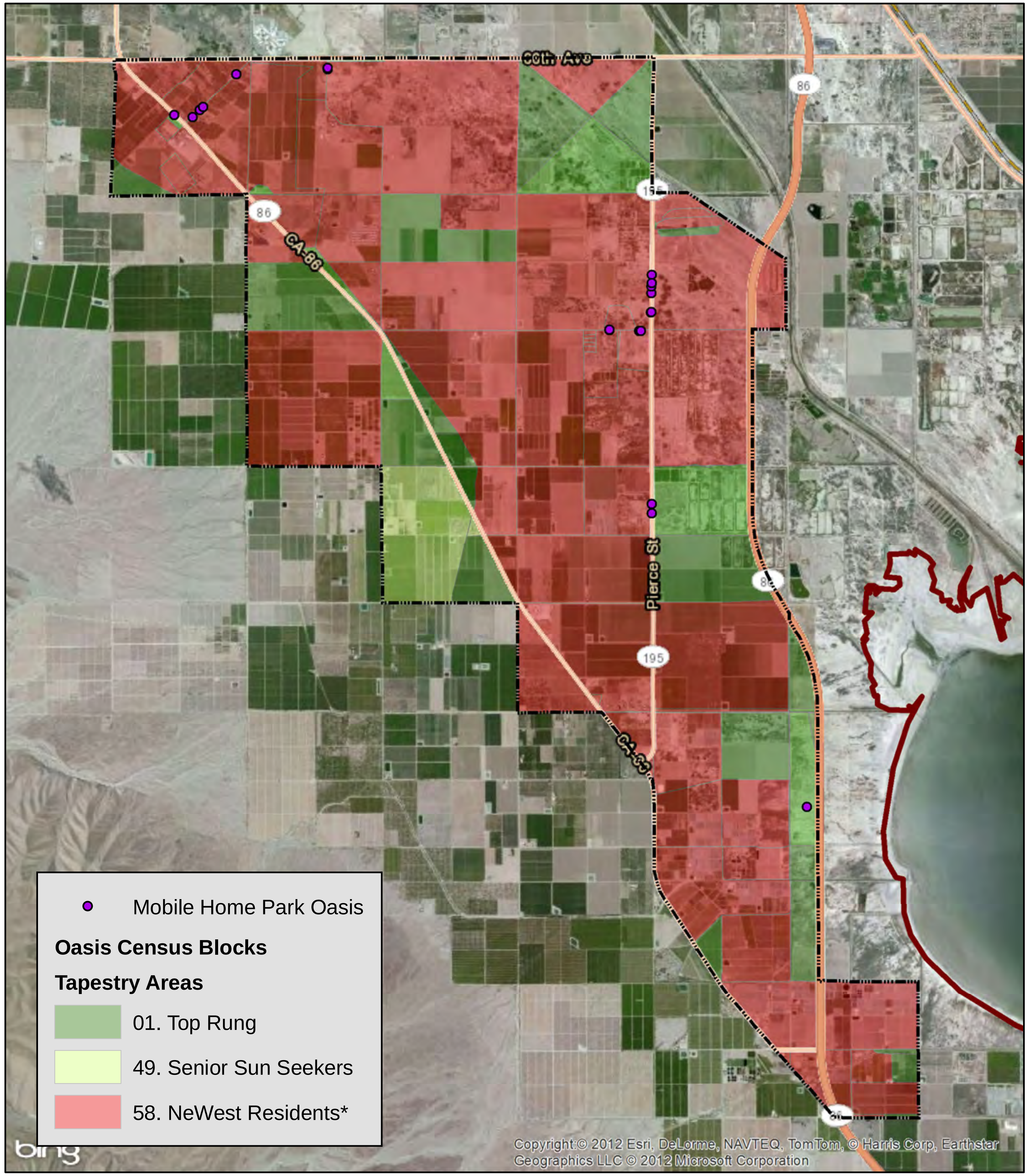
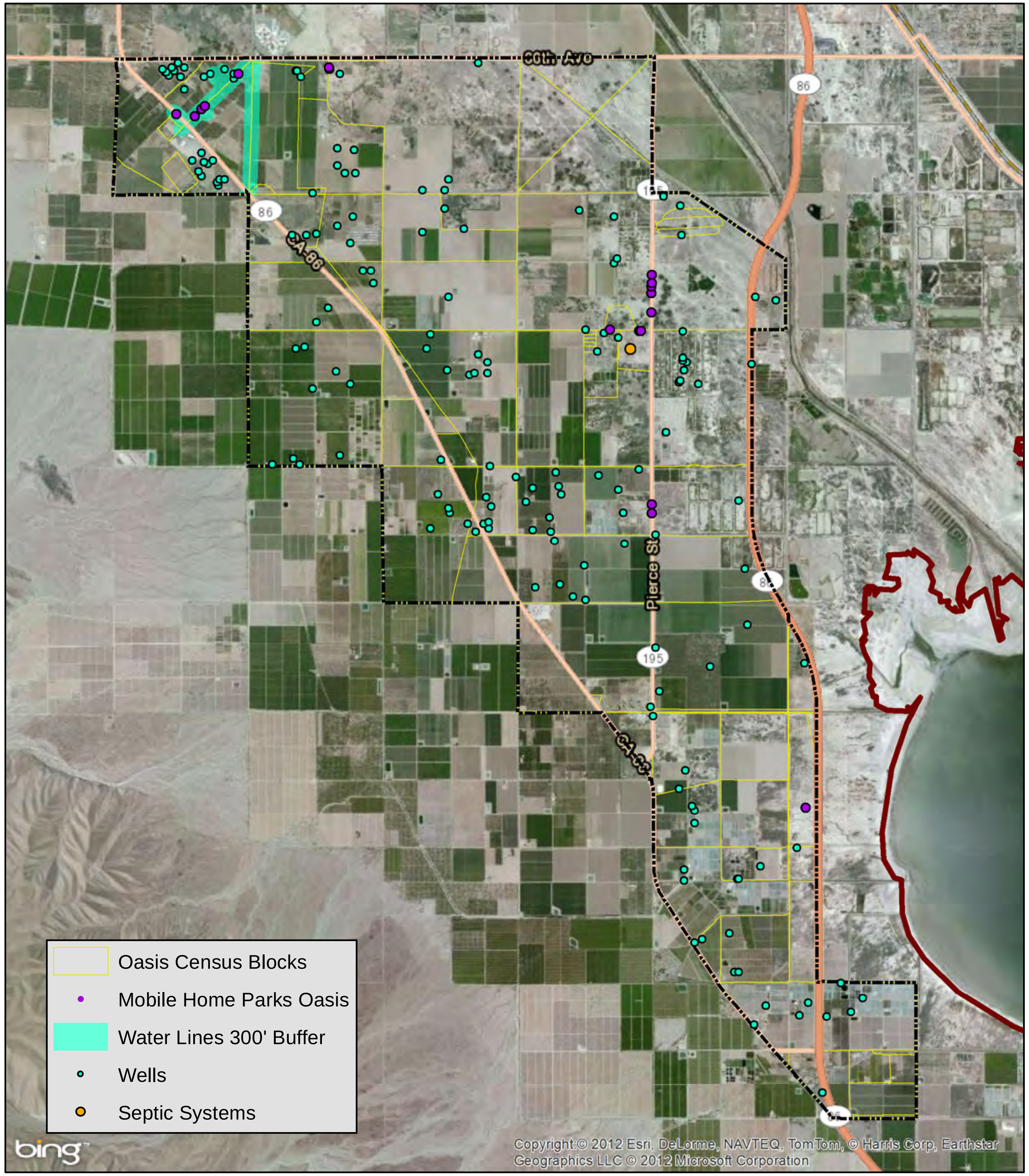
INTPLN GIS
NOV 2012
Sources:
Bing Maps
Census.gov
ESRI

Mecca

11. Oasis Focus Area





* = DAC Characteristics

0 0.5 1 2 3 4 Miles

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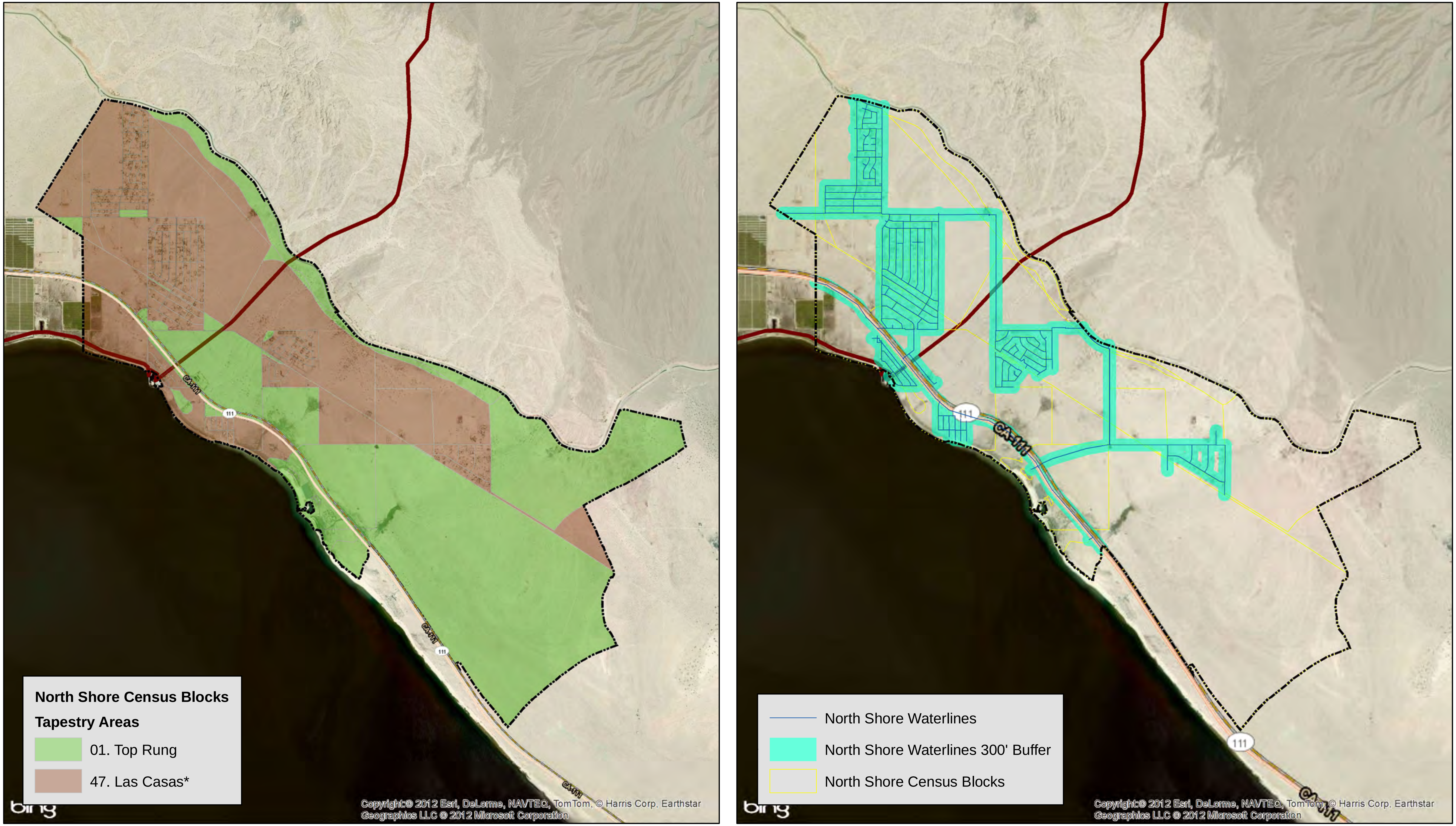
Sources:
Bing Maps
Census.gov
ESRI

🟥 CVRWMG Management Region
☐ Oasis Focus Area

12. North Shore Focus Area



* = DAC Characteristics

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Sources:
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Census.gov
ESRI

North Shore
CVRWMG Management Region

13. Desert Shores Focus Area

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* = DAC Characteristics

0 0.075 0.15 0.3 0.45 0.6
Miles

N

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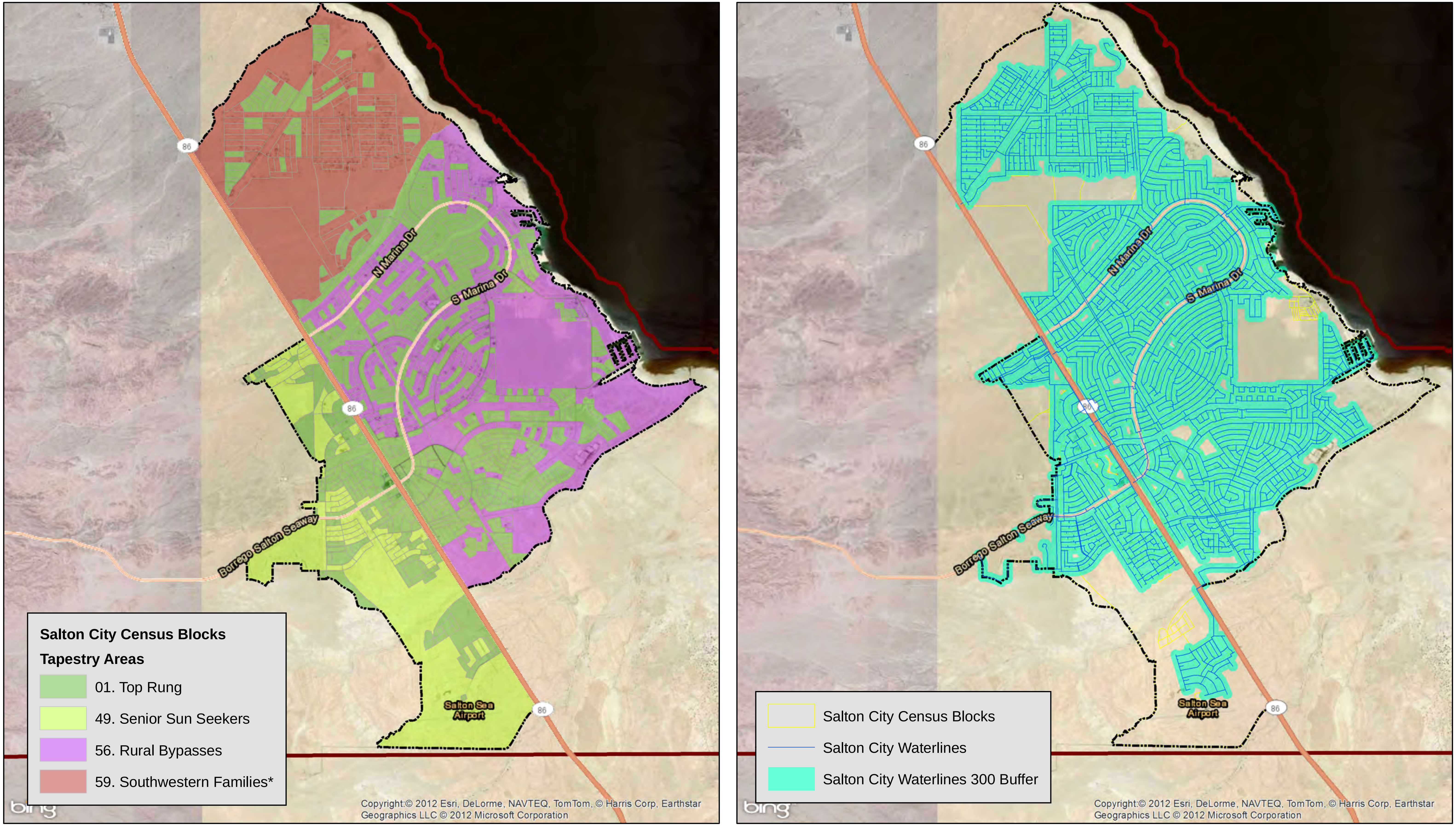
INTPLN GIS
NOV 2012
Sources:
Bing Maps
Census.gov
ESRI

▭ Desert Shores CDP
▭ CVRWMG Management Region

**No Water Line Buffer Due To Proximity

14. Salton City Focus Area



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* = DAC Characteristics

0 0.5 1 2 3 4 Miles

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INTPLN GIS
NOV 2012
Sources:
Bing Maps
Census.gov
ESRI

Salton City
CVRWMG Management Region

Appendix VII-B: Disadvantaged Communities Mapping and Characterization Project Report

This appendix contains the draft results of the Disadvantaged Communities Mapping and Characterization Project, which administered surveys to DACs in the Region to help characterize the nature and needs of the DACs.

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Coachella Valley Disadvantaged Community Outreach Program

Draft Report

Disadvantaged Communities (DAC) Mapping and Characterization Project

for the

Coachella Valley Integrated Regional Water Management Plan

Prepared by Ryan G. Sinclair
of the
Loma Linda University School of Public Health Department of Environmental Health

for

RMC Water and Environment

and

The Coachella Valley Regional Water Management Group

November 25, 2013

1 Introduction

This report summarizes the results from outreach and mapping activities conducted by Loma Linda University (LLU) on behalf the Coachella Valley Integrated Regional Water Management (IRWM) Disadvantaged Community (DAC) Outreach Program. LLU worked in concert with the Coachella Valley Regional Water Management Group (CVRWMG) to complete this project for the Coachella Valley Disadvantaged Community (DAC) Outreach Demonstration Program. The Coachella Valley Water District (CVWD), representing the CVRWMG, contracted with the Department of Water Resources (DWR) to develop a DAC Outreach Demonstration Program (DAC Outreach Program) for the Coachella Valley Integrated Regional Water Management Region (Region).

Through the DAC Outreach Program, LLU conducted DAC outreach, completed DAC mapping and community characterization, identified challenges that have historically prevented or discouraged DAC involvement in IRWM planning, and made recommendations about techniques to overcome challenges and promote participation in the IRWM process. The goal of the Coachella Valley DAC Outreach Program was to develop and implement methods to improve DAC participation in the Coachella Valley IRWM Program.

The objectives of outreach activities included identifying new DAC individuals or groups, coordinating workshops and meetings in the eastern and western portions of the Coachella Valley, and identifying successful outreach techniques and approaches. The objective of mapping and community characterization activities was to conduct outreach in known or previously unknown DAC areas that would pinpoint the location of DACs and identify those communities' water-related issues and problems. The objective of employing select outreach techniques was to identify the most effective techniques for characterizing those DACs and their water-related problems.

1.1 DAC Outreach

The outreach activities required documenting the groups and individuals with known interest in water-related planning efforts and DAC-related issues and engaging with those individuals to participate in the Coachella Valley IRWM Program. Given that the non-profit organizations (refer to Section 2 below) that took part in this process had extensive experience working with individuals and other organizations in the Coachella Valley, the IRWM project team asked non-profit partners to provide contact names of additional persons that had not been previously contacted as part of the Coachella Valley IRWM effort and would have potential interest in participating. Once a comprehensive list of potential DAC stakeholders was compiled, outreach was conducted to those individuals to ask for participation in a variety of outreach workshops that took place between 2012 and 2013. Two community-focused workshops were conducted with support from the non-profit team in June of 2013; those workshops were held sub-regionally (one in the East Valley and one in the West Valley).

An expanded technical memorandum (TM) is available to compliment this report; it is titled "Outreach to Disadvantaged Communities in the Coachella Valley: Findings, Challenges, and Achievements." The TM summarizes the technical challenges that have historically discouraged DAC participation in the Coachella Valley IRWM Program and includes details about the outreach methods that were implemented for the DAC Outreach Program. The TM discusses how the survey and outreach team overcame challenges through outreach and DAC stakeholder engagement. The TM also makes recommendations for other mechanisms that could be implemented to overcome challenges to DAC participation in the Coachella Valley IRWM Program. The second part of the technical memorandum details the outreach process undertaken for the DAC Outreach Program, including information about the people who were contacted, methods that were implemented for outreach, and information about the sub-regional DAC workshops that took place in June of 2013.

1.2 DAC Mapping and Characterization

The DAC mapping and characterization process included three principle work activities:

1. Identification of DAC locations
2. Identification and perceived characterization of drinking water, wastewater management, and flood risk issues within the identified DACs
3. Input of new data to update of the existing GIS database and DAC focus area maps

A survey questionnaire was the primary tool used to gather information in communities considered severely economically disadvantaged and economically disadvantaged (Appendix 1 contains the compiled list of questions administered during the survey). Workshops in disadvantaged communities allowed LLU to gather additional information to add to survey results. The three principle work activities resulted in new information that informed the development of four projects funded by the Coachella Valley IRWM process to address key issues in DACs. Work activities are summarized in Table 1 (Appendix 2 contains the Scope of Services).

1.3 Study Goal and Objectives

1.3.1 Study Goal

The study goal and description was provided to the LLU team in the Scope of Services. The goal and description of the project is described as follows:

> *"The goal of the Coachella Valley DAC Outreach Program is* ***to develop and implement methods to improve Disadvantaged Community (DAC) participation in the Coachella Valley IRWM Program****"… "DAC areas are defined by the State of California as having an income of 80% of the Statewide median household income (MHI) or $48,706 according to 2010 US Census statistics. The DAC Outreach Program is a DWR model program that will be used to shape DAC outreach efforts throughout California. As such, it is important that the DAC Outreach Program include substantial local input from entities and individuals that are most familiar and closely associated with the region's impacted disadvantaged communities. Therefore, part of the DAC Outreach Program includes contracting with local non-profit organizations in the Coachella Valley to provide support on specific tasks associated with outreach, mapping, and the larger regional IRWM effort."*

1.3.2 Study Objectives

Output objectives from the overall Study goal (see Section 1.3.1) are to further characterize DACs in the Coachella Valley. Specifically, these output objectives are to:

- Map "pocket" DACs. This is to show the location of communities that the CVRWMG team knew about and to officially map new pockets of DACs identified through the survey and research process. The term "pocket" is used, because these DACs are often located in small clusters and are generally not included in large-scale socioeconomic mapping efforts such as the United States Census survey due to their small and isolated nature.
- Characterize the DACs. This work objective includes defining the DACs, characterizing their demographics, flood management, water, and wastewater practices. Please note that because the nature of this research was based on interviews and a survey questionnaire, DAC characterizations are based on perceived issues and conditions rather than actual conditions; opinions collected through the survey were not validated through the survey process.
- Provide GIS data. LLU provided geocoded survey data so that the survey data could be overlaid on existing maps of the Coachella Valley water resources.

- Characterize existing data. This includes previous work on DACs provided by the larger Coachella Valley IRWM effort and the Tapestry Community data, previous DAC working meetings, and previous projects of the authors of this report.

1.3.3 Process objectives

Process objectives that were implemented to meet the overall goals and objectives described in previous sections are to:

- Complete a rapid field assessment. After a 5-month postponement period (due to grant funding delays from DWR), the team had a short 6-week period of time to complete on-the-ground research and DAC characterizations.
- Compile a "Main Report". The main report would include an overall summary of the DAC mapping and characterization process as well as outcomes from that process.
- Prepare additional memorandum. In addition to the main report, an additional memorandum was prepared to address two topics. The first topic included a documentation of outreach activities and a description of the challenges that have historically discouraged or prevented DAC involvement in the Coachella Valley IRWM process. The second topic included information about actions that were taken to overcome the identified challenges as well as other actions that could be taken to increase DAC involvement in the Coachella Valley IRWM process in the future.

Table 1: Work Activities

Work Activity	Description
Survey questionnaire and household observations	Field surveyors visited over 350 homes in the Coachella Valley with questions about their concerns and experiences with water resources, wastewater management, and flooding.
Geocoding and map development	Analysts geocoded the household data to the ESRI ARCMAP format.
DAC workshops and community mapping	DAC workshops were held in the eastern and western Coachella Valley to allow residents a forum to provide input for the IRWM process
Communications with residents	Other interviews and communications with local residents about the IRWM process or the issues addressed through previous efforts in the Coachella Valley.

2 Survey Questionnaire and Surveying Techniques

The survey questionnaire and DAC workshops were administered by three non-profit organizations. The non-profit team was selected by the CVRWMG in early 2013 as a result of a formal solicitation and interview process. The non-profit team was led by Loma Linda University. El Sol Neighborhood Educational Center (El Sol) and Pueblo Unido Community Development Corporation (Pueblo Unido) were the organizations responsible for administering surveys in the western Coachella Valley and eastern Coachella Valley. LLU students assisted in this task. The non-profits and the non-profit leaders are listed below:

1. The Loma Linda University School of Public Health Department of Environmental Health in Loma Linda, CA: Dr. Ryan G. Sinclair
2. The El Sol Neighborhood Educational Center - active in the western and eastern DACs in the Coachella Valley: Alexander Fajardo and Susie Del Toro.
3. The Pueblo Unido Community Development Corporation - active in DACs in the eastern Coachella Valley: Sergio Carranza and Rodolfo Piñon.

2.1 Survey Questionnaire

A survey questionnaire approach was used to gather household-reported information about water/wastewater knowledge, usage, and practices. The survey was administered in-person by representatives from El Sol, Pueblo Unido, and LLU students. The on-site and in-person format has many benefits over other types of surveys for this situation (i.e. phone, internet, or mailed survey forms). The following methods increased the statistical validity of the survey:

- Allow surveyors to ask questions and make observations about the physical structures on-site
- Ensure a higher response rate with unscheduled in-person visits to people who would not normally respond to surveys in any other way
- Allow the opportunity for return visits when a selected household was unable to participate on the first visit
- Allow a rigorous spatial sampling method to ensure quality control and an overall higher statistical significance
- Allow surveyors to visit randomly-selected households based on proximity alone. Many of the randomly-selected households are not otherwise registered or represented by formal demographic or population estimates such as those conducted by the United States Census Bureau
- The surveyors from local organizations (known as promoters or “promotores” in Spanish) have a unique regional knowledge of the area and sometimes have already established rapport with the neighborhoods or mobile home park community organizations. For this reason, conducting in-person surveys with such participants increases access to areas that other “outsider” surveyors may not be able to access
- Through the survey process, the promotores grow to have a new understanding of the water-related challenges and resources in their home community. They are now more likely to see the priority of water-related development and advocate for community-driven change
- The promotores can use their own expertise to contribute to the survey process and the DAC characterization. The initial meetings of this survey project allow a thorough review of the questionnaire and assessment methods. The survey review workshops allowed the questionnaire items to be made relevant to the local stakeholders who have a different perception from the survey authors
- The sampling process was setup with 232 required survey locations and about 100 additional survey sites that the local promotores had to select. They were allowed to go beyond the pre-selected households and survey locations that they prioritized. Many promotores have already worked in the community and know where the DACs are located

Other methods were used to supplement the survey questionnaire process. These were two community workshops, outreach methods, and a crowdsourcing method from a previously funded project. The crowdsourcing project trained area youth to use smart phone technology to report occurrences of wastewater failure. The crowdsourcing project was successful in reporting concerns but was limited to those community members who attended training sessions or otherwise knew about the free and accessible phone technology available for the project. The crowdsourcing project found an age-based restriction in that most residents who were over college-age reported that they would prefer to report occurrences of wastewater failure verbally rather than using a phone application. Because of this major restriction of crowdsourcing, the DAC characterization relied heavily on the data from the survey questionnaire.

2.2 Sampling Methods

The goal of the survey questionnaire was to assess water, wastewater, and flood conditions and issues from the perspective of the severely economically disadvantaged population in the Coachella Valley. To obtain this data a probability-proportionate-to-size (Trochim 2006) sampling methodology was used. This sampling methodology allowed the investigator to make reliable estimates of community characteristics without surveying each household in the target area. For this method to be effective, it is important to give each household an equal and positive chance of potentially being in the survey. A random household selection criterion was used based on DWR's definition of severely disadvantaged communities(DWR 2006). DWR defines a "severely disadvantaged community" as a community with "a median household income of less than 60 percent of the statewide average". For the time of this survey, the severely disadvantaged communities were any community reporting less than an annual income of $37,000. The Loma Linda University group obtained median household income data and parcel data from the Riverside County publically available map resources. A sample size number was input into a geographic-based mapping program (Hawths Toolbar of ESRI ARCGIS).

The sample size calculation was made using the EPINFO 6 STATCALC program from the US Centers for Disease Control (USCDC, Atlanta). The sample size calculation assumes a normal distribution, 80% power and a 95% confidence interval. This provided a survey questionnaire number of 132 based on the assumption that 10% of all households have a failing wastewater system. A count of 100 was added to this number to consider the non-response and refusals, resulting in a total preliminary target sample size of 232. The number of 232 was fed into the HAWTHS tools for random selection of households based on the Riverside County publically available housing information. An additional 109 households were selected by local non-profits and added to the overall survey number, which was 341 in total, to characterize the communities that local non-profit personnel believed are especially in need. These communities are shown on the DAC location maps in Appendix 4.

The sample site locations were selected using parcel and census block information. These parcels sometimes represent a single house and sometimes may include over 100 mobile homes. Multi-stage sampling was conducted in situations where a parcel represented more than one single residence. The first sample selection stage is the household random selection using the software above. The second stage is done manually via satellite images or pre-survey visits to count the number of living quarters or outbuildings located on one parcel. The third stage is to use a systematic random method within the parcel outbuildings based on the total amount of households estimated for the single random point. The LLU team controlled for multiple surveys at single mobile home park addresses by identifying clusters in SPSS v.20 (IBM, USA).

Sample size: The original sample size of 132 was the minimum required number for a simple cross-sectional analysis. The actual sample size of 341 allowed for stratification of variables and provided an improved statistical accuracy. Refusals or absences were documented as blank survey forms. All surveyors were instructed to go to specific home addresses and were given print-outs of satellite images with labels on the houses to survey. If the respondent was not home, the surveyor was to revisit the house three times and move on to the next assigned survey house after three visits. The surveyor was never allowed to "substitute" a home with a nearby resident who may have been available for a survey.

2.3 Mapping Methods

Integrated Planning and Management, Inc. (Redlands, CA) generated the initial focus area maps of the Coachella Valley as part of the overall Coachella Valley IRWM Program effort related to DAC mapping and characterization. These focus area maps defined the DACs in the Coachella Valley and provided a brief community description using the ESRI Community Analyst Tapestry Segmentation (Redlands, CA).

These tapestries and the income information were used as part of the multi-stage sampling process described in the sampling methods above.

Maps were generated for this project using the ARCGIS program with ESRI-supplied base maps and municipal border information from Riverside County. All survey questionnaires were geographically-referenced and linked to the map for a spatial view of the survey questionnaire. Surveyors were equipped with tablet computers to validate the pre-selected spatial data of the participant households. This allowed the survey questionnaire data and results to be plotted spatially. The maps in Appendix 3 show the selected questions from the opinion survey by individual and/or clusters of household locations.

2.3.1 Additional DAC Clusters

The field surveyors identified additional disadvantaged community clusters during the survey process; those additional disadvantaged community clusters are included in the maps located in Appendix 4. The Appendix 3 Map 1 shows the mobile home park (MHP) areas as red circles. The green circles are mobile home parks that were validated during a previous project's work in 2012 (Ibrahim, Diana et al. 2013).

2.4 Survey Results

As stated previously, the "results" of the survey include responses obtained by those residents who received administered surveys. None of the information presented below indicates actual demographic, water, wastewater, flood, or other conditions. The data obtained through the survey questionnaire process is self-reported. The survey respondents reported their opinions; none of the failure reports have been physically confirmed by the study team.

2.4.1 Demographics: Survey Administration

There were 341 survey questionnaires and observational checklists administered to 273 households in 25 mobile home park clusters and 68 "stick built" households of the Coachella Valley. Of these, refusals or absences were documented as blank survey forms in 21 households. Only one mobile home household respondent of Oasis Mobile Home Park was a documented refusal. The remaining absences or refusals occurred in single family home neighborhoods in Indio and Salton City or were documented as refusals due to surveyor access problems in the mobile home parks of Desert Edge (Table 2a and Table 2b). Overall, the mobile home park household survey visit benefited from a high response rate (93%) where surveyors were able to access 320 out of the 341 randomly selected households. LLU kept the 11 survey variables where observations were taken but no response was recorded for the survey questionnaire. There were also several occasions where respondents refused to provide an answer. For this reason, it is important to keep in mind the total number of surveys or the "N" varies for each question and is reported separately in each table of this report that contains statistics pertaining to the survey.

Table 2a. Opinion Survey: Number of Surveys Conducted and Total Sample Size

Parameter	Number
Total Number of households Selected	341
No response or refusal	-21
Missing answers in each question	variable
"N" Total Sample Size (Maximum)	320

Table 2b. Opinion Survey: Selected Sites That Could Not Be Accessed by Surveyors in the Summer 2013 Coachella Valley IRWM DAC Characterization Survey

Site	Number of Surveys	City	Reason
Desert Crest Country Club	3	Desert Edge	Security guards did not allow surveyors to continue
Desert Springs Spa and RV park	2	Desert Edge	Locked gate
Miracle Acres	1	Desert Edge	Locked gate
Almar Acres	1	Desert Edge	Locked gate and manager did not allow after survey supervisor requested access
Sparkling waters	1	Desert Edge	Security guards did not allow surveyors to continue
Joshua Springs	1	Desert Edge	Locked gate and manager did not allow after survey supervisor requested access
Single Family Homes	6	Thermal (Salton City)	Refusal by respondent
Single Family Homes	6	Indio	Refusal by respondent
Total	**21 households refused or absent**		

2.4.2 Demographics: Household information

Most respondents were considered severely disadvantaged based on their self-reported annual income (DWR 2006) and reported an annual income of less than $37,000 (see Table 3). Many of these disadvantaged households reported to own or have mortgaged their current home (n=142, 44%). In addition, there were 57 respondents (18%) who reported that they own their home but pay for mobile home space rental fees. The average amount of rent paid by those who rent their home was reported as $534 per month.

Table 4 shows that the amount respondents reported to pay for mortgage or rent was significantly different across three housing types (mobile homes, single family homes, or apartments), but was not significantly different geographically (East Valley vs. West Valley). The amount paid for mortgage or rent was significantly higher in single family homes ($836 per month) than in mobile homes ($484 per month) across the entire Coachella Valley. Figure 1 shows a bar chart of the comparative income data between different housing types as well as between different geographic areas of the Coachella Valley.

Table 3. Opinion Survey: Household Information about Home Ownership and Identification of DAC Status

Item	n	%	N
Identified as severely disadvantaged with less than $37,000 per year as income	267	97. 8%	273
Reported to own or mortgage their current home	142	44%	320
Reported to own their home, but pay a space rental fee	57	17.8%	320

Table 4. Opinion Survey: Survey Household Information

(Presented with the mean (μ), standard deviation (sd), minimum (min), maximum (max) and total surveys collected (N))

Item	μ	sd	Min	Max	N
Amount paid per month for mortgage or rent	$534	$225	$0	$1,351	254
Amount paid per month in Eastern MHPs	$528**	$248	$0	$1,351	116
Amount paid per month in Western MHPs	$539**	$203	$0	$1,350	138
Amount paid per month for all Mobile Homes	$484*	$142	$3	$900	217
Amount paid per month for all Single Family Homes	$836*	$348	$0	$1,350	29
Amount paid per month for all Apartments	$799*	$435	$0	$1,351	8

Group of 2 (western vs. eastern) **is not significantly different (independent t-test F=2.378, p=0.124)
*Group of 3 house types **is significantly** different (ANOVA F=51.532, p=0.00)

Figure 1. Opinion Survey: Histogram Chart with Error Bars of Amount Paid per Month in Mortgage or Rent

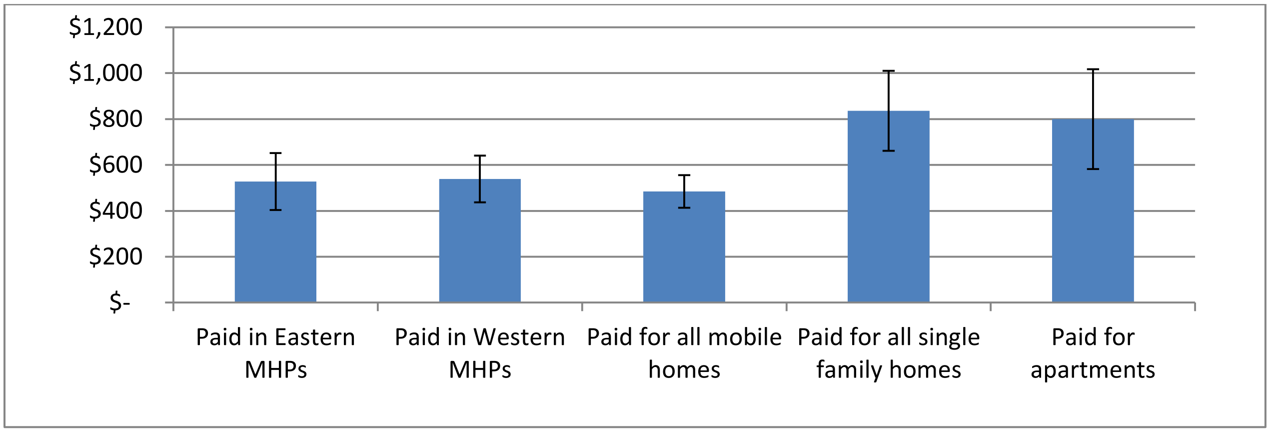


Table 5 shows that respondents reported that there are about 4.2 people per household in the Coachella Valley homes that were surveyed. The number drops down to 3.7 people per household for single family homes and 4.3 people per household for mobile homes. The number of people per household was significantly different across the eastern and western portions of the Coachella Valley, increasing from 4.1 in the West Valley to 4.5 in the East Valley (see Figure 2).

Table 5. Opinion Survey: Survey Household Information

(Presented with the mean (μ), standard deviation (sd), minimum (min), maximum (max) and total surveys collected (N))

Item	μ	sd	Min	Max	N
Number of people in the household	4.21	1.56	1	10	278
Number of people in household for Mobile Homes	4.30	1.59	1	10	229
Number of people in household for Single Family homes	3.68	1.42	1	6	41
Number of people per household in the eastern area	*4.52	1.04	1.55	2	10
Number of people per household in the western area	*4.11	1.25	1.61	1	10

*T-tests show a significant difference between the number of people per household in the east and west valley.

Figure 2. Opinion Survey: Histogram Chart with Error Bars of Number of Residents per Household

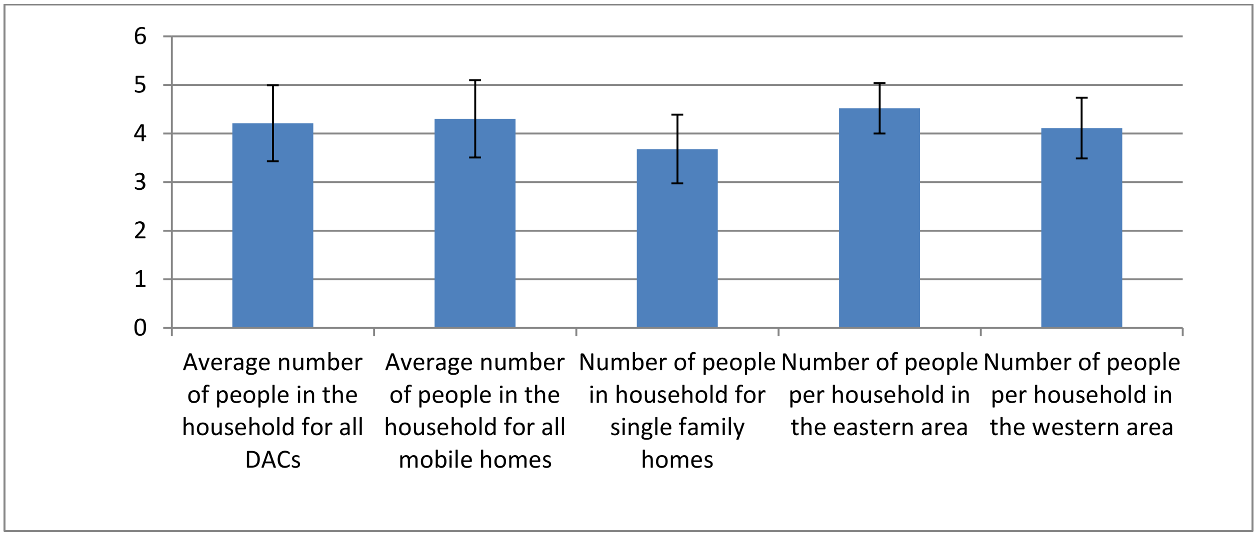


Table 6 shows the reported education, language and literacy of the household's primary wage earner. Most families in this survey report speaking, reading, or writing Spanish (76.9%), which is greater than those who report speaking, reading, or writing English (33.8%). 85% of all survey respondents reported basic reading and writing literacy in either Spanish or English.

Table 6. Opinion Survey: Education, Language, and Literacy of the Household's Primary Wage Earner

(Presented with the mean (µ), standard deviation (sd), minimum (min), maximum (max) and total surveys collected (N))

Item	***µ***	***sd***	***Min***	***Max***	***N***
Highest grade in school completed	8.24	3.70	0	16	278
Item			**n**	**%**	**N**
Reads, writes and speaks English			108	33.8%	320
Reads, writes and speaks Spanish			246	76.9%	320
Reads, writes and speaks another language			12	3.8%	253
Reads and writes in Spanish or English			271	84.7%	320

2.4.3 Water

58 respondents indicated that they believe there is some kind of contamination in their drinking water. This group was made up of 45 mobile homes, 12 single family homes, and 1 apartment home (refer to Table 7). The self-reported information collected in the survey questionnaire was not validated by our study team; the information presented below pertaining to water and water quality only shows opinions of respondents and does not represent actual water or water quality conditions.

Table 7. Opinion Survey: Reported Drinking Water Variables Shown with Row Percentages

(Calculated by Number of "yes"(n) / Total number assessed (N))

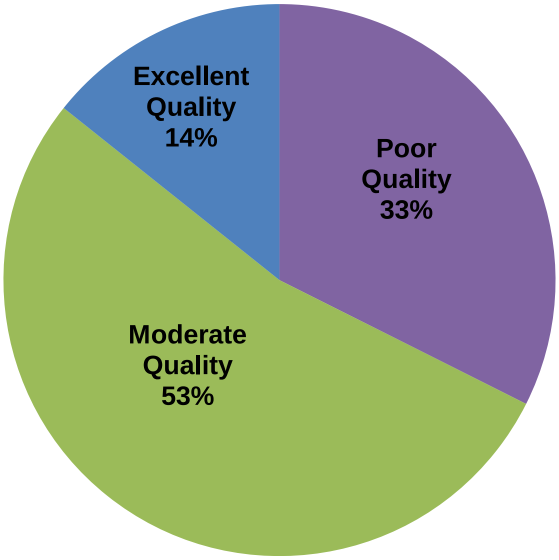
Item		n	%	N
Respondents' perceived quality of tap water	Poor quality	93	32.4%	287
	Moderate quality	153	53.3%	
	Excellent quality	41	14.3%	
Respondents perceived poor quality of tap water in eastern valley		63	47.0%	134
Respondents perceived poor quality of tap water in western valley		30	19.6%	153
Respondents belief of who should maintain their tap water	Landlord/park owner/manager	136	48.2%	282
	The water district	99	30.9%	282
Reported use of water	For keeping the dust down on the road	245	76.6%	320
	For the lawn	153	47.8%	320
	For children or swimming	123	38.4%	320
	For domestic animals	185	57.8%	320
Reports that they sometimes run out of drinking water (purchased or tap)		115	46.7%	246
For those that report running out of drinking water, they would drink tap water when they run out.	Yes	59	37.3%	158
	No	99	30.9%	
Reported source of drinking water in the home	The tap in the home	46	16%	287
	Disposable plastic bottles	112	39%	
	Delivered large containers	32	11.1%	
	Self-filled large containers	97	30.3%	
Reports that they purchase drinking water		247	77.2%	320
Reports that they drink tap water without boiling or filtering		77	28.5%	270
Reports that they drink tap water without boiling or filtering in the eastern valley		25	19.8%	126
Reports that they drink tap water without boiling or filtering in the western valley		52	36.1%	144
Reports that they drink any kind of tap water (direct, POU, or from well)**		113	35.3%	320
Reports that there is some kind of contaminant in water***	Overall	58	18%	320
	In mobile home parks	45	17.2%	262
	In single family homes	12	4.58%	262

* Point-of-Use water filters were reported in 34 of the 320 households.

** Combined result from those reporting that they drink from their tap, use a POU, or drink tap without treatment.

*** This variable was defined by text comments that indicated one of the following terms: "arsenic", "dirty" water, water with a color, "cloudy" water, sick, trust, parasites, unhealthy or "filth". Comments with "Clorox", "chlorine", "bad taste" or "bad smell" were excluded.

Figure 3. Opinion Survey: Perceived Water Quality Reported as Percentages



Those who reported perceived contamination in their water were mostly located in the south part of Coachella Valley. The area located in and around the Salton Sea reported the highest amount of perceived water contamination (see Map 5 in Appendix 3). Those respondents who ranked their drinking water quality as poor are also largely located in the southeastern Coachella Valley in mobile home parks and in single family homes near the Salton Sea. The highest reported user-satisfaction for water quality was in the Desert Hot Springs and Palm Springs area (see Map 5 in Appendix 3).

About one third of all respondents (35.5%, n=113) in this survey report drinking water from the tap. This survey used three questions to assess the practice of drinking tap water. The three questions were worded differently, as a survey questionnaire validation method (Guralnik 2007). A new variable for “drinks tap water” was generated if respondents answered “yes” to any of the three questions intended to illicit a response regarding drinking water consumption (see questions 14, 17, and 22 in Appendix 1).

Figure 4. Opinion survey: Percentages of Respondents Who Report Drinking Their Tap Water

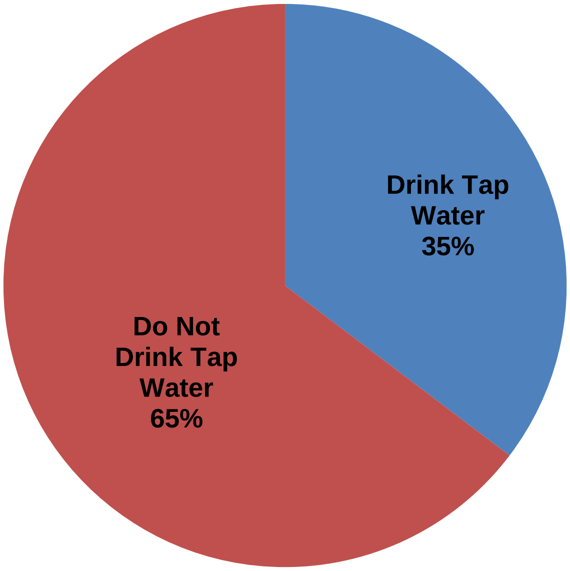


Table 8. Opinion Survey: The Average Reported Price Paid for Water

Item	*μ*	*sd*	*Min*	*Max*	*N*
Amount paid per month for tap water	$31.08	$26.76	$0	$160	267
Amount paid per month for water in mobile homes	$27.4	$22.9	$0	$130	213
Amount paid per month for water in single family homes	$46.5	$37.2	$0	$160	44

2.4.4 Wastewater

The survey questionnaire revealed Onsite Wastewater System (OWS) failures as a serious potential public health problem in many of the DACs of the Coachella Valley, because many survey respondents reported wastewater problems. The two areas of the Region (East vs. West valley) reported differences with regards to wastewater, because more of the eastern DAC clusters reported "ever" having a wastewater failure event while the western DAC clusters reported that their OWS failed more often (Tables 9, 10a and 10b). None of the respondents mentioned knowing of a community group that helps with wastewater problems.

Residents who reported that they have an OWS are shown in Map 6 of Appendix 3. The pink dots are those who reported that they have access to a centralized sewer system, while the green dots are those who reported that they have an OWS. The data obtained through the survey questionnaire process is self-reported and represents opinions relating to residents' onsite wastewater systems.

Several variables from the survey questionnaire were combined to form a new assessment that considered if the areas surveyed have access to a centralized sewer system. The primary variable used for this assessment was from question 24 (Appendix 1) where the respondent listed that they have a type of OWS (originally coded as 1-7) or a centralized sewer (originally coded as 8). Question 71 was used to indicate what kind of wastewater system the residents' neighbors have.

Table 9. Opinion Survey: Wastewater Related Variables shown with Row Percentages

(*Calculated by Number of "yes"(n) / Total number assessed (N))*

Item		n	%	N
Have wastewater problems where the respondent reports:	toilet doesn't flush and sink drain doesn't drain	118	36.9%	320
	grass is growing where septic tank is located	6	1.9%	
	smells sewage in the morning and at night when people are taking showers	54	16.9%	
	The ground is often muddy, spongy or wet around the septic tank / distribution field	17	5.3%	
	There are puddles in my yard when it has not rained for weeks	17	5.3%	
Have had some kind of reported wastewater problem:	Total	142	44.4%	320
	Western valley	61	38.4%	159
	Eastern valley	81	50.3%	161
How often did the problem happen (per respondents' opinion) in the eastern valley?	Once per year	27	37%	73
	Once every 6 months	14	19%	
	At least every 2 months	2	3%	
	At least once per month	6	8%	
	Often/sometimes daily	2	3%	
	During the Rainy season	2	3%	
	Never	20	27%	
How often did the problem happen (per respondents' opinion) in the western valley?	Once per year	21	24%	86
	Once every 6 months	24	28%	
	At least every 2 months	9	10%	
	At least once per month	8	9%	
	Often/sometimes daily	15	17%	
	During the Rainy season	3	3%	
	Never	6	7%	

Figure 5. Opinion Survey: Percentages of Respondents Who Reported Some Type of Wastewater Problem in the Past Year

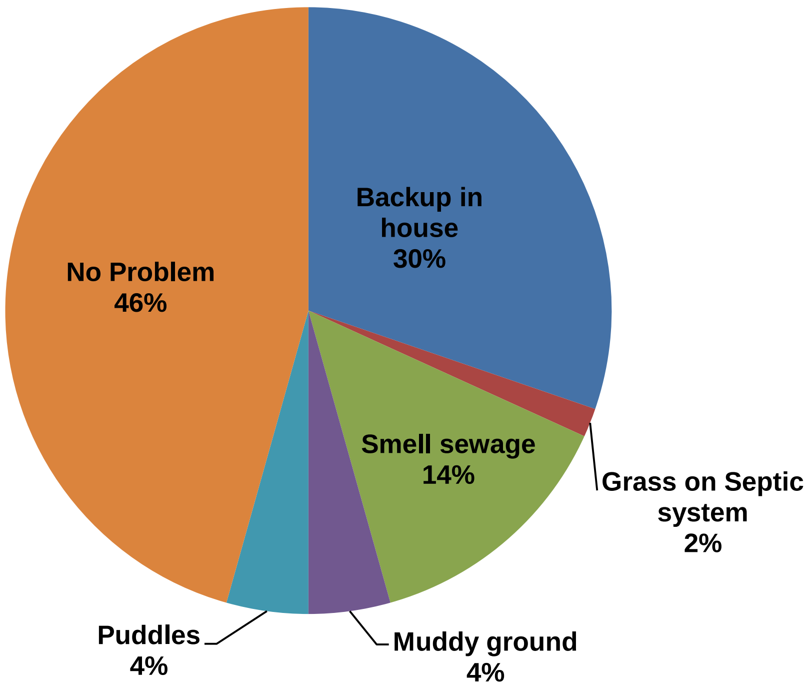


Table 10 shows that reported wastewater problems happen most often in the western Coachella Valley mobile home parks. To help explain this trend, the survey team members conducted informal non-survey reports from a few respondents of mobile home parks in the Desert Hot Springs and Desert Edge community. One respondent of the Mountain View Park said her park manager frequently dumps their park's excess wastewater in the desert outside of their park. Concerning frequent failures of OWS, a resident of the Casa Del Sol Park said "there are only 5 or 6 septic tanks for the entire park of 50 mobile homes".

The following bullet points summarize the survey questionnaire's findings about wastewater management:

- 38.4% of western valley households and 50.3% of eastern valley households reported their wastewater systems as occasionally failing (Table 9)
- The national OWS failure rate is 10-20%. California's reported failure rate is 1-4%. These failure rates are defined as wastewater surfacing, premise plumbing backup, or other problems (USEPA 2002)
- Table 9 shows the most common type of failure in the Coachella Valley is the user noticing that the toilet does not flush and the sink does not drain (n=118, 36.9%, N=320)
- Of those reporting failed wastewater systems, most stated that the problem will happen once per year (24% and 37% for the eastern and western portions of the Valley, respectively)
- In the western valley, there are many mobile home parks reporting a serious OWS problem. Many report that wastewater systems fail "often, sometimes daily"
- The Desert Hot Springs mobile home parks with respondent-reported frequent OWS failure are highlighted in bold on Table 10a

Table 10a. Opinion Survey: The Number of Respondents Per Park Stating That A Wastewater Problem Happens From "At Least Every Two Months" To "Very Often And Sometimes Daily"

This category was built to represent those DACs with severe wastewater problems. Mobile Home Park names in bold are those believed by surveyors and promotores to experience the most frequent wastewater failures in comparison to other parks

Mobile Home Park Name*	City	Total Number of Surveys in Park	Surveys Reporting Severe Problem
Casa Del Sol Mobile Home Park	**Desert Hot Springs**	**17**	**5 (29%)**
Corkhill Park	**Desert Hot Springs**	**20**	**5 (25%)**
Golden Sands Park	**Palm Springs**	**19**	**6 (32%)**
Mountain View Park	**Desert Hot Springs**	**15**	**5 (33%)**
Oasis Trailer Park	Thermal	42	2 (5%)
Palm Drive Mobile Estates	Desert Hot Springs	31	6 (19%)
A Polanco park on 88510 69th Ave	Thermal	5	1 (20%)
A Polanco park on 76250 Pierce St.	Thermal	2	1
Saint Anthony's mobile home park	Mecca	10	3 (30%)
Single family home 12900 Cuando Way	Desert Hot Springs	1	1
Single family home 13212 el Rio Ln.	Desert Hot Springs	1	1
Single family home 1330 Beacon Dr.	Thermal	1	1
Sky Ridge Mobile Home Park	Cathedral City	6	2 (33%)
Whispering Sands Mobile Home Park	Desert Hot Springs	15	1 (7%)

*The mobile home parks that are indicated in bold are those that meet two criteria: they were identified by promotores to have an identified water-related need and they had a large number of self-reported failing OWS.

Table 10b. Opinion Survey: Characterizing the Onsite Wastewater Systems in the Eastern Vs. Western Coachella Valley

OWS Event	Eastern	Western
Any type of reported OWS failure	81 out of 161 surveys (50.3%)	61 out of 159 surveys (38.4%)
OWS Reported to Fail often and sometimes daily	2 out of 73 surveys (3%)	15 out of 86 surveys (17%)
OWS Reported to Fail at least every two months	2 out of 73 surveys (3%)	9 out of 86 surveys (10%)

2.4.5 Flooding

The survey questionnaire assessed flood risk and flood preparedness through three inquiries: knowledge of floods in the area, experiences during floods, and family preparedness. 15.5% of all respondents indicated that they experienced a flood in the last year and an additional 6.5 % indicated that they experienced a flood in the last 5 years (Table 11). Table 12 lists the text that respondents used to describe their flood experience. The floods were reported to have happened in the locations of the Oasis Mobile Home Park on Avenue 70 of Thermal and in the Saint Anthony Mobile Home Park of Mecca (Table 13), the same areas affected by a known documented flood on September 11, 2012 (Associated Press 2012). Additional locations where respondent-reported flooding occurred are some addresses in

Coachella, Palm Drive Mobile Estates in Desert Hot Springs, and Bermuda Palms Apartments in Indio (Table 13 and Map 9 of Appendix 3).

Most families (86.9%, n=238) agreed to a statement of “preparation, planning and emergency supplies will help me handle the situation” (with regards to flooding). 10% of participants agreed with the statement that read “nothing I do to prepare will help me handle the situation”. This assessment question was taken from a Federal Emergency Management Agency (FEMA) Community Preparedness and Participation Survey (FEMA 2009). The FEMA study found that 81% of respondents agreed with the statement about natural disasters stating, “preparation, planning and emergency supplies will help me handle the situation”. Similarly, 7% of participants in the FEMA survey said that “nothing I do to prepare will help me handle the situation”.

Table 11. Opinion Survey: Reported Flood-Related Variables

Item		n	%	N
Statement about how families can handle a flood situation	I can handle the situation without any preparation	4	1.5%	274
	Preparation, planning and emergency supplies will help me handle the situation	238	86.9%	
	Nothing I do to prepare will help me handle the situation	32	11.7%	
House is described as on a flood plain or at flood risk	Yes	51	18.3%	279
	No	152	54.5%	
	I don’t know	76	27.2%	
Reports a nearby flood in the past year		31	15.5%	279
Reports a nearby flood in the past 5 years		10	6.5%	153
Reports to have known about floods in this area before moving here		17	6.9%	247

Table 12. Opinion Survey: Text of How Respondents Handled Flood Situations

- I had to “battle out”
- “I couldn’t take my kids to school”
- “We had water up to my knees”
- “Much mud”
- “Much mud on the streets”
- “We could not go out with the car”
- “We were unable to leave home”
- My children “lost days in school”
- It affected me “psychologically”
- “We couldn’t leave”
- “It only affected us in passing but the puddles were bad”
- “The roads were affected”
- “The sewage backed up”
- “Trauma”
- “Insects”

Table 13. Opinion Survey: The Names of Mobile Home Parks Where Respondents Indicated That Floods Occurred In the Last Year or Five Years

Mobile Home Park name	City	Total Number of answers about flood	Surveys reporting flood problem
Bermuda Palms Apartment Homes	Indio	6	3
Casa Del Sol Mobile Home Park	Desert Hot Springs	14	2
Corkhill Park	Desert Hot Springs	15	1
Gamez Trailer Park	Thermal	2	2
Los Gatos Mobile Home Park	Mecca	1	1
Oasis Mobile Home park	Thermal	21	7
Palm Drive Mobile Estates	Desert Hot Springs	22	6
Polanco parks in Thermal	Thermal	13	2
Saint Anthony's mobile home park	Mecca	7	6
Single Family Homes*	DHS and Coachella	31	3
Whispering Sands Mobile Home Park	Desert Hot Springs	9	1
Mountain View Park	Desert Hot Springs	10	1

*Addresses of SFH: 13735 Verbena Street, Desert Hot Springs; 83988 Fiesta Ave, Coachella; 83994 Fiesta, Coachella.

2.4.6 Community Group Assistance

A series of questions was asked to survey respondents that were designed to assess the level of contact that the DACs have with various community organizations. There was an overall minimal rate of contact reported by survey respondents. There were 28 respondents (out of 272) that said they knew of community groups that help with health, water, or other problems. The mentioned names of those community groups were only a few and were combined from questions 54 and 55 (refer to Appendix 1). The names mentioned by respondents (with the number of times mentioned in parentheses) include:

- "El Sol" (6)
- "Pueblo Unido" (5)
- "Clinicas De Salud De Pueblo"(2)
- "Medicos Voladores" (1)
- "Program del agua" (1)[1]
- "SSI aid" (1)
- "The Desert Cancer society" (1)
- "La Iglesia"(1) [1]

Another question assessed the method of contact with community organizations. The few responses were "visits" (3); "letters"(3); and "telephone"(3). There was no mention of internet, brochures, or flyers as a method of communication with the few respondents that answered this question.

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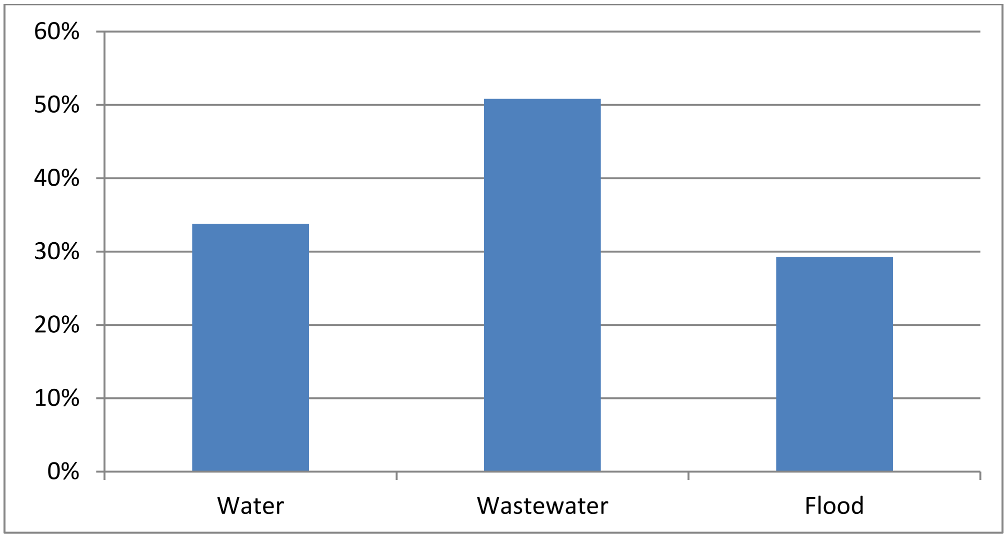
[1] The English translation for "La Iglesia" is "The Church". The English translation for "Program del agua" is "water program". The other Spanish language terms are names of organizations with "Medicos Voladores" meaning the "Flying Doctors", which is an established organization.

3 Recommendations and Discussion

Survey respondents were asked a general question about IRWM projects and funds. The question was, "what type of water, wastewater, or flood control project can be built with funding from the California Department of Water Resources?" Residents who participated in this survey requested help with combinations of all three types of projects; wastewater related projects were recommended more than water or flood related projects (see Figure 6). The sections below provide details about recommendations for water, wastewater and flood projects based on community data gathered through the survey. The recommendations were developed during the survey, mapping and community outreach process.

Figure 6. Opinion Survey: Type of Project Requested by Respondents at Least One Time During the Survey Questionnaire.



3.1 Water

Drinking Water Education: About one third of all respondents (35.5%, n=113) in this survey reported that they drink water from the tap (Table 7) with or without treatment. Due to the location of many of the surveyed residences within local water agency jurisdictions, it is possible that many of the surveyed residences receive municipal water supplies that may be safe to drink if the residents' onsite plumbing system is properly maintained. Applicable water agencies and water districts ensure that the quality of drinking water meets all regulated drinking water standards up to their water meters. Any onsite water infrastructure within mobile home parks or private residences is the responsibility of the land owner and is not regulated by water agencies or water districts.

Despite the presence of municipal water supplies, many residents included in the survey reported that they do not drink tap water, and 77% reported a preference to purchasing drinking water rather than drinking water from the tap (Table 7). The practice of purchasing water represents a potentially unnecessary economic expenditure for already economically disadvantaged communities as well as an overall loss in potential revenue and public value for the Coachella Valley's water districts. To change this practice, drinking water education projects are recommended for the Region's DACs. The education curriculum could promote drinking water as a positive health choice and provide education on the water treatment resources that are provided for water from the Region's water agencies and districts. This type of education program should be synchronized with a water testing service to show residents that the water is safe to drink. An educational program should also consider that onsite plumbing systems (beyond water agency or water district-regulated water meters) may not be properly maintained and may have cross-connection issues or other problems that are beyond the jurisdiction of the water district.

An education curriculum could reference the water education programs offered by the nearby Eastern Municipal Water District out of their Hemet/San Jacinto Water Reclamation Facility. There are also drinking water educational curricula available from the federal government due to the first lady Michelle Obama's drinking water promotion campaign (Office of the First Lady 2013). The Coachella Valley area non-profits such as El Sol and the Pueblo Unido are well-equipped to coordinate educational programs in the Region's DACs. The El Sol group suggested that they are capable of providing these services during the DAC western workshop and the Pueblo Unido group suggested that they can expand their current education programs during the eastern workshop. Pueblo Unido currently meets with Mobile Home Park owners to educate them with a curriculum on water conservation, wastewater management, and water quality improvements for mobile home residents.

These types of educational programs could be promoted for the entire Coachella Valley, but findings from the survey and the differences between the eastern and western Coachella Valley knowledge about drinking water should be considered when designing educational programs. One of the most important findings from the survey is that more respondents in the eastern Coachella Valley rate their water quality as poor (47.0% in the East Valley vs. 19.6% in the West Valley). The western Coachella Valley respondents who rated the water quality as poor are also generally located in the mobile home parks that surveyors and local non-profits described as communities in-need. Communities in-need were identified by the non-profit surveyor promotores through their community networks (refer to Appendix 4). As discussed in Section 2, the surveyors were given an opportunity to add communities and areas to the survey area that they believed were a priority due to a known need in one of the three areas of wastewater, water or flood. The mobile home parks in Table 10a that are indicated in **bold** are those that meet two criteria: they were identified by promotores to have an identified water-related need and they had a large number of self-reported failing OWS.

Drinking Water Treatment: Some residents of the Coachella Valley do not have access to drinking water from a municipal system, and therefore rely upon private onsite wells for water. During the process of this assessment there were some enforcement actions from the US Environmental Protection Agency (USEPA) to a Coachella Valley mobile home park owner (James 2013; USEPA 2013). The citation was issued, because the owner provided water from onsite groundwater wells that did not meet water quality criteria for arsenic to an estimated 300 mobile home park residents in the eastern Coachella Valley. There were four households interviewed during this June 2013 assessment who live in that community. All four residents surveyed in that park had knowledge that their tap water did not meet drinking water quality standards. These four respondents also stated that they do not have a water filter or other treatment system in their house, but that they drink the water from their tap even though they understand that their water did not meet drinking water standards. This mobile home park and similar mobile home parks in the area need priority for drinking water treatment and education.

Some local non-profits are already addressing drinking water treatment needs; Pueblo Unido has a new program where they are working with a consortium of the smaller mobile home parks around Pierce and Avenue 70 cross streets in Thermal, California. Pueblo Unido's goal with their new program is to improve the water, wastewater and electrical infrastructure in these parks and address the local park owners' needs. The program has already implemented many household point-of-use (POU) water filters and some local wastewater management solutions. These solutions have already benefited many residents in over 30 small mobile home parks. The mobile home parks currently being served by Pueblo Unido are typically the smaller privately owned "Polanco parks" with less than 12 units (KTGY Group 2010). Many of the Polanco parks in the eastern Coachella Valley have already received a small household POU water treatment system through support from Pueblo Unido, the Desert Alliance for Community Empowerment (DACE), and the Rotary Club.

Other residents living in the larger mobile home park clusters have not received POUs and need assistance with their drinking water treatment. Those households in the mobile home parks such as the Avenue 70 cluster or the D&D mobile home park need improved drinking water quality (see Map A in Appendix 4). There is data from the USEPA (laboratory results) that validates knowledge of water contamination in the D&D Mobile Home Park. The Avenue 70 cluster's need for improved water quality has not been validated by water quality testing, but is from self-reported opinions of the water quality (Table 7) and from an interview with a local non-profit (Caranza and Pinon 2013).

A feasible solution for these parks is to replicate an already successful program in the area. Pueblo Unido now has a fully operational pilot of a cost-effective Point-of-Entry system for a small park that is large enough to require compliance with regulations that preclude the use of POU systems. This pilot project is located at the San Jose Community Learning Center near the cross streets of Pierce Street and Avenue 69. The San Jose Community Learning Center is now operational and its water system is set-up for tours of the drinking water and wastewater treatment processes. The learning center is conveniently located near the Avenue 70 larger mobile home parks (also commonly referred to as "La Chicanitas" or "Oasis Park") located on the Torres-Martinez tribal lands.

3.2 Wastewater and Flood Control

The most common type of wastewater failure reported by respondents in the survey is that "the toilet doesn't flush and the sink doesn't drain"; this type of issue is generally indicative of a hydraulic failure and usually indicates the need for system pumping. An OWS is in serious need of maintenance or repair when the wastewater is noticed by the resident in the house; this issue is considered serious due to its potential health risk. Residents reported noticing wastewater over a wide area in the eastern Coachella Valley, but this situation was described as a more common problem in the western Coachella Valley communities listed in Table 10a. Wastewater is described as part of the flooding problem in this section of the report, because when rains come, the OWS will often overfill and backup into the house. The following recommendations are presented for the western and eastern portions of the DACs in the Coachella Valley based on the wastewater and flood information collected during the survey effort.

Community consortium for a sewer line: It was suggested by an attorney with a local non-profit organization (California Rural Legal Assistance) that a consortium of small and large mobile home parks should be formed around the Sunbird Mobile Home Park cluster (Map C: Appendix 4).The cluster of DAC mobile home parks near the Sunbird cluster should form a community consortium and apply for funding to be connected to the municipal sewer system. That area would include approximately 134 mobile homes. The Sunbird park concept was addressed during the last Coachella Valley IRWM grant funding round (Round 2 of Proposition 84 Implementation Grant funding), but this concept had not yet formally come to fruition and the area small parks were not yet in place. The reason for creating a cluster of mobile home parks that could all connect to a single sewer line is to make the area more competitive for connection to a centralized sewer from a cost perspective; the amount of connections to a single sewer line reduces the overall cost to connect on a per connection basis. This type of consortium could be modeled after the recently successful community consortium for a sewer in the Enchanted Heights park of Perris, CA (Sinclair et al. 2011).There are additional areas and neighborhoods in the Coachella valley that could benefit from a coalition to approach funding sources. The Corkill Park and Casa Del Sol Park of the Desert Edge community or the Mountain View Park of Desert Hot Springs are some communities that could potentially benefit from forming a consortium that would apply for funding to be connected to a sewer line (Map E of Appendix 4).

Water District Rural Community Education and Data Center: Pueblo Unido recommends that a community liaison office be created by a water agency, water district, or other local jurisdiction to coordinate outreach and advocacy for DAC water and wastewater management. The office would coordinate education and outreach directly with communities and with the community-based non-profit organizations such as El Sol and Pueblo Unido. The government-sponsored office could also help establish economically disadvantaged communities as a recognized and acknowledged population, which is important because DACs need recognition to be eligible to receive external funding for infrastructure or other forms of support. The Riverside County supervisor's community councils are the only current organizations that represent DACs in the East Valley. Local entities have expressed preference for government sponsorship and support from local water districts or agencies (compared to the County or local cities) and have suggested that local water districts or agencies could explore external funding options to establish a community liaison within the DAC areas.

Flood Control and Disaster Preparedness: Most families (86.9%, n=238) agreed to a statement of "preparation, planning and emergency supplies will help me handle the situation", and 10% of survey participants agreed with the statement that read "Nothing I do to prepare will help me handle the situation". The responses to the aforementioned questions in the Coachella Valley are slightly different from responses to similar questions across the United States. The assessment questions described above were taken from a Federal Emergency Management Agency (FEMA) Community Preparedness and Participation Survey (FEMA 2009). The FEMA study found that 81% agreed with the statement about natural disasters where "Preparation, planning and emergency supplies will help me handle the situation" (compared to 86.9% in the Coachella Valley). Similarly, 7% of participants in the FEMA survey said that "Nothing I do to prepare will help me handle the situation" (compared to 10% in the Coachella Valley). Ethnicity can help explain the differences in responses in the Coachella Valley survey when compared to the national FEMA survey. The FEMA survey analyzed the data by ethnicity and found that "Hispanic individuals (17%) were significantly more likely to believe that nothing they do would help them prepare for a natural disaster, as compared to non-Hispanic individuals (6%)." This is an important consideration for the disadvantaged populations of the eastern Coachella Valley which are reported to be considered 94% people of color, a 14% unemployment rate and be 65% below the poverty line (London, Greenfield, and Zagofsky 2013). Health disparities and social vulnerability is another important factor for post-disaster recovery. The ability to rebuild has been linked to ethnicity, social economic status, class, income and gender (Finch, Emrich, and Cutter 2010; Gamboa-Maldonado et al. 2012; Mutter 2005).

Advocacy for severely disadvantaged communities is urgent; many DAC residents rent their homes in mobile home parks and report issues associated with aging and/or expired infrastructure. The community liaison can potentially assist these neighborhoods to develop a water, wastewater, and flood master plan. Many mobile home parks in the eastern Coachella valley are established in agricultural zones that are not ideal for families with young children. The community liaison can help these areas become more livable for families who would normally fear any external help due to a fear of enforcement, "red-tagging", and displacement. In addressing this problem, one community member in the eastern DAC workshop said "my 15 year old water tanks are now totally corroded". Mr. Rodolfo Piñon of Pueblo Unido says most communities would welcome a community liaison from a water agency or water district, because now the only people that could potentially help the community with infrastructure issues are also those who could issue citations and enforcement actions (Carranza and Piñon 2013). *Linkages:* A grass-roots approach for a municipal system extension (water or wastewater) represents the start of a long process, but an answer to all three water-related infrastructure problems (water, wastewater, and flooding). It took six years after the community organized for the Enchanted Heights Community in Perris, CA to break ground on their central sewer line (City of Perris 2012). The nearby community of Quail Valley is still working on the process. Figure 8 below shows the steps required for a community to break ground on a sewer line project.

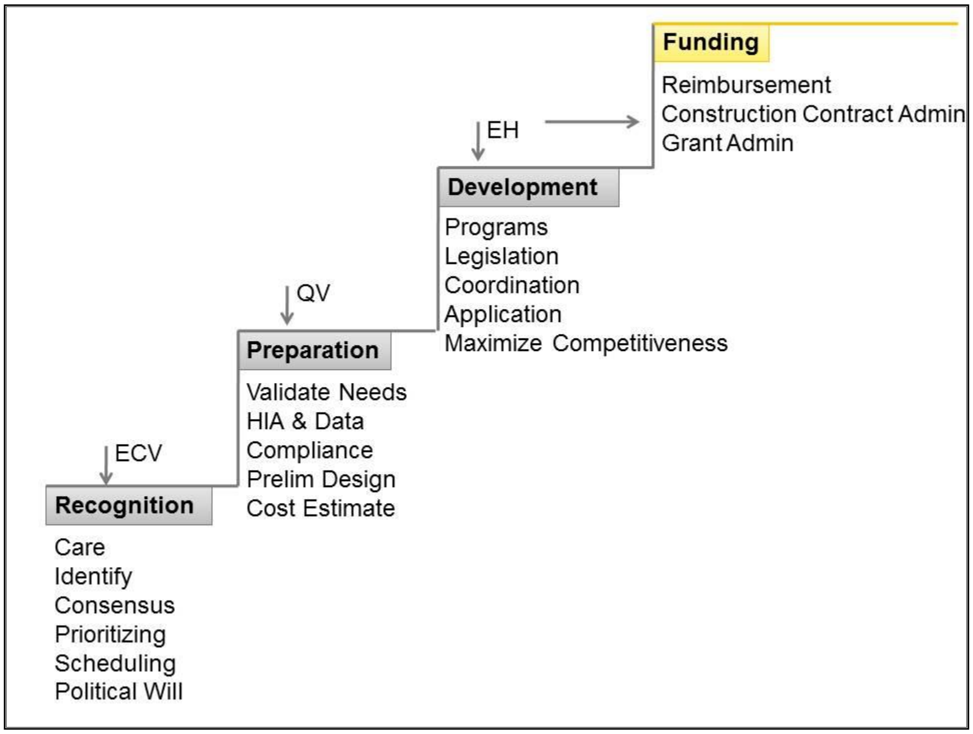
Municipal system extensions can provide a foundation for other types of infrastructure projects and the Enchanted Heights case study shows that a sewer line extension helped grow all aspects of the neighborhood. A central sewer line can also help the community's concern with flood control as rain events are correlated with septic system failures.

Figure 7. The enchanted heights case study.

"The city realized early on that public education and outreach was a critical factor in ensuring the success of the project. The city launched a multimedia campaign which included Public Service Announcements in both Spanish and English, formal community meetings at the local elementary school, one on one conversations with the residents of Enchanted Heights, a bilingual media campaign and a dedicated bilingual webpage on the City's website. The residents of Enchanted eagerly embraced the sewer project and directly engaged in the outreach efforts. The children of Enchanted Heights also begin to take notice of the outreach campaign. It was not unusual to see them also engage in the outreach process. The children began to pass out flyers in the neighborhood. Those same children also explained to their Spanish-speaking parents how the City of Perris and its partners planned to improve the quality of life in their community and encouraged them to support the project."(City of Perris, 2012)

The largest concern for the disadvantaged communities of the Coachella valley is sewage failure (Figure 6). Sewer line extensions not only provide infrastructure to communities, but are also symbolic of successful and cohesive community organizing. The grass roots approach used in the Enchanted Heights and Quail Valley areas are successful models, but need modification to the widespread wastewater problems in the Coachella Valley. Many areas in the Coachella Valley may be too far from any sewer line with too few residents to justify the investment. Other communities may be in close proximity, but have a different type of park ownership structure or community culture (e.g. the Tribal lands). These differences are expected and grass-roots organizing will require some unique solutions specific to the Coachella Valley.

Figure 8. Steps Required for a Community to Organize Towards a Central Sewer System *The Status Towards Development Is Shown On The Figure For The Eastern Coachella Valley (ECV), Quail Valley (QV), And Enchanted Heights (EH)*



Based on the recommendation above and as part of the DAC Outreach Program project, the CVRWMG developed four projects to address DAC issues associated with drinking water quality and OWS failure and potential connections to sewers. Those projects are described below:

Project 1: Educational Materials

This project includes the development of bilingual (English and Spanish) educational materials for economically disadvantaged communities located within areas that are experiencing substantial water quality or wastewater issues. The materials will include general information about water and wastewater systems within the Coachella Valley and will also provide information to residents about who to contact when experiencing a variety of water and wastewater system issues.

This project directly addresses issues identified through the surveys and the DAC Workshops, because both outreach processes revealed a need to provide educational materials for residents. These outreach efforts revealed a substantial knowledge gap regarding water and wastewater systems in the Coachella Valley, and also found that local non-profit organizations such as El Sol and Pueblo Unido would benefit from having materials available to provide to residents to increase educational opportunities for various water-related concerns.

The ultimate purpose of this project is to provide resources to residents to help them resolve issues that can be addressed by local agencies, and provide local non-profit organizations with the information necessary to empower local DACs. The portion of this project that required development of educational materials was completed through the DAC Outreach Program, and those materials are available as an appendix to the 2014 Coachella Valley IRWM Plan Update. The next steps for project implementation will require outreach and engagement with local non-profit groups to disseminate materials to local stakeholders and provide residents with the materials they need to understand water and wastewater systems in the Coachella Valley and secure code compliance for applicable water and wastewater issues. It is anticipated that implementation via the non-profit partners will begin in late 2013 or early 2014 and will continue to be implemented through these groups into the future.

Project 2: Determining Connection Opportunities

This project involves detailed mapping to help locate municipal service connection opportunities. The idea for this project was developed as a result of DAC outreach efforts and is based upon the sewer consortium idea initiated by the California Rural Legal Assistance Foundation (see above for more details). Connecting residents that do not currently receive municipal services (water and wastewater) to the municipal system is a common request that has been expressed by DAC and other Coachella Valley IRWM stakeholders throughout the duration of the Coachella Valley IRWM Program.

While the demand for municipal connections is high, it has been found that many of the connection projects submitted for IRWM grant funding are not technically or economically feasible. Due to the dispersed and rural nature of portions of the Region (particularly the East Valley), sewer extension and connection projects may not be cost-effective if they require construction of large lengths of pipeline for relatively few users. From a technical point of view, sewer connections are not feasible if property owners are unwilling to participate or residents are unable to provide requisite sewer connection fees.

Because many factors are involved in selecting potential sewer connection projects in the Coachella Valley IRWM Region, this project aims to provide technical information to help prioritize future connection projects from both technical and economic perspectives. In order to accomplish this goal, the project includes multiple steps, including: mapping, analysis, and feasibility analysis.

The ultimate goal of this project will be to identify potential municipal system connection projects for Round 3 of Proposition 84 funding that are feasible from an economic and a technical perspective.

Regional Program for Septic Rehabilitation

This project was developed to address the large amount of reports of failing OWS throughout the Coachella Valley DACs. In addition to the amount of OWS failures reported during the survey process, outreach conducted for the DAC Outreach Program also found that one of the non-profit partners that participated in the program, Pueblo Unido, who has been working in the East Valley for several years, has already been focusing on addressing wastewater issues and OWS failures in particular. Due to Pueblo Unido's experience with local mobile home park owners and residents and their technical experience with septic systems, it was determined that they would be the most appropriate partner to work with on program design and engineering for this project.

With the resources available to the DAC Outreach Program, the team determined that it would be preferable to develop a regional program that clarifies the process by which septic rehabilitation can be undertaken for local mobile home parks. In particular, this project was meant to provide support for those residents that cannot realistically or feasibly connect to a municipal wastewater system, and therefore would benefit from upgrading their OWS. As a demonstration component of this program, the project team completed preliminary engineering and design work, including onsite soils percolation testing, for several mobile home parks. This project aims to provide the following:

- A framework for future efforts to rehabilitate septic systems in the Coachella Valley as it would be able to demonstrate how to appropriately design septic systems for a range of different site conditions such as elevation, soil conditions, number of residents, etc. and
- Actual design and engineering plans for a number of mobile home parks, which would make these sites potentially eligible to receive funding for implementation (construction and permitting) from a variety of grant programs.

The technical team worked with Pueblo Unido to locate the mobile home parks where onsite percolation testing, design, and engineering would be conducted. During this process it was determined that Polanco Parks in the East Valley would be appropriate to target, because they have reduced permitting requirements and there are hundreds of Polanco Parks within the East Valley, making future replication more feasible. There were a number of reported failing and overflowing septic systems in the West Valley, however non-profit partners in this area did not have the established relationships with mobile home park owners or residents that were deemed necessary for successful future project implementation.

Four Polanco Parks in Thermal, CA were selected for this project: Valenzuela (Harrison between Avenues 81 and 82), Don Jose (Avenue 64 west of SR-86), Cisneros (Avenue 77 between Fillmore and Harrison), and Gutierrez (Harrison between Avenues 80 and 81). Soil testing was conducted at the three sites that had not yet been tested, design plans were drafted for all four sites, and regulatory requirements and processes were identified. Three wastewater alternatives were assessed for each site: conventional, nitrogen removal, and centralized and decentralized options. Following these assessments, the four sites are now positioned to apply for or receive funding for construction and permitting.

These efforts resulted in a framework for future rehabilitation of septic systems at small sites similar to Polanco parks. This framework includes consideration of a range of different conditions, including elevation, soil conditions, and number of residents. Final results of this project are included as an appendix to the 2014 Coachella Valley IRWM Plan Update.

Project 4: Regional Program for Onsite Water Treatment

This project was developed to address water quality concerns, particularly in the East Valley where mobile home parks are in remote, low-density areas and also rely upon private groundwater that may have elevated levels of constituents such as arsenic.

Collaboration with Pueblo Unido, DACE, and the Rotary Club has identified two key aspects necessary for an effective water treatment program in the East Valley: technical needs (water treatment) and community organization. The technical component includes evaluating and identifying the appropriate point of entry and/or point of use water treatment facilities for mobile home parks in the East Valley setting. The community organization component includes distribution of O&M manuals and emergency procedures, and development of rental agreements with park tenants for a monthly user fee to cover O&M costs (such as filter replacement). This project includes development of a regional program that includes both of these program components, for use in accelerating the existing efforts to install treatment systems in both permitted and unpermitted mobile home parks that have documented drinking water quality exceedances. The program focuses on installation of appropriate, commercially-available reverse-osmosis under-counter treatment units for tenants at the mobile home parks. Materials developed for this program are provided as an appendix to the 2014 Coachella Valley IRWM Plan Update.

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5 List of Appendices

- Appendix 1: Survey questionnaire
- Appendix 2: Scope of Services
- Appendix 3: Survey Maps
- Appendix 4: Additional DAC Cluster Maps

Appendix 1: Survey Questionnaire and Observation Form

CVRWMG
Coachella Valley
Regional Water Management Group

Pueblo Unido CDC
EASTERN COACHELLA VALLEY

El Sol
NEIGHBORHOOD EDUCATIONAL CENTER

LOMA LINDA
UNIVERSITY
School of Public Health

COACHELLA VALLEY IRWM DISADVANTAGED COMMUNITY PROGRAM

DAC MAPPING AND CHARACTERIZATION QUESTIONNAIRE

Participant Information Sticker
(Address, house ID, Region)

Interviewer Information	**Data Entry**
Interviewer Initials_____________________ ___________ Interviewer ID: ________ ________	Date: _______/______/______ (month /day/ year) Initials: ____

Date First Visited Household	_______/______/______ (month) (day) (year) **Start:** ___ ___: ___ ___ ☐ a.m. ☐ p.m. **End:** ___ ___: ___ ___ ☐ a.m. ☐ p.m ☐ Respondent not home
Second Attempt at survey questionairre	_______/______/______ (month) (day) (year) **Start:** ___ ___: ___ ___ ☐ a.m. ☐ p.m. **End:** ___ ___: ___ ___ ☐ a.m. ☐ p.m ☐ Respondent not home
Third Attempt at survey questionairre	_______/______/______ (month) (day) (year) **Start:** ___ ___: ___ ___ ☐ a.m. ☐ p.m. **End:** ___ ___: ___ ___ ☐ a.m. ☐ p.m ☐ Respondent not home

Introduction Statement:

I am conducting a survey to collect information about water and wastewater for the California Department of Water Resources. There is a California state budget to address water quality and wastewater management issues in this region. We would like to find out from you what actions or projects the state should consider in these topics. Would you like to answer some questions and give us your input? The information you provide will be used to help guide funding decisions in the Coachella Valley.

Q1 What kind of dwelling is this?
(Observe)
○ Mobile home single (1)
○ Mobile home double wide (2)
○ Smaller Trailer or RV (3)
○ Single family house (4)
○ Apartment (5)

Q2 Are you this household's primary wage earner (PWE)?

○ Yes (1)
○ No (2)

Q3 What is your relationship to this household's primary wage earner?

○ Spouse (1)
○ Mother (2)
○ Father (3)
○ Grandmother (4)
○ Grandfather (5)
○ Daughter (6)
○ Son (7)
○ Uncle (8)
○ Aunt (9)
○ Niece (10)
○ Nephew (11)
○ Other (12)

Q4 Gender of Respondent
(Observe)
○ Male (1)
○ Female (2)

Q5 What is your occupation? *(write answer)*

________________________________ ________________________________ ________________________________

Answer Q6 if Q3 indicates that they are not the PWE

Q6 What is the primary wage earner's occupation?

Q7 Who do you pay for your water bill?
(If they say water district, ask the name of the water district)

- ○ My landlord / park owner / manager / with my space rental (1)
- ○ My water district. (2) ________________________________
- ○ The US Federal government (3)
- ○ The CA state government (4)
- ○ My County government (5)
- ○ My City government (6)
- ○ My Tribal Council government (7)
- ○ I have my own water source (8)
- ○ Other (9) ________________________________

Q8 Where does the water in your kitchen sink come from?
(Probe: What is the SOURCE of the water before it is piped to you?) *(Read answers and if a well is specified, ask for location)*

- ○ A water treatment plant (1)
- ○ A private well near this house (2)
- ○ A water district owned well (3)
- ○ Rainwater (4)
- ○ Other (5) ________________________________
- ○ The All American Canal or Colorado River (6)
- ○ The Irrigation District (7)
- ○ The Salton Sea (8)
- ○ Don't know / Pay landlord (9)

Comment

Q9 How much do you pay per month for water?

____ ________________________________

Q10 Where does the majority of your household drinking water come from?

(Read answers)

○ The tap in the home (1)
○ Plastic bottles from a grocery store or convenience store (2)
○ In large containers from a commercial delivery method (3)
○ In large containers that I fill at a vending machine or other sources (4)

Answer Q11 If Q10 above "The tap in the home" Is Not Selected

Q11 Do you ever run out of water that you purchase for drinking?

○ Yes (1)
○ no (2)

Answer Q12 If above Q11 is "yes"

Q12 If you ran out of the water supply that you normally drink, would you drink your tap water?

○ yes (1)
○ No (2) *(why not?)*

Comment

Q13 What source of water do you use for the following?

(Read answers and probe: Watch for quizzical face and better explain if necessary)

	Water straight from the tap (1)	In home filtered water (2)	Purchased water (bottled water, water store, or vending machines) (3)
Drinking (1)	☐	☐	☐
Cooking (2)	☐	☐	☐
Washing Clothes (3)	☐	☐	☐
Brushing Teeth (4)	☐	☐	☐
Hand washing or Bathing (5)	☐	☐	☐

Q14 Which of the following do you use your water for?
(Read answers)

- ☐ Keeping dust down on dirt road or driveway (1)
- ☐ Gardening (2)
- ☐ Watering the lawn (3)
- ☐ Swimming or children playing (4)
- ☐ Domestic animals (5)
- ☐ Other (6) ____________________

Q15 Do you drink the water from your tap without filtering it or boiling it?

- ○ yes (1)
- ○ no (2)

Q16 Please rate the quality of your tap water. Would you rate your water as Excellent, moderate or poor quality?

	Poor Quality (1)	Moderate Quality (2)	Excellent Quality (3)
Quality of Tap Water (1)	○	○	○

Answer Q17 If Q16 was described as poor or moderate quality:

Q17 You rated your water quality as "moderate quality" or less. Please detail the factors that contribute to this.

Q18 Is there a Point of Use water system in the house? What kind is it? Can we photograph the filter?
(Ask if the observer can photograph the water filter)

- ☐ A Brita filter or similar pitcher style carbon filter (1)
- ☐ An under-sink filter system (2)
- ☐ A whole house filter system such as a water softener (3)
- ☐ Other (4) ____________________
- ☐ No filter (5)

Q19 Who do you think should maintain and manage delivery of safe drinkable water to your household?
(Read answers)

- ○ My landlord / park owner / manager (1)
- ○ My water district (2)
- ○ The US Federal government (3)
- ○ The CA state government (4)
- ○ My city government (5)
- ○ My county government (6)
- ○ My tribal council government (7)
- ○ myself (8)
- ○ Other (9) ____________________

Q20 What kind of wastewater disposal system does this house use?
(Read Answers)

- ○ Septic system (1)
- ○ Shared septic system with other houses (2)
- ○ Cesspool (3)
- ○ Shared cesspool with other houses (4)
- ○ Drainage ditch (5)
- ○ Onsite, but don't know details (6)
- ○ Nearby lagoon (7)
- ○ A sewer line that flows to a wastewater treatment plant (8)

Q21 If your community has a septic tank or cesspool, is the system shared with other residents in your community? If so, how many houses?

- ○ Yes *(how many houses?)* (1) ____________________
- ○ No (2)
- ○ Don’t Know (3)

Q22 Most homes in this community are:
(Read answers) (Community is defined as mobile home park or other not more than 1 mile away)

- ○ Connected to a sewer line that flows to a wastewater treatment plant (1)
- ○ Connected to a septic system (2)
- ○ Have a lagoon system (3)
- ○ Other (4) ____________________

Q23 For septic systems which of the following are OK to drain or flush down the kitchen sink?
(Read answers)

- ☐ Food waste from a food waste disposal system (1)
- ☐ Fats and Grease (2)
- ☐ Bleach and Chemicals (3)
- ☐ Dirty Dish Water (4)

Q24 For septic systems, which of the following are OK to flush down the toilet?
(Read answers)

☐ Urine and Feces (1)
☐ Toilet Paper(2)
☐ Sanitary Napkins(3)
☐ Small garbage items (4)

Comment

Q25 Who do you think should maintain and manage your household's wastewater disposal system?
(Read answers if necessary)

○ My landlord / park owner / manager (1)
○ My water district (2)
○ The US Federal government (3)
○ The CA state government (4)
○ My city government (5)
○ My county government (6)
○ My tribal council government (7)
○ myself (8)
○ Other (9) ____________________

Q26 Have you ever had any problems with your wastewater or septic system? If so, what was it?
(Do not read answers)(Complete questions 32-35 if they answer 1-7 below)

☐ Toilet doesn't flush and sink drain doesn't drain (1)
☐ Grass is growing where septic system is located (2)
☐ I smell sewage in the morning and at night when everyone is taking showers (3)
☐ The ground is often muddy, spongy or wet around the septic tank/distribution field (4)
☐ There are puddles in my yard when it has not rained for weeks (5)
☐ Other (6) ____________________
☐ No problems (7)

Answer Q27 – Q28 if respondent named a sewage problem for Q26

Q27 For how many days did that problem last?
(Probe how long does the problem last)

___________________ _____________________

Q28 How often does the problem happen? Would you say it....
(Read answers)
○ Once per year (1)
○ Once every 6 months (2)
○ At least every 2 months (3)
○ At least once every month (4)
○ Very often and sometimes daily (5)
○ Only during the rainy season (6)
○ Never happens (7)

Q29 Which of the following would indicate a reason to get your wastewater system checked by a professional?
(Read answers)
☐ Toilet doesn't flush and sink drain doesn't drain (1)
☐ Grass is growing where septic system is located (2)
☐ I heard we have cesspools and no septic tanks (3)
☐ I smell sewage in the morning and at night when everyone is taking showers (4)
☐ The ground is often muddy, spongy or wet around the septic tank/distribution field (5)
☐ There are puddles in my yard when it has not rained for weeks (6)
☐ It has been 3 years since the last time it was inspected (7)
☐ Are there any other reasons? (8) ______________________

Q30 How are most of your neighbor's wastewater systems performing in this area?
(Read answers)
○ Performing well without problems (1)
○ Some problems but mostly OK (2)
○ There are m any problems, but also many without problems (3)
○ Almost everyone has a problem with septic systems failing (4)
○ Comment
○

Answer Q31 if Q30 is answered with a problem indicated (2, 3, 4)

Q31 Could the Wastewater system problems in this area be fixed by a program that could help residents affordably pump septic tanks?
○ Yes (1)
○ No (2)

Q36 Is your house in a flood plain or at flood risk?

- ○ Yes (1)
- ○ No (2)
- ○ Don't know (3)

Q37 Have there been any floods in this area in the past ?

	Yes (1)	No (2)
Year (1)	○	○
Last 5 years (2)	○	○

Answer Q38 if Q37 indicates that they had floods in the past year or 5 years

Q38 How did the flood impact you, your property or your family? What items did it damage? What is the value of those items?

	Specify the impact (1)	What was damaged? (2)	Value of items lost? (3)
Impact you (1)			
Impact your property (2)			
Impact your family (3)			

Q39 Did you know about floods in this area before you moved here?

- ○ Yes (1)
- ○ No (2)

Q40 What could be done to prevent flooding if it happened in your community?

______________________ ______________________ ______________________ ______________________

Q41 Do you have a community network to provide your warning and preparation support for floods or other natural disasters?

- ○ Yes (1)
- ○ No (2)

Q42 In a natural disaster such a s a flood, which of the following statements best represents your belief about how you are able to handle the situation?

- ○ I can handle the situation without any preparation (1)
- ○ Preparation, planning and emergency supplies will help me handle the situation (2)
- ○ Nothing I do to prepare will help me handle the situation (3)

Q43 This question is about project funding from the California Department of Water Resources. What type of water, wastewater, or flood control project should be built with this money? Please be specific.
(Do not give examples)

____

____

Q44 Can the PWE read, write and speak in the English, Spanish or other languages? What other language?

	Read (1)	Write (2)	Speak (3)
English (1)	☐	☐	☐
Spanish (2)	☐	☐	☐
Other 1 (3)	☐	☐	☐
Other 2 (4)	☐	☐	☐

Q45 Is the PWE a native American?

- ○ Yes (1)
- ○ No (2)

Q46 How long has the PWE lived in this community? How long has the PWE lived in this house?

	How long has the PWE lived in this community? (1)	How long has the PWE lived in this house? (2)
Years (1)		
Months (2)		

Q47 What is the highest grade in school that the PWE completed?
(Write a number for the different grades)   Do not enter text.
Example grades are: ([Primaria = 01-06; Secundaria = 07-09; Preparatorio = 10-12; GED = 12th grade; Finished college = grade 16; NEVER WENT= 00; DK= 88; REF= 99])

____

Q48 How many people live in this household?

____

Q49 Does the PWE own the house?   Does the PWE:

(Read answers)
☐ Owns or mortgaged (1)
☐ Pays Rent (2)
☐ Owns but pays mobile home park dues (3)
☐ Owned by relative (4)
☐ Other (5) ____________________

Q50 How much do you pay per month for your house payment (mortgage or rent)?

-
____
_

Q51 Have you had a problem with rat, mouse, insect or other pest infestation?
○ Yes (1)
○ No (2)

Q52 How much money does your household make each year?
○ Less than $37,000 per year (1)
○ Less than $49,305 per year but greater than $37,000 (2)
○ Greater than 49,305 (3)

Q53 Are you aware of any community groups or organizations that help to organize to address health, water, or other problems in your community? If so, who are they?

○ yes (1) ____

○ No (2)

Answer if the respondent indicates "yes" for the answer of the above question Q53.

Q54 Who do they typically work with?

____________________ ____________________ ____________________ ____________________

Q54 How do they communicate with you?

____________________ ____________________ ____________________ ____________________

Q55 Do they deal with water issues of any kind? If yes, please describe.

○ yes (1) ____________________

○ No (2)

Thank you for completing this survey.

OBSERVATION SHEET

Q1 Surveyor and Observer

Surveyor Name: ________________________

Observer Name: _______________________
Date (5)

Q2 What is the location of this house?

Address Unit Number ___________________________________
Address street number ___________________________________
Address street name ___________________________________
Address City ___________________________________

Q3 What kind of dwelling is this?

○ Mobile home single (1)
○ Mobile home double wide (2)
○ Trailer or RV (3)
○ Single family house (4)
○ Apartment (5)
○ Other (Specify) (6) ____________________

Q4 Are there other inhabited outbuildings on this household's property?

○ yes (1)
○ No (2)

If No Is Selected, Then Skip To How many vehicles are parked in the h...

Q5 What kind of outbuildings are these?

- ○ apartments (1)
- ○ barracks (2)
- ○ Small houses (3)
- ○ Trailers (4)

Q6 What source of water do you use for the following? (read answers and probe) Watch for quizzical face and better explain if necessary

______ Number of non-commercial vehicles (1)
______ Number of motorized mobile homes (2)
______ Number of work related trucks, buses or tractors (3)

Q7 Do you see the following in the yard of this household?

	Yes/No		DK
	yes (1)	No (2)	Could not observe (1)
Standing pools of water nearby that last over a day after it rains. (1)	○	○	○
Washing machine greywater piped to soil surface or garden (2)	○	○	○
Standing pools of sewage near the household (within 100 feet) (3)	○	○	○
A visible septic tank or cesspool (4)	○	○	○
A well for fresh water (5)	○	○	○
An outhouse or latrine (6)	○	○	○
The house is located on a dirt road (unpaved) (7)	○	○	○
The yard is neat and orderly and landscaped (8)	○	○	○

Q8 Please upload pictures to characterize any of the above items in the yard. Do not photograph any items or locations that Include a person, a vehicle license plate, an address sign, or any other information which could be used to identify the respondent.

Q11 Are domestic livestock animals housed nearby? (Chickens, Cows, Goats, etc.)

- ○ Yes (1)
- ○ No (2)
- ○ Could not observe (3)

If No Is Selected, Then Skip To Agricultural Field Proximity

Q12 Where is the livestock housing located?

- ○ In house (1)
- ○ Adjacent to house (2)
- ○ Visible but not adjacent to house (3)
- ○ Could not observe (4)

Q13 When you are in the yard, can you smell the livestock?

- ○ yes (1)
- ○ No (2)

Q14 Is there an agricultural field near the house?

- ○ Adjacent to house (add photo below) (1)
- ○ Visible but not adjacent to house (add photo below) (2)
- ○ No fields (3)
- ○ Could not observe (4)

Q15 Photo 3: Ag Field

Q16 What kind of air cooling system does this house have?

- ○ Central air conditioning (1)
- ○ Window based air conditioning (2)
- ○ Evaporative cooler (3)
- ○ Fans only (4)
- ○ None (5)

Q17 What kind of wastewater disposal system does this household have?

- ○ Septic system (1)
- ○ Cesspool system (2)
- ○ Lagoon or pond system (3)
- ○ small wastewater treatment plant (4)
- ○ Centralized sewerage (5)
- ○ Ditch or trench system with open wastewater (6)
- ○ Other (Specify) (7)

Q19 What kind of wastewater disposal system do most households in this area, community, neighborhood or park have?

- ○ Septic system (1)
- ○ Cesspool system (2)
- ○ Lagoon or pond system (3)
- ○ small wastewater treatment plant (4)
- ○ Centralized sewerage (5)
- ○ Ditch or trench system with open wastewater (6)
- ○ Other (specify) (7)

Q20 Does the wastewater system appear to be shared with other residents in the same neighborhood or community cluster? (Ask after survey if possible)

- ○ yes (1)
- ○ No (2)

Answer If What kind of wastewater disposal system does this househo... Septic system Is Selected Or What kind of wastewater disposal system does this househo... Cesspool system Is Selected Or What kind of wastewater disposal system does this househo... Ditch or trench system with open wastewater Is Selected

Q21 Does the septic system appear to:

	yes (1)	no (2)
Overflowed recently (1)	○	○
Have an open access or service port (2)	○	○
Have excess vegetation growing on drainfield (3)	○	○
Have water puddled around tank location (4)	○	○
have spongy moist dirt or puddles near drainfield (5)	○	○
Have a visible clean-out plug or access hatch (6)	○	○
to be open and a fall hazard (7)	○	○

Answer If What kind of wastewater disposal system does this househo... Lagoon or pond system Is Selected

Q23 How many feet is the lagoon from the nearest residence?

Answer If What kind of wastewater disposal system does this househo... Lagoon or pond system Is Selected

Q24 How many families use the lagoon for wastewater management?

Answer If What kind of wastewater disposal system does this househo... Lagoon or pond system Is Selected

Q25 Does the lagoon appear to

	yes (1)	No (2)
have overgrown vegetation (1)	○	○
have a pump system to bring sewage in (2)	○	○
have a noticeable foul odor (3)	○	○
be secured (locked) against access for unauthorized visitors (4)	○	○
be full of water (5)	○	○

Answer If What kind of wastewater disposal system does this househo... Lagoon or pond system Is Selected

Q26 Could the septic system problems in this area be fixed by a program that could help residents afford-ably pump septic tanks?

Q27 Is the PWE a native American?

○ Yes
○ No

Q28 How does the outdoor air feel to you when you breathe it in?

○ fresh (1)
○ Slightly dusty but still fresh (2)
○ Very dusty (3)
○ Thick with dust and odor (4)

Q29 What is the outdoor air temperature?

Q30 What is the indoor air temperature?

Q31 Is there trash cans or recycling receptacles present outside?

○ Yes (1)
○ No (2)

If No Is Selected, Then Skip To How many dogs live in this household?

Q32 Are trash receptacle lids tight-fitting enough to protect contents?

	Yes (1)	No (2)
Trash receptacle lids are tight-fitting to protect contents (1)	○	○
Trash or refuse is littered outside of trash receptacles (2)	○	○
Residents have collected many empty bottles and cans outside (3)	○	○

Answer If Are trash receptacle lids tight-fitting enough to protect... Trash receptacle lids are tight-fitting to protect contents - No Is Selected Or Are trash receptacle lids tight-fitting enough to protect... Trash or refuse is littered outside of trash receptacles - Yes Is Selected Or Are trash receptacle lids tight-fitting enough to protect... Residents have collected many empty bottles and cans outside - Yes Is Selected

Q33 Photo 7: Trash

Answer If Are trash receptacle lids tight-fitting enough to protect... - Yes Is Selected

Q34 Is there water pooling in the empty bottles and cans?

○ Yes (1)
○ No (2)

Q35 How many dogs live in this household or around the house?

Q36 Is dog waste visible in the household yard?

○ Yes (1)
○ No (2)

Q37 Are there feral dogs or cats nearby?

☐ Feral dogs (1)
☐ Feral cats (2)
☐ Other wild animals (3)

Q38 What is the source of tap water for this house?

☐ Municipal tap water (1)
☐ Water from a water well (2)
☐ other (3) ____________________

Q39 Are there water jugs in the house for drinking water?

☐ Yes, for filling at a water vending machine (1)
☐ Yes, from a commercial water delivery service (2)
☐ Yes, for storing tap water (3)
☐ No (4)

Q41 Do you see more than 1 commercial disposable water bottle full or empty? (e.g. Dasani, Arrowhead)

○ Yes (1)
○ No (2)

Q42 Is there a Point of Use water system in the house?

☐ A Brita filter or similar pitcher style carbon filter (1)
☐ An under sink filter system (2)
☐ A whole house filter or water softener (3)
☐ Other (4) ____________________
☐ No (5)

Q44 Does this house appear to:

	yes (1)	no (2)
be located near a wash or drainage ditch? (1)	○	○
show evidence of flooding? (2)	○	○
be safe from minimal floods because of stormwater flow control infrastructure built on the streets and in community? (3)	○	○
be located on a dirt road where owners spray water daily? (4)	○	○

Q45 Browser Meta Info

Browser (1)
Version (2)
Operating System (3)
Screen Resolution (4)
Flash Version (5)
Java Support (6)
User Agent (7)

Q10 Photo 2: Yard

Q9 Photo 1: Yard

Answer If Is there a Point of Use water system in the house? No Is Not Selected

Q43 Photo of the home water filter device or other water filter device from above question

Q18 Photo 4: Wastewater

Answer If What kind of wastewater disposal system does this househo... Septic system Is Selected Or What kind of wastewater disposal system does this househo... Cesspool system Is Selected

Q22 Photo 5: Septic

Answer If Are there water jugs in the house for drinking water? No Is Not Selected

Q40 Photo 8: Water Jug

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Appendix 2: Scope of Services

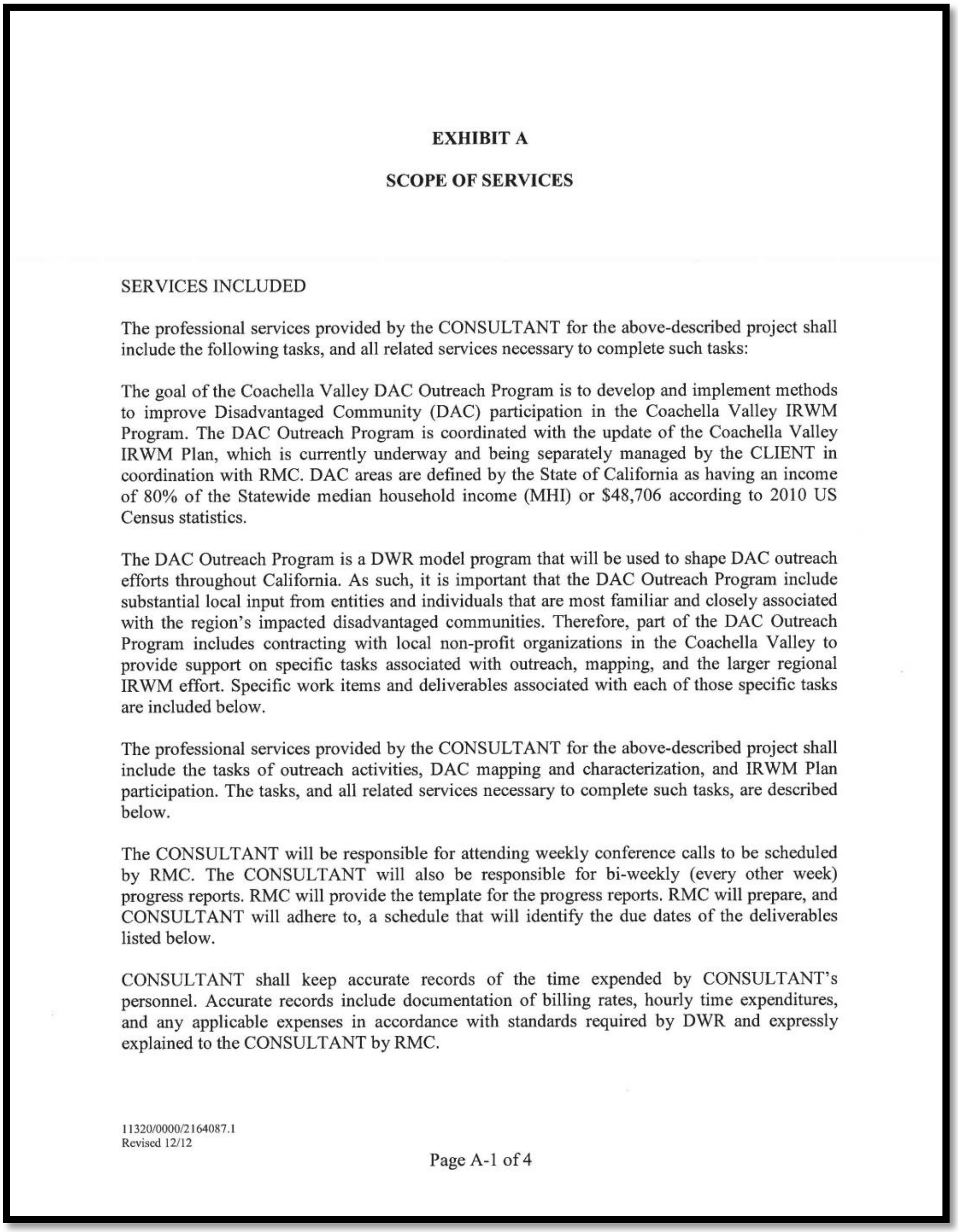


EXHIBIT A

SCOPE OF SERVICES

SERVICES INCLUDED

The professional services provided by the CONSULTANT for the above-described project shall include the following tasks, and all related services necessary to complete such tasks:

The goal of the Coachella Valley DAC Outreach Program is to develop and implement methods to improve Disadvantaged Community (DAC) participation in the Coachella Valley IRWM Program. The DAC Outreach Program is coordinated with the update of the Coachella Valley IRWM Plan, which is currently underway and being separately managed by the CLIENT in coordination with RMC. DAC areas are defined by the State of California as having an income of 80% of the Statewide median household income (MHI) or $48,706 according to 2010 US Census statistics.

The DAC Outreach Program is a DWR model program that will be used to shape DAC outreach efforts throughout California. As such, it is important that the DAC Outreach Program include substantial local input from entities and individuals that are most familiar and closely associated with the region's impacted disadvantaged communities. Therefore, part of the DAC Outreach Program includes contracting with local non-profit organizations in the Coachella Valley to provide support on specific tasks associated with outreach, mapping, and the larger regional IRWM effort. Specific work items and deliverables associated with each of those specific tasks are included below.

The professional services provided by the CONSULTANT for the above-described project shall include the tasks of outreach activities, DAC mapping and characterization, and IRWM Plan participation. The tasks, and all related services necessary to complete such tasks, are described below.

The CONSULTANT will be responsible for attending weekly conference calls to be scheduled by RMC. The CONSULTANT will also be responsible for bi-weekly (every other week) progress reports. RMC will provide the template for the progress reports. RMC will prepare, and CONSULTANT will adhere to, a schedule that will identify the due dates of the deliverables listed below.

CONSULTANT shall keep accurate records of the time expended by CONSULTANT's personnel. Accurate records include documentation of billing rates, hourly time expenditures, and any applicable expenses in accordance with standards required by DWR and expressly explained to the CONSULTANT by RMC.

Outreach Activities

The purpose of outreach activities is to expand upon the previous DAC outreach efforts and identify additional organizations and groups that are working with DACs in the Region on water-related issues. By increasing participation, the opportunity is provided to identify needs and issues of DACs relating to water management and potential projects that may be included in the IRWM regional process.

The DAC outreach effort to date has developed a database for all known organizations and individuals interested in DAC issues and conducted outreach using email, letter, phone calls, and in-person meetings. The database allows the program to track the progress of all interactions and develop profiles of organizations and individuals that include organizational history, affiliations, assessment of regional water issues and needs, participation in water resource projects, and interest in or work on potential IRWM-related needs, issues, and projects.

The CONSULTANT will work expand outreach into DACs by identifying and documenting communications with interested individuals and organizations.

Deliverables:

- List of new DAC individuals or groups who have been contacted and who have shown an interest in the IRWM program. List should include name, organizational affiliation, address, telephone, and email address and profile information (past DAC-related activities, areas of interest, assessment of priority issues, needs, and projects, etc.).
- Coordination of overall DAC outreach in both the western and eastern portions of the Valley
- Record of calls or emails encouraging attendance at meetings or workshops
- List of new contacts that have attended meetings or workshops as documented in meeting sign-in sheets
- Attendance at DAC workshops and regional IRWM Plan update meetings
- Assistance in organizing DAC workshops, including one workshop in the eastern valley and one workshop in the western valley. Assistance will include workshop meeting notes and assistance with preparation of meeting materials.
- Memorandum summarizing the outreach effort that describes outreach techniques that were successful, new contact information, problems encountered, how problems were resolved, and suggested outreach approaches for the future. The final memorandum shall incorporate supporting information from the other non-profits hired to work on this project.

DAC Mapping and Characterization

The RMC team has developed 14 Coachella Valley IRWM DAC focus area maps with demographic and Tapestry Community data that identifies and characterizes DAC areas. The CONSULTANT will utilize the assistance of community *promotores* and LLU university students to develop additional spatial and descriptive mapping data. This information will update the focus area maps. In addition, the CONSULTANT will provide information characterizing the community and its members, key issues and challenges facing the community, and potential projects that address issues and challenges. The CONSULTANT will focus on DACs that are not provided with water or wastewater services by local agencies or municipalities. Deliverables include the following:

Deliverables:

- Selection, development, organization, and coordination of Loma Linda University students and *promotora* teams
- Training of Loma Linda University students and *promotora* teams in GIS use and GPS field methods at LLU geoinformatics laboratory and other training sites in the east and west Coachella Valley
- Revisions to the RMC team focus area maps that pinpoint the location of mobile home parks, locations of on-site wastewater systems (OWS), characterization of OWS that may be failing, locations of groundwater wells with any available data regarding groundwater contaminants, and use of other database to identify locations of areas subject to the risk of flooding
- Direction of observational surveys by student and *promotores* teams
- Engagement of local DAC residents and other stakeholders during informal interviews to validate, verify, and locate attributes of OSWs
- Development and updating of the GIS database and maps from satellite imaging and other relevant databases
- Development of interview instrument that includes a standard set of data gathering questions and response forms to be uniformly used for all DAC community/member interviews
- Conduct training classes in assessment, GPS data gathering, and GIS mapping
- Deliver final report summarizing the data gathering and mapping process. The final report shall incorporate supporting information from the other non-profits hired to work on this project.

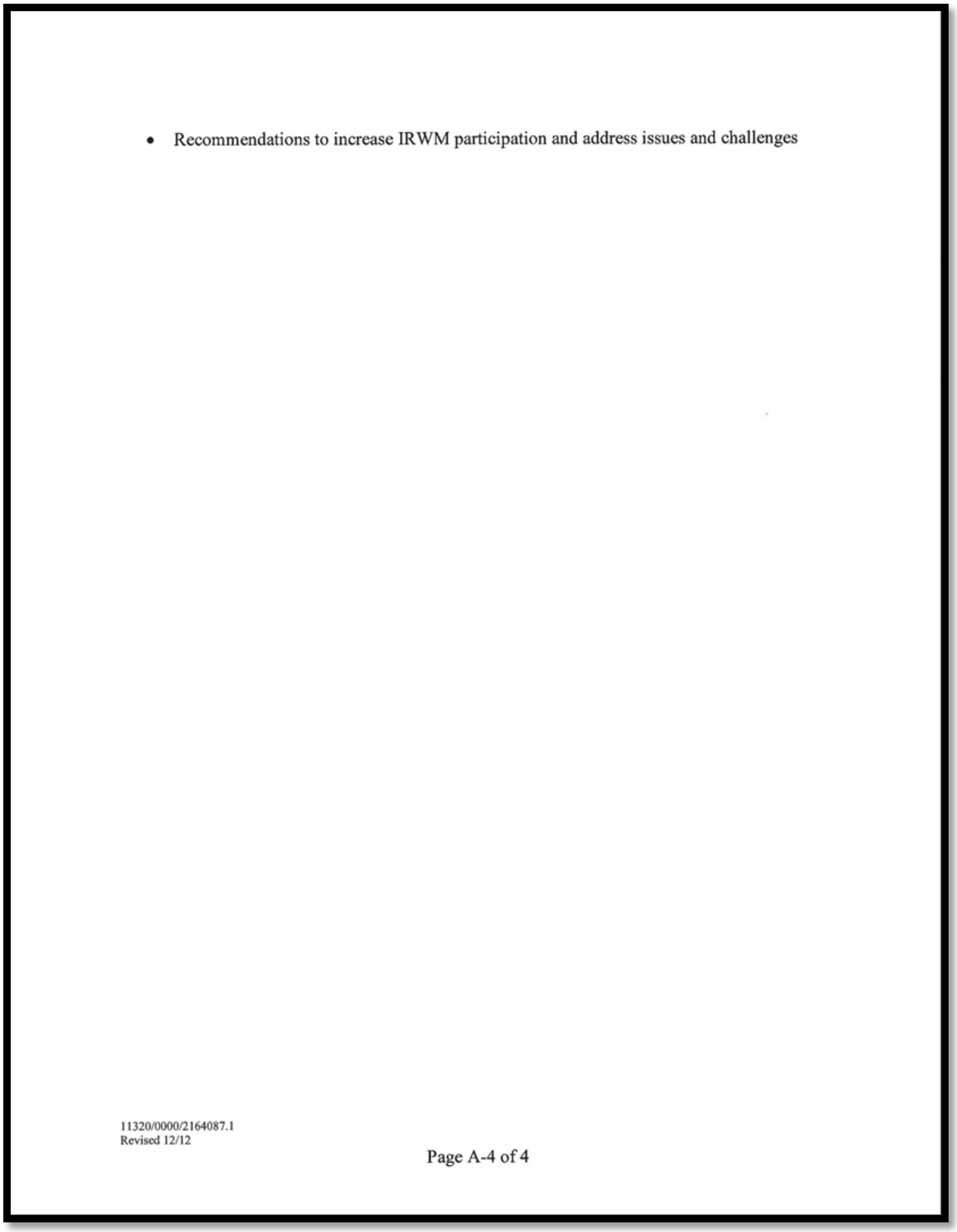
Identification of Challenges and Recommendations to IRWM Program

The RMC team and CONSULTANT will develop a list of challenges that have historically prevented or discouraged DAC involvement in IRWM planning activities. Outreach techniques will be recommended to overcome those challenges and promote DAC involvement in IRWM planning. The CONSULTANT will develop this information through the outreach and mapping processes. CONSULTANT will help identify solutions and potential projects to address challenges and issues.

Deliverables:

The final memorandum shall incorporate supporting information from the other non-profits hired to work on this project. The memorandum shall include the following:

- Challenges that have historically discouraged or prevented DAC involvement in the IRWM process
- Water management challenges and issues facing DACs, including specifics about mapped sites
- Potential projects or project concepts to address water management challenges and issues
- Successful techniques that increased DAC involvement in the IRWM process (meetings, development of projects, etc.)



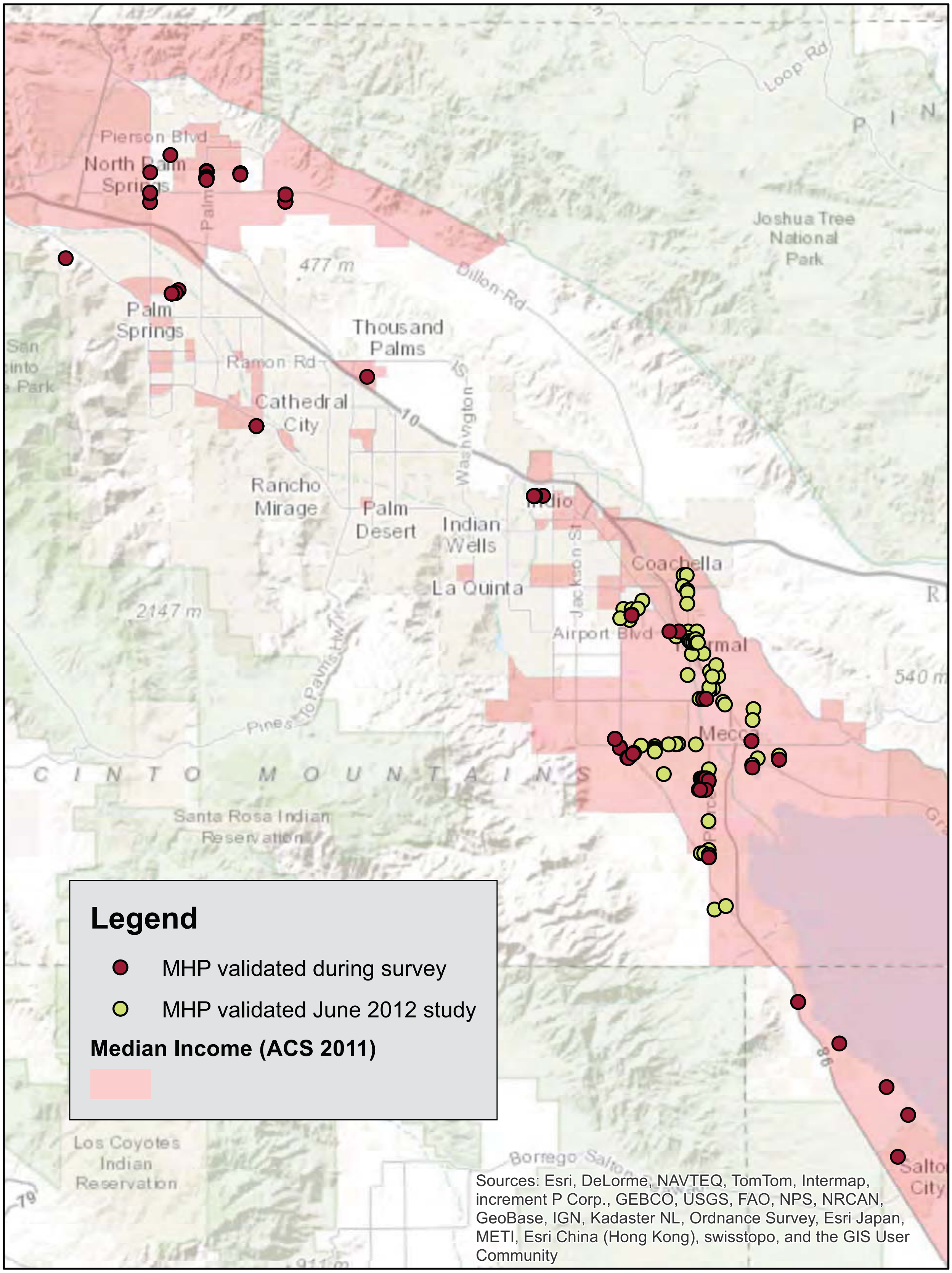
- Recommendations to increase IRWM participation and address issues and challenges

Appendix 3: Survey Maps

Map 01

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire
DAC Locations



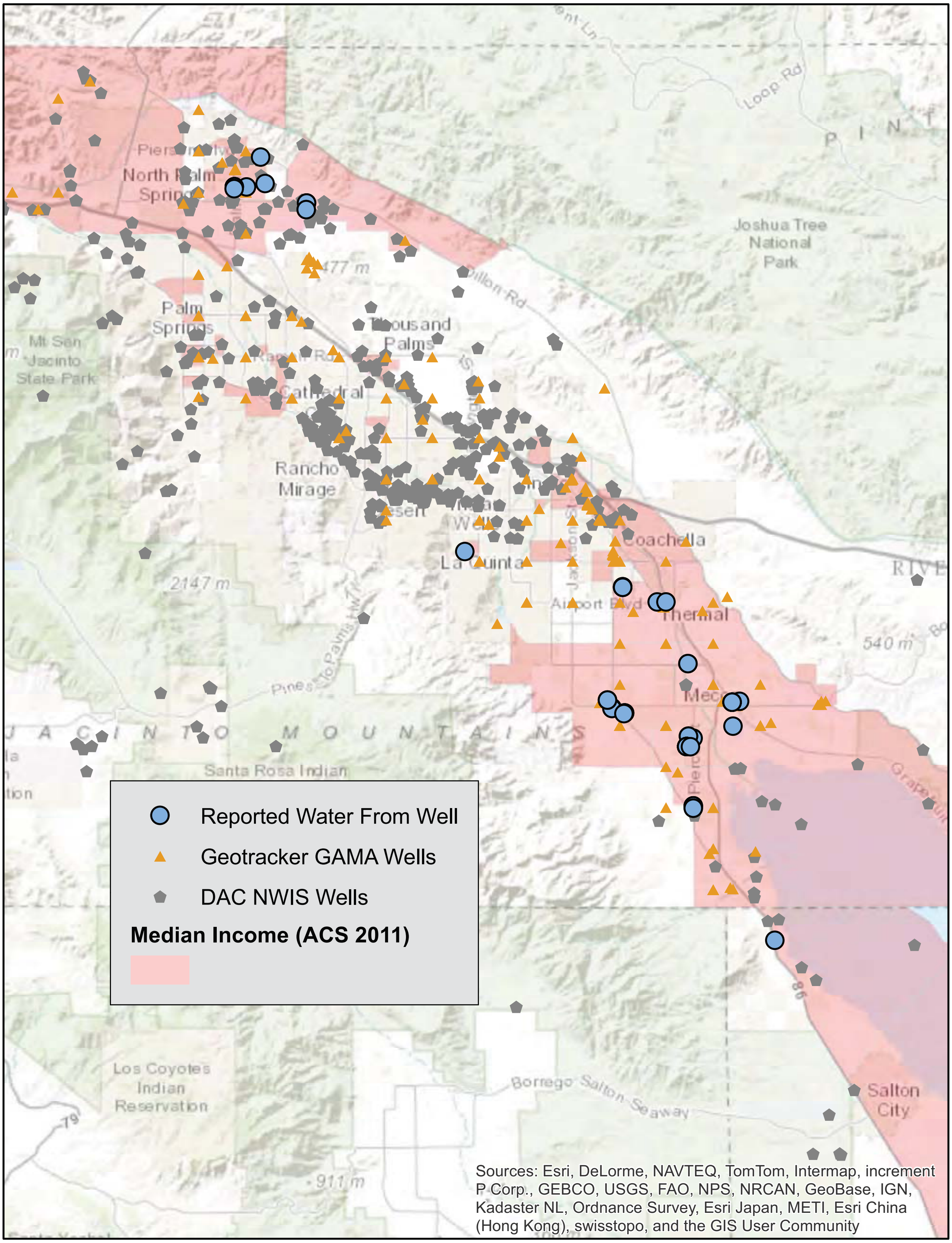
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Loma Linda University School of Public Health, RMC and CVIRWMG

Map 02

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire
Respondents Receiving Water From Well



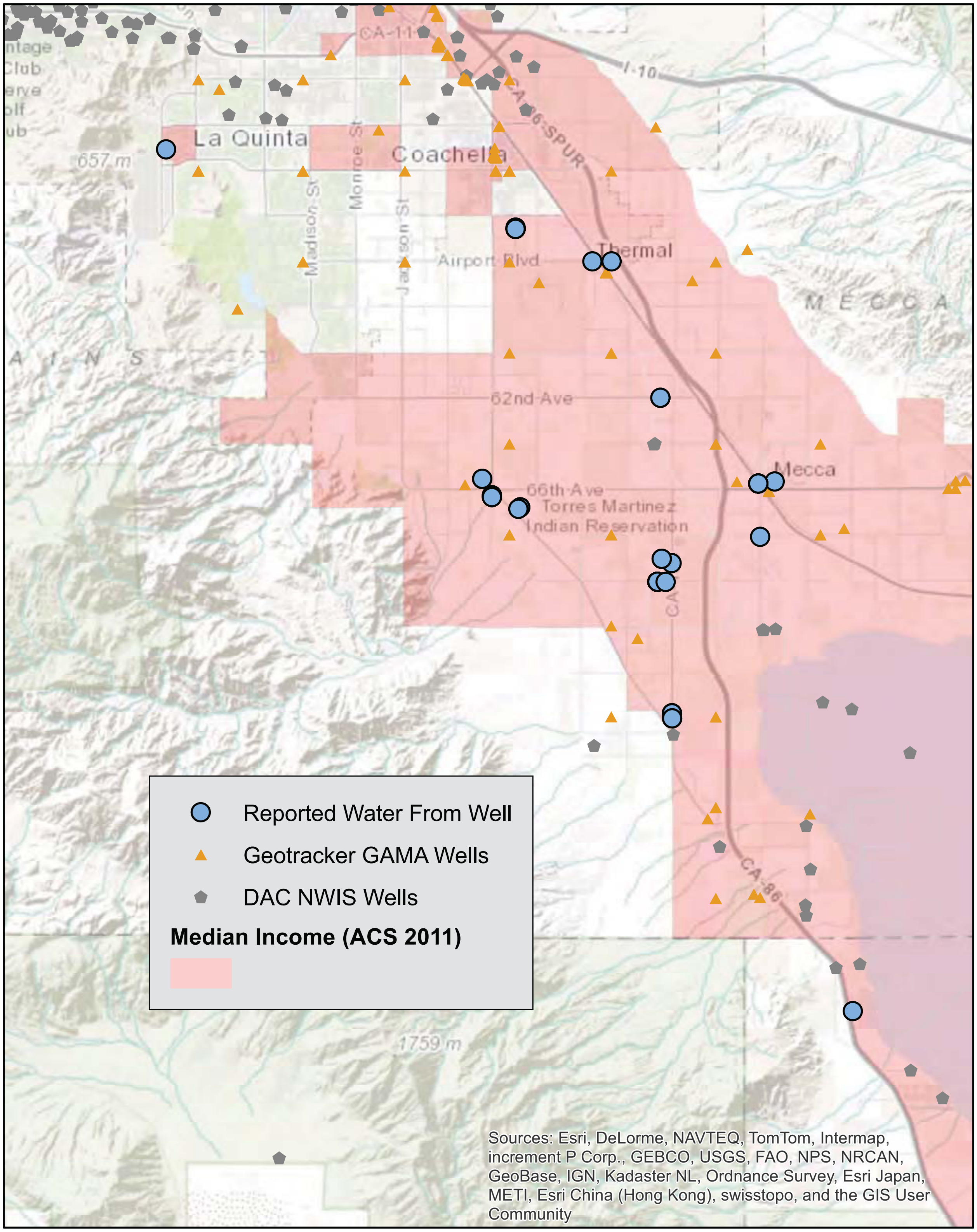
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Loma Linda University School of Public Health, RMC and CVIRWMG

Map 03

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire
Respondents Receiving Water From Well – Eastern Valley



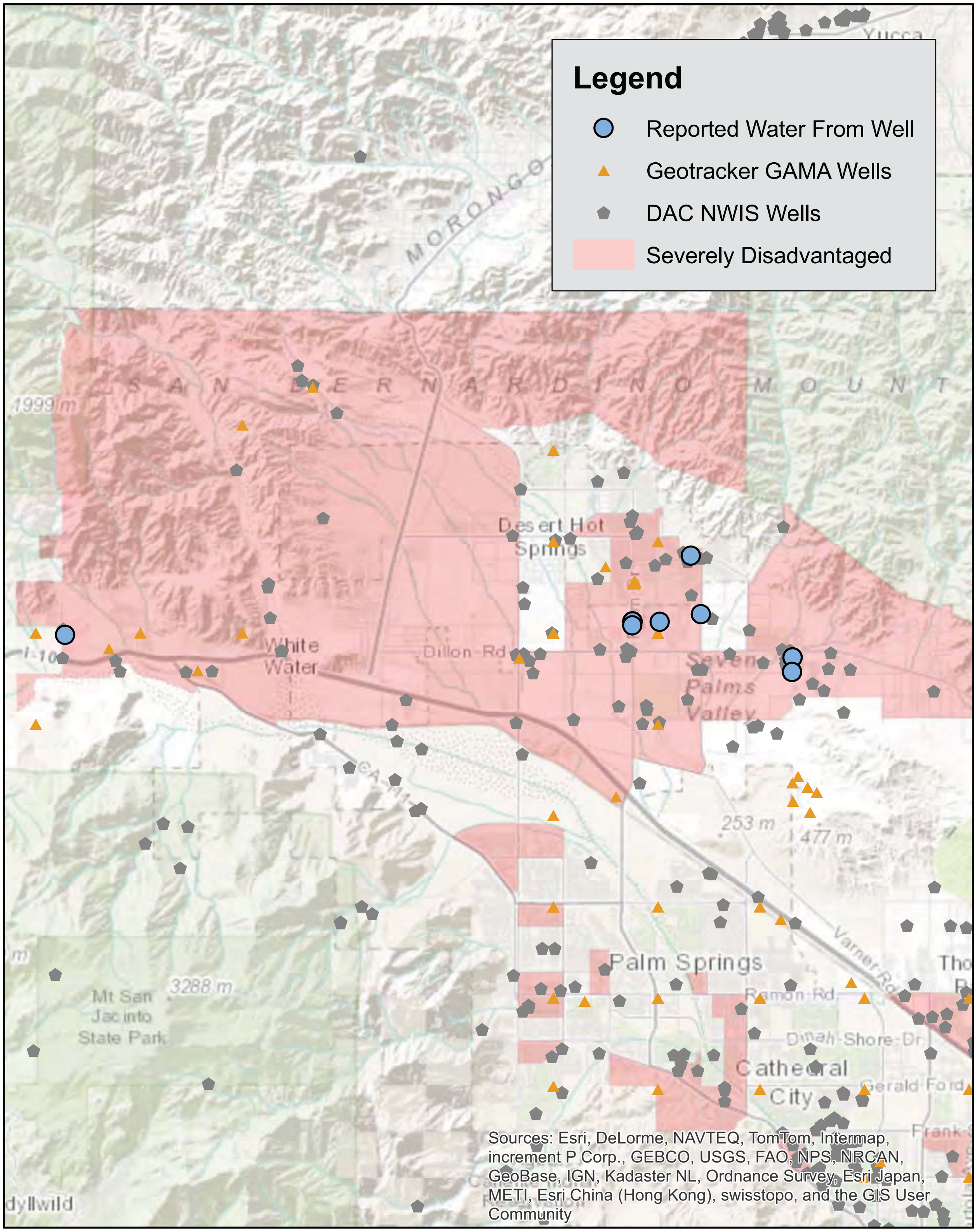
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Loma Linda University School of Public Health, RMC and CVIRWMG

Map 04

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire
Respondents Receiving Water From Well - Western Valley



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

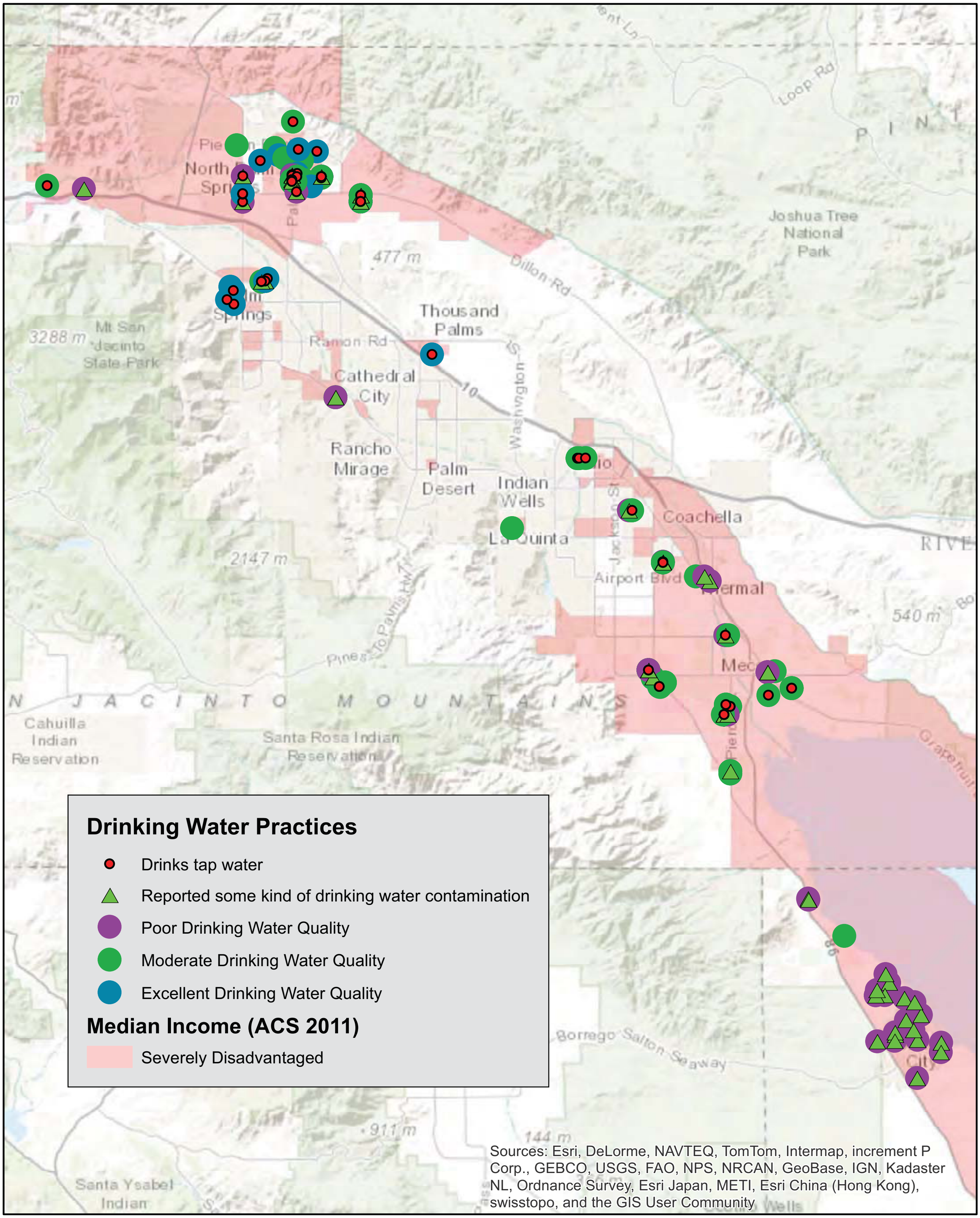
Loma Linda University School of Public Health, RMC and CVIRWMG

Map 05

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire

Respondent-reported drinking water practices



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

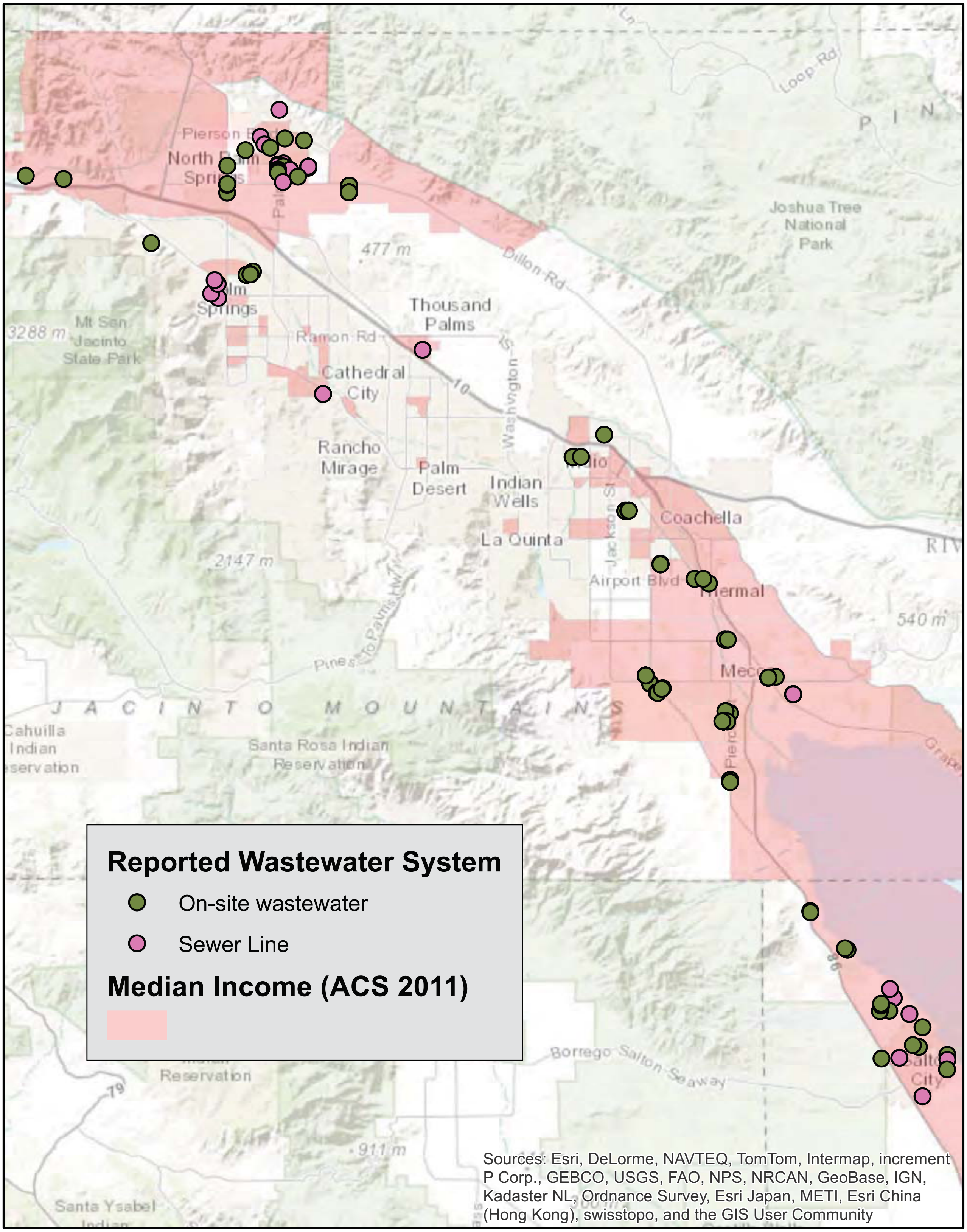
Loma Linda University School of Public Health, RMC and CVIRWMG

Map 06

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire

On-site Wastewater

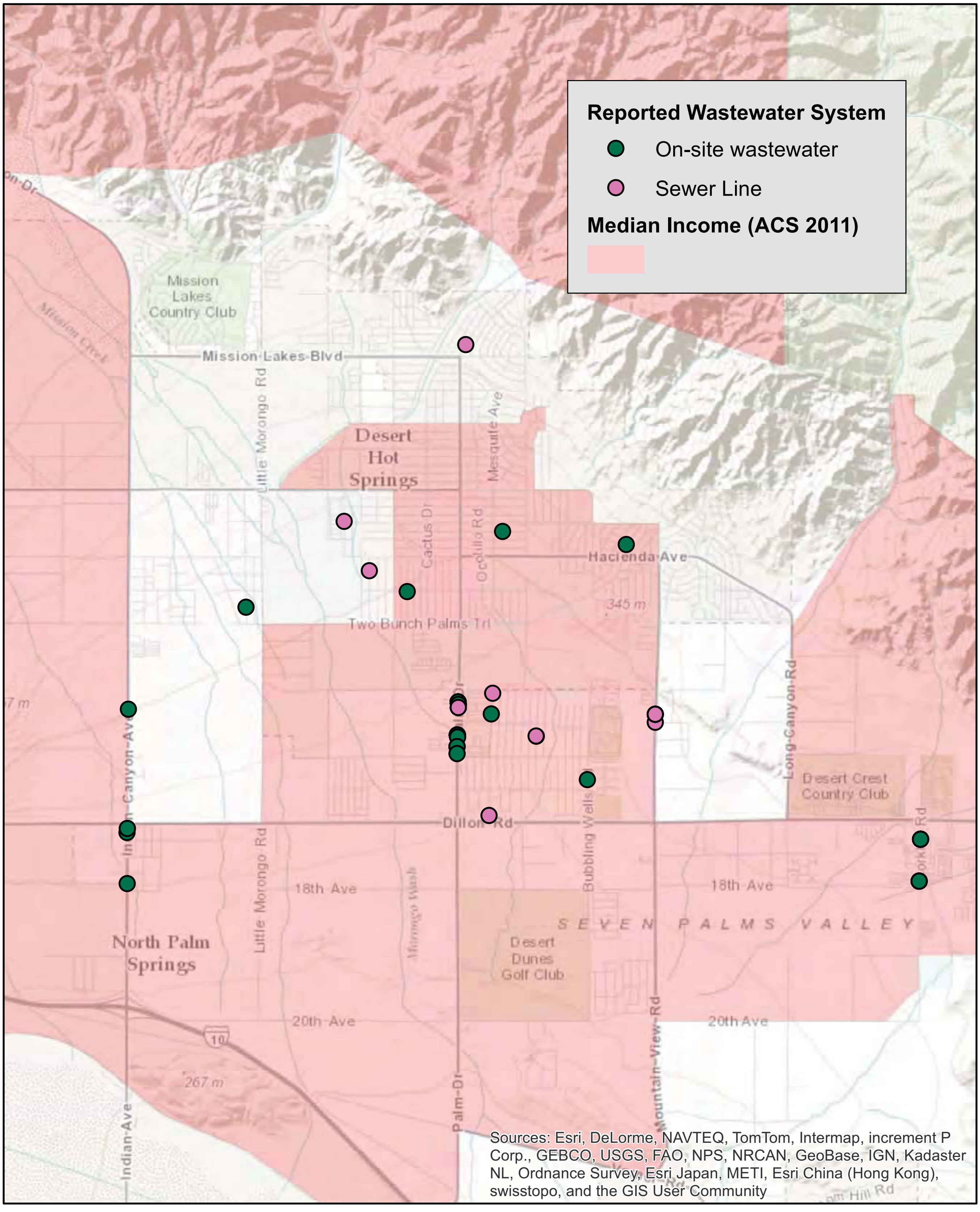


Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Loma Linda University School of Public Health, RMC and CVIRWMG

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire
On-site Wastewater/ Desert Hot Springs



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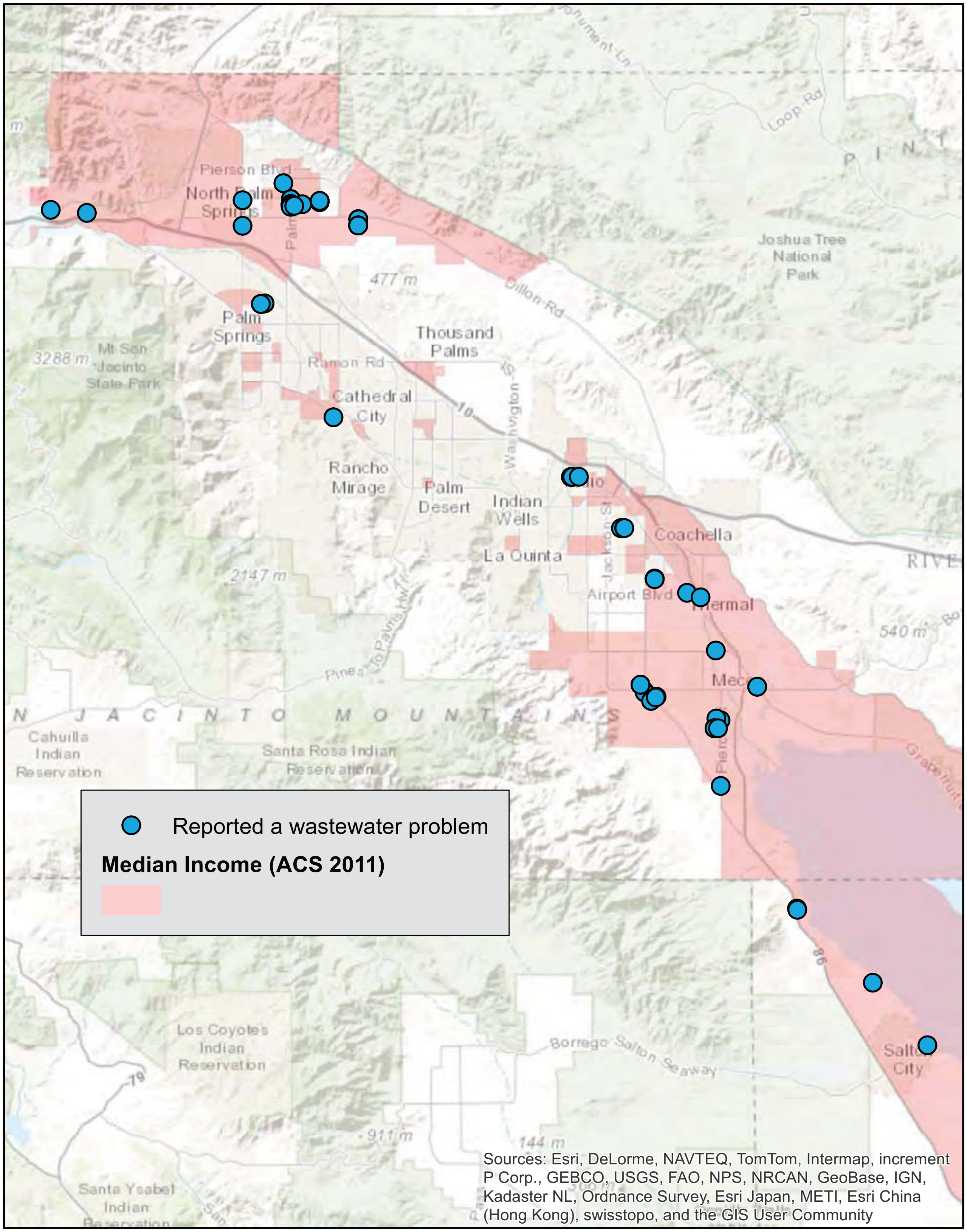
Loma Linda University School of Public Health, RMC and CVIRWMG

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire
Reported Experiencing a Failed OWS



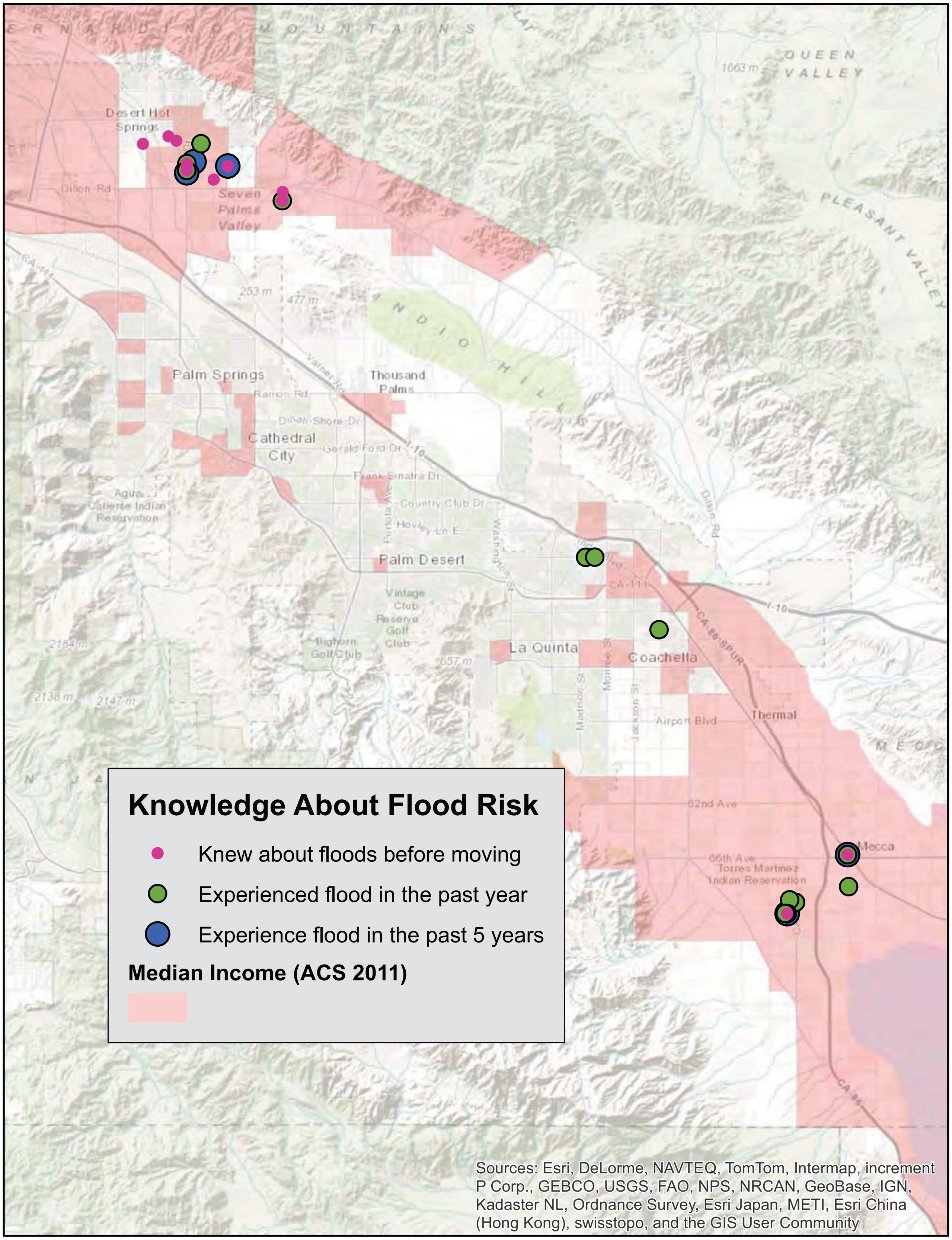
Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Loma Linda University School of Public Health, RMC and CVIRWMG

Map 09

CV Disadvantaged Communities Characterization

Opinion Survey May 2013 Questionnaire
Experience And Prior Knowledge About Flood Risk



Sources: Esri, DeLorme, NAVTEQ, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, and the GIS User Community

Loma Linda University School of Public Health, RMC and CVIRWMG

Appendix 4: Additional DAC Cluster Maps

Map A

CV Disadvantaged Communities Characterization

Severely DAC Mobile Home Park Clusters in the Eastern Coachella Valley

Chicanitas, Ave 70 polanco, D&D group

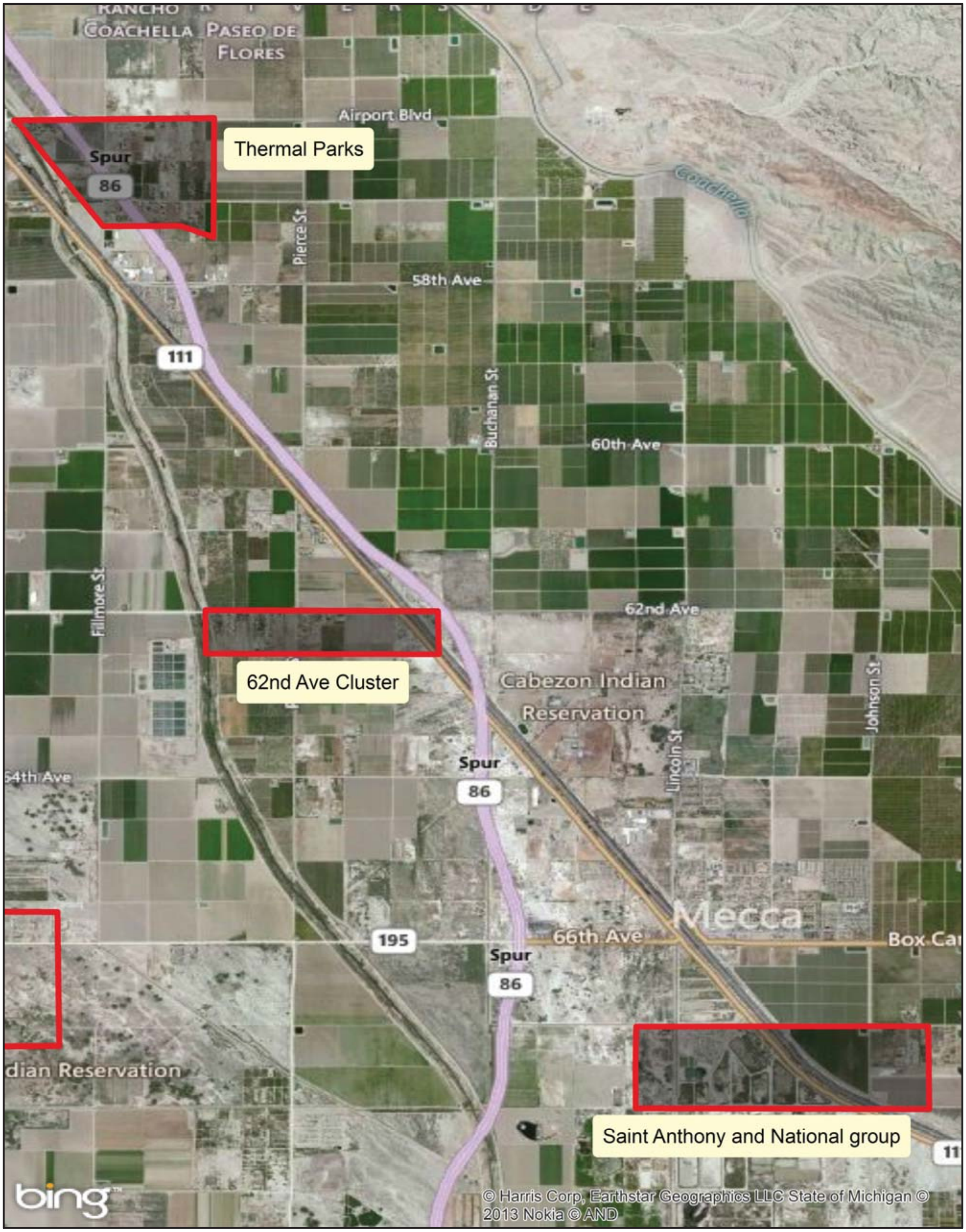
Loma Linda University School of Public Health, RMC and CVIRWMG

Map B

CV Disadvantaged Communities Characterization

Severely DAC Mobile Home Park Clusters in the eastern Coachella Valley

Saint Anthony Mobile Home Park area



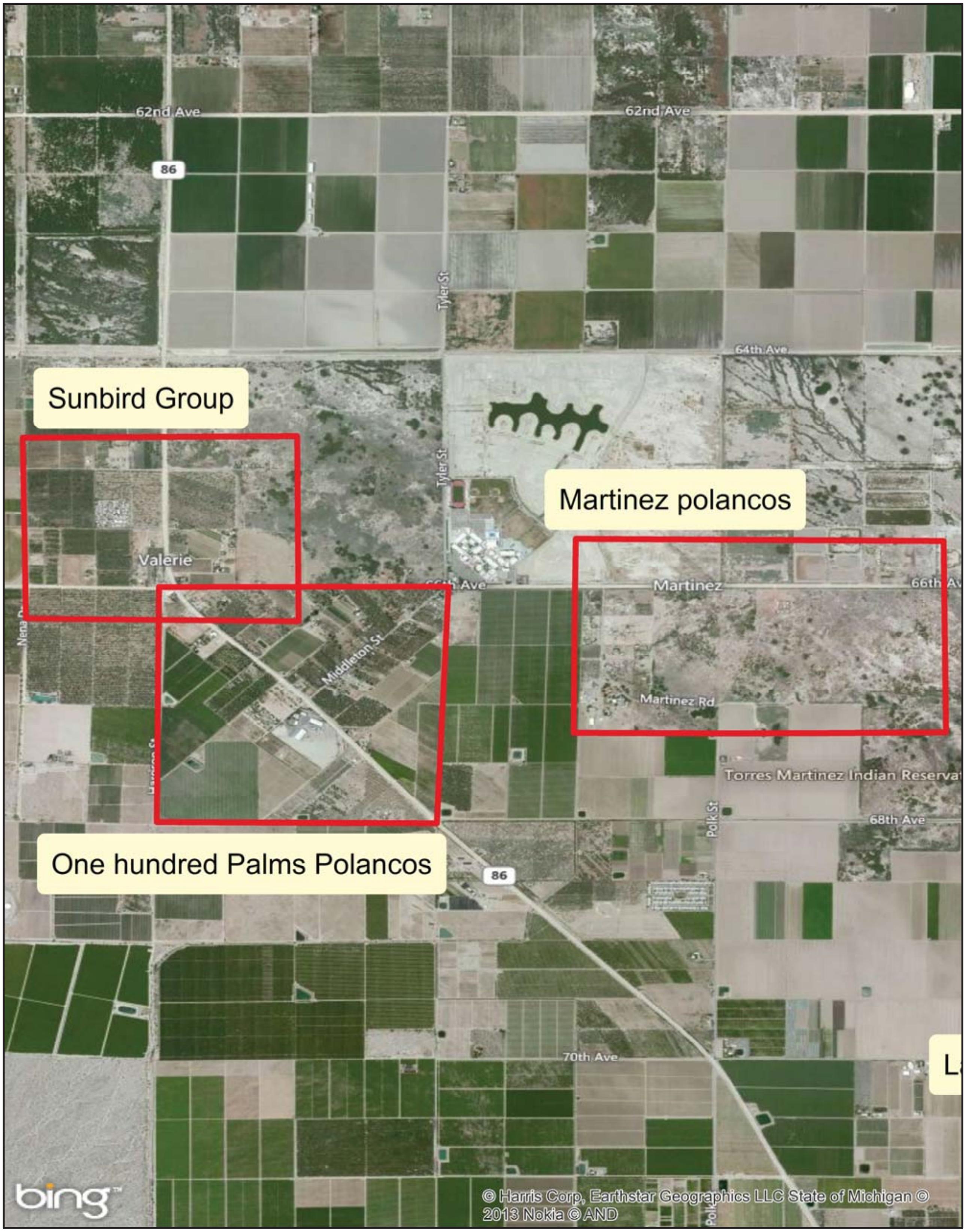
Loma Linda University School of Public Health, RMC and CVIRWMG

Map C

CV Disadvantaged Communities Characterization

Severely DAC Mobile Home Park Clusters in the eastern Coachella Valley

Sunbird group, Martinez polancos, One Hundred Palms polancos



Loma Linda University School of Public Health, RMC and CVIRWMG

Map D

CV Disadvantaged Communities Characterization

Severely DAC Mobile Home Park Clusters near the Salton Sea, Coachella Valley

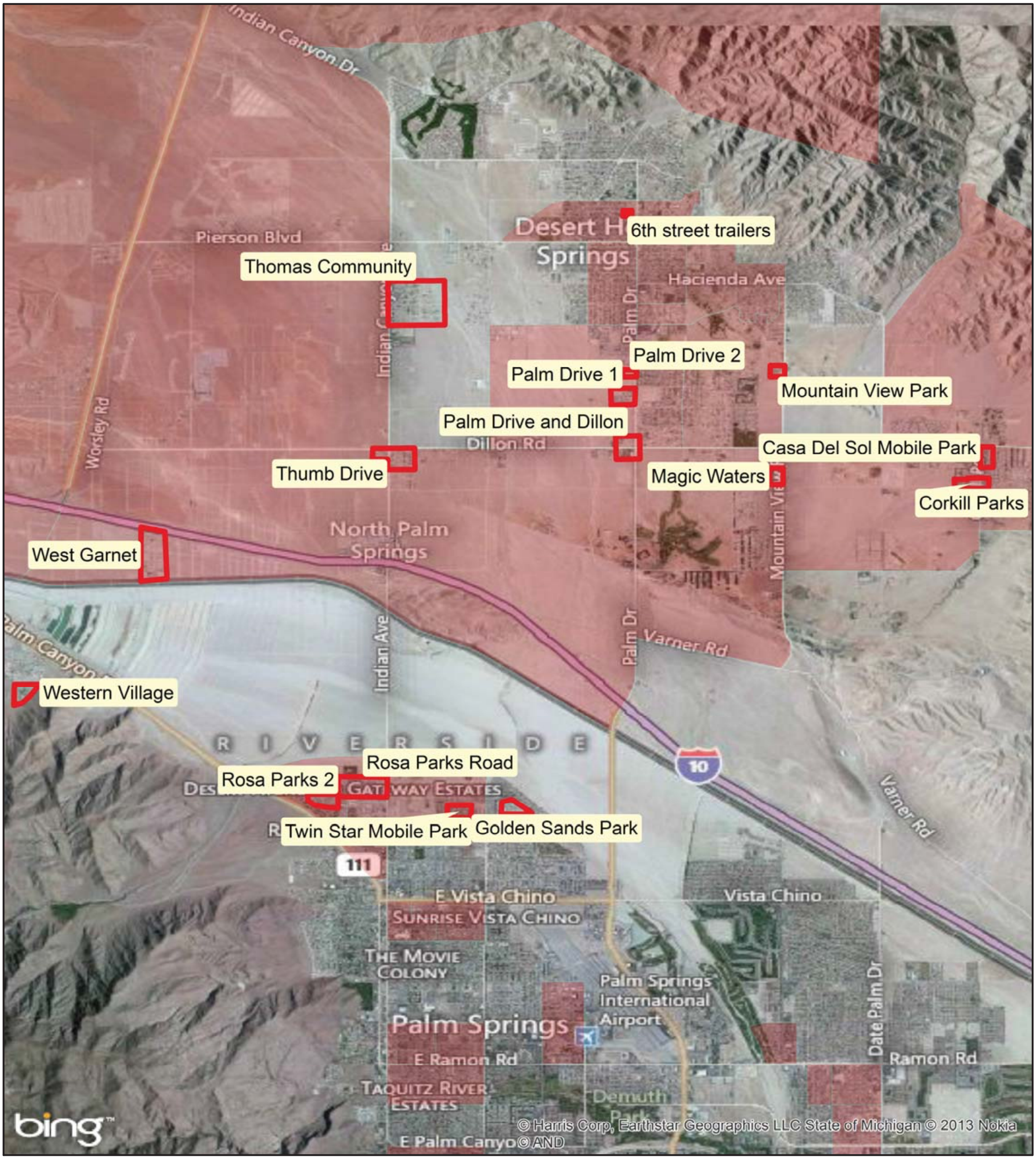
Salton Sea Beach and Desert Shores

Loma Linda University School of Public Health, RMC and CVIRWMG

Map E

CV Disadvantaged Communities Characterization

Severely DAC Mobile Home Park Clusters in Desert Hot Springs and Palm Springs



Loma Linda University School of Public Health, RMC and CVIRWMG

Map F

CV Disadvantaged Communities Characterization

Severely DAC Mobile Home Park Clusters in Indio and Thermal

Filmore Street, Indio, Thousand Palms, Cathedral City, and Shady Lane

Loma Linda University School of Public Health, RMC and CVIRWMG

Appendix VII-C: Disadvantaged Communities Water Quality Evaluation and Residential Groundwater Treatment Program

This appendix includes the report from the DAC Water Quality Evaluation technical study conducted as part of the 2014 Coachella Valley IRWM Plan update process. As a result of the DAC Water Quality Evaluation, DAC Project 4 – Residential Groundwater Treatment Program was developed. This program is one of four demonstration projects for the DAC Outreach Program, and is included in this appendix following the DAC Water Quality Evaluation report.

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Coachella Valley Integrated Regional Water Management Plan Update

Disadvantaged Community (DAC) Water Quality Evaluation

Final Report

Prepared by:

RMC
Water and Environment

February 2014

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1 Introduction

The Coachella Valley Regional Water Management Group (CVRWMG) – composed of Coachella Valley Water District (CVWD), Mission Springs Water District (MSWD), Desert Water Agency (DWA), Coachella Water Authority (CWA), and Indio Water Authority (IWA) – are preparing an update of the 2009 Coachella Valley Integrated Regional Water Management (IRWM) Plan. The purpose of the Coachella Valley IRWM Plan is to accurately characterize the existing water resources conditions, issues, and needs of the Valley, and then to establish a project selection process for funding water management projects that help to meet those needs. During the scoping process for the IRWM Plan update, stakeholders identified the need to better understand and document water quality conditions in the region's disadvantaged communities so that projects can be developed to ensure safe drinking water for those populations.

1.1 Project Purpose

The Coachella Valley Groundwater Basin (CVGWB or basin) is of critical importance to the local community – it provides the majority of water used in the Valley, including nearly all that is used for domestic purposes. In areas of the region that lay outside of municipal water suppliers' distribution systems, private wells pump groundwater from varying depths for use as drinking water. Elevated concentrations of fluoride, arsenic, chromium, uranium, nitrate, and total dissolved solids (TDS) are present in some areas of the groundwater basin; these constituents are presenting concerns about the quality of drinking water supplies.

The State of California defines a Disadvantaged Community (DAC) as a community with an annual median household income (MHI) that is less than 80% of the Statewide MHI. Using this standard, four of the nine cities in the Coachella Valley IRWM Region would qualify as DACs: Cathedral City, Coachella, Desert Hot Springs, and Palm Springs. Smaller DACs are also present in other areas of the Valley. Because groundwater is their only source of water, these communities are potentially impacted by poor groundwater quality.

To best manage the local groundwater resource to meet needs of all Valley residents, this study was conducted to assess groundwater quality issues in and around DAC areas outside of the water purveyor's municipal service areas. This study, documented herein, identified chemical constituents with concentrations that are near or exceed drinking water standards in groundwater in DAC areas, and developed and screened possible solutions for addressing any impacts resulting from these elevated concentrations in groundwater in these identified areas. This study also identified significant gaps in water quality data coverage in the basin, and presents a plan for addressing these data gaps. A groundwater quality monitoring plan was developed as part of the IRWM Program to assess local monitoring activities; that report, the *Evaluation of Valley-Wide Groundwater Monitoring Programs*, is included as Appendix VI-J to the 2014 Coachella Valley IRWM Plan Volume I.

2 Data Collection and Analysis

Data collected for this *DAC Water Quality Evaluation* were used to complete several key steps in the study:

- To identify the areas of concern (AOCs) within the groundwater basin;
- To identify the constituents of concern (COCs) within the groundwater basin;
- To determine where there are AOCs with COCs in groundwater above the primary drinking water standards;
- To identify projects that can address those COCs found in AOCs; and

- To aid in developing a groundwater quality monitoring plan to both fill data gaps and allow for ongoing assessment of DAC water quality issues.

For this analysis, only federal and state primary drinking water standards (referred to as Maximum Contaminant Levels or MCLs) were considered as these standards are set to protect human health. Secondary MCLs, also issued both the federal government and the State of California, are set based on esthetics, such as taste, odor or staining potential, but do not present human health hazards. As such, Secondary MCLs were not considered in this analysis.

2.1 Data Collection and Review

Data used in the *DAC Water Quality Evaluation* were collected from publically-available sources and from IRWM stakeholders. A formal request for data was submitted to the CVRWMG and the region's stakeholders on August 17, 2012. Subsequent requests for data were made to the stakeholders, via email, in late August and early September 2012. Requested data sets included:

- Groundwater quantity data, such as groundwater elevations, DAC and/or municipal supply well locations, and well construction details.
- Groundwater Quality data, such as water quality and monitoring data, information to establish water-bearing zones correlating with the water quality data, geostatistical analyses, plume delineations (for both natural and anthropogenic plumes), and information regarding groundwater treatment systems.
- Monitoring information, including information regarding ongoing monitoring programs, the location and screened depths of wells being monitored, water quality sampling and analysis parameters, the frequency of sampling/data evaluation, and reporting methodologies.
- Other information, such as the location of septic systems, groundwater management plans (GWMPs) and groundwater-specific studies.

Water quality data were received from CVWD, and well construction logs were received from the California Department of Water Resources (DWR). Additional GIS-based data sets were received from CVWD, including a shapefile of their potable water service area.

Supplemental groundwater quality data were collected from two publically-available online databases – GAMA-Geotracker and the Water Quality Portal. GAMA-Geotracker is an online groundwater information system maintained by the State Water Resources Control Board that allows access to water quality data from multiple sources, including the State and Regional Water Boards, California Department of Public Health, Department of Pesticide Regulation, Department of Water Resources, U.S. Geological Survey (USGS), and Lawrence Livermore National Laboratory. The Water Quality Portal (WQP) is located on the National Water Quality Monitoring Council (NWQMC) website. NWQMC is an organization composed of representatives from the USGS and U.S. Environmental Protection Agency (USEPA) created to develop collaborative, comparable and cost-effective approaches for monitoring and assessing the Nation's water quality. The WQP is a cooperative service by the USGS, the USEPA, and the NWQMC that integrates publicly-available water quality data from the USGS National Water Information System (NWIS) and the EPA STOrage and RETrieval (STORET) Data Warehouse.

2.2 Data Analysis

Data sets used in this DAC Water Quality Evaluation are as follows:

- Groundwater basin designation/delineation – DWR
- Geology/Hydrogeology – DWR, USGS
- Potable water service areas – CVWD, DWA, IWA, MSWD, and CWA
- DAC designation/delineation – U.S. Census Bureau
- Well construction information – DWR
- Water Quality Data – USGS, USEPA, SWRCB, RWQCBs, Department of Public Health, Department of Pesticide Regulation

The data sets were manipulated in a GIS environment, with data layers overlain to identify intersections. Figures 1 through 6 show some of the GIS layers that were developed and applied during the data evaluation.

Over 20 chemical constituents or classes of constituents were evaluated during the data analysis. These are as follows:

- Dissolved oxygen
- pH
- Alkalinity
- Turbidity
- Volatile Organic Compounds (VOCs)
- Polar Pesticides and degredates
- Pesticides and degredates
- Pharmaceutical Compounds
- Dissolved Organic Carbon
- Wastewater Indicator Compounds
- Perchlorate
- 1,2,3-trichloropropane
- Nutrients
- Major and Minor Ions and Trace Elements
- Arsenic
- Chromium
- Iron
- Hydrogen and Oxygen Isotopes
- Carbon and Carbon 14 Isotopes
- Uranium
- Radioactivity
- Noble Gases
- Bacterial Indicators
- Viral Indicators

In addition, a SWRCB document entitled *Communities that Relay on Contaminated Groundwater* (February 2012) was examined to determine how the results of that study correlated with the findings of the data analysis. As documented in this study, 22 of the 36 identified community water systems in Riverside County were found to be 100% reliant on groundwater, and eight communities were found to have MCL violations. Of these eight communities, all were 50% to 100% reliant on groundwater as their principal water supply. Finally, the study identified 10 principal contaminants in these water system; these constituents were arsenic, nitrate, gross alpha radioactivity, perchlorate, perchlorethylene (PCE), trichloroethylene (TCE), uranium, dibromochloropropane (DBCP), fluoride, and carbon tetrachloride. The report did not, however, provide a sufficient level of detail to allow direct correlation to the Coachella Valley (versus all of Riverside County as a whole).

Figure 1: Coachella Valley Groundwater Basin

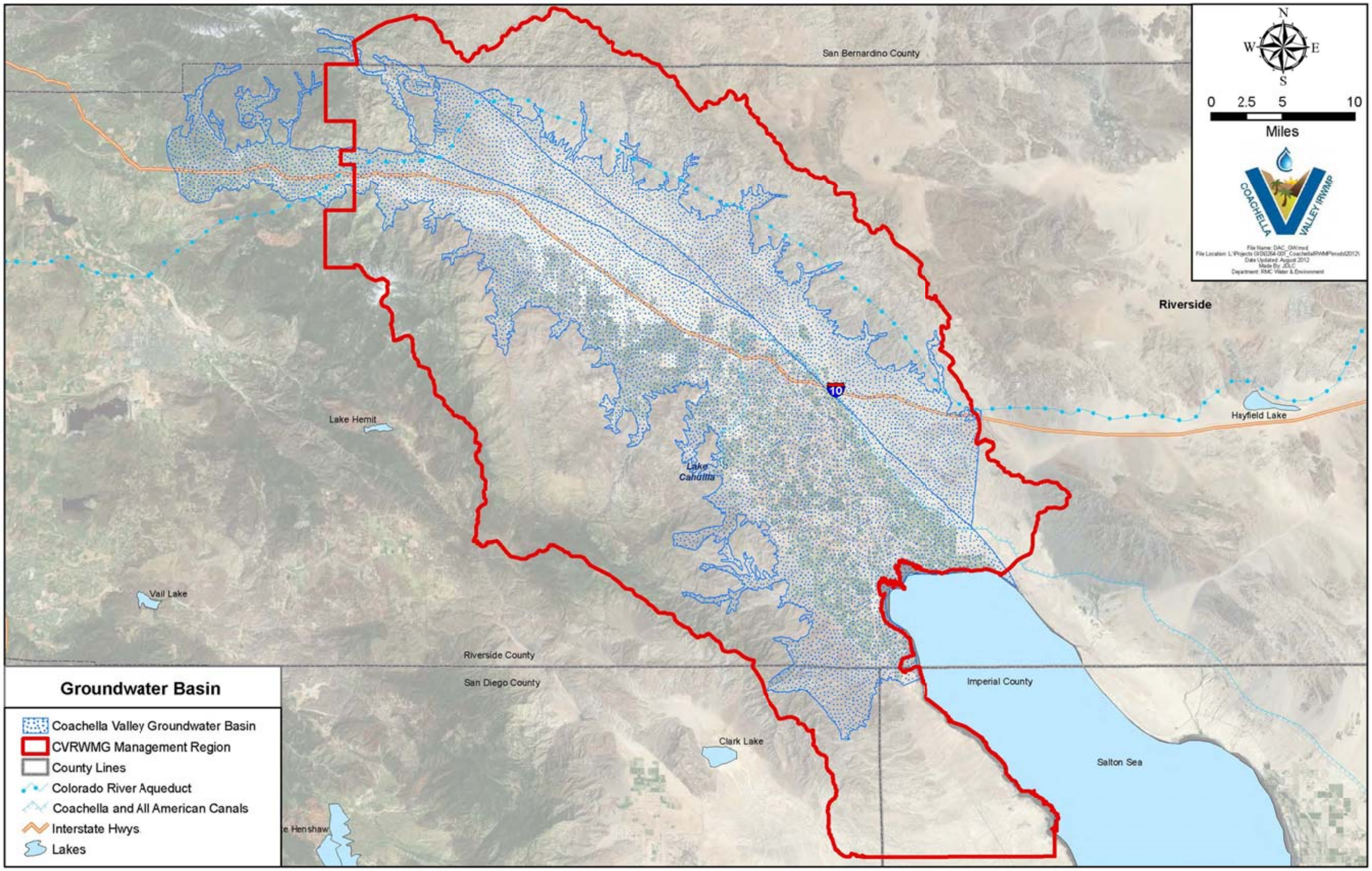
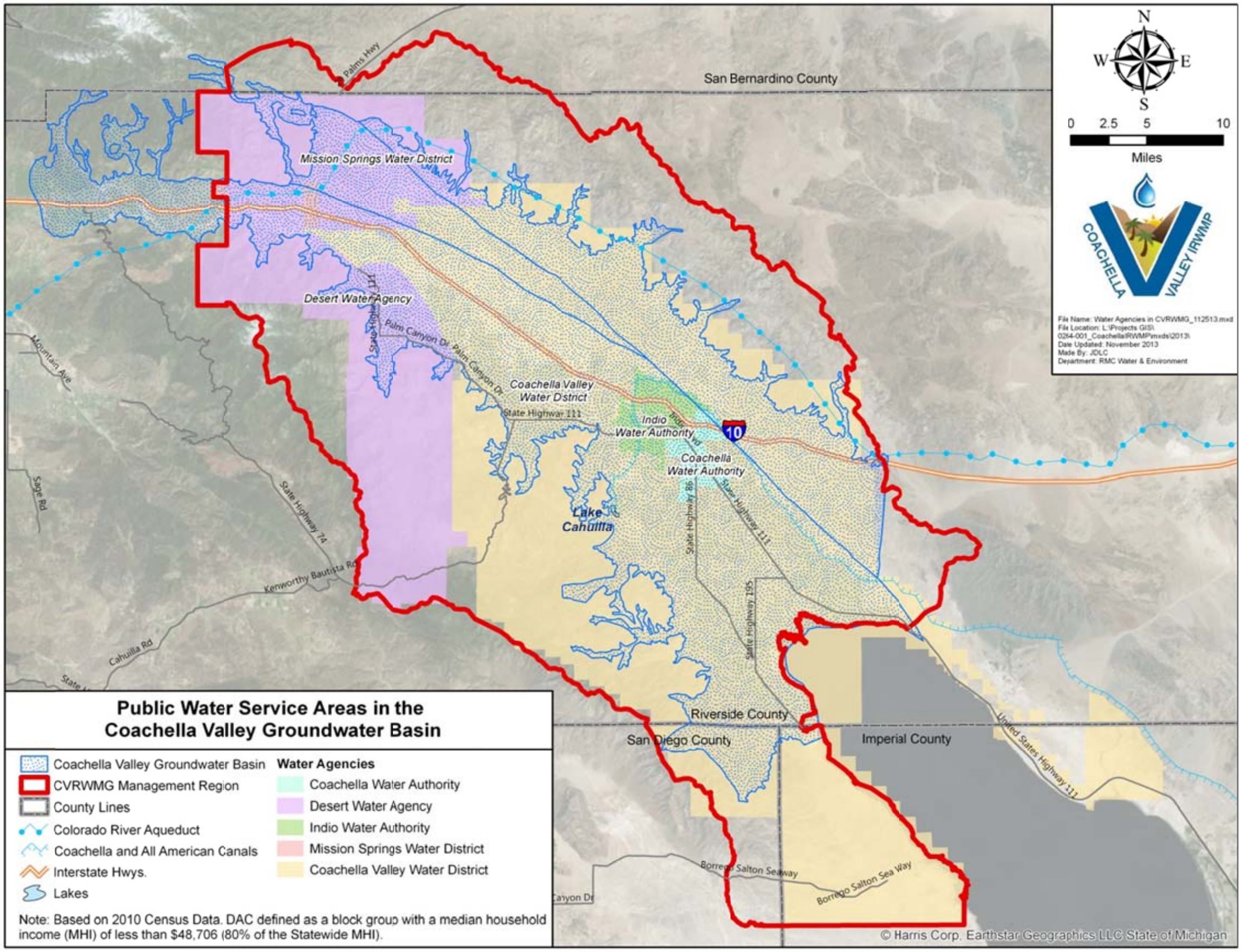


Figure 2: Public Water Service Areas in the Coachella Valley Groundwater Basin



Note: Based on 2010 Census Data. DAC defined as a block group with a median household income (MHI) of less than $48,706 (80% of the Statewide MHI).

Figure 3: Disadvantaged Communities in the Coachella Valley Groundwater Basin

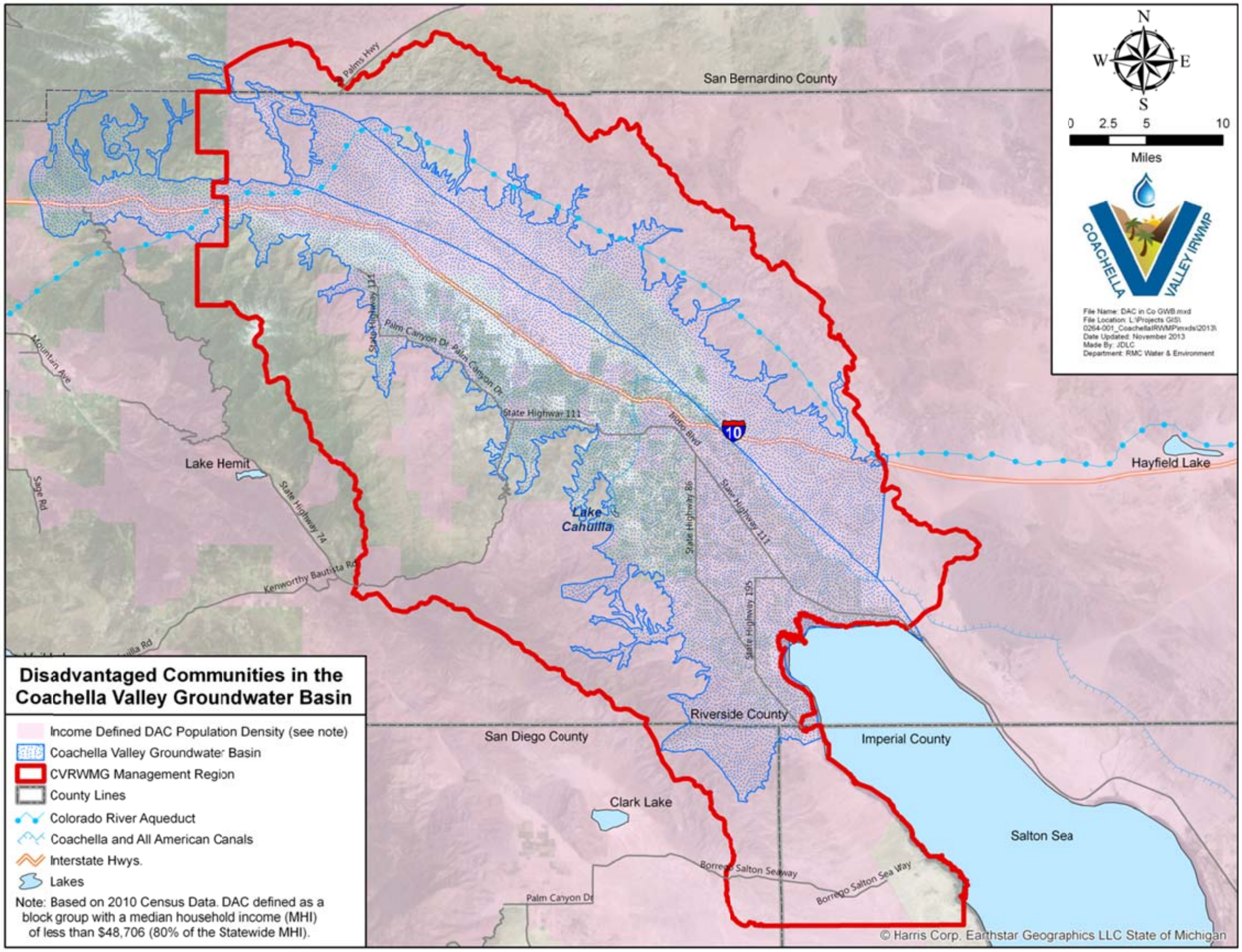
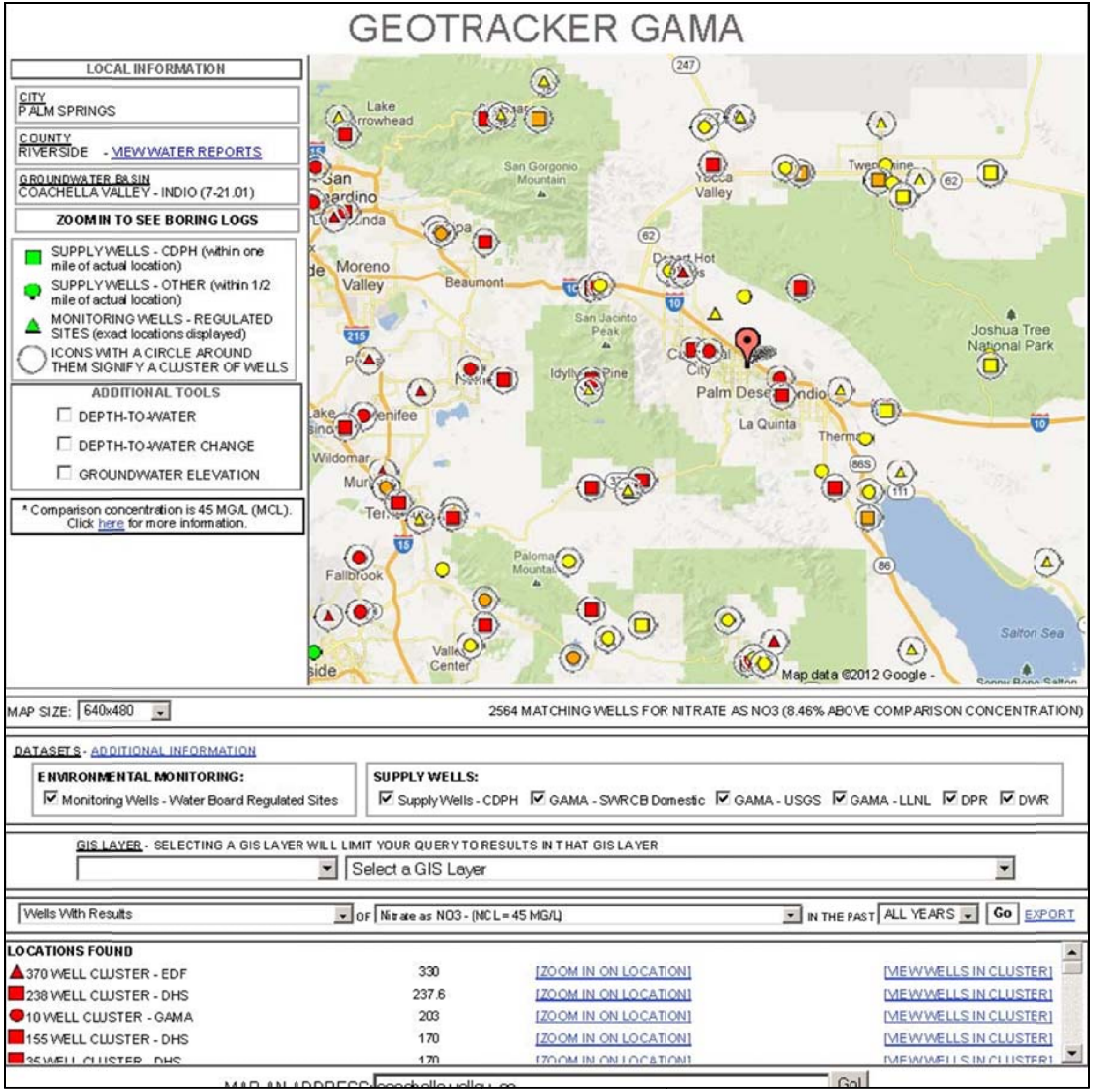


Figure 4: Screenshot of GeoTracker-GAMA Data Set



LOCAL INFORMATION

CITY
PALM SPRINGS

COUNTY
RIVERSIDE - VIEW WATER REPORTS

GROUNDWATER BASIN
COACHELLA VALLEY - INDIO (7-21.01)

ZOOM IN TO SEE BORING LOGS

- 🟩 SUPPLY WELLS - CDPH (within one mile of actual location)
- ● SUPPLY WELLS - OTHER (within 1/2 mile of actual location)
- ▲ MONITORING WELLS - REGULATED SITES (exact locations displayed)
- ○ ICONS WITH A CIRCLE AROUND THEM SIGNIFY A CLUSTER OF WELLS

ADDITIONAL TOOLS

☐ DEPTH-TO-WATER
☐ DEPTH-TO-WATER CHANGE
☐ GROUNDWATER ELEVATION

* Comparison concentration is 45 MG/L (MCL). Click here for more information.

MAP SIZE: 640x480

2564 MATCHING WELLS FOR NITRATE AS NO3 (8.46% ABOVE COMPARISON CONCENTRATION)

DATASETS - ADDITIONAL INFORMATION

ENVIRONMENTAL MONITORING:
☑ Monitoring Wells - Water Board Regulated Sites

SUPPLY WELLS:
☑ Supply Wells - CDPH ☑ GAMA - SWRCB Domestic ☑ GAMA - USGS ☑ GAMA - LLNL ☑ DPR ☑ DWR

GIS LAYER - SELECTING A GIS LAYER WILL LIMIT YOUR QUERY TO RESULTS IN THAT GIS LAYER

Select a GIS Layer

Wells With Results OF Nitrate as NO3 - (MCL = 45 MG/L) IN THE PAST ALL YEARS Go EXPORT

LOCATIONS FOUND

▲ 370 WELL CLUSTER - EDF	330	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
🟥 238 WELL CLUSTER - DHS	237.6	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
● 10 WELL CLUSTER - GAMA	203	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
🟥 155 WELL CLUSTER - DHS	170	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]
🟥 35 WELL CLUSTER - DHS	170	[ZOOM IN ON LOCATION]	[VIEW WELLS IN CLUSTER]

Figure 5: Screenshot of Data Set from Water Quality Data Portal

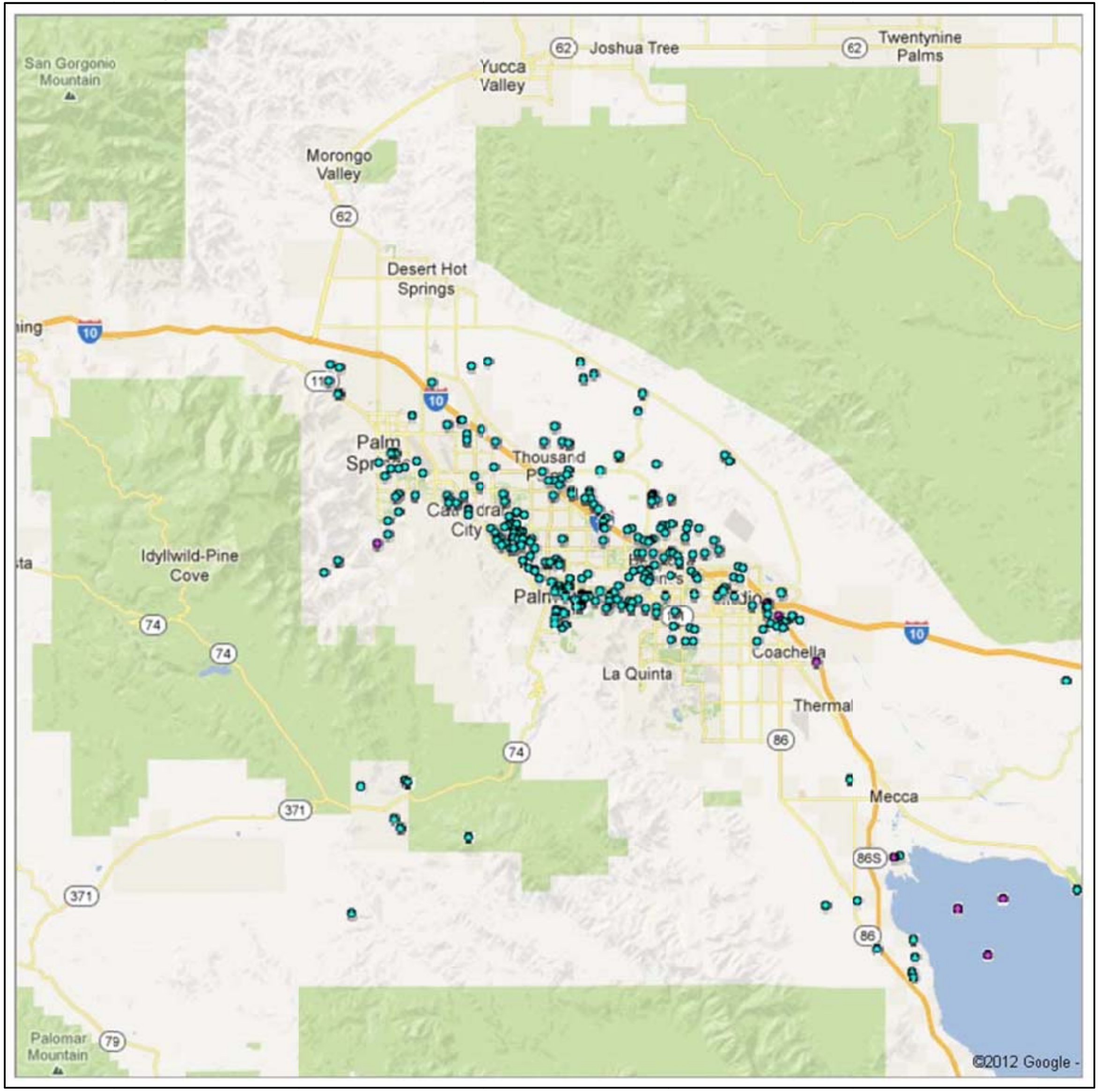
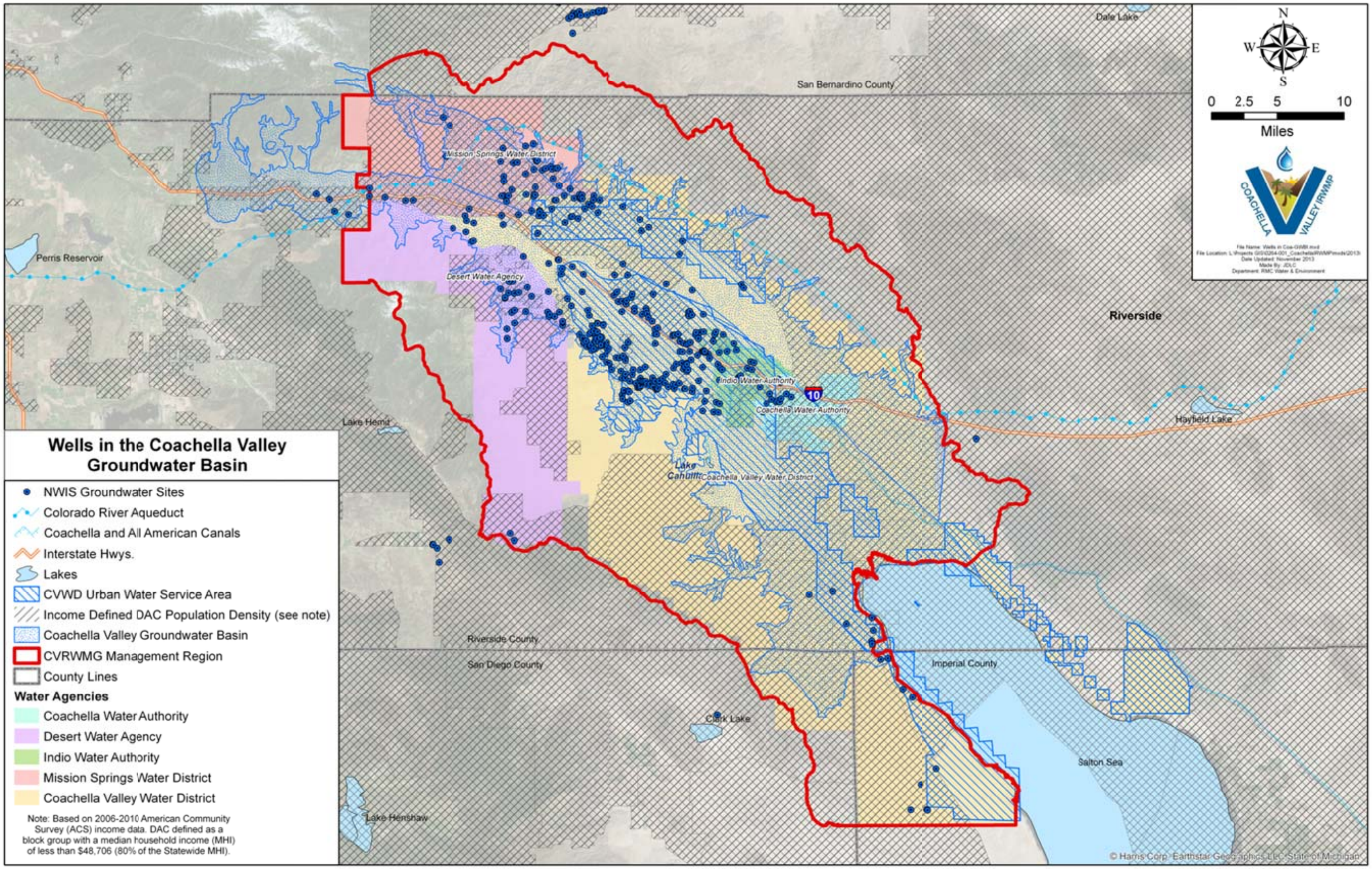


Figure 6: Wells in the Coachella Valley Groundwater Basin



3 Problem Identification and Solution Development and Evaluation

The following section describes how the data collected above were used to identify problem areas in the groundwater basin and to develop solutions to drinking water supply impacts.

3.1 Identification of Areas of Concern (AOCs)

Areas of concern (AOCs), for the purpose of this analysis, are defined as areas overlying the groundwater basin, outside of an established public potable water service area, containing DACs. Additionally, these areas contain wells that have groundwater quality data exceeding the Primary Maximum Contaminant Level (MCL) of drinking water standards for specific constituents (called Constituents of Concern or COCs). Key to this definition is the assumption that public water agencies, such as CVWD, DWA, IWA, MSWD and CWA, regularly monitor their delivered water quality and have taken actions, as needed to date, to ensure that the potable water they deliver meets drinking water standards. Therefore, the AOCs are those areas that depend on individual or small community water supply wells for their service, and the assumptions that these wells are infrequently tested and groundwater from these wells is not treated.

To identify these AOCs, the water quality data were combined with other existing database/GIS information, such as the delineation of the Coachella Valley IRWM Region and the CVGB and the location of the water agency potable water service areas. These layers were then overlain by the identified DACs to identify the AOCs. Figure 7 shows the locations of AOCs within the CVGB, while Figures 8 through 11 highlights the individual areas of concern.

3.2 Identification of Constituents of Concern (COCs)

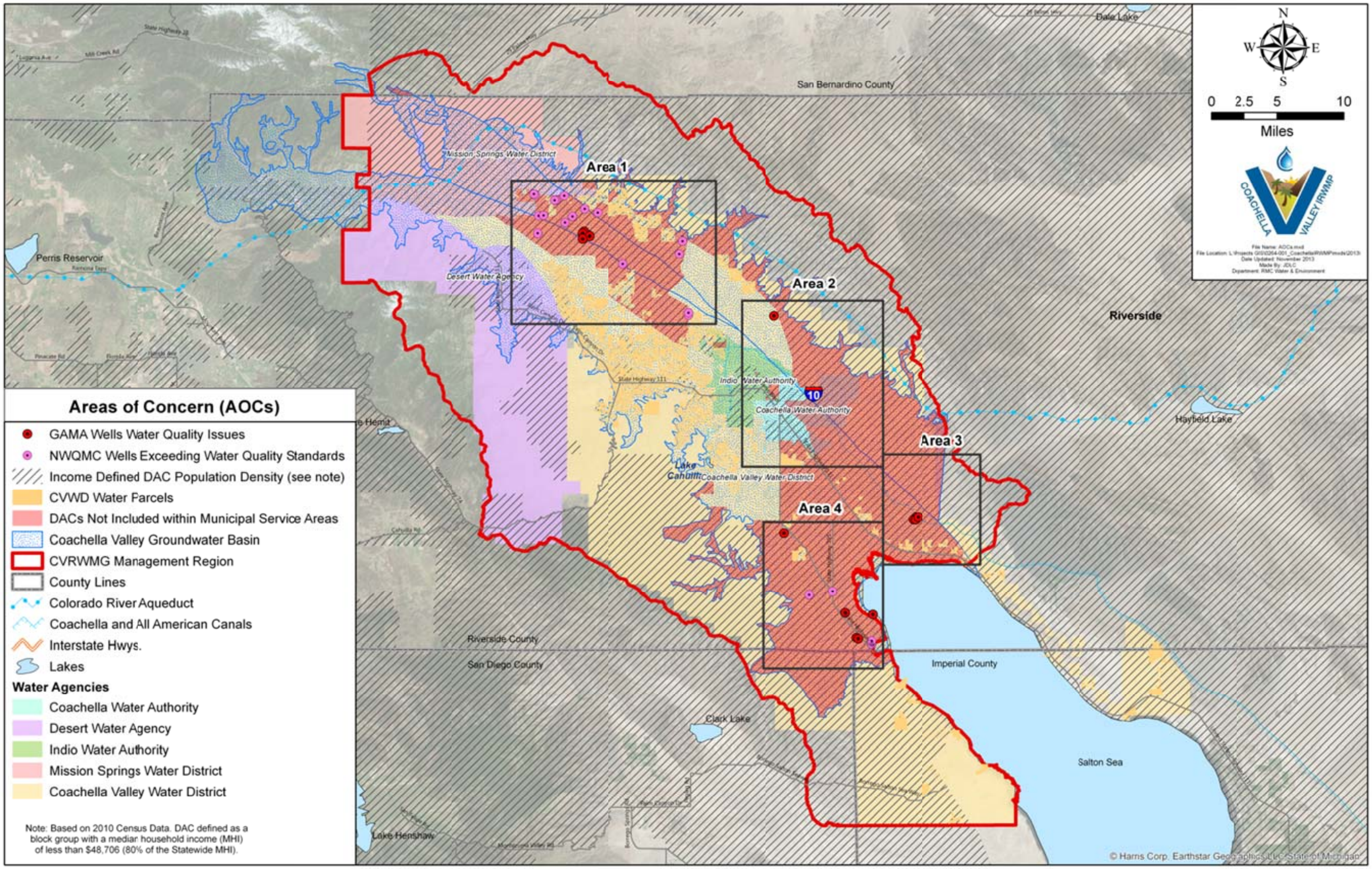
The water quality data previously described were evaluated to identify those constituent in the groundwater basin that had one or more exceedences of their respective primary MCLs. The AOCs, as described above, were then overlain on these data to determine/confirm if the AOCs overlie these areas of known groundwater quality exceedences. In summary, four constituents of concern (or COCs) were identified for the Coachella Valley Groundwater Basin: arsenic, fluoride, nitrate, and uranium. Table 1summarizes the COCs and the average observed concentrations.

Table 1: Identified Constituents of Concern

Constituent of Concern	Primary MCL	Average Concentration in AOCs	Number of Sampling Points
Arsenic	10 μg/L	237 μg/L	8
Fluoride	2 mg/L	6.6 mg/L	200
Nitrate – N	10 mg/L	30.2 mg/L	302
Uranium	30 mg/L or 20 pCi/L	28.6 pCi/L	52
Hexavalent Chromium	10 μg/L	9.1 μg/L	392

Recently, elevated concentrations of chromium in groundwater in the Coachella Valley Groundwater Basin have been considered cause for concern due to the development of a drinking water standard for hexavalent chromium (Cr^{+6}). In August of 2013, the California Department of Public Health (CDPH) issued a draft primary MCL of 10 μg/L for hexavalent chromium. As some groundwater samples collected in east of Palm Springs around the border of Indio and Mission Creek Subbasins, north of North Palm Springs and around La Quinta, Indian Wells, Indio and Coachella show hexavalent chromium concentrations above the proposed primary MCL, hexavalent chromium was added to the list of COCs to be addressed in this study.

Figure 7: Areas of Concern (AOCs)



Note: Based on 2010 Census Data. DAC defined as a block group with a median household income (MHI) of less than $48,706 (80% of the Statewide MHI).

Figure 8: Areas of Concern – Area 1

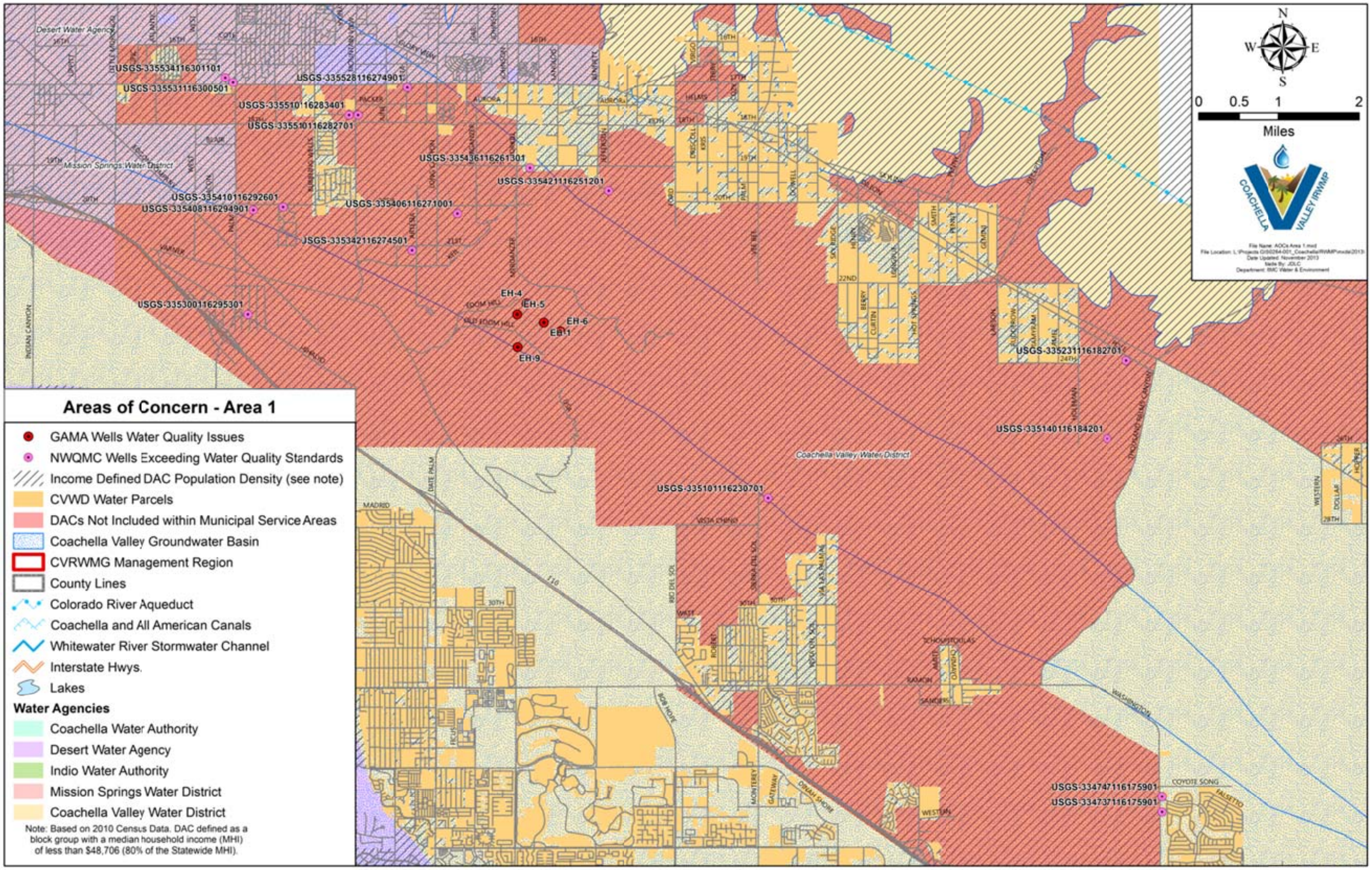


Figure 9: Areas of Concern – Area 2

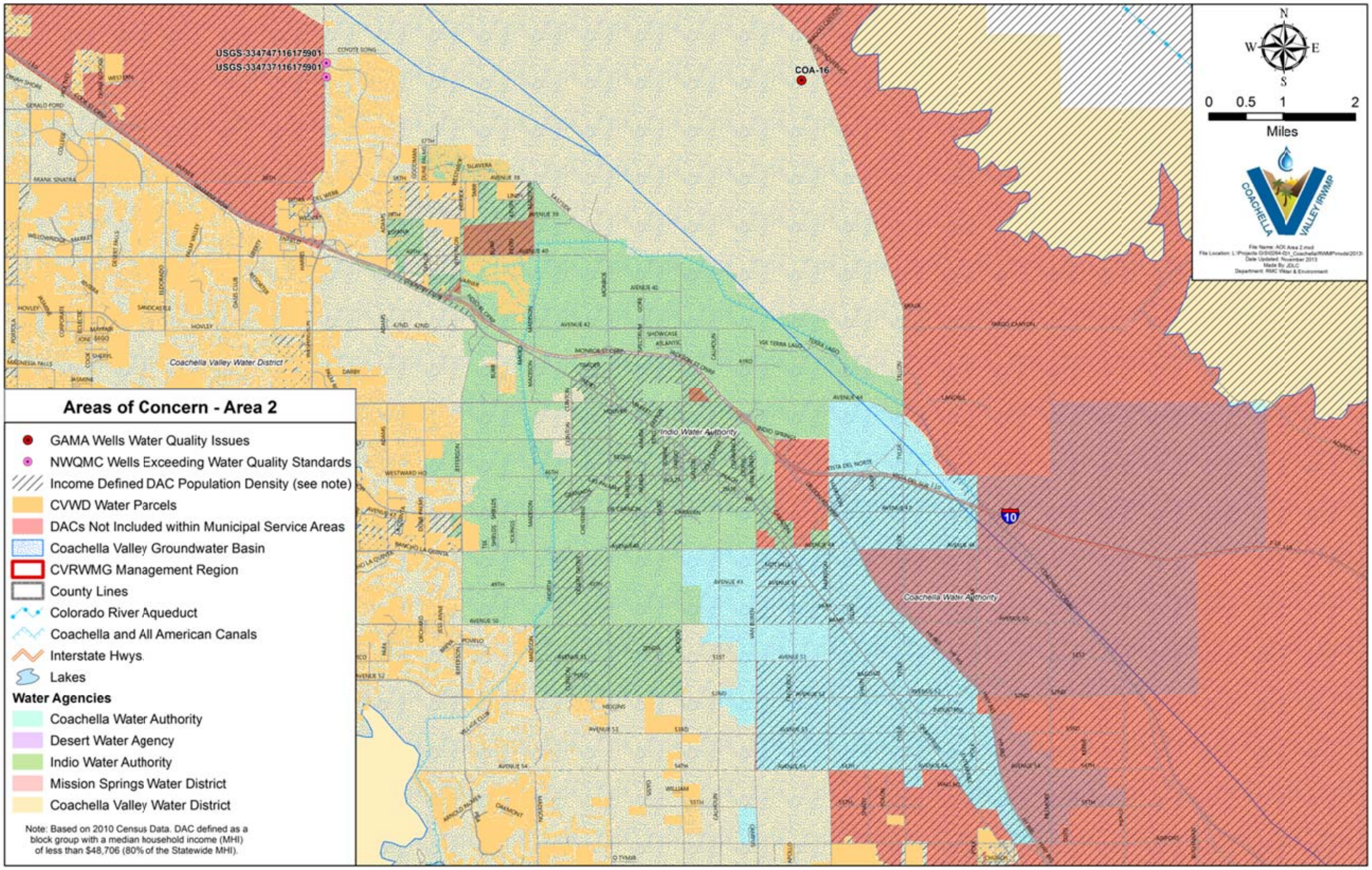


Figure 10: Areas of Concern – Area 3

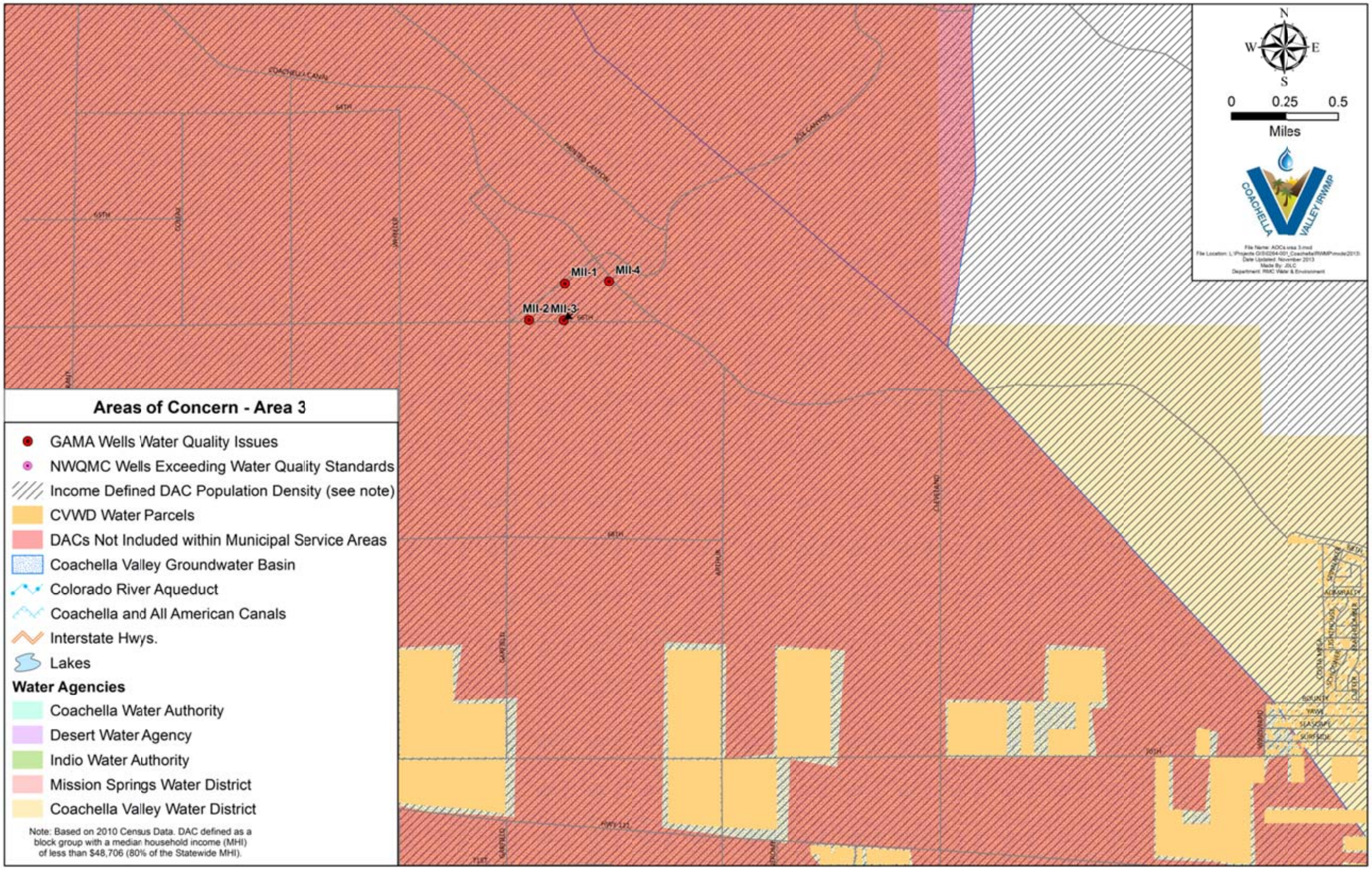
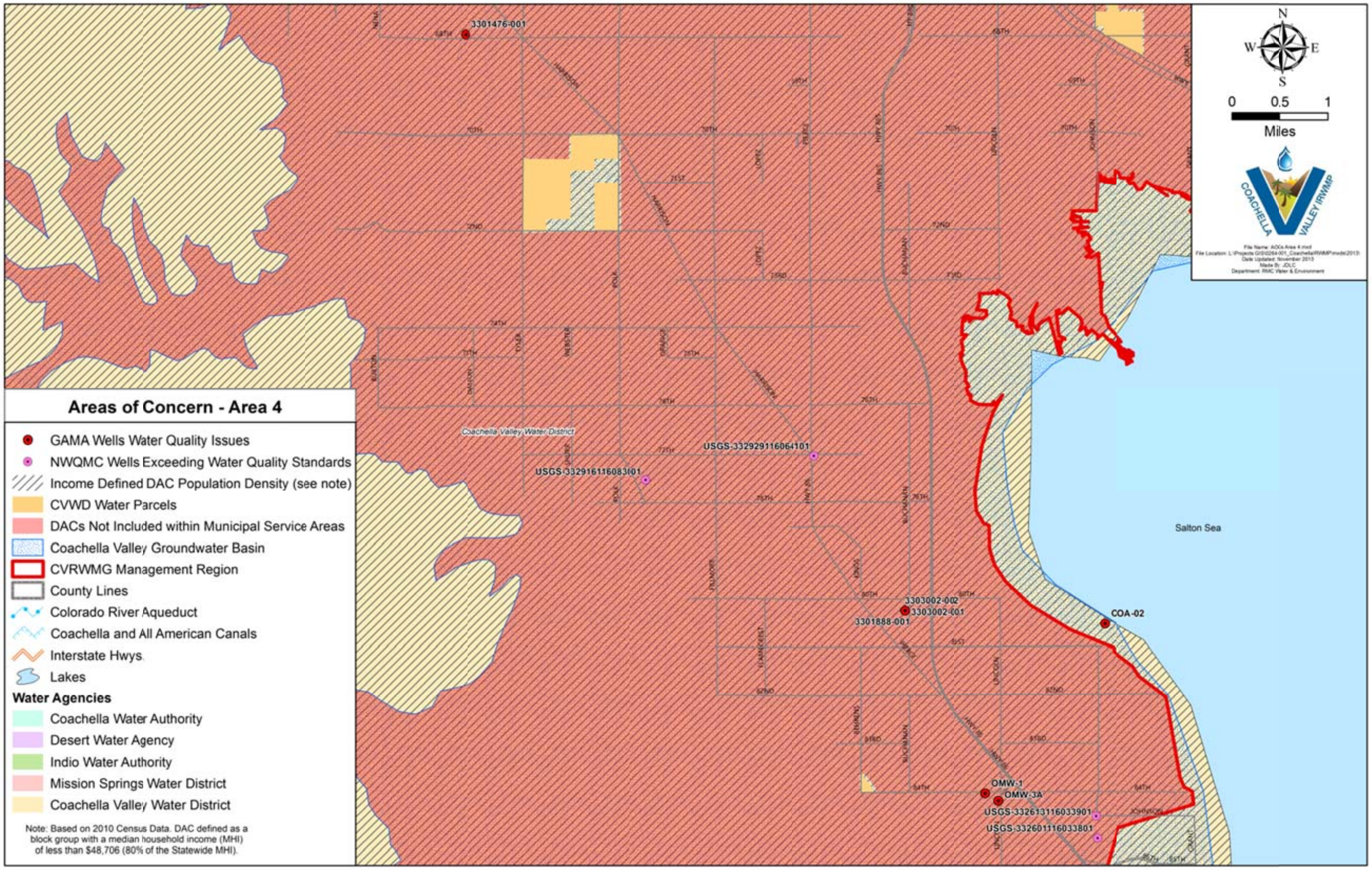


Figure 11: Areas of Concern – Area 4



3.3 Management/Treatment Alternatives

In order to address groundwater concentrations of COCs above drinking water, possible treatment/management alternatives and delivery methods were identified and considered for use in the AOCs. These management and treatment alternatives are discussed in more detail below.

3.3.1 Treatment Methods

Publically-available resources were used to evaluate potential treatment technologies for removing the COCs from groundwater. One key source utilized was the USEPA's Drinking Water Treatability Database, found at http://iaspub.epa.gov/tdb/pages/general/home.do. This database presents referenced information on the control of contaminants in drinking water gathered from thousands of literature sources. The database includes more than 25 treatment processes used by drinking water utilities, and presents literature from peer-reviewed journals and conferences, other conferences and symposia, research reports, theses, and dissertations, in addition to bench-, pilot- and full-scale studies of groundwater treatment.

Table 2 summarizes the various treatment methods available for the selected COCs, and provides a relative ranking of the effectiveness of those methods. Table 3 identifies which treatment methods are considered Best Available Technology (BAT) for the identified COCs.

Treatment Methods for Arsenic

Arsenic occurs naturally in rock, soil and biota. Arsenic in groundwater exists in one of two oxidation states, depending on local oxidation-reduction conditions: as Arsenite (or As(III)) or Arsenate (or As(V)). Under anaerobic (low oxygen) conditions, as often found in deep groundwater, arsenic exists predominantly as As(III). Under aerobic (fully oxygenated conditions), such as observed in surface water or shallow groundwater, arsenic exists primarily as As(V). The effectiveness of groundwater treatment systems for arsenic often are affected by the oxidation state of the arsenic in groundwater. In many cases, pretreatment is included as part of the treatment process to oxidize the As(III) to transform it to As(V) in order to improve removal efficiencies.

Arsenic has been linked to cancer and has been shown to have non-carcinogenic cardiovascular, pulmonary, neurological and endocrine effects. As a result, the USEPA and the State of California set a Primary MCL of 10 micrograms per liter (μg/L) in drinking water. Methods for treating/removing arsenic from groundwater includes:

- Adsorptive Media
- Aeration and Air Stripping
- Biological Filtration
- Chemical Treatment
- Chloramine
- Chlorine
- Chlorine Dioxide
- Conventional Treatment
- Direct Filtration
- Granular Activated Carbon
- Ion Exchange
- Membrane Filtration
- Membrane Separation
- Ozone
- Permanganate
- Precipitative Softening
- Slow Sand Filtration
- Ultraviolet Irradiation (UV)

These processes are described in more detail below and are predominantly from the USEPA's drinking water treatability database (USEPA, 2012b).

Table 2: Treatment Alternatives

Constituent	Adsorptive Media	Aeration/Air Stripping	Biological Filtration	Biological Treatment	Chemical Treatment	Chloramine	Chlorine	Chlorine Dioxide	Conventional Treatment	Direct Filtration	Electrodialysis	GAC	Ion Exchange	Membrane Filtration	Membrane Separation	Ozone	Permanganate	PAC	Precipitative Softening	Slow Sand Filtration	Ultraviolet Irradiation
Arsenic	++	●	+		+	–	PT	–	++	++		●	++	++	++	++	++		++	++	–
Fluoride	++			+	+				+				+		++			++	+		
Uranium	++			+					++			++	++	–	++				++		
Nitrate				+	+						++		++		++						
Hexavalent Chromium	+								++			●	++		++				++		

Notes:
+ Effective treatment alternative
++ Very effective treatment alternative
– Not effective treatment alternative
● Somewhat effective treatment alternative

Table 3: Best Available Technology

Constituent	Adsorptive Media	Conventional Treatment	Direct Filtration	Ion Exchange	Membrane Separation	Precipitative Softening
Arsenic	✓	✓	✓	✓	✓	✓
Fluoride	✓				✓	
Uranium	✓	✓		✓	✓	✓
Nitrate				✓	✓	
Hexavalent Chromium		✓		✓	✓	✓

Adsorptive Media

Adsorption can be very effective for removing arsenic from groundwater - up to greater than 99 percent removal - and is a commonly used method for arsenic treatment. Arsenic removal by adsorptive media is largely dependent on the initial concentration, oxidation state, adsorbent type, and water chemistry (pH and competing anions). Adsorption can be achieved through the use of aluminum and iron oxide/hydroxides (amorphous or granular); however, adsorption on activated alumina is listed by the USEPA as one of the BATs for arsenic removal.

Aeration and Air Stripping

Effect of aeration on the removal of arsenic was studied in full-scale on a well water sample. Aeration was used as a pre-treatment for the oxidation of arsenic (As) prior to removal. Aeration was found to be largely ineffective in oxidizing As(III) to As(V). Forced draft aeration performance was slightly better than staged bubble aeration, with up to 25 percent of As(III) oxidation was observed with forced draft aeration.

Biological Filtration

Biological filtration using biological activated carbon (BAC) was found to be highly effective in the removal of arsenic from groundwater based on data available from one study. The high removal of arsenic through the BAC filter was due to the presence of iron oxidizing bacteria in the BAC filter. Iron present in the raw water was oxidized by the bacteria, and arsenic was removed by co-precipitation with biologically-oxidized iron.

Chemical Treatment

Removal of arsenic by chemical treatment can be effective under appropriate conditions. In one EPA study, Filox, a manganese dioxide-based media, was effective for As(III) oxidation. When dissolved oxygen (DO) was not limiting, complete oxidation was observed under all conditions studied. However, when DO was reduced, incomplete oxidation was obtained in the presence of interfering reductants. The adverse effect of interfering reductants was completely eliminated by supplying enough DO or increasing the contact time. In addition to oxidizing As(III), the Filox media also removed some arsenic by adsorption, which diminished greatly as the media came into equilibrium with the As(III)-spiked synthetic water.

Chloramine

The effect of chloramines on the oxidation/removal of arsenic was studied in two bench-scale experiments. One study used formulated challenge water similar in composition to surface and ground waters. In that study, a monochloramine dose of 0.10 milligrams per liter was added to the oxidation reactor and a 40 percent oxidation of As(III) to As(V) was observed. In the other study, a real surface water sample was used, and a high chloramine residual was obtained. Both studies indicated that chloramines are not very effective in the conversion of As (III) to As(V).

Chlorine

Chlorine is very commonly used as a pre-treatment for arsenic removal. If As(III) is present, the water is chlorinated in order to oxidize As(III) to As(V). Removal efficiencies of most arsenic treatment processes are higher with As(V) than with As(III). Greater than 95 percent of As(III) was oxidized to As(V) with the application of chlorine for both ground waters and surface waters.

Chlorine Dioxide

Oxidation of As(III) to As(V) using chlorine dioxide was studied in one bench-scale experiment. The water used in the test was formulated challenge water similar in composition to surface and ground waters. A low dose (0.27 mg/L) of chlorine dioxide was not very effective in the oxidation of As(III). However, when the chlorine dioxide dose was increased to 0.90 mg/L, greater than 95 percent oxidation of As(III) was achieved.

Conventional Treatment

Removal of arsenic by conventional treatment processes can be very effective under appropriate treatment conditions. Removal efficiencies are higher for As(V) (up to greater than 99 percent removal) than for As(III). Conventional treatment for arsenic removal can consist of oxidation/ filtration, or coagulation/ filtration, both of which are considered BATs by the USEPA.

Oxidation/filtration is also known for iron (Fe) removal and refers to a precipitative process that is designed to remove naturally occurring iron and manganese from water. Arsenic can also be removed by this process using two mechanisms: adsorption and coprecipitation. In this treatment process, an oxidant is first added to the water to oxidize soluble iron and As(III). Then As(V) adsorbs on to the iron hydroxide and precipitates out. The resulting solution is then filtered to remove the precipitates. Oxidation/filtration works well when the Fe:As ratio exceeds 20:1.

Coagulation/ filtration processes are more commonly used than oxidation/ filtration processes for arsenic removal. Coagulation/ filtration is a precipitative process that can be optimized to remove dissolved inorganic As(V) from water. The mechanism involves adsorption and co-precipitation of As(V) to a coagulant precipitate. Both alum and ferric coagulants have been shown to successfully remove As(V) below the maximum contaminant level (MCL) during the coagulation/ filtration process, even though removal efficiencies achieved with ferric were higher than alum. Performance of a coagulation/ filtration process is improved when the addition of Fe elevates the Fe:As ratio to above 20:1. Both alum and ferric coagulants may require pH adjustment to achieve optimal arsenic removal for most water sources.

Direct Filtration

Removal of arsenic by direct filtration can be very effective (75 percent to greater than 99 percent removal of As(V)), especially with the addition of a coagulant. Direct filtration for arsenic removal can constitute of oxidation/ filtration, or coagulation/ filtration, both of which are considered BATs by the USEPA and were described above under conventional treatment. In field applications, arsenic removal via direct filtration is primarily applied to groundwater sources with low turbidity. Sand is primarily used as filter media in direct filtration for the removal of arsenic. The use of manganese greensand is presented in the description of Ion Exchange, provided below.

Granular Activated Carbon

Removal of arsenic by granular activated carbon was documented in one pilot study, which ran for 60 days. The waters tested were surface water, well water, and well water spiked with arsenic. Granular Activated Carbon (GAC) filters were placed after dual-media filters, and the GAC bed depth was 30 inches. Additional arsenic removal (varying between 11 and 99 percent) was observed when water was treated by the GAC filters. The mechanism of arsenic removal by GAC was hypothesized to be filtration (particle removal) not adsorption.

Ion Exchange

Ion exchange is among the BATs listed by the USEPA for arsenic treatment. Ion exchange processes can remove arsenic from water very effectively (greater than 99 percent removal), when arsenic is in the As(V) oxidation state. If As(III) is present in the raw water, a concurrent oxidation is usually applied to convert As(III) to As(V). The removal efficiency is dependent upon the resin type, regeneration frequency, initial arsenic concentration, and competing ions in the water (especially sulfate). Strong base anion exchange resins in either the chloride form or the hydroxide form are most consistent in the removal of arsenic. The chloride form is preferred because regeneration is accomplished with a salt rather than caustic solution.

Membrane Filtration

Membrane filtration is generally very effective for the removal of arsenic, with up to 50 percent to 99 percent removal. The process typically consists of the addition of an iron-based coagulant to water. Arsenic-Iron (As-Fe) complexes are formed which precipitate from the solution and are filtered out by the membrane. So the arsenic removal process is through filtration rather than size exclusion (as is the case for membrane separation, described below). For effective removal, arsenic present in the water should be in the As(V) oxidation state. Any As(III) present in the water should be preoxidized with chlorine or other oxidants for effective removal. Lowering the water's pH prior to the addition of coagulant also lowers the coagulant dose necessary (thereby lowering solids loading on the membrane, increasing membrane flux and improving the operational life of the system) and increases arsenic removal efficiency.

Membrane Separation

Removal of As(V) from water by membrane separation processes can be very effective (50 percent to greater than 90 percent removal). Literature data suggest that removal of As(III) by membrane separation is not as effective. Reverse osmosis (RO) has been identified by the USEPA as a BAT for arsenic removal, while nanofiltration has also been used in some cases. RO is a pressure-driven membrane separation process capable of removing arsenic from water by means of particle size, dielectric characteristics, and hydrophilicity/ hydrophobicity. Factors such as applied pressure on the membranes, feedwater temperature, influent arsenic concentration, and source water chemical composition, have strong influence on the efficiency of membrane processes.

Ozone

Oxidation of As(III) to As(V) can be very effective with ozone. Ozone pre-treatment can be used prior to removal of As(V) by other treatment technologies. In two bench-scale studies, greater than 95 percent conversion of As(III) to As(V) was observed for both surface water and formulated challenge water (with composition similar to ground water and surface water) samples. The ozone doses in these experiments varied from 0.1 to 0.8 milligrams per liter and the contact times were between 0.0033 and 2.2 minutes.

Permanganate

Oxidation of As(III) to As(V) can be very effective with potassium permanganate, as observed in one bench-scale study. The water used in the test was formulated challenge water similar in composition to surface and ground waters. The permanganate dose tested ranged from 0.16 to 3.20 milligrams per liter. The permanganate contact times ranged from 0.25 to 0.85 minutes. Greater than 95 percent oxidation of As(III) to As(V) was observed even at the lowest permanganate dose and the shortest contact time.

Precipitative Softening

Precipitative softening is considered a BAT for arsenic removal by the USEPA. Removal of arsenic by precipitative softening can be effective under certain conditions. In several bench-scale studies, it was shown that arsenic removal by softening varied greatly (between less than 5 and greater than 95 percent) in synthetic groundwater. For optimal performance in removing both As(III) and As(V), the pH range used in softening experiments varied between 9 and 12. When softening is performed with lime at pHs higher than 10.5, magnesium hydroxide is formed and As(V) is removed by co-precipitation with magnesium hydroxide.

Slow Sand Filtration

Removal of arsenic from water by slow sand filtration was shown to be very effective (95 percent removal) in one pilot study. The source water was groundwater with a total arsenic concentration of 17.4 micrograms per liter. Iron was oxidized and precipitated from the water, and arsenic was removed by co-precipitation with iron.

Ultraviolet Irradiation

Oxidation of As(III) to As(V) using ultraviolet irradiation was tested in one bench-scale study. The water used in the test was formulated challenge water similar in composition to surface and ground waters. For the majority of the experiments, UV was largely ineffective in oxidizing As(III) to As(V), with conversions lower than 50 percent. The UV intensity tested varied between 32 and 41.2 milliWatts per square centimeter with UV contact times varying between 60 and 1440 minutes.

Treatment Methods for Fluoride

Fluoride is a naturally occurring element found in groundwater. Low levels of fluoride occur naturally in most sources of drinking water, and are the result of leaching from rock formations. In drinking water, fluoride may be applied at low levels to aid in dental and skeletal health; however, elevated concentrations can lead to bone or dental disease. As a result, the USEPA and the State of California established a Primary MCL of 4 mg/L for fluoride.

Methods for removing fluoride from groundwater include the following treatment processes:

- Adsorptive Media
- Biological Treatment
- Chemical Treatment
- Conventional Treatment
- Ion Exchange
- Membrane Separation
- Other Treatment
- Powdered Activated Carbon
- Precipitative Softening

Each of these methodologies is described in more detail below (USEPA, 2012b).

Adsorptive Media

Removal of fluoride in water by adsorptive media can be very effective (up to 100% removal depending on the type of media used) and is the most common defluoridation method used. Adsorptive media available for removal of fluoride in water includes activated alumina (AA), which has been designated BAT for fluoride control. In general, the adsorption process is typically highly pH dependent and generally is most effective at a slightly acidic pH. The fluoride removal capacity generally increases directly with fluoride concentration and inversely with pH of the water. Removal of fluoride is also highly dependent on the amount of adsorptive media used and on the contact time between provided between fluoride and the adsorptive media.

Biological Treatment

Batch studies demonstrated that algal biosorbents were somewhat effective for the removal of fluoride from the aqueous phase (depending on the species), and not effective for others. Removal was shown to be affected by the initial fluoride concentration, pH, adsorbent concentration, and temperature. Greater fluoride removal was observed with: lower initial fluoride concentration, lower pH, and greater adsorbent concentration.

Chemical Treatment

Removal of fluoride in water by the Nalgonda technique can be effective (52-86% removal), where the effectiveness is primarily dependent on fluoride concentration, pH, and alum/lime dosages. The Nalgonda technique involves mixing of alum and lime solution with the raw water in a two-step process to remove fluoride. High alum dosages are typically required to reduce fluoride levels enough for drinking water applications and can therefore result in exceedances of safe levels of aluminum and sulfate in the treated water. This process also generates a significant quantity of sludge.

Removal of fluoride in water by various calcium phosphates was found to be effective for one study (>90% removal). The effectiveness of fluoride removal was primarily dependent on pH, amount of fluoride in the raw water and amount of calcium phosphates added. One study also reported the removal of fluoride (>86 percent) with magnesium oxide. The removal was independent of the initial fluoride concentration. Removal of fluoride in water by alum alone was found to be marginally effective for several bench-scale studies (30% to >80% removal). However, the doses required for removal were higher than what is typically used in water treatment.

Conventional Treatment

Fluoride removal from groundwater by conventional treatment (i.e., alum coagulation, flocculation, sedimentation and filtration) was found to be moderately effective in one study (between 50% and 71% removal achieved) in both batch and pilot scale experiments. Alum dosages used were higher than what is typically used in drinking water treatment. Percent removals with and without granular activated carbon at the pilot scale were not significantly different.

Ion Exchange

Removal of fluoride from water can generally be effective (typically >85% removal) with ion exchange resins. Fluoride removal can occur with either cation or anion exchange resins. In anion exchange resins, fluoride removal occurs when fluoride ions replace chloride ions of the resin. This process continues until all sites on the resin are occupied. The removal efficiency of ion exchange resins is dependent upon the resin type, regeneration frequency, initial fluoride concentration, and competing ions in the water. Strong base anion exchange resins in the chloride form are most consistent in the removal of fluoride. Regeneration of this type of resin is accomplished with a sodium chloride salt.

Membrane Separation

Membrane separation is effective for removing fluoride. Studies reported close to 95 percent removal with nanofiltration, reverse osmosis, and electrodialysis. RO was designated BAT by the USEPA for control of fluoride, and studies generally showed removals in the high 80s to 100 percent. Removal via membrane separation is influenced by membrane porosity, initial fluoride concentration, feed water composition, flow rate, and the applied pressure. In membrane separation involving potential differentials (electrodialysis and Donnan dialysis), the fluoride separation is also affected by the voltage applied. The electrodialysis studies reported greater removal with higher voltage and initial fluoride concentration.

Other Treatment

Removal of fluoride from water using the electrocoagulation process with aluminum electrodes was found to be very effective (>95% removal) without co-existing anions for one study. The types and concentrations of co-existing anions can have a significant impact on the defluoridation capacity of the electrocoagulation system. Another study found that the hydroxide and fluoride molar ratio had a significant impact on the defluoridation capacity of the electrocoagulation system. The study found that the efficiency of defluoridation was close to 100% when the sum of the hydroxide and fluoride molar ratios was close to 3.

Powdered Activated Carbon

Removal of fluoride with powdered activated carbon (PAC) was found to be very effective in one study (up to 100% removal achieved). However, the process is pH dependent with effective removals obtainable only at a pH of 3.0 or less. At a pH of 8.0, very little fluoride removal is achieved (<5% removal). The use of PAC for fluoride removal in drinking water applications may be limited given the low pH that is necessary to achieve effective fluoride removals.

Precipitative Softening

Removal of fluoride through lime softening has been found to be marginally effective (0 - 80% removal) in both bench and full scale applications, but is highly dependent on the amount of magnesium removed during the softening process. If sufficient amounts of magnesium are not present in water, a magnesium salt would need to be added to provide the desired level of fluoride removal. This method may be adaptable to low-fluoride-high-magnesium waters requiring softening. The effectiveness of lime softening on fluoride removal is highly dependent on source water quality conditions.

Treatment Methods for Nitrates

Nitrates are regulated in drinking water to protect public health. While some nitrogen compounds are naturally found in groundwater, elevated concentrations of nitrate in groundwater may be the result of anthropogenic (man-induced) causes such as fertilizer use. Nitrates in humans have been shown to cause shortness of breath and blue baby syndrome, and result in serious illness or death in infants below six months. In order to protect human health, the USEPA and the State of California established a Primary MCL of 10 mg/L for nitrates measured as nitrogen (Nitrate-N).

Method for removing nitrates from groundwater include the following:

- Biological Treatment
- Chemical Treatment
- Electrodialysis
- Ion Exchange
- Membrane Separation

Each of these treatment methodologies is described further below.

Biological Treatment

Microbe-induced nitrate reduction can be accomplished using organic carbon electron donors such as methanol or acetic acid, or inorganic electron donors such as hydrogen or reduced sulfur. For this to occur, however, dissolved oxygen content in the water must be lowered to about 0.1 mg/L for the reduction to occur.

Biological treatment typically occurs in reactors that use plastic media, buoyant polystyrene beads, sand media or hollow-fiber membranes. Recent advances in hollow-fiber membranes allow autotrophic bacteria to brow on the outside of the membrane in nitrate-laden water while hydrogen gas is slowly supplied from within the membrane. Nitrate and oxygen permeate into the biofilm growing on the membrane and are reduced in the anoxic environment within the biofilm.

Chemical Treatment

Chemical denitrification can use metals such as platinum, palladium, tin, and copper to chemically reduce nitrate to other forms, but these typically require a low pH and often need additional hydrogen gas or another strong reductant along with added heat to perform well. Zero-valent iron (Fe^0) has gained recent attention as a nitrate-reductant system. This treatment methodology can occur both in-situ and in above-ground system and has been shown to be promising. In this methodology, oxidation of iron frees electrons which are then available for nitrate reduction. Like biological denitrification systems, these systems require low levels of dissolved oxygen to proceed favorably. While the precise reactions for zero-valent iron and other chemical reduction processes are not well known for groundwater matrices, in most cases, nitrate reduction does not proceed to innocuous gas as it does in distilled water or in biological denitrification systems. Instead, the majority of the nitrogen transforms to ammonia, which can pose other water quality challenges (Westerhoff and Doudrick, 2009).

Electrodialysis

Electrodialysis (ED) treatment of groundwater is similar to that of other membrane separation technologies. In ED-based systems, electric current is used to pass positive ions (cations) or negative ions (anions) through a semi-permeable membrane. The current can be adjusted to pass only cations and reject anions such as nitrate. Contaminant removal by electrodialysis is dependent upon membrane type, electrical current, recovery, and initial contaminant concentrations.

Ion Exchange

Nitrate removal from groundwater by ion exchange is the most frequently used treatment technology and is considered a BAT by the USEPA for the control of nitrates. In this process, groundwater is passed through a resin where nitrate ions are exchanged for other ions, most often chlorides in the resin. Nitrate-selective resins may also be used. Ion exchange is dependent upon the resin type, regeneration frequency, competing ions, and initial concentration.

Membrane Separation
Removal of nitrates from groundwater by membrane separation (specifically reverse osmosis or RO) can be very effective (85 to 95 percent) (Siemens, 2012). Reverse osmosis is considered a BAT for control of nitrate in groundwater. The RO process uses semi-permeable membranes to selective remove various inorganics from the groundwater. The membranes do not exhibit high selectivity for any given contaminant, and therefore the RO process results in the removal of many contaminants, including nitrates. Contaminant removal by reverse osmosis is dependent upon membrane type, system pressure, recovery, and initial contaminant concentration.

Treatment Methods for Uranium

Some groundwater sources have low levels of naturally-occurring radionuclides (radioactive elements) that result from leaching from rocks. Uranium has three radionuclides that have been detected in groundwater and which are regulated. U-238 is an alpha emitter and the parent compound in the uranium-238 series. U-235 is also an alpha emitter and the parent compound in the actinium series. U-234 is a beta emitter and the third-member decay product in the uranium-238 series.

Emitted particles from uranium ionize or destabilize atoms as they pass through the body's cell, damaging chromosomes which can lead to cancer. In addition, exposure to elevated uranium levels in drinking water can lead to kidney failure. As a result, the USEPA and State of California established a Primary MCL of 30 μg/L or 20 picocuries per liter (pCi/L). Treatment technologies that can remove uranium from groundwater include (USEPA, 2012b):

- Adsorptive Media
- Biological Treatment
- Conventional Treatment
- GAC Isotherm
- Ion Exchange
- Membrane Filtration
- Membrane Separation
- Precipitative Softening

Each of these treatment methodologies is described in more detail below (USEPA, 2012b).

Adsorptive Media
As indicated from batch isotherm tests, adsorption can be very effective (up to greater than 99 percent removal) for uranium removal. Data for full-scale water treatment were not available. Uranium removal by adsorptive media is largely dependent on the initial concentration, oxidation state, adsorbent type, and water chemistry (pH and competing anions). Best removals were achieved in the pH 4 to 7 range. Iron-based media, particularly zero valent iron, were most effective at uranium removal. Most of the studies acknowledged that adsorption was not the only mechanism that played a role in uranium removal. Uranium reduction from U(VI) to U(IV) and co-precipitation also played a role in removing uranium. Other polymer-based media were also effective at removing uranium in batch isotherm tests.

Biological Treatment
One study found biological treatment to be effective at removing uranium (25 to 88 percent) in situ bioremediation and in a bench-scale soil column test. The study indicated that both adsorption and reduction likely played a role in uranium removal. In both cases, acetate was used to develop the

microorganism population. Uranium removal continued after acetate addition. Sterilized soil columns were not effective at uranium removal.

Conventional Treatment
Removal of uranium by conventional treatment processes can be very effective (up to 95 percent) under appropriate treatment conditions. Conventional treatment has been identified by the USEPA as a BAT for uranium removal.

Coagulation/ filtration processes are commonly used for uranium removal. The mechanism involves adsorption and co-precipitation of U(VI) to a coagulant precipitate. Both alum and ferric coagulants have been shown to successfully remove uranium below the MCL during the coagulation/ filtration process. Both alum and ferric coagulants may require pH adjustment to achieve optimal uranium removal for most water sources; a pH in the range of 6.0 was shown to be ideal for uranium removal.

GAC Isotherm
Based on isotherm studies, adsorption of uranium in water by granular activated carbon (GAC) can be very effective. One study showed that treating the GAC with hydrophobic aerogels would enhance GAC adsorption.

Ion Exchange
Removal of uranium from water by ion exchange can be very effective (greater than 99 percent removal in most cases). Ion exchange is considered a BAT by the USEPA for the control of uranium. It is dependent upon the resin type, regeneration frequency, competing ions, and initial concentration. The most common resin used was an anionic resin. Limited regeneration studies were available, but based on the limited data, uranium removal appears to be unaffected by multiple regenerations.

Membrane Filtration
Membrane filtration alone is generally not very effective for the removal of uranium (less than 60 percent depending on the membrane type and pH). One study found 0.45 micron membrane filtration to remove 50 to 60 percent of uranium between pHs 6.5 and 9. The article suggested that the hydrolyzed uranyl complexes were polymerized and thus were retained on the membrane. Typically, however, membrane filtration followed coagulation/flocculation methods, which were suspected to be responsible for most of the uranium removal.

Membrane Separation
Removal of uranium from water by membrane separation (specifically reverse osmosis) can be very effective (greater than 90 percent in most cases). Reverse osmosis is considered a BAT for control of uranium. Contaminant removal by reverse osmosis is dependent upon membrane type, pH, recovery, and initial contaminant concentration.

Precipitative Softening
Removal of uranium from water by precipitative softening can be very effective (up to 99 percent). Removal rates were largely dependent on the equilibrium pH, chemical doses and concentrations, charge of the uranium species, and competing ions. The presence of free carbonate ions appeared to shift the optimum pH for removal and reduce uranium removal 20 percent or more for a given pH. Lime softening is considered a BAT for uranium control.

Treatment Methods for Hexavalent Chromium

Hexavalent chromium is a metallic chemical that can originate as a contaminant in the groundwater from the discharges of dye and paint pigments, wood preservatives, chrome-plating liquid wastes, and leaching from hazardous waste sites. Hexavalent chromium may also occur naturally in groundwater, associated with serpentinite-containing rock or chromium-containing geologic formations.

Hexavalent chromium is currently regulated by the State as part of total chromium MCL of 50 µg/L. In August of 2013, the California Department of Public Health (CDPH) proposed a state primary MCL of 10 µg/L for hexavalent chromium; the final MCL is still pending.

Methods for removing hexavalent chromium from groundwater include the following:

- Adsorptive Media
- Convention Treatment
- GAC Isotherm
- Granular Activated Carbon
- Ion Exchange
- Membrane Separation
- Precipitative Softening

Each of these treatment methodologies is described further below

Adsorptive Media

Hexavalent chromium removal by adsorption can be effective and is strongly dependent on the adsorbent dose, influent pH, and initial concentration. Hexavalent chromium adsorption is favorable in the acidic pH range for carbon and iron based sorbents. Iron based resins, carbon nanotubes, limestone, river bed sand are known to remove hexavalent chromium under appropriate treatment conditions in lab scale experiments.

Conventional Treatment

Coagulation/filtration is considered a BAT for chromium control in drinking water. Removal of hexavalent chromium in water by conventional processes can be very effective under appropriate treatment conditions. One study evaluated chromium removal by reduction using ferrous sulfate, coagulation assisted by aeration, followed by medial filtration with removal efficiencies up to 100 percent achieved under optimized treatment conditions. Reduction pH and aeration/filtration pH was also found to be influential factor for chromium removal.

Granular Activated Carbon (GAC) Isotherm

Granular Activated Carbon can remove hexavalent chromium. Numerous studies have reported GAC isotherms for various carbon materials. Hexavalent chromium adsorption capacity was higher in the acidic pH range.

Granular Activated Carbon (GAC)

Hexavalent chromium removal by granular activated carbon can be very effective under the acidic pH range; however the average GAC service life is limited (between 0.14 and 0.39 days).

Ion Exchange

Ion exchange is a one of the BATs for hexavalent chromium removal. Ion exchange can effectively remove hexavalent chromium up to 100 percent under favorable water quality conditions. Anionic resins appear to work best for hexavalent chromium removal with removal efficiency varying based upon the choice of resin, regeneration frequency, competing ions, and their concentrations, initial concentrations, influent pHs and contact time. Popular resins in literature used for hexavalent chromium removal includes zeolite, zeolite modified with iron, cellulose based ion exchange resins, strong base anion exchange resins and weak base anion exchange resins.

Membrane Separation

The USEPA has identified reverse osmosis as BAT for chromium control in drinking water. Hexavalent chromium removal is a function of applied potential difference, contact time, and initial solution pH.

Precipitative Softening

USEPA has also identified precipitative softening as BAT for chromium control in drinking water. Based on one desktop study (that looked at 273 groundwater and surface water samples), precipitative softening is up to 98.8 percent effective for the removal of hexavalent chromium for the conditions evaluated.

3.3.2 Delivery Methods

Just as there are multiple ways of treating groundwater to remove the COCs, there are multiple ways of delivering that treatment technology. These include:

- Blending
- Point of use
- Point of entry
- Wellhead treatment
- In-situ treatment
- Public water system

Each of these delivery methods is described further below.

Blending

Blending is a means of managing constituent concentrations in drinking water and is achieved largely by blending (mixing) groundwater with surface water containing lower concentrations of the constituent of concern. This approach is common for drinking water treatment for larger municipalities and requires the availability of a second water source with lower concentrations and facilities to thoroughly mix the water before use.

Point of Use (POU)

Point of Use (POU) systems typically treat water in batches and deliver water to a single tap in the house, such as a kitchen sink faucet or an auxiliary faucet mounted next to the kitchen sink. POU systems can include:

- Personal water bottles – These systems typically consist of a bottle and filter, with the filter integrated into the bottle cap or integrated into a straw.
- Pour through systems – In these systems, water is poured into a shallow basin and gravity is used to drip the water through the filter into a pitcher or other vessel.
- Faucet mounted system – This type of filter is typically mounted on an existing kitchen sink faucet. A diverter is then used to direct the water through the system when treated drinking water is desired.
- Counter-top manual fill - This system is usually placed on a counter and filled by pouring water into the system and activating it for a batch of water.
- Counter-top connect to sink faucet - This product is usually placed on a counter and connected by tubing to an existing kitchen sink faucet. The treated water dispenses out of a return tube from the kitchen faucet, or the treated water is dispensed from a spout on the system.
- Plumbed-in - This type of system is usually installed under the sink and requires a permanent connection to an existing water pipe. The filter water is dispensed through the existing sink faucet.

- Plumbed-in to separate tap - This product installs in the same manner as plumbed-in systems (above); however, the filter water is dispensed through an auxiliary faucet mounted next to the kitchen sink.

Point of Entry (POE)
Point of Entry (POE) systems are systems that typically treat most of the water entering a residence. Point-of-entry systems, or whole-house systems, are usually installed after the water meter. An example of a POE system is a water softener.

Wellhead Treatment
Wellhead treatment systems place the treatment technology at the location of the well, and treats groundwater before it enters the distribution system. This treatment delivery method is typically applied where there are large quantities of water to treat, with separate treatment systems on each well or using a centralized treatment system to treat groundwater from several, closely located wells. Wellhead treatment systems typically require more space than those previously mentioned, and often require the presence of equalization tanks in order to ensure smooth continuous service.

In-situ Treatment
In-situ treatment of groundwater utilizes naturally-occurring and/or introduced bacteria or chemicals to treat groundwater before it leaves the aquifer. Chemicals, oxygen and/or other materials are introduced into the subsurface in a manner that accounts for groundwater movement, biological and chemical process reaction times and local hydrogeologic conditions to 'manage' the contaminant in the aquifer such that the groundwater extracted contains reduced concentrations of the constituents of concern.

Connection to Public Water Systems
While groundwater treatment may be feasible, it is not always economical. In some cases, connecting a residence to a nearby public water system is the most effective means of delivering drinking water that meets federal and state standards.

3.3.3 Evaluation of Alternatives

Treatment Methodology

Given that the objective of the study is to identify a method of treating groundwater for DACs, and that these DACs have been identified as being at various locations within the groundwater basin, it is reasonable to identify one or more treatment methodologies that will effectively treat multiple COCs. Additionally, those treatment methods identified as being BATs have been shown to be effective in removing the COCs and as being cost-effective under a variety of circumstances. Based on these criteria, only one treatment method, membrane separation by reverse osmosis (RO), was effective at treating all five identified COCs, and was considered BAT for all five COCs. PUCDC has had success with this technology in removing arsenic and other water quality concerns through their STAT project, which was successfully implemented through a Proposition 84 Round 1 grant. One additional advantage of RO is that it will also treat for microbes, radium and other salts (such as sulfate, calcium, magnesium, potassium and phosphorus). However, this treatment methodology requires an advanced operator skill level and often is more costly than other treatment options.

Adsorptive Media, primarily by activated alumina, was found to be effective for three of the five COCs. (Activated alumina is not considered a good treatment methodology for nitrates or hexavalent chromium.) Ion exchange was also found effective for four of the five COCs (all but fluoride). In both cases, adsorptive media and ion exchange have been found to be cost-effective, easy to operate and requires minimal operator attention. However, if either of these technologies are selected, a secondary treatment technology would be required to treat households with concentrations of nitrate, fluoride and/or hexavalent chromium greater than the primary MCL. Anion exchange could potentially be an alternative ion exchange technology as this method has been identified as a BAT for arsenic, nitrate, hexavalent chromium and uranium, and has been shown to be effective in treating fluoride (though is not a BAT for fluoride). One issue with this treatment technology (anion exchange) is, however, that an intermediate skill level is required to operate the system.

Delivery Methodology

Of the six treatment delivery methods that were evaluated, two methods were removed from further consideration. Blending was removed as a second source of potable water is not readily available to small communities and individuals for blending. Additionally, in-situ treatment was removed from further consideration as it has not been found effective for all the COCs, nor was it considered practical given the dispersed nature of the DACs.

POU, POE and wellhead treatment systems, and connection to existing public water systems remained as viable options for delivering treated drinking water to DACs. The advantages and disadvantages of each of these four delivery systems are summarized in Table 4.

Table 4: Advantages/Disadvantages of Treatment Delivery Methods

Delivery Method	Description	Advantages	Disadvantages
Point of Use (POU)	Treats water as it enters the faucet or other distribution location	• Treats water where it's used	• Only delivers treated water at one location (typical for consumption)
Point of Entry (POE)	Treats water as it enters the house (in-line or plumbed to single tap)	• Treats water for all uses in the house	• Most costly than POU • Water at all taps treated
Wellhead Treatment	Treats water as it leaves the wells and prior to entering the distribution system	• Efficient for single or multiple wells • Cost-effective • Centralized monitoring and maintenance	• Not as cost-effective for single wells
Public Water System	Connect resident(s) to existing public potable water systems	• No treatment required by residents • Ongoing monitoring and maintenance	• Cost of connection to system may be expensive • Location of resident relative to system is a key factor

Assessment

Given that the AOCs are, by definition, outside the location of established public water agencies, these areas are served water by either individual private wells or small community wells. By their design, treatment systems will therefore need to be either POU or POE systems or small wellhead treatment systems. Where feasible, however, individual residences in the AOCs should be connected to the existing public potable water systems.

A key goal of this study is to identify a region-wide program that can be implemented to effectively address drinking water quality violations in DACs using groundwater. As these DACs are, for the most part, spread out throughout the region, centralized treatment systems are not cost-effective. Therefore, the program offered needs to be able to address households on individual wells, and households on small community systems (i.e. trailer parks). To this end, either POU systems or small wellhead treatment systems should be identified and offered as treatment delivery methods. And as these AOCs are spread out throughout the IRWM region and will likely have varying water quality, whatever treatment methods are offered should be able to address all five of the COCs. Given this criteria, reverse osmosis was the only treatment technology that was designated as a BAT for all five COCs. Anion exchange is, however, another possible treatment methodology as this methodology was identified as a BAT for four of the five COCs and found to be effective (though not a BAT) for the fifth (fluoride).

Recommendation

A regional program designed to address the drinking water quality of DACs in identified AOCs should provide either POU, POE and/or wellhead treatment of groundwater via reverse osmosis or anion exchange.

3.3.4 Recommended Program

Based on the assessment conducted above, this *DAC Water Quality Evaluation* recommended development of a regional program (titled the *Disadvantaged Communities Residential Groundwater Treatment Program*) that provides either POU, POE and/or wellhead treatment of groundwater via reverse osmosis or anion exchange. Appendix A contains the *Disadvantaged Communities Residential Groundwater Treatment Program* work plan.

The *Disadvantaged Communities Residential Groundwater Treatment Program* is similar in form to the Short-Term Arsenic Treatment (STAT) Project that was funded under a Proposition 84-Round 1 Implementation Grant and has implemented by Pueblo Unido since 2010. The fact that the *Disadvantaged Communities Residential Groundwater Treatment Program* parallels the STAT Project is indicative of the technical feasibility and reasonableness of the proposed approach. The *Disadvantaged Communities Residential Groundwater Treatment Program* is, however, intended to address DAC groundwater quality concerns on a regional scale and to incorporate similar recently-developed programs by the Rotary Club and Desert Alliance for Community Empowerment (DACE). This program was designed to support DACs scattered throughout the IRWM region, to treat groundwater for multiple COCs (rather than just arsenic), and to create a program to allow for the long-term sustainability of the systems in providing potable water meeting drinking water standards.

To this end, the recommended approach for developing and implementing a program to address the drinking water quality of DACs in identified AOCs was designed to be a phased approach for implementation, addressing mobile home parks with fewer than 16 connections separately from those with 16 or more connections.

The first phase of a program that would be implemented to address water quality concerns in DACs should consist of two key tasks:

1. Confirming the location of the AOCs and the presence of the COCs in their drinking water.
2. Identifying DACs in AOCs that are situated such that they can reasonably be connected to an existing public potable water system.

Site-specific projects can then be developed for those systems identified during these two steps.

For trailer parks and neighborhoods with 16 or more connections (the regulatory cut-off for small water systems), it is recommended that each site be addressed on an individual basis, with the STAT Project used as a model for developing, permitting, and implementing a site-specific wellhead treatment and potable delivery system. Additionally, it is recommended that NSF 61 certification of small-system wellhead treatment units continue to be pursued in order to streamline the development and installation of these RO-type treatment units on park systems.

For trailer parks with fewer than 16 connections, a coordinated (and approved) program with Riverside County DEH, Pueblo Unido, Rotary Club, and DACE should be developed to purchase, install and maintain commercially-available under-counter POU RO treatment systems in individual trailers and homes. Items to be developed/addressed as part of this program include:

- Development of a guidebook for purchasing, installing and testing the commercially-available under-counter POU RO treatment systems.
- Development of an operations and maintenance (O&M) manual for monitoring and maintaining treatment systems.
- Training of local trailer park/neighborhood personnel in the testing and maintenance of the selected treatment units.
- Pursuit and award of State grant funding to purchase and install POU RO treatment systems on those trailer parks/neighborhoods not yet retrofitted.
- Development of an investment/long-term funding program/strategy for O&M with Rotary Club using Rotary grant funding as ‘seed money’ to ensure the sustainability of the program.

Preliminary work towards developing such a program (the DAC Residential Groundwater Treatment Program) is described in more detail in Appendix VI-A of the 2014 Coachella Valley IRWM Plan Volume I.

4 Data Gap Analysis

As part of the data analysis step previously described, gaps in water quality data distribution were identified. Additionally, due to the public nature of the databases used, specific data could not be attributed to specific wells; therefore, identified data gaps include the specific locations of individual and small community wells located within the AOCs. While a preliminary analysis has been completed using available data and ArcGIS, more detailed information is necessary to better understand the users located in the AOCs and to confirm that these areas are, in fact, using groundwater that exceeds primary drinking water standards. Specific locations of the individual and small community wells require identification and more water quality and quantity data are required in order to develop the best program for addressing these concerns. Therefore, site-specific and depth-specific water quality data at the wells has also been identified as a data gap.

In general, data gaps are divided into three categories:

1. **Specific Well Locations in AOCs:** the evaluation described in Section 2 characterized the wells in the AOCs that pump groundwater with COCs based on data provided by CVWD and DWR, as well as groundwater quality data collected from two publically-available online databases – GAMA-Geotracker and the Water Quality Portal. To confirm the water quality of the identified wells and gather more useful data, specific wells need to be identified and water samples collected and analyzed from those wells to confirm that they meet the program requirements.
2. **Other Locations in AOCs Not Yet Identified with Groundwater Concerns:** it is possible that there are existing groundwater wells that did not have available data in the databases used for this analysis, or which had no or insufficient reported data. An evaluation should be conducted to see if these areas exist.
3. **Basin-wide Data Gaps:** There are areas within the groundwater basin with limited groundwater quality data. A basin-wide collection and analysis of a pre-determined set of water quality constituents can provide a one-time snapshot of baseline groundwater quality.

Site-specific groundwater data will be needed for each category. These are described in the following sections.

4.1 Specific Well Locations in AOCs

As described in Section 2, a preliminary analysis was completed to identify the DACs (both communities and individuals) relying on groundwater, outside of public water agencies' service areas, with groundwater quality in which constituents exceed the primary drinking water standards. This analysis was completed by identifying the wells in the AOCs that pump groundwater with COCs based on data provided by CVWD and DWR, as well as groundwater quality data collected from two publically-available online databases – GAMA-Geotracker and the Water Quality Portal. Except for the agency-specific data, all water quality data were attributed to specific wells with approximate location information (latitude and longitude). The exact location of these wells, and the specific users who consume groundwater from these wells or wells in the immediate area, remains to be determined, as does the economic status of those users. Therefore, one key data gap category to be addressed is identifying specific DAC persons and/or communities with groundwater wells at identified locations, and to collect water samples from these wells to confirm that they meet the program requirements (that is, groundwater from those wells exceeds primary drinking water standards and is presently being consumed by DAC community members).

This data gap can be addressed by working with the DAC Issues Group to identify the specific DAC community members and the locations of their wells. Permission would then be obtained from the well owner for groundwater sampling and analysis. Samples collected from the wells would be analyzed at a State-certified laboratory for a pre-determined list of constituents to confirm drinking water quality violations. Data regarding the volume of water being pumped and its uses would also be compiled, if available.

4.2 Other Locations in AOCs Not Yet Identified with Groundwater Concerns

There may be existing groundwater wells that did not have sufficient or available water quality data for use in the preliminary analysis. In order to identify these wells, well construction diagrams obtained from DWR would be examined, along with anecdotal information, to identify where unsampled wells may be located and to assess if data from these wells would be of benefit to the study. For areas that do not have existing wells, and therefore no available data, it would be valuable to first confirm that there are no wells in that area and second, to potentially add a monitoring well to gather quality data. The well construction reports received from DWR can be examined to confirm well locations and the resulting analysis cross-checked with the Riverside County DEH. If there are unsampled wells, water samples can be collected and analyzed with the permission of the well owners. If there are no wells, a recommendation for the addition of a monitoring well in that area may be made to provide permanent monitoring locations for data collection and evaluation allowing for long-term evaluation of groundwater quantity and quality trends in the AOCs.

4.3 Basin-Wide Data Gaps

Figure 6 shows the wells that were included in the preliminary water quality data analysis; these data were obtained from the basin's water agencies and from the GAMA-Geotracker and Water Quality Portal databases. As can be seen, there are areas in the groundwater basin that do not appear to have reported groundwater quality data. The use of existing data may exclude unpermitted mobile home parks, other unregulated water systems, and private wells, a data gap that should be addressed to fully understand the extent of the Areas of Concern and their issues. In order to improve basin-wide groundwater quality understanding, well construction reports obtained from DWR can be compared against the wells included in this analysis to identify any wells that may exist within the basin for which water quality data are not available. The continued existence of these wells would then need to be verified, and the owner's permission obtained before groundwater sampling and analyses can occur. This data gap category can, however, be addressed by conducting a basin-wide sampling and analysis program on a periodic (quarterly to annual) basis on a selected series of wells to confirm constituents of concern and trends in groundwater quality.

5 Monitoring Program Assessment

An assessment of existing groundwater monitoring programs in the Coachella Valley was conducted to understand the impacts of groundwater quality on the potable supplies of DACs in the Coachella Valley. The purpose of the assessment was to describe existing groundwater monitoring efforts in the Coachella Valley and to present recommended modifications to existing groundwater monitoring programs for the CVGB as it relates to water quality constituents identified as impacting the drinking water of DACs. Appendix VI-J of the 2014 Coachella Valley IRWM Plan Volume I (see www.cvrwmg.org) contains the *Evaluation of Valley-Wide Groundwater Monitoring Programs.*

Recommendations proposed in the monitoring program assessment include:

- Continue groundwater elevation and water quality monitoring as is currently being implemented by water agencies in the Coachella Valley for compliance with the State's CASGEM program and as required by the CDPH and Riverside County DEH.
- Installation of additional monitoring wells, specifically in the southeastern portion of the Mission Creek Sub-basin and the southeastern portion of the Desert Hot Springs Sub-basin.
- Collect addition groundwater level information in the areas with data gaps, namely in Garnet Hill Sub-basin and areas of Mission Creek and Desert Valley Sub-basins.
- Implementation of suggested modifications to the frequency of water quality sampling in the groundwater basin for the COCs.

This assessment is described in more detail in Appendix VI-J of the 2014 Coachella Valley IRWM Plan Volume I (see www.cvrwmg.org).

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Appendix A - Disadvantaged Communities Residential Groundwater Treatment Program

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Coachella Valley Integrated Regional Water Management Program

Disadvantaged Community Outreach Demonstration Project

Disadvantaged Communities Residential Groundwater Treatment Program

Final Report

Prepared by:

RMC
Water and Environment

February 2014

Table of Contents

Appendices

List of Abbreviations

AOC	Area of Concern
CDPH	California Department of Public Health
COC	Constituent of Concern
CVRWMG	Coachella Valley Regional Water Management Group
CVWD	Coachella Valley Water District
CWA	Coachella Water Authority
DAC	Disadvantaged community
DWA	Desert Water Agency
DWR	California Department of Water Resources
IRWM	Integrated Regional Water Management
IWA	Indio Water Authority
MCL	Maximum Contaminant Level
MHI	Median household income
POE	Point-of-entry
POU	Point-of-use
PUCDC	Pueblo Unido Community Development Corporation
RO	Reverse osmosis
TM	Technical Memorandum

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1 Introduction

The Coachella Valley Regional Water Management Group (CVRWMG) – comprising Coachella Valley Water District (CVWD), Coachella Water Authority (CWA), Desert Water Agency (DWA), Indio Water Authority (IWA), and Mission Springs Water District (MSWD) – are preparing an update of the Coachella Valley Integrated Regional Water Management (IRWM) Plan. The purpose of the Coachella Valley IRWM Plan is to accurately characterize the existing water resources conditions, issues, and needs of the Coachella Valley, and then to establish a regional process for prioritizing potential water management projects that can be implemented to help address those needs. During development of the original IRWM Plan (adopted in 2010), stakeholders identified a need for improved understanding of water quality and supply issues and needs of particular importance to economically disadvantaged communities (DACs). One of the issues of concern for DACs, as identified by stakeholders, was the quality of groundwater used for drinking water in DACs. As a result of this identified need, the 2014 IRWM Plan Update process involved a separate technical evaluation, the *DAC Water Quality Evaluation*, which was prepared to address groundwater-related drinking water quality issues in DACs. The *DAC Water Quality Evaluation* is included as Appendix VII-C of the 2014 Coachella Valley IRWM Plan (see www.cvrwmg.org)

DACs are defined by the California Department of Water Resources (DWR) in its 2012 IRWM Grant Program Guidelines as areas with an annual median household income (MHI) of 80% or less than the Statewide MHI. Per the 2012 IRWM Grant Program Guidelines, DACs were areas with an MHI of less than $48,706. Areas identified and mapped as DACs in the Coachella Valley are presented and discussed in Chapter 4 of the 2014 Coachella Valley IRWM Plan Volume I (see www.cvrwmg.org).

1.1 Project Purpose

This technical memorandum (TM) presents a scope of work that represents the recommended program resulting from the *DAC Water Quality Evaluation*. The proposed program has been designed with a phased implementation approach, allowing for program formulation and development to be conducted before actual implementation. This approach was selected because it maximizes the ability to obtain outside funding for program implementation, provides for development of an approach to ensure the sustainability of the program, and allows for the time necessary to address institutional issues that may arise as a result of the program. The program is based on the work of Pueblo Unido Community Development Program (PUCDC) to install point-of-use (POU) treatment systems in DACs in the eastern Coachella Valley, and is presented here as a potential work plan, for use by other organizations looking to implement such a program themselves. The program as presented here has been recommended by PUCDC and vetted by local non-profits with experience working in local DACs for feasibility as a short-term solution to address drinking water needs of DACs located in remote locations where it is currently unfeasible to connect to the municipal potable water system.

1.2 Background

As part of the Coachella Valley IRWM Plan Update, the *DAC Water Quality Evaluation* was conducted to assess groundwater quality in DACs where privately-pumped (non-municipal) groundwater was the primary source of drinking water, and to address stakeholder concerns about the quality of those drinking water supplies. The *DAC Water Quality Evaluation* identified four Areas of Concern (AOCs) in the Coachella Valley IRWM Region. AOCs were defined as areas that: 1) qualified as DACs based on documented MHI that 2) lie outside of an established public potable water service area, and 3) utilize groundwater that contains constituents of concern (COCs) above State and Federal Primary Maximum Contaminant Levels (MCLs). Because the AOCs lie outside of water supply agency service areas, it was assumed that the identified AOCs depend on private groundwater supply wells for their drinking water, and that water produced by these wells are untreated prior to delivery at the tap. Five primary COCs were identified in the groundwater underlying the AOCs: arsenic, fluoride, nitrate, uranium, and hexavalent chromium. Though MCLs have only formally been established for four of these COCs, a draft MCL of 10 µg/L was issued for hexavalent chromium in August 2013, which is below levels found in some wells in the Region. The *DAC Water Quality Evaluation* also considered appropriate methods that could be implemented to treat all five identified COCs, including treatment methodologies and varying modes for treatment delivery. Finally, the *DAC Water Quality Evaluation* recommended that a program be developed to address the COCs found in the AOCs, and ensure treatment of drinking water supplies for DACs in the East Valley. The recommended program, formally referred to as the *DAC Residential Groundwater Treatment Program*, is contained within this TM.

PUCDC's work in the eastern Coachella Valley, including the Short-Term Arsenic Treatment (STAT) program, funded through the Proposition 84 - Round 1 Implementation Grant, served as the model for the *DAC Residential Groundwater Treatment Program*. The STAT program was used as a model because analysis of the various treatment methods and location of DACs in relation to existing infrastructure, amongst other factors, found the STAT program model to be the most effective for addressing drinking water concerns in DACs on a short-term, immediate basis. Concerns over the potential O&M costs of on-site water treatment systems for DACs and the potential financial impact of the proposed financing plan (see *Subtask 4.3* and **Appendix H**) were vetted through PUCDC, who felt that the monthly costs used to fund the program on an on-going basis were reasonable.

1.3 Using the Technical Memorandum

This TM contains guidance and information that can be used to include an onsite residential groundwater treatment program in a grant application package for future DWR IRWM grant programs, or other similar funding opportunities. Remembering that the specific requirements will vary from opportunity to opportunity, and that DACs are not all identical, the contents of this work plan are intended to act as a detailed general template. A similar program should be vetted by residents, local non-profits, or other organizations and agencies with experience working with local DACs for feasibility and reasonableness. Included in this TM is an example Work Plan, Budget, and Schedule. These materials can be used in grant applications or as a guideline for initial planning purposes. This TM contains information specific to the Coachella Valley DAC Water Quality Program, but text that will be or is likely to require modifications is indicated with **[brackets]**. The template is based on the requirements of the 2012 Proposition 84 Implementation Grant – Round 2 Proposal Solicitation Package. It is anticipated that future IRWM grants will have similar requirements.

2 Work Plan

2.1 Introduction

[The Introduction provides the background and drivers for the project – What is the project? Why is it necessary? How does it support and complement IRWM?]

2.1.1 Project Sponsor

[Lead Project Sponsor] is the sponsor for the *Disadvantaged Community (DAC) Residential Groundwater Treatment Program* **[Project Title]**.

2.1.2 Project Need

The *DAC Residential Groundwater Treatment Program* was developed to fulfill the recommendation of the *DAC Water Quality Evaluation* to create an on-site water treatment program for small DAC mobile home parks that could be implemented by interested parties.

2.1.3 Project Purpose

The purpose of the *DAC Residential Groundwater Treatment Program* **[Project Title]** is to provide households in DACs a safe supply of drinking water through installation of Point-of-Use (POU) systems that will address the constituents of concern (COCs) for the local area.

2.1.4 Project Abstract

[Use project abstract consistent with other locations in the application calling for the project abstract]

In the Coachella Valley **[Region]** there is documented contamination of tap water in localized areas of the Region dependent on groundwater. While these issues can be found in localized areas regardless of income, the ability to address these issues is greatly diminished in disadvantaged communities (DACs). DACs are defined by DWR as communities with a Median Household Income (MHI) 80% or less of the statewide MHI. In 2010 **[year]**, DACs were those communities earning $48,706 **[DAC MHI]** or less. In the Coachella Valley, many DACs are outside water supply agency service areas, and are too remote to make connecting to an existing municipal water supply system feasible on a short-term basis. While the Region would like to be able to connect most, if not all, communities to municipal water and sewer systems, it is unable to do so immediately, so a solution must be implemented to protect the health of residents.

Residents using contaminated groundwater may not be aware what concerns there might be with their tap water. Unlike non-DACs, DACs may not have the resources or capacity to purchase alternative treatment for their tap water that effectively treats constituents of concern (COCs). COCs of greatest concern in the Region are arsenic, fluoride, nitrate, uranium, and hexavalent chromium. Through an assessment of various treatment options, it was determined that the most cost-effective method for treating all of these COCs in DACs is installation of a Point-of-Use reverse osmosis (RO) system. These systems are installed under the sink and treat the water in the home. The *DAC Residential Groundwater Treatment Program* will install **[number of systems]** Point-of-Use systems in households within DACs identified as having water quality issues. To ensure continued proper maintenance of these systems, the program proposes to conduct a series of training workshops and manuals designed to teach residents how to care for their systems, how to test their water to check for problems in the system, when to replace filters and other parts, and how to find answers to common questions regarding their individual system. **[Project sponsor]** anticipates the *DAC Residential Groundwater Treatment Program* to train up to **[number]** of individuals in system care, and expects to install enough systems to serve **[number]** people.

2.1.5 Project Partners

[Lead Project Sponsor] is the primary project sponsor for the *DAC Residential Groundwater Treatment Program* **[Project Title]**. Project partners for this project include: **[Interested NGOs, County Department of Public Health, City Public Health Department, Environmental Justice Coalition on Water, California Rural Legal Assistance Foundation, include any and other appropriate partners]**. These groups have **[previous work/experience/interest in or related to project]**.

2.1.6 Project Timing and Phasing

This program is a multi-phased project consisting of five phases:

1. Identify the most cost-effective onsite, residential POU RO system to address the five identified COCs;
2. Conduct pilot testing of treatment systems if necessary;
3. Develop the necessary program documentation to ensure consistency of implementation (including a Testing and Installation Manual, a Monitoring and Maintenance Manual and other related training materials);
4. Train local community members to install, monitor, and maintain the POU systems; and then do the installation; and
5. Design a finance model to fiscally sustain the program, thereby ensuring that, once the POU systems have been installed, a forum exists to ensure that members within the identified DACs will continue to have access to safe drinking water.

Phases [1 through 5] are included in this project, though other phases of the project could potentially occur in other locations throughout the Region.

2.1.7 Project Map

[Figure X] is a map showing the location of proposed individual communities that will receive the POU systems. It also shows DAC boundaries, the groundwater basin, and the extent of the existing nearby municipal connections.

[Insert project map]

2.1.8 Project Objectives

The *DAC Residential Groundwater Treatment Program* **[Project Title]** includes the following project objectives:

- Offer cost-effective and reliable technology to remove high levels of COCs
- Provide short-term alternatives to deliver quality drinking water for disadvantaged communities
- **[other objectives, as appropriate]**

[Table X] provides an overview of the Coachella Valley **[Region]** IRWM Plan objectives that are expected to be indirectly (○) or directly (●) achieved through implementation of the *DAC Residential Groundwater Treatment Program* **[Project Title].**

Table X: Contribution to IRWM Plan Objectives
[Complete table and explanation below using objectives from local IRWM Plan]

Proposal Project	**Contribution to IRWM Plan Objectives**												
	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**	**K**	**L**	**M**
DAC Residential Groundwater Treatment Program **[Project Title]**	●	-	-	-	○	-	○	-	-	●	-	●	●

● = directly related; ○ = indirectly related

The project contributes to the IRWM Plan Objectives in the following ways:

- ***A: Provide reliable water supply.*** This project intends to improve the quality of local water supplies, thereby reducing the need for communities to rely on other, less reliable water supplies such as hauled water.
- ***E: Protect groundwater quality and improve, where feasible.*** This project will indirectly protect groundwater quality by reducing constituents of concern from entering the wastewater supply, and therefore preventing this water from percolating into the groundwater.
- ***J: Maximize stakeholder involvement.*** This project provides education and training in water management operations, thereby increasing the number of stakeholders involved and increasing their level of involvement.
- ***L: Address water and sanitation needs of disadvantaged communities.*** This project directly addresses water quality issues of DACs within the Coachella Valley.
- ***M: Maintain affordability of water.*** This project will provide a cost-effective solution to local water quality issues within a DAC. In addition, by improving drinking water quality within these communities, this project will reduce the need for residents to rely on other, more expensive water supplies such as bottled water.

2.1.9 Project Integration

The program complements existing projects and programs in the Coachella Valley IRWM Region **[Region]** seeking to address water quality needs in DACs, such as the *Short Term Arsenic Treatment (STAT) Program*, funded through a Proposition 84 Implementation Grant – Round 1 **[Discuss other related projects]**. It also includes partnerships between water agencies, local non-profits, and DACs that will foster and strengthen new and existing relationships between these groups. The project meets multiple IRWM Plan objectives and provides multiple benefits.

2.1.10 Linkages and Synergies with Other Projects in the Proposal

[If applicable:]This program will install POU systems in DACs using contaminated groundwater. Several other projects in this proposal aim to protect groundwater quality or address water supply needs of DACs. **[Discuss these projects briefly]**. The Coachella Valley IRWM Plan identifies the critical need to serve the Region’s DACs (IRWM Plan Objective L) and this funding application helps the Region to accomplish that goal.

[If not applicable:] Though this program will support IRWM Plan objectives and complements efforts of previous IRWM projects in the region **[list other projects]**, it does not have linkages or synergies with other projects in this application package.

2.1.11 Completed Work

[Any work completed prior to grant application that directly supports the project]

- DAC Water Quality Evaluation – CVRWMG completed a DAC Water Quality Evaluation in 2013 that identified COCs in localized areas of groundwater used by DACs
- Contract Documents – **[Project sponsor]** completed design for the project in **[DATE]**
- Environmental Compliance – **[Project sponsor]** completed environmental compliance processing in **[DATE]**
- **[other completed work, could include design work, or any of the tasks listed in the work plan that have been completed prior to application]**

2.1.12 Existing Data and Studies

This project type, scope, and focus are identified in the following plans and studies:

- Rural Community Assistance Corporation. January 21, 2010. Drinking Water Assessment Final Report: San Antonio del Desierto Mobile Home Park.
- Rural Community Assistance Corporation. March 2010. *Coachella Valley Water Systems Assessments.*
- Coachella Valley Regional Water Management Group. March 2014. *Coachella Valley Integrated Regional Water Management Plan Update*.
- **[Other Plans could include General Plans, UWMPs, IRWMs, Feasibility Studies, etc.]**

2.2 Project Work

[Project Work includes the specific tasks required to complete the project and the anticipated schedule for each activity]

The proposed program has been divided into four key tasks for development and implementation, with additional tasks for grant administration, permitting, project administration, and construction administration **[add other tasks as necessary]**. Each task is described below and has associated deliverables, and costs. It is important to note that the program defined below is only applicable to DACs with fewer than 15 connections and fewer than 25 users. Water systems serving 15 or more connections or serving 25 or more people are considered community water systems and are regulated by the California Department of Public Health (CDPH). While POU systems are allowed for these larger systems, they are considered to be an interim measure and are only allowed for three years as a permanent treatment solution is identified, designed and installed.[1] For these larger DACs, groundwater treatment will need to be addressed on a site-by-site basis.

Grant Administration

CVWD **[Grant application package lead agency or other responsible party]** will be responsible for administration and processing of the Implementation Grant contract, including tasks associated with compiling and submitting project invoices, quarterly reports, and completion reports for DWR.

Direct Project Administration Costs

Task 1: Project Administration – This project will involve project administration before and after the Implementation Grant Agreement is formalized (**[date]**). Based on administration costs from the STAT project, it is estimated that the project will require 500 **[number]** hours of effort from a Project Manager to coordinate with CVWD **[Grant Package Administrator identified above]**, produce invoices and reports, and fulfill all other necessary administrative tasks associated with the project. This estimation is

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[1] California Department of Public Health, Division of Drinking Water and Environmental Management, *Point of Use Compliance*. (March 2013).

based on the anticipated schedule of 3 years and would likely need to increase if a project will take longer to implement.

Task 1 Deliverables:

- Quarterly invoices
- **[List other deliverables – could include approvals]**

Task 2: Labor Compliance Program – Not applicable. Construction associated with this project will not involve significant ground disturbing activities, or any other construction activities that would necessitate a Labor Compliance Program.

Task 2 Deliverables:

A labor compliance program is not applicable to this project, so no deliverables for Task 2 are required. **[If applicable: list deliverables.]**

Task 3: Reporting – All reporting for this project will occur after the Implementation Grant Agreement is formalized (after **[Start date of grant]**). In order to assess progress and accomplishments of the project, the following submittals will be completed by each indicated date.

Task 3 Deliverables:

- Quarterly progress reports, including required deliverables
- Project Assessment and Evaluation Plan (PAEP)
- Project Completion Report

Table X: Direct Project Administration

Activity or Deliverable	Schedule	Status	Completion of Task	
			Before [grant start date]	After [grant start date]
Task 1: Project Administration				
Project Coordination	**[Grant start date – end of project]**	Not yet begun		X
[If applicable]: Task 2: Labor Compliance Program				
[If applicable:] Labor Compliance Program, including field interviews, reviewing contractor payroll, preparing deficiency notifications, and preparing final report	**[Construction dates of project]**	Not yet begun		X
Task 3: Reporting				
Compile PAEP, Invoices, and Progress Reports	**[Grant start date – end of project]**	Not yet begun		X
Prepare Quarterly Reports	**[Grant start date – end of project]**	Not yet begun		X
Prepare Final Report	**[Six months prior to end of project – end of project]**	End of work		X

Land Purchase/Easement

No easement acquisitions and/or right-of-ways will be required for implementation of this project.

Land Purchase Easement Deliverables:

No work related to land purchase easements will be completed for the project, therefore deliverables are not applicable.

Planning/Design/Engineering/Environmental Documentation

Task 4: Assessment and Evaluation - This task involves preparation of all studies designed to assess and evaluate the project, as well as planning designed to create a sustainable program. For the *DAC Residential Groundwater Treatment Program* **[Project title]**, this task will involve three subtasks:

- Market research and identification of preferred water treatment system
- Pilot testing **[Only required if recommended POU treatment system from Subtask 4.1 is not currently in use in Region]**
- Long-term financing plan

Subtask 4.1: Market Research and Identification of Preferred Water Treatment System

The *DAC Water Quality Evaluation* **[previous study]** determined that a membrane separation (commonly referred to as reverse osmosis or RO) POU water treatment system would be best implemented given the rural and semi-rural nature of the AOCs, the potential for one or more COCs to be present in groundwater, and past experiences in the Coachella Valley with systems of this nature. In this task, an analysis will be conducted to identify affordable, commercially-available RO treatment systems for possible use within the AOCs. This analysis will include collection of publically-available data regarding the system specification operations (both directly from the manufacturer and third-party sources), information on the performance of RO systems currently in use in the Coachella Valley, and capital, monitoring and maintenance costs. Budget and RO system requirements will be established so as to best understand the type of system and number of systems required by the AOCs. Based on the results of the analysis, a commercially-available water treatment system will be selected for long-term application in the program. **[Project sponsors should consider prioritizing systems already in use in the region to avoid the need for Subtask 4.2: Pilot Testing. Sponsors should also contact CDPH for guidance on system and permit requirements.]**

Subtask 4.1 Deliverables:

[A sample document for the Subtask 4.1 deliverable is included as Appendix A to this TM.]

- Technical memorandum documenting the analysis of possible water treatment systems and presentation of a recommended system

Subtask 4.2: Pilot Testing

[If the recommended POU treatment system identified in Subtask 4.1 is not currently in use in the Coachella Valley:]A pilot testing program will be conducted to demonstrate compliance with the CDPH objectives of such a program. The pilot program will consist of the installation, testing and monitoring of the selected POU systems in one DAC in the valley **[project area]**. In keeping with CDPH protocols, the pilot testing will be conducted for at least two months to demonstrate successful treatment of area groundwater. The POU treatment units will be installed on five units **[appropriate number]**, with tap water tested immediately before and following installation and weekly thereafter for a period up to two months.

Subtask 4.2 Deliverables:

[A sample document for Subtask 4.2 is included in this TM as Appendix B.]

- Pilot testing work plan

- Pilot testing summary report

Subtask 4.3: Long-Term Financing Plan

The goal of this program is to create an economically self-sustaining model for providing safe drinking water to DACs in the Coachella Valley. To this end, ongoing financing will be required for the purchase of replacement parts and materials, ongoing training of community members, system monitoring and data management. As it is recognized that State funding will not support system maintenance, this subtask will develop a long-term financing program that will provide funding for long-term support.

It is assumed that the Long-Term Financing Plan to be developed under this subtask will require a one-time infusion of local funds as ‘seed money’ and will create a program requiring a nominal monthly fee from those utilizing the program units to both offset long-term maintenance and provide capital for program expansion. Specifically, this subtask envisions development of a program similar to those used by Rotary Club and other sustainable charitable programs, incorporating elements of sustainability presently being considered under the STAT Program. As envisioned, this will include a nominal monthly fee charged for system use, collected and deposited into an account, which will be used to fund the long-term monitoring and maintenance of the treatment systems. The financing plan will consider and recommend a specific management model for the program (including identification of an oversight agency and agreement format) and suggested investment methods to ensure that the seed money and collected funds are properly managed and protected against financial pitfalls. Any proposed long-term financing plan will be vetted for the ability of residents to afford the necessary O&M costs, and remain in compliance with California Civil Code §798.

Subtask 4.3 Deliverables
[A sample document for Subtask 4.3 is included in this TM as Appendix H.]

- *Long-Term Financing Plan*

Task 5: Final Design – Once a POU treatment unit has been selected, as part of final design prior to installation of the selected system, the following three subtasks will be completed to produce the documents necessary to create a sustainable program:

- Develop installation manual and methodology
- Develop protocols for program operations and maintenance
- Develop monitoring and maintenance manual

Subtask 5.1: Develop Installation Manual and Methodology

Prior to installing the treatment units, an Installation Manual will be developed. The purpose of this manual will be to document the appropriate protocols for system installation and testing, and for use in training local community members in how to install the selected water treatment systems. The manual will include, but is not limited to, procedures for system installation, common troubleshooting, the importance of and process for pre- and post-installation water quality testing, and manufacturer contact information.

Subtask 5.1 Deliverables
[A sample document for Subtask 5.1 is included in this TM as Appendix C, which is the annotated outline for an installation manual]

- *Installation Manual*

Subtask 5.2: Develop Protocols for Program Operations and Maintenance

Under this subtask, protocols will be developed for the method/mode by which the POU treatment units will be purchased, stored, distributed and tracked, and the means for tracking installed units, including, but not limited to, equipment and records tracking and management. As needed, forms for recording information will be developed and a simple EXCEL-based database developed for maintaining all data collected.

Subtask 5.1 Deliverables

[Two sample documents for Subtask 5.2 are included in this TM as Appendix D and Appendix E, which are an annotated outline for program operations protocols and a sample program tracking spreadsheet]

- *Program Operations Protocols (for equipment purchase, maintenance, distribution and tracking)*

Subtask 5.3: Develop Monitoring and Maintenance Manual

In Subtask 5.3, a Monitoring and Maintenance Manual will be completed, providing the necessary protocols for maintaining the selected POU treatment units. Also included in the manual will be manufacturer information for replacement parts and recommended testing procedures. This information will be included in the training program provided to community members in Task 9, below. The manual will include information such as system specifications, process for purchasing and installing replacement filters, maintenance and replacement schedules, annual testing, and manufacturer contact information.

Subtask 5.3 Deliverables

- **[A sample document for Subtask 5.3 is included in this TM as Appendix F, which is the annotated outline for a monitoring and maintenance manual]***Monitoring and Maintenance Manual*

Task 6: Environmental Documentation – Environmental documentation for this project is not required as it will not be of the size, scale, or impact as to trigger CEQA, NEPA, or other environmental regulations. **[If project is expected to trigger one of these regulations, describe as appropriate here.]**

Task 7: Permitting – Permitting for this project will occur before and after initiation of the grant agreement **[insert grant start date]**. **[Project sponsor]** in collaboration with **[other agencies]**, will secure all necessary permits for installation of the selected systems. Preparation of permit applications is not included in this work plan **[if included, delete this statement and include in table below]**. Permits required for the project include a treatment permit from Riverside County Department of Environmental Health **[use appropriate agency]** and an onsite construction permit from the Riverside County Building Department **[use appropriate agency]**. **[Other permits may include treatment or construction permits from cities, project sponsors should check local regulations.]**

Table X: Planning/Design/Engineering/Environmental Documentation

Activity or Deliverable	Schedule	Status	Completion of Task	
			Before [grant start date]	After [grant start date]
Task 4: Assessment and Evaluation				
Subtask 4.1 Market Research and Identification of Preferred Water Treatment System				
Potential RO systems analysis, including data collection, analysis of systems	**[Grant start date – start date + 4-6**	Not yet begun		X

currently in use, determination of costs, budget and system requirements, **[locally applicable regulations]**	**months]**			
[If required]*Subtask 4.2 Pilot Testing*				
Installation of 5 **[appropriate #]** POU systems	**[End of subtask 4.1 – end of subtask 4.1+1 months]**	Not yet begun		X
Tap water testing	**[End of subtask 4.1 + 2 months]**	Not yet begun		X
Monitoring of POU systems	**[Installation of 5 POU systems – installation of systems + 2 months]**	Not yet begun		X
Subtask 4.3 Long-term Financing Plan				
Develop funding plan	**[End of subtask 4.1 – end of subtask 4.1+6 months]**	Not yet begun		X
Implement funding program	**[End of develop funding plan – end of project]**	Not yet begun		X
Task 5: Final Design				
Subtask 5.1 Develop Installation Manual and Methodology				
Write Installation Manual	**[End of Subtask 4.2 – end of Subtask 4.2 + 4-6 months]**	Not yet begun		X
Subtask 5.2: Develop Protocols for Program Operations and Maintenance				
Develop protocols	**[End of Subtask 4.2 – end of Subtask 4.2 + 4-6 months]**	Not yet begun		X
Develop forms for recording information	**[End of Subtask 4.2 – end of Subtask 4.2 + 1-6 months]**	Not yet begun		X
Develop database for collected data	**[Start of Task 4 – Start of Task 4 + 6 months-1year]**	Not yet begun		X
Write Program Operations Protocols	**[End of Subtask 4.2 – end of Task 4.2 + 4-6 months]**	Not yet begun		X
Subtask 5.3 Develop Monitoring and Maintenance Manual				
Write Monitoring and Maintenance Manual	**[End of Subtask 4.2 – end of Task 4.2 + 4-6 months]**	Not yet begun		X
[If required]Task 6: Environmental Documentation				
[if required, could include CEQA (Neg. Dec./MND/EIR), NEPA (FONSI/EIS), or other]	**[Start of activity +6-18 months]**	Not yet begun		X
[If including in work plan] Task 7: Permitting				

Obtain treatment permit	**[End of Task 5 – End of Task 5 + 4 months]**	Not yet begun		X
Obtain environmental health permit	**[End of Task 5 – End of Task 5 + 4 months]**	Not yet begun		X
Obtain construction permit	**[End of Task 5 – End of Task 5 + 4 months]**	Not yet begun		X

Construction/Implementation

Task 8: Construction Contracting – All construction contracting will occur after initiation of the Grant Agreement. Once final plans are approved, **[Project sponsor]** will be the lead agency in preparing bid documents to retain construction contractors. **[If pilot project was conducted, and bidding occurred during this process: During the pilot project (Project Sponsor) obtained bids to retain a general contractor and subcontractor for required onsite work at (project site). Because (project sponsor) has already been through the bidding process, they do not anticipate the need to re-bid this part of the (project name)].** Construction contracting is not included as part of this application. **[if included, delete this sentence and include it in tasks table.]**

Task 9: Construction – The project proposes to install POU RO treatment systems in DACs using contaminated groundwater for their source of tap water. The project will address a critical water supply need for DACs currently unable to connect to municipal supply systems. To prepare residents for system installation, training will be provided as part of site preparation.

Subtask 9.1 Mobilization and Site Preparation: *Train Local Community Members to Conduct Installation, Monitoring and Maintenance*

In Subtask 9.1, a training program will be developed to train local community members in how to install the water treatment systems. The training is part of site preparation activities because it prepares residents for installation of the treatment systems as well as preparing them for how to monitor and maintain the systems to ensure they remain functioning through the life of the project. This program will build off similar programs conducted to date, and will include, but is not limited to, the identification and solicitation of community members for inclusion in the training program, and preparation of training materials (presentation, script, etc.). Training workshops will be held for the community members, and will include modules on treatment unit installation, monitoring, maintenance and troubleshooting. Once members have completed the training program, the water treatment systems will be installed at previously identified DACs as described in Subtask 9.2.

Subtask 9.1 Deliverables

[A sample document with an outline for training presentation for Subtask 9.1 is included as Appendix G to this TM]

- *Training presentation and handouts*
- *Up to five (5)**[appropriate number]** training workshops held for community members*
- *List of trained community members*

Subtask 9.2 Project Construction: *Install Treatment Units*

Following completion of Subtask 9.1, the POU treatment units will be purchased in bulk, with the number of units purchased dependent on funds available. Using the protocol developed in Task 5, all purchased units will be managed and tracked, and a master list of all installed units compiled, including documentation of installer name, installation date and location, owner(s) name and contact information, pre- and post-installation water quality data, and installation notes. It is assumed that pre- and post-installation water quality sampling will be conducted for each installed treatment unit.

Subtask 9.2: Deliverables

- *EXCEL database (developed in Subtask 5.2 and completed here)*

Subtask 9.3 Performance Testing and Demobilization*: Follow-up with residents*
This task will include return visits to residences who installed POU treatment systems under the program. On these visits, **[Project sponsor]** will test tap water to ensure systems are working and inspect systems for maintenance issues.

Subtask 9.3: Deliverables

- Performance testing results

Table X: Construction/Implementation

Activity or Deliverable	Schedule	Status	Completion of Task	
			Before [grant start date]	After [grant start date]
[If included]Task 8: Construction Contracting				
[If included]Construction bidding and contracting activities	**[Start of Grant +1 month – Start of Grant + 6 months]**	Not yet begun		X
Task 9: Construction				
Subtask 9.1 Mobilization and Site Preparation				
Develop training materials	**[End of Task 5 – end of Task 5 + 3-6 months]**	Not yet begun		X
Identify and invite community members to participate in training	**[One month prior to completion of training materials – one month after completion of training materials]**	Not yet begun		X
Hold 5 **[appropriate #]** training workshops	**[Following invitation to community members – 3 months later]**	Not yet begun		X
Subtask 9.2 Project Construction				
Install **[number]** POU treatment systems	**[End of Subtask 9.1 – end of Subtask 9.1 +1 month per site]**	Not yet begun		X
Subtask 9.3 Performance Testing and Demobilization				
Revisit installation sites and test systems	**[Revisit 1 yr after installation]**	Not yet begun		X

Environmental Compliance/Mitigation/Enhancement

Task 10: Environmental Compliance/Mitigation/Enhancement – This project will not trigger requirements of CEQA, NEPA, or other environmental regulations and will therefore not require environmental compliance, mitigation, or enhancement. **[If project triggers one of these things, describe here.]**

Task 10 Deliverables:

As there are no project activities for Task 10, no deliverables are required. **[If Task 10 is required, deliverables might include EIR, EIS, Mitigation Monitoring Program, etc. If Task 10 is required, include table similar to those for other tasks]**

Construction Administration

Task 11: Construction Administration – This task involved administration, coordination, and review of the construction contract and all other related construction tasks, and will occur **[before and]** after initiation of the formal grant agreement. A project manager will be needed to coordinate with contractors, complete invoicing and billing, and other construction administration tasks as needed.

Table X: Construction Administration

Activity or Deliverable	Schedule	Status	Completion of Task	
			Before Sept 2013	After Sept 2013
Task 11: Construction Administration				
Management of Construction Contractor	**[Award date of construction contract – completion of construction (Subtask 9.2)]**	Not yet begun		X

3 Budget

The *DAC Residential Groundwater Treatment Program* **[Project title]** will involve tasks designed to identify and install appropriate POU RO treatment systems in DACs in the Coachella Valley **[Region]**. To create a sustainable program and ensure the systems work through the end of the project life, training will be provided to residents on proper testing and maintenance, and a financial program developed to create a long-term funding solution to help cover ongoing training, maintenance, and data collection and management expenses. This project will address a critical water supply quality issue for DACs that will protect health of residents by providing access to safe tap water. Funding for this program involves project administration, planning, and implementation.

The total cost associated with the *DAC Residential Groundwater Treatment Program* **[Project title]** is **[Total project cost]**. Of these total costs, **[grant request]** is being requested for grant funding through the IRWM Grant Program **[name of grant program]**. The remaining **[remaining costs]** will be provided by the project sponsor **[partner agencies] [and other grants]**. In total, the non-State share of the total project (funding match) is **[funding match]**% for this program. The funding match will be provided by the **[source of funding match]** of the operating funds of the **[project sponsor/partner agencies]**.

[Table X], below, provides a more detailed break-down of the total project budget.

Table X: Project Budget

Proposal Title: Coachella Valley IRWM Implementation Grant Proposal – Round 2

Project Title: Non-Potable Water Use Expansion Program

Project serves a need of a DAC?: ☒ Yes ☐ No

Funding Match Waiver request?: ☐ Yes ☒ No **[check appropriate box]**

		(a)	**(b)**	**(c)**	**(d)**
	Category	**Requested Grant Amount**	**Cost Share: Non-State Fund Source* (Funding Match)**	**Cost Share: Other State Fund Sources***	**Total**
(a)	Direct Project Administration				
(b)	Land Purchase/ Easement				
(c)	Planning/ Design/ Engineering/ Environmental Documentation				
(d)	Construction/ Implementation				
(e)	Environmental Compliance/ Mitigation/ Enhancement				
(f)	Construction Administration				
(g)	Other Costs				
(h)	Construction/ Implementation Contingency				
(i)	**Grand Total**				

** Sources of funding: The non-state funding match will be provided by the* ***[funding source]****.*

This proposal is requesting funding for **[appropriate #]** project tasks identified within the *DAC Residential Groundwater Treatment Program* **[Project title]** work plan (refer to **[add reference]**). The sections below provide detailed descriptions of each of the row and task budgets (where applicable). In addition, each section describes how cost estimates for each of the tasks or rows were calculated.

Table X: Cost Breakdown by Work Plan Task and Subtask

Row/Task	Category	Total
GA	Grant Administration	
Row (a)	Direct Project Administration Costs	
Task 1	*Project Administration*	
	[If applicable: Task 2 Labor Compliance]	
Task 3	*Reporting*	
Row (c)	Planning/Design/Engineering/Environmental Documentation	
Task 4	*Assessment and Evaluation*	
Task 5	*Final Design*	
	[If applicable: Task 6 Environmental Documentation]	
Task 7	*Permitting*	
Row (d)	Construction/Implementation	
	[If applicable: Task 8 Construction Contracting]	
Task 9	*Construction*	
	[If applicable: Row (e) Environmental Compliance/Mitigation/ Enhancement]	
	[If applicable: Task 10 Environmental Compliance/Mitigation/ Enhancement]	
Row (f)	Construction Administration	
Task 11	*Construction Contracting*	
Row (g)	Other Costs	
Row (h)	Construction/Implementation Contingency	
Row (i)	**Grand Total**	

Grant Administration

[Describe how grant administration will be handled] Local project sponsors shall dedicate a portion of their grant funds to CVWD **[agency responsible for grant administration]** for administration and processing of the Implementation Grant. The *DAC Residential Groundwater Treatment Program* **[Project title]** will contribute **[amount for grant administration]** to this administration cost. **[Describe who will be doing what for this task:]** Costs for grant administration include labor costs for a planning manager to coordinate receipt of quarterly progress reports and an analyst who will receive and reconcile invoices for grant reimbursables and funding match from project sponsors to create a grant invoice for DWR. The costs are based on hourly rates for these positions, and effort based on **[justification]**. **[Note: in the past, Coachella Projects have allocated between 2% and 3% of project cost for Grant Administration]**

Table X: Grant Administration

Activity	Discipline	Hourly Wage ($/hr)	Number of Hours	Total	Funding Match	Grant Request
Grant Administration						
Grant administration	Planning Manager	$85		120		
	Analyst	$60		180		
Grant Administration Total						

Direct Project Administration

[If applicable] The total direct project administration costs for the project are **[total direct project administration costs]** and will be spent by **[responsible party]** for administration and processing of the IRWM Implementation Grant.

Task 1: Project Administration – [Project sponsor] will assume all direct project administration costs for this project. This task involves administration of the *DAC Residential Groundwater Treatment Program* **[Project title]**, and include costs for a Project Manager and equipment and supplies associated with project administration. These costs are estimated to be **[costs]**. Cost estimates are based on project administration requirements of the STAT project, and adjusted for efficiencies and differences between the STAT project and the *DAC Residential Groundwater Treatment Program* **[provide appropriate reasoning for costs]**.

Task 2: Labor Compliance Program – Not applicable. **[If applicable, include who will incur costs, what they will be doing (refer to Work Plan), and how costs were determined.]**

Task 3: Reporting – [If not already included under Task 1:] Costs for Task 3 include those incurred by preparing the Project Assessment and Evaluation Plan, quarterly progress reports and invoices, and a Project Completion Report for the *DAC Residential Groundwater Treatment Program* **[Project title]**. Task 3 costs are estimated to be **[cost]**.

Table X: Direct Project Administration Budget

Activity	Discipline	Hourly Wage ($/hr)	Number of Hours	Total	Funding Match	Grant Request
Task 1: Project Administration						
Project Coordination	Project Manager	$100	240			
			Task 1 Total			
[If applicable:] Task 2: Labor Compliance Program						
Field Interview Project Labor Force	Consultant	$120	72			
Review Contractor Certified Payroll	Consultant	$120	48			
Prepare Deficiency Notification	Consultant	$120	48			
Prepare Final Report Summarizing Labor Compliance	Consultant	$120	24			
			Task 2 Total			
Task 3: Reporting						
PAEP	**[job title]**					
Compile invoices and work summary	Consultant	$120	40			
Prepare Quarterly Reports	Consultant	$120	120			
Prepare Final Report	Consultant	$120	80			
			Task 3 Total			
			Row (a) Total [Sum of this table]			

Land Purchase/Easement

Not applicable. **[if applicable, include description of WHO will do WHAT, any materials needed, total cost estimate, justification for estimate, and summary table]**.

Planning/Design/Engineering/Environmental Documentation

The total planning/design/engineering/environmental documentation costs for this project are **[costs]**. **[Table X]** provides a detailed listing of all applicable costs. This cost total is based on the following:

Task 4: Assessment and Evaluation – This task includes the costs for completing the market research and identification of preferred water treatment system, pilot testing **[if required]** (costs to include water testing and any construction costs for the pilot project, and costs for pilot project analysis **[insert brief description of activities from work plan for pilot project]**), and development of the long-term financing plan.. These costs are estimated to be **[cost]**, based on previous experience with water testing and similar pilot projects, as well as the **[justification for cost estimate for financing plan]**.

Task 5: Final Design – This task includes costs for development of the installation manual, protocols for program operations and maintenance, and monitoring and maintenance manual, estimated to total **[cost]**. Costs will be incurred by **[responsible party job title]**, and are estimated based on hourly rates and effort. Effort was estimated based on past experience creating similar sample documents, and adjusted for the additional detailed effort required for full implementation **[add justification]**.

Task 6: Environmental Documentation – Not applicable. **[If applicable: include costs for CEQA, NEPA, etc. as guided by the Work Plan]**

Task 7: Permitting – **[Project Sponsor]** has applied **[will apply]** for and received a treatment permit from the Riverside County Department of Environmental Health **[regulating agency]** for the project. **[Project sponsor]** will also apply for an Environmental Health Permit and a Building Department Permit for implementation of the *DAC Residential Groundwater Treatment Program*. Staff and other costs required to finalize this permitting is anticipated to be **[cost]**, based on prior experience submitting and receiving permits from the County of Riverside **[regulating agency]**.

Table X: Planning/Design/Engineering/Environmental Documentation Costs

Activity	Discipline	Hourly Wage ($/hr)	Number of Hours	Total	Funding Match	Grant Request
Task 4: Assessment and Evaluation						
Subtask 4.1: Market Research and Identification of Preferred Water Treatment System						
RO systems analysis						
[Add analysis activities to correspond with Work Plan]						
[If applicable:]*Subtask 4.2: Pilot testing*						
Water testing	Hydrologist		100			
Installation of 5 POU systems	**[job title]**					
	POU system	$125**[unit cost]**	5 **[# of systems installed]**	$625		
System monitoring	**[job title]**					
Subtask 4.3: Long-term Financing Plan						
Development of long-term financing plan	Financial Analyst					
	Consultant					
Funding Program						
			Task 4 Total			
Task 5: Final Design						
Subtask 5.1: Develop Installation Manual and Methodology						
Develop installation manual						
Subtask 5.2: Develop Protocols for Program Operations and Maintenance						
Develop protocols						
Develop recording forms						
Develop database						
Write program operation protocols						
Subtask 5.3: Develop Monitoring and Maintenance Manual						
Write monitoring and maintenance manual						
[if applicable: engineering and design]						
			Task 5 Total			
[If applicable:] Task 6: Environmental Documentation						
[NEPA/CEQA/etc.]						
			Task 6 Total			
Task 7: Permitting						
Treatment permit						
Environmental health						

permit						
Building permit						
[If applicable: encroachment permit, etc.]						
Task 7 Total						
Row (c) Total [Sum of this table]						

Construction/Implementation

The total construction/implementation costs for the *DAC Residential Treatment Program* **[Project title]** is **[cost]**. This cost total is based on the following:

Task 8: Construction contracting – Not applicable. **[Construction contracting will be conducted prior to any construction activities, but are not included as part of this application] [if applicable: describe activities – WHO will do WHAT (match Work Plan), provide cost estimates and justification]**

Task 9: Construction – Construction/implementation costs for this project are necessary to complete subtasks 9.1 through 9.3, as described in the Work Plan (**[reference work plan]**).

The total Task 9 cost estimate is **[cost]**, and is based on **[cost justification]**. Costs for this task are divided into three categories: Materials, Equipment, and Labor **[appropriate categories]**.

- Materials: Materials that will be required for construction/implementation of this project include training materials (handouts, manuals, **[other training materials]**), **[construction materials]**. Estimated cost for materials is **[cost]**.
- Equipment: Anticipated equipment costs for the project include costs for the POU systems, **[other equipment]**. Total equipment cost is anticipated to be **[cost]**.
- Labor: Labor costs for this project include costs for a trainer, general contractor, masonry, an electrician, and a plumber **[use appropriate labor based on Work Plan]**. Total labor costs are estimated at **[cost]**.

Table X: Construction/Implementation costs

Materials						
Activity	**Materials**	**Unit Costs ($)**	**Number of Units**	**Total ($)**	**Funding Match**	**Grant Request**
5 **[appropriate #]** Training	Training manual	**[do not include cost to develop – just cost to print/materials to print]**				
	Handouts	**do not include cost to develop – just cost to print/materials to print]**				
	[other training materials]					
Subtotal						
Equipment						
5 **[appropriate #]** Training	Training Space		**[# of meetings]**			
	[other equipment for training – projectors, etc. if not included in space]					
POU installation	POU system	$125				
	[other equipment]					
Subtotal						
Labor						
Activity	**Discipline**	**Hourly Wage ($/hr)**	**Number of Hours**	**Total**	**Funding Match**	**Grant Request**
5 **[appropriate #]** Training	**[Job title for trainer]**		40 **[# of meetings x time per meeting]**			
	[other persons necessary to conduct training]		40			
POU Installation	General Contractor		800			
	Masonry		160			
	Electrician		160			
	Plumber		280			
	General Labor		160			
	[Other labor]					
Subtotal						
Row (d) Total [Sum of this table]						

Environmental Compliance/Mitigation/Enhancement

This project will not trigger requirements of CEA, NEPA, or other environmental regulations and will therefore not require environmental compliance, mitigation, or enhancement or incur costs for such activities. **[if applicable, describe WHO will do WHAT, total costs, justification of costs, etc. and add a table summarizing costs]**

Task 10: Environmental Compliance/Mitigation/Enhancement – Not applicable.

Construction Administration

Total estimated construction administration costs for the *DAC Residential Groundwater Treatment Program* is **[cost]**.

Task 11: Construction Administration – Costs for this task include the cost for a Project Manager to oversee a contractor for construction and POU system installation, and to oversee the training program.

Table X: Construction Administration

Activity	Discipline	Hourly Wage ($/hr)	Number of Hours	Total	Funding Match	Grant Request
Task 11: Construction Administration						
Training administration	Project Manager	$85	40			
Construction/installation administration	Project Manager	$85	476			
			Row (f) Total			

Other Costs

Other costs for the project are **[costs]**. These costs include **[describe what these other costs are – may include environmental health dept. fees, costs for certified operator for monitoring, others costs incurred based on previous experience]**. Other costs incurred will be provided by the project proponent as matching funds **[unspecified costs unlikely/unable to be covered by grant]**.

Construction/Implementation Contingency

Based on past experience with similar projects, approximately 10% of construction/implementation funds are generally required for unexpected expenses related to construction. As such, the project has budgeted **[10% of construction/implementation costs]** for constriction/implementation contingency.

Grand Total

The Grand Total for the *DAC Residential Treatment Program* (**[total cost]**) was calculated as the sum of rows **[first row]** through **[last row]** for each column.

Table X: Grand Total Costs

Row	Budget Category	Total Costs
GA	Grant Administration	
(a)	Direct Project Administration Costs	
(b)	Land Purchase/Easement	
(c)	Planning/Design/Engineering/ Environmental Documentation	
(d)	Construction/Implementation	
(e)	Environmental Compliance/ Mitigation/Enhancement	
(f)	Construction Administration	
(g)	Other Costs (Including Legal Costs, Permitting and Licenses)	
(h)	Construction/Implementation Contingency	
(i)	**Grand Total**	

4 Schedule

The project schedule for the *DAC Residential Groundwater Treatment Program* **[Project title]** was developed from the Work Plan (**[reference work plan location]**), and includes anticipated start and end dates, as well as milestone for each work plan task. **[Note: grant application may require actual dates, not just lengths of time from grant start date; schedule included here is to provide the minimum time required to complete each task. Timing will vary depending on specific tasks, site characteristics, number of sites, and project sponsor’s ability to front the funding to complete each task. Project sponsor may choose to add time to tasks to provide for unexpected delays]**

	Qtr 1				Qtr 2				Qtr 3				Qtr 4				Qtr 5				Qtr 6				Qtr 7				Qtr 8				Qtr 9				Qtr 10				Qtr 11				Qtr 12			
Task	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Grant Administration	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Task 1: Project Administration	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
[If applicable:] Task 2: Labor Compliance	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																														
Task 3: Reporting	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Compile PAEP, Invoices, and Progress Reports	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░
Quarterly Grant Reporting and Invoices				░				░				░				░				░				░				░				░				░				░				░				░
Final Report																																											░	░	░	░	░	░
Task 4: Assessment and Evaluation	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Potential system analysis	░	░	░	░																																												
Pilot study installation					░																																											
Pilot study water testing					░	░																																										
Pilot study monitoring						░	░																																									
Develop Funding Plan					░	░	░	░	░	░																																						
Implement Funding Plan											░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░	░
Task 5: Final Design	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																																					
Installation Manual								░	░	░	░																																					
Develop protocols								░	░	░	░																																					
Develop recording forms								░																																								
Develop database	░	░	░	░	░	░																																										
Write Program Operations Protocols								░	░	░	░																																					
Write Monitoring and Maintenance Manual								░	░	░	░																																					
[If applicable:] Task 6: Environmental Documentation	▨ Potentially start before grant	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																														
Task 7: Permitting											▨	▨	▨	▨																																		
Obtain treatment permit											░	░	░	░																																		
Obtain env. health permit											░	░	░	░																																		
Obtain construction permit											░	░	░	░																																		
[If applicable:] Task 8: Construction Contracting		▨	▨	▨	▨	▨																																										
Task 9: Construction/Implementation												▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																
Develop training materials												░	░	░																																		
Identify and invite training participants															░	░																																
Hold training workshops																░	░	░																														
Install POU systems																			░																													
Follow-up testing																																░																
[If applicable:] Task 10: Environmental Compliance/Mitigation/Enhancement	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨
Task 11: Construction Administration							▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨	▨																													

Appendix A - Commercially-Available Point of Use (POU) Reverse Osmosis (RO) Treatment Units (as of October 15, 2013)

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Task 1 Sample Document:

Commercially-Available **Point of Use (POU) Reverse Osmosis (RO) Treatment Units**

(as of October 15, 2013)

	System Information					Capital Cost		Replacements	
	Manufacturer	**Model Name**	**Model No.**	**Stages**	**Flow (gpd)**	**List Price**	**Online Price**	**Parts**	**Cost**
On-line	iSpring		RCC7	5	75	$300	$170	filter pack	$32.00
	iSpring		RCC7AK	6	75	$340	$210	filter pack	$74.67
	iSpring		RCC7AK-UV	7	75	$460	$276		
	Watts Premier	RO-Pure	531411	4	50	$400	$200	filter pack	$50.00
	New Wave	Enviro	796515300000	10		$119	$87		
	Aquatic Life	RO Buddie	540016	3	50	$80	$69	sediment cartridge, carbon cartridge	$28.57
	Aquatic Life	RO Buddie	540017	3	100	$120	$83	sediment cartridge, carbon cartridge	$57.14
	Hydro-Logic	Stealth-RO100	HLRO100		100	$225	$175	sediment filter, carbon filter	$34.21
	Purenex		RO-5-50	5	50	$150	$143	filter replacement set	$30.00
	US Water Systems	Aquapurion	APRO-4050	4	50	$150	$234		
	US Water Systems	Aquapurion	5050 (-5050A, -5050F, -5	5	50 - 75	$190-$290	$297-$500		
	US Water Systems	Aquapurion Plus	APRO-5075	5	75	$280	$437		
	US Water Systems	Aquapurion Re-Mineralization	APRO-6050	6	50	$340	$531		
	US Water Systems	Aquapurion Permate Pump	APRO-5050P	5	50	$350	$547		
	US Water Systems	Aquapurion High Pressure Permat	APRO-5100-P-14	5	100	$550	$859		
	US Water Systems	Whole House RO	USWHRO	6	500, 1500 & 4000 units	$3,995	$6,242		
	EcoWater	EcoWater ERO 375	ERO 375	3					
	EcoWater	EcoWater ERO 175	ERO 175	3					
	Coralife	Pure-Flo	5692	4	50	$275	$148	filter pack	$50.00
	Coralife	Pure-Flo	76000	3	24	$200	$120		
Home Depot	Perfect Water Technologies	Tap Master Artesian	TMAFC	7		$419	$419		
	Perfect Water Technologies	Tap Master Ultra	TMULTRA	6		$459	$459		
	General Electric	RO Water Filtration System	GXRM10RBL	3	11	$149	$149	filter set	$47.23
	DuPont	QuickTwist RO System	WFRO60X	3		$279	$279		
	EcoPure		ECOP309	3		$170	$170		
Lowe's	Whirlpool		WHER25	3		$131	$131	filter set	$77.00
	Krystal Pure		KR15	3	30	$320	$320	filter set	$34.90
	Krystal Pure		KR10	3	30	$220	$220	filter set	$26.77

Appendix B - Example Sampling and Analysis Plan (SAP) for POU Treatment Unit Pilot Testing

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1 Introduction

As part of the Coachella Valley IRWM Plan 2013 Update, a Disadvantaged Community (DAC) Water Quality Evaluation was conducted to assess groundwater quality in DACs where groundwater was the primary source of drinking water and to address stakeholder concerns about the quality of those drinking water supplies. This study identified Areas of Concern (AOCs), defined as areas of DACs that are utilizing groundwater containing constituents of concern (COCs) above State and Federal drinking water standards or Maximum Contaminant Levels (MCLs). Primary COCs identified in the underlying groundwater were arsenic, fluoride, nitrate, uranium, and hexavalent chromium. Additionally, as part of this earlier study, methods for treating the groundwater were considered, including treatment methodologies and varying modes for delivery of that treatment. Finally, projects to address the COCs found in the AOCs were identified and a monitoring plan developed to fill identified data gaps.

The DAC Residential Groundwater Treatment Program was one of the projects identified during the DAC Water Quality Evaluation as a means of addressing poor drinking water quality in AOCs. This program identified commercially-available point of use (POU) reverse osmosis (RO) treatment units as the most cost-effective way to treat drinking water in DACs in outlying areas (areas distant from existing public water systems). Outlined in the program are several steps or tasks for development of a program for selecting, installing, monitoring and maintaining POU RO units in DACs. These steps are:

Task 1 – Identify Possible Water Treatment System

Task 2 – Pilot Test Recommended Systems

Task 3 – Prepare Program Documentation (including installation manuals and monitoring and maintenance manuals)

Task 4 – Train Local Community Members and Install Systems

Task 5 – Develop Financing Strategy for Sustainable Monitoring and Maintenance

This document presents a summary of key elements to be included in a POU water treatment pilot test and an example sampling and analysis program for addressing Task 2, development and implementation of a pilot testing program. The pilot testing should be conducted to aid in the selection of a POU treatment device and to demonstrate compliance with the objective of providing safe drinking water to DACs. This plan will support the pilot program by providing a guide for establishing the current tap water quality conditions relative to tap water quality post-installation of under-sink POU treatment systems. Specifically, the objectives of this plan are to:

- Identify key elements of the pilot testing as a guide to testing protocol development;
- Provide guidance in collecting and analyzing water quality samples to support selection of a POU RO water treatment device; and
- Outline elements of treatment unit installation, monitoring and maintenance to be considered in overall program development.

2 Elements for Inclusion in Pilot Testing Program

Using the information contained in this section, a pilot testing program should be developed to support overall program development. Specifically, the following steps are recommended to be conducted in outlining the pilot testing program.

2.1 System Identification and Surrogate Selection

Three to five POU RO treatment units should be selected for the pilot program. RO systems were identified as the best available technology for removing identified COCs (arsenic, fluoride, nitrate, uranium, and hexavalent chromium) from groundwater underlying DACs in the Coachella Valley. Similarly, three to five households should be identified for participation in the testing program.

Prior to initiation of the pilot testing, the system manufacturer should be contacted about possible surrogate analyses to be considered during pilot testing. A surrogate parameter is one that can be easily measured at the testing site and can be correlated directly with performance of the treatment unit. Typical surrogates include specific conductance/electrical conductivity (EC) and turbidity. Field testing equipment should be obtained and calibrated for the selected surrogate parameter.

Finally, the pilot testing protocol should be documented in a pilot testing workplan. Parameters to be addressed by the testing are summarized in Section 2.5, below, and should be considered in work plan preparation.

2.2 Pre-Installation Testing

Prior to POU treatment system installation, tap water samples should be collected from the pilot households per the protocols documented herein. While each DAC may have an identified COC, it is recommended that both pre- and post-installation sampling be conducted for the full array of COCs.

During pre-installation water quality testing, split (two) samples should be collected at the tap, with one sample analyzed using the field testing equipment for the surrogate of choice, temperature and pH, and the other sample tracked and sent to the selected state-certified analytical laboratory for analysis. Visual observations of water quality should also be made at the time of sampling, and recorded in field notebook or file.

2.3 Treatment Unit Installation

Following pre-installation water quality samples, the POU treatment systems should be installed per the manufacturer’s instructions on separate household taps in the identified DAC(s). System startup should also follow the manufacturer’s instruction, with all steps documented in a field notebook or file. Post-installation water quality samples should be collected immediately following start-up per sampling and analysis protocols documented herein. As with the pre-installation sampling, split samples should be collected, with one sample analyzed at the testing site for the selected surrogate parameter, temperature and pH, and the second sample sent to the selected analytical laboratory. Visual observations of water quality should also be made at the time of sampling, and recorded in field notebook or file.

2.4 Pilot Testing

Pilot testing (POU treatment system use) should continue for a minimum of two months, with weekly water quality samples collected from each system. As before, split samples should be collected, with one sample analyzed at the testing site for the selected surrogate parameter, temperature and pH, and the second sample sent to the selected analytical laboratory. Visual observations of water quality should also be made at the time of sampling, and recorded in field notebook or file.

2.5 Pilot Testing Data Analysis

The results of the pilot testing should be analyzed to address several key parameters/issues. The results of the analyses should then be used to guide the overall program development. The following are descriptions of the key parameters to be addressed.

Contaminant Removal Efficiency

During pilot testing, the COCs which are being removed by each unit must be identified and the percent removal of each constituent calculated for each POU device tested. Operating extremes should be considered. At a minimum, data should be plotted over time to identify trends in measured conditions, such as production and contaminant removal efficiency over time.

Service Life

The pilot testing should run long enough to determine when routine or common operations and maintenance will required given the varying water quality at the testing sites.

Performance Indication Devices

Pilot testing should evaluate the effectiveness of mechanical warnings or other performance indication mechanisms on the selected treatment units. Warning or mechanism tests must correlate the alarms to measured data indicating functionality in accordance with manufacturer's specifications.

Waste Characterization

The resulting wastes from each treatment unit considered in the pilot testing program must be evaluated to determine how waste from the device will be characterized and disposed. Anticipated wastes include used filters and membranes. The County Department of Environmental Health may be consulted in determine the best disposal method for resultant wastes.

Device Location(s)

During installation of the pilot testing units, consideration should be given the device location. Factors to consider when choosing installation locations are accessibility to devices, pilot test run time or volume of treated water needed to collect sufficient data and variability of water characteristics in the distribution system or customer's home. Documentation of justification and/or reasoning for site selection and setup should be prepared.

Device Specifications

In selecting the treatment units to be tested, the unit type, make and model of device(s) to test should be based on treatment needs, flow rates, COCs, costs, device capability, appurtenances needed, manufacturer's support, etc.

Raw Water Quality/Constituents of Concern

A key objective of pre-installation water quality testing will be to establish raw water quality, including which constituents of concern need to be addressed by the treatment unit.

Measured Parameters

Prior to pilot testing, parameters will be sampled in the field versus analyzed by the laboratory must be identified, plus methods for sample collection, transport and analysis. Characteristics to measure performance of the devices, setup and appurtenances must be considered, along with performance characteristics, including quality of treated water, time to surrogate or contaminant breakthrough, time of failure, device cycle life before service or replacement, treated water production rate, waste produced, overall device integrity, effectiveness of device failsafe or warning indicators and effectiveness of appurtenances. The data and results from the pilot testing program should then be used to optimize POU device and setup.

Device Setup Procedures

It is recommended that pilot testing and setups be conducted under different conditions. Several treatment technologies may need to be incorporate into a single POU treatment system to address certain water quality problems. For example, pre-filtration may extend the life of the RO membrane, while post-filtration activated carbon filter may improve aesthetics of treated water.

System Conditions and Variability

Pilot testing should test the performance characteristics of the POU treatment devices under a range of conditions, including low incoming pressure.

Surrogate Monitoring

Pilot testing should also evaluate if a surrogate parameter (such as specific conductance) can be used to accurately predict device performance. Ideally, surrogate parameters selected can be measured in the home with handheld devices. Pilot testing should establish a strong correlation between the surrogate and the constituents of concern using split samples with both field measurements and water quality analyses by a state certified laboratory. To minimize testing errors, the field testing device should be able to be calibrated, verified with a known standard, and include temperature correction, if appropriate.

Pre/Post Treatment (if necessary)

Pre- and/or post-treatment processes should be considered, if necessary, to improve customer satisfaction or to extend the life of the treatment device.

3 Example Sampling and Analysis Plan

This example Sampling and Analysis Plan (SAP) will discuss the following key elements of a SAP:

- Sampling locations
- Sampling methodology
- Sampling documentation

3.1 Sampling Locations

Sampling locations for the pilot program are the taps on which the POU RO treatment units will be installed, most likely the kitchen faucets. Both baseline (pre-installation) and post-installation sampling will occur at the same location following the same sampling methodology in order to provide comparable data. Water samples from the treated taps will be analyzed for the five identified constituents of concern: arsenic, uranium, fluoride, nitrate, and hexavalent chromium. Field (in-home) measurements should also be made using handheld devices for temperature, pH, specific conductance and/or turbidity .

3.2 Sampling Methodology

This section presents the sampling methods to be followed during pre- and post-installation pilot testing.

No sampling methods are presented here for field (in-home) measurements as the sampling protocols will be dependent on the devices selected. It is recommended that the manufacturer’s instructions be followed for device calibration prior to sampling and for sample collection and analysis.

3.2.1 Sampling Methods and Frequency

There are three sampling phases in the POU RO treatment unit pilot program: a baseline (pre-installation) phase, an installation phase, and a post-installation phase. Each of these phases is described in more detail below.

Baseline Sampling Phase

Baseline water quality will be established by collecting water samples prior to the installation of the water treatment unit. During the baseline phase, water samples will be collected from the tap on which the treatment unit will be installed. It is recommended that each of these samples, for each location, be collected on the same day of the week and at roughly the same time to remove any natural temporal variations in water quality. Field (in-home) analyses of surrogate parameters should also be conducted and recorded to correlate to the analytical laboratory samples.

Installation Phase

During installation of the water treatment unit, two samples will be collected: one immediately prior to the installation of the treatment unit and one immediately following the installation. Field (in-home) measurements of surrogate parameters should indicate an immediate improvement in water quality. Laboratory analysis of the samples collected will confirm the treatment unit's successful application.

Post-Installation Sampling Phase

In the weeks following installation of the water treatment unit, samples will be collected from the same tap as was used during baseline sampling. Sampling will occur weekly after installation for a period of at least two months. As before, it is recommended that post-installation sampling at each location occur on the same day of the week and within the same general time of day as the baseline sampling at that same location so as to remove any natural temporal variation in water quality. Field (in-home) analyses of surrogate parameters should also be conducted and recorded to correlate to the analytical laboratory samples.

All Sampling Phases

For all three sampling phases, grab water samples for analytical laboratory analyses will be collected in unpreserved bottles for analysis. Prior to sample collection, the tap must be turned on and left running for at least one minute before the water sample is collected. Visible characteristics of the samples, including color, smell, and clarity, will be noted at the time of sampling using in a field sheet or log book, similar to the one presented in Appendix A. Samples will be placed in a cooler with ice for shipment to laboratory within 24 hours and must be kept under 46°F (8°C).

3.2.2 Equipment

Sampling Containers

Sampling for laboratory analyses will require two 500 mL sterile plastic bottles and one 250 mL sterile plastic bottle. Water samples for field (in-home) analyses should be collected following manufacturer's instructions for the selected measurement device.

Field Equipment

The following equipment will be required for sample collection:

- Disposable gloves (polyethylene, nitrile, or non-talc latex gloves recommended); a new pair should be worn at each sample site
- Appropriately-sized coolers with cube ice, blue ice or dry ice
- Pre-labeled sample containers
- Unpreserved bottles for sampling from sink taps
- Deionized water for equipment blanks
- Data sheets and chain of custody forms for recording sample information and field measurements

Equipment Preparation

Prior to sampling, bottles should be prepared with pre-printed labels with the information discussed in Section 3.3 of this Plan.

Decontamination

Water sampling and field analysis equipment will be cleaned before use, between measurements, and before leaving the site. For bottles used in field measurements, wash using soapy water consisting of Liqui-nox^{TM} or Alconox^{TM} followed by one rinse of clean tap water and then two rinses of distilled water. All buckets will be decontaminated before use on the site.

3.3 Documentation

Sample Name and Type

Each sample collected will be identified by its sampling location using the following code: *Location Code-Sample Type-Sample Number*. Location codes are numerically assigned for each unit installed. Sample types are outlined in Table 1 below. Sample numbers are assigned based on the number of the sample type. For instance, the third sample taken post-installation at the second sampling location would be labeled 2-PI-3.

Table 1: Sample Types

Sample Type	Code
Baseline	BL
Post-Installation	PI
Quality Control (field blanks)	MISC

Sample Labels

Sample labels are necessary to prevent misidentification of samples. Labels shall be filled out using indelible ink with the following information:

- Sample identification number (see above naming convention)
- Date and time of collection
- Analyses to be performed
- Sampling personnel

Labels will be affixed to all sample containers at the time of sampling.

Chain of Custody

Each laboratory used for this study has a Chain of Custody form that will be used when transferring samples to the lab. This form identifies the sampler's name, date and time of collection, matrix, sample ID, sample location, sample preservation technique (if applicable), the analysis requested, and the date and time of transfer. Signatures are required on the chain of custody forms each time the samples change hands (i.e. from sampler to courier, from courier to laboratory). A sample chain of custody form is included in Appendix A. A list of state-certified analytical laboratories in the Coachella Valley area which may be used is presented in Appendix B.

Water Monitoring Field Sheet/Field Log Book

All information pertinent to the sampling effort will be recorded on a field sheet, log book, or an equivalent standardized form, similar to the one shown in Appendix A. Each page/form will be consecutively numbered. All entries will be made in indelible ink and all corrections will consist of line-out deletions that are initialed and dated. Entries in this field sheet or log book may include the following:

- Purpose of sampling
- Location and description of the sampling point
- Name and address of field contact
- Documentation of procedures for preparation of reagent or supplies which become an integral part of the sample (e.g., field blanks)
- Type of sample (e.g., tap water)
- Number and volume of sample taken
- Sample type taken (e.g., primary sample, replicate, field blank)
- Sampling methodology
- Sample preservation
- Date and time of collection
- Weather conditions
- Sample distribution and how transported (e.g., name of the laboratory and shipping agent)
- Reference such as maps of the sampling site
- Field observations
- Any field measurements made
- Signature and date by the personnel responsible for observations
- Decontamination procedures

Sampling situations vary widely. No general rules can specify the extent of information that must be entered into a log book or standardized form. However, records will contain sufficient information so that the sampling activity can be reconstructed without relying on the collector's memory.

A sample numbering system (as previously described) will be used to identify each sample collected. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. A listing of the sample identification numbers will be maintained in the field sheet or log book.

4 Analytical Methodology

For the purposes of the pilot program, all pre-installation and installation-related water samples should be analyzed in the laboratory for the five COCs, and in the field (in-home) for temperature, pH, and any selected surrogate parameters (such as specific conductance or turbidity). Table 2, below, summarizes the laboratory analyses to be conducted for the five COCs, holding times and sampling container information.

All samples will be collected in unpreserved bottles. For those analytes requiring a preservative, the appropriate preservative will be added in the laboratory. During laboratory testing, arsenic and uranium analysis will occur from the same bottle and nitrate and fluoride analysis will occur from the same bottle. Hexavalent chromium testing requires a separate 250 mL bottle sample.

For post-installation sampling at any given sampling location, only those analytes found in the baseline analysis will be tested for by the analytical laboratory. Water samples collected will be sent to a pre-determined analytical laboratory. This laboratory should be contacted in advance of the sampling as they will provide the bottles, coolers (for transportation of the samples) and chain of custody forms at no cost. A list of nearby analytical laboratories is included in Appendix B.

Table 2: Parameters and Sampling Information

Parameter	Analytical Method	Hold Time	Container Type	Preservative	Volume	Reporting Limit
Arsenic	EPA 200.8	180 days	Plastic	HNO3	500 mL	1.0 µg/L
Uranium	EPA 200.8	180 days	Plastic	HNO3	500 mL	1.0 µg/L
Fluoride	EPA 300.0	28 days	Plastic	None	500 mL	0.11 mg/L as N 0.5 mg/L as NO3
Nitrate	EPA 300.0	48 hours	Plastic	None	500 mL	0.27 mg/L
Hexavalent Chromium	EPA 218.7	14 days	Plastic	Ammonium Sulfate & Ammonium Hydroxide	250 mL	0.03 µg/L

5 Quality Assurance/Quality Control (QA/QC) Measures

Quality assurance (QA) and quality control (QC) measures are followed to verify the accuracy of the samples collected and analyzed.

Quality control samples will be collected at various times and sites during sampling events. Equipment blanks will be taken to assess potential sample contamination levels that occur during field sampling activities while field duplicates are collected to verify laboratory procedures and accuracy. The QA/QC procedures documented here are adapted from the State Water Resources Control Board's *Quality Assurance Program Plan* for the Surface Water Ambient Monitoring Program.

5.1 Field QA/QC

Field duplicates will be collected to provide precision information as it pertains to the sampling process. The duplicate sample must be collected in the same manner as the primary sample and as close in time as possible to the original sample. This will allow examination of field homogeneity and sample handling. One field duplicate sample should be taken during each sampling event. Table 3 shows the frequency of analysis and measurement quality objectives for each of these quality control methods.

Equipment blanks (also known as rinse blanks) are recommended if sampling equipment is pre-cleaned or cleaned in the field. Equipment blanks are not required for disposal or one-time use equipment. Equipment/rinse blanks are collected by first cleaning the equipment, and then collecting the final rinse water (analyte-free) as it is rinsed on or through the sampling equipment (whether pre-cleaned or field cleaned). The final rinse water is placed in the appropriately preserved containers, and stored and transported with the other water samples.

Equipment (or rinse) blanks are used to determine the effectiveness of field cleaning procedures as well as to reveal those sources of contamination that may be found in field blank samples. Equipment/rinse blank samples will collected and analyzed for all parameter groups and matrices. When less than five samples of a similar matrix are collected, one equipment blank sample is recommended for pre-cleaned or field-cleaned equipment for each parameter analyzed. For sampling events involving ten or more samples, one blank should be collected on field-cleaned equipment for every 10% of the samples in each analyte group.

Table 3: Field Quality Control Methods

Quality Control Method	Frequency of Analysis	Measurement Quality Objective
Field Duplicate	10% of total project sample count	Relative Percent Difference <25%
Equipment Blank	Per method/per sampling event	< Reporting Limit for target analyte

5.2 Lab QA/QC

All samples collected during this project will be analyzed for the selected parameters in accordance with standard methods found in U.S. Environmental Protection Agency manuals, *Standard Methods for the Examination of Water and Wastewater*, or other standard accepted methods. Upon receipt, the temperature of samples will be recorded by laboratory personnel.

Each analytical laboratory has a slightly different QA/QC program. Laboratory QA/QC programs should be examined prior to selecting an analytical lab to be used for sampling analysis. A list of state-certified analytical labs within the area is included in Appendix B.

5.3 Calibration

All analytical equipment used in the field for in-home sampling and analyses should be calibrated prior to use, verified with a known standard, and include temperature correction, if appropriate. All calibration results should be recorded in the field log or notes.

6 Data Reduction, Validation, Analysis and Reporting

Accurate data reduction, validation, and reporting methods are essential in summarizing information to support conclusions. The objective of these procedures is to provide a documented history of a sampling or measurement activity and to achieve the data quality objectives. Proper techniques for both field and laboratory activities are described in this section.

6.1 Data Reduction

Data reduction methods can include the computation of summary statistics, their standard errors, and confidence intervals or limits. Reduction of analytical data will be performed using the format specified in the USEPA- or CLP-approved method.

6.2 Data Validation

Data validation techniques include reviewing, accepting, rejecting, or qualifying data on the basis of sound criteria. Data validation is based on the following criteria:

Field Criteria

- Preservation
- Chain of custody
- Sample integrity
- Confirmation

Laboratory Criteria

- Initial calibration
- Continuing calibration
- Holding times
- Blank sample results
- Other QC sample results

Data values that are significantly different from the population are referred to as "outliers." Outliers can result from improper sampling or analytical methodology, matrix interferences, errors in data transcription, and real but extreme changes in analytical parameters. Outliers resulting from errors found during data validation will be identified and corrected, and those that cannot be attributed to analytical, calculation, or transcription errors will be retained in the database for further evaluation. The validation methods for field and laboratory activities are described below.

Field Data

QA personnel will validate field data through reviews of data sets to identify inconsistencies or anomalous values. Any inconsistencies discovered will be resolved immediately, if possible, by seeking clarification from those personnel responsible for data collection. All field personnel will be responsible for following the sampling and documentation procedures described in the sampling protocols and this QA/QC Plan to ensure that defensible and justifiable data are obtained.

Laboratory Data

Laboratory personnel will assess data at the time of analysis and reporting through reviews of the raw data for any nonconformances of the analytical method protocols. Data validation will be performed by a QA Specialist.

Initially, 10% of the analytical data will be randomly selected for full validation. Full validation not only includes review of data sheets, initial and continuing calibrations, MS/MSD, LCS, method blanks, and surrogates, but it also includes raw data review. This percentage may be increased if substantial data quality issues are raised during the initial assessment. Additionally, all background samples will be selected for full validation. All data will undergo a cursory review. A cursory review includes examination of the items found in a full validation, but it does not include raw data evaluation.

6.3 Data Analysis

All data collected during the pilot testing program should be analyzed to establish necessary programmatic and operational parameters. See Section 2.5 of this document for the information to be determined from data analysis.

6.4 Reporting

Following data validation, both field and laboratory data should be reported according to procedures described in this subsection.

Field Data

Field data recorded during the sampling activities will be compiled and reported in summary tables for review. Corresponding descriptions and units will also be provided to accurately reflect the field conditions.

Laboratory Data

The following items are included by the laboratory in presentation of data in laboratory analytical reports:

- The final data presentation will be checked in accordance with data verification requirements and approved and certified by the laboratory manager
- Data will be presented in a tabular format whenever possible
- Each page of data will be identified with the project number and name, date of issue, and project name
- Reported data will include the sample identification number, laboratory sample identification number, analytical method, associated QC reported value, unit of measurement, and quantification limits

- Field QC results will be reported in the same format as real samples
- Footnotes will be referenced to specific data if required to explain reported values
- The laboratory will provide case narratives that include any problems that occurred at the laboratory in reference to the samples

Laboratory data packages and reports should be archived at a pre-determined location.

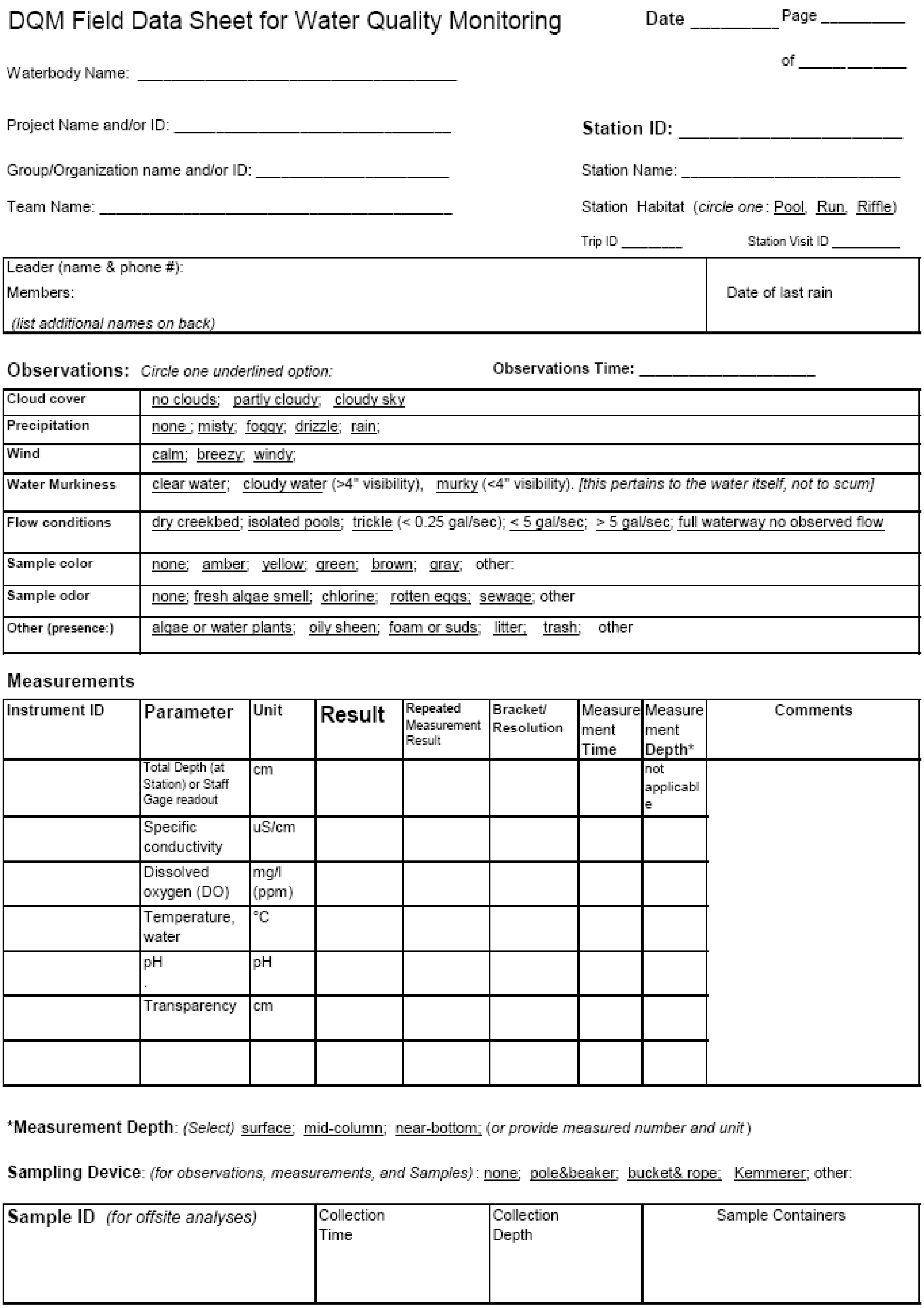
Analysis Report

Data analysis will be completed by compiling and analyzing the data collected in the sampling phase of the project. This analysis should be documented in a report or memorandum format, and should include a summary of the pilot testing program, sampling conducted, data collected, conclusions, and findings. This should include, but is not limited to, a summary of baseline water quality data collected and preliminary analysis of the data, including overall observed water quality conditions and potential sources contributing parameters of concern, the recommended POU RO treatment unit for use in the program, and proposed operating parameters for the recommended treatment unit.

7 References

State Water Resources Control Board. 2008. *Quality Assurance Program Plan*. Surface Water Ambient Monitoring Program. http://www.swrcb.ca.gov/water_issues/programs/swamp/qaprp.shtml.

Appendix A: Example Sampling and Field Forms



DQM Field Data Sheet for Water Quality Monitoring

Date ________ Page ________

of ________

Waterbody Name: ______________________________

Project Name and/or ID: ____________________________

Station ID: ____________________

Group/Organization name and/or ID: __________________

Station Name: ______________________

Team Name: ____________________________________

Station Habitat (*circle one*: Pool, Run, Riffle)

Trip ID _______ Station Visit ID ________

Leader (name & phone #): Members: *(list additional names on back)*	Date of last rain

Observations: *Circle one underlined option:* **Observations Time:** __________________

Cloud cover	no clouds; partly cloudy; cloudy sky
Precipitation	none ; misty; foggy; drizzle; rain;
Wind	calm; breezy; windy;
Water Murkiness	clear water; cloudy water (>4" visibility), murky (<4" visibility). *[this pertains to the water itself, not to scum]*
Flow conditions	dry creekbed; isolated pools; trickle (< 0.25 gal/sec); < 5 gal/sec; > 5 gal/sec; full waterway no observed flow
Sample color	none; amber; yellow; green; brown; gray; other:
Sample odor	none; fresh algae smell; chlorine; rotten eggs; sewage; other
Other (presence:)	algae or water plants; oily sheen; foam or suds; litter; trash; other

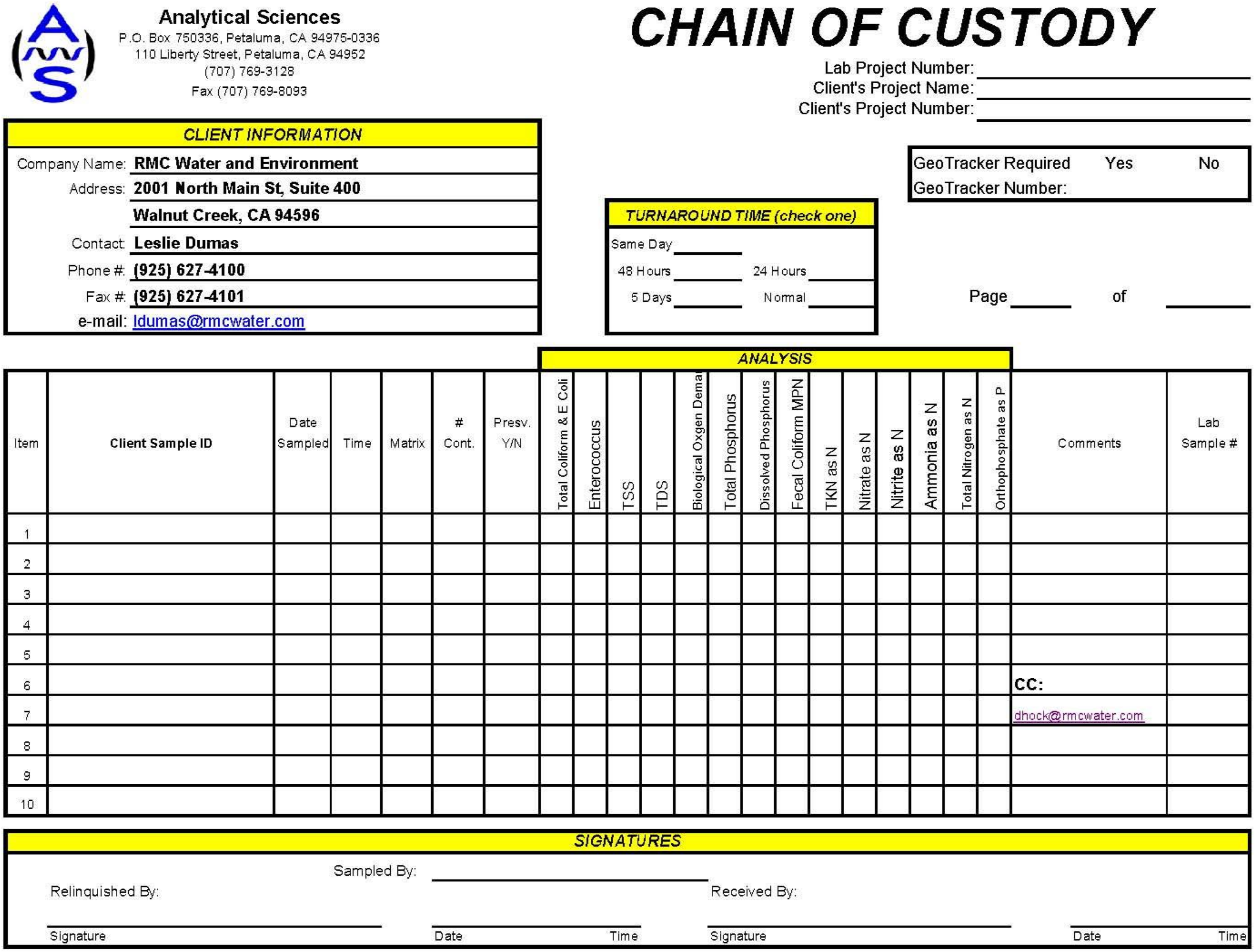
Measurements

Instrument ID	Parameter	Unit	Result	Repeated Measurement Result	Bracket/ Resolution	Measurement Time	Measurement Depth*	Comments
	Total Depth (at Station) or Staff Gage readout	cm					not applicable	
	Specific conductivity	uS/cm						
	Dissolved oxygen (DO)	mg/l (ppm)						
	Temperature, water	°C						
	pH .	pH						
	Transparency	cm						

***Measurement Depth**: *(Select)* surface; mid-column; near-bottom; *(or provide measured number and unit)*

Sampling Device: *(for observations, measurements, and Samples)*: none; pole&beaker; bucket& rope; Kemmerer; other:

Sample ID *(for offsite analyses)*	Collection Time	Collection Depth	Sample Containers



Analytical Sciences
P.O. Box 750336, Petaluma, CA 94975-0336
110 Liberty Street, Petaluma, CA 94952
(707) 769-3128
Fax (707) 769-8093

CHAIN OF CUSTODY

Lab Project Number: __________
Client's Project Name: __________
Client's Project Number: __________

CLIENT INFORMATION

Company Name: **RMC Water and Environment**
Address: **2001 North Main St, Suite 400**
Walnut Creek, CA 94596
Contact: **Leslie Dumas**
Phone #: **(925) 627-4100**
Fax #: **(925) 627-4101**
e-mail: ldumas@rmcwater.com

GeoTracker Required Yes No
GeoTracker Number:

TURNAROUND TIME (check one)

Same Day ______
48 Hours ______ 24 Hours ______
5 Days ______ Normal ______

Page _____ of _____

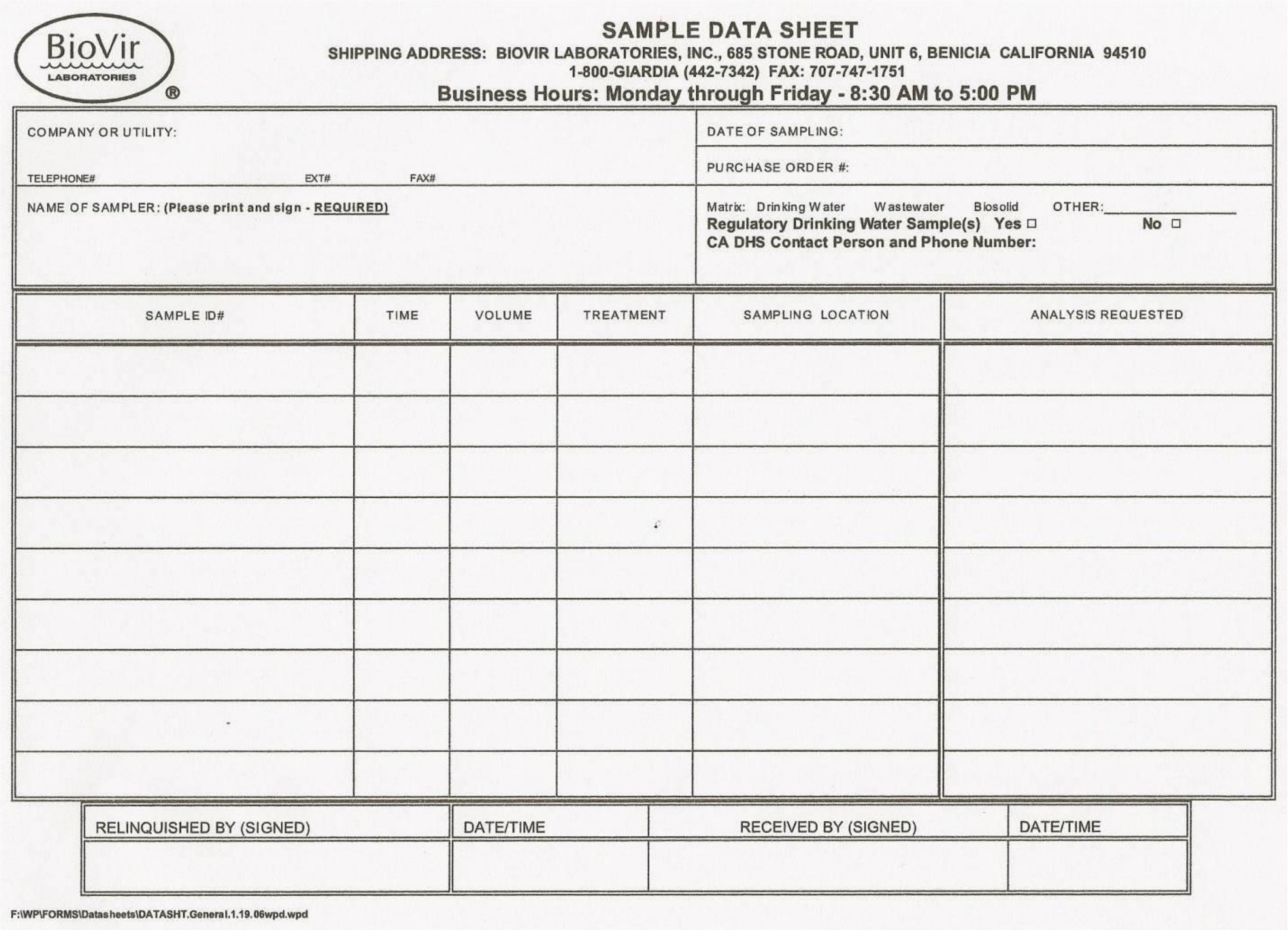
							ANALYSIS															
Item	Client Sample ID	Date Sampled	Time	Matrix	# Cont.	Presv. Y/N	Total Coliform & E Coli	Enterococcus	TSS	TDS	Biological Oxgen Dema	Total Phosphorus	Dissolved Phosphorus	Fecal Coliform MPN	TKN as N	Nitrate as N	Nitrite as N	Ammonia as N	Total Nitrogen as N	Orthophosphate as P	Comments	Lab Sample #
1																						
2																						
3																						
4																						
5																						
6																					**CC:**	
7																					dhock@rmcwater.com	
8																						
9																						
10																						

SIGNATURES

Sampled By: __________

Relinquished By:
Signature __________ Date ______ Time ______

Received By:
Signature __________ Date ______ Time ______



BioVir
LABORATORIES ®

SAMPLE DATA SHEET

SHIPPING ADDRESS: BIOVIR LABORATORIES, INC., 685 STONE ROAD, UNIT 6, BENICIA CALIFORNIA 94510
1-800-GIARDIA (442-7342) FAX: 707-747-1751
Business Hours: Monday through Friday - 8:30 AM to 5:00 PM

COMPANY OR UTILITY:

TELEPHONE# EXT# FAX#

NAME OF SAMPLER: **(Please print and sign - REQUIRED)**

DATE OF SAMPLING:

PURCHASE ORDER #:

Matrix: Drinking Water Wastewater Biosolid OTHER:________________

Regulatory Drinking Water Sample(s) Yes ☐ No ☐

CA DHS Contact Person and Phone Number:

SAMPLE ID#	TIME	VOLUME	TREATMENT	SAMPLING LOCATION	ANALYSIS REQUESTED

RELINQUISHED BY (SIGNED)	DATE/TIME	RECEIVED BY (SIGNED)	DATE/TIME

F:\WP\FORMS\Datasheets\DATASHT.General.1.19.06wpd.wpd

Appendix B: Analytical Labs within the Area

ELAP/NELAP Accredited Laboratory List (as of June 19, 2012)

The list is based on information available at the time, and is subject to change.
Should you have any questions about a specific laboratory or need further information, please call ELAP at (510) 620-3155.

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	Commercial	ATS Analytical Laboratories	104 South 8th Street	Brawley	CA	92227	Imperial	(760) 344-2532	1632	ELAP
	Industrial	Calenergy Operating Corporation	7030 Gentry Road	Calipatria	CA	92233	Imperial	(760) 348-4000	2612	ELAP
	City	City of Calexico	298 W. 2nd Street	Calexico	CA	92231	Imperial	(760) 768-2167	2447	ELAP
	Public Wastewater System	City of El Centro Wastewater Treatment Plant	2255 La Brucherie Road	El Centro	CA	92243	Imperial	(760) 337-4562	2063	ELAP
	Industrial	El Centro Generating Station	485 East Villa Avenue	El Centro	CA	92243	Imperial	(760) 339-0506	1125	ELAP
Y	County	Imperial County Public Health Laboratory	935 Broadway	El Centro	CA	92243	Imperial	(760) 482-4437	1773	ELAP
	Commercial	Imperial Valley Environmental Laboratory	501 East 3rd Street	Calexico	CA	92231	Imperial	(760) 357-8764	2524	ELAP
	Public Wastewater System	Niland Sanitary District	125 West Alcott Road	Niland	CA	92257	Imperial	(760) 359-0454	1442	ELAP
	Industrial	Ormat Nevada, Inc.	895 Pitzer Road	Heber	CA	92249	Imperial	(760) 353-8200	2680	ELAP
	Commercial	ABC Environmental Laboratories	1640 South Grove Avenue, Suite B	Ontario	CA	91761	Los Angeles	(562) 413-8343, (909) 923-8628	2584	ELAP
	Commercial	ABN Environmental Laboratories, Inc.	10926 Rush Street, Suite A-168	South El Monte	CA	91733	Los Angeles	(626) 575-5137	1507	ELAP
	Commercial	Acculabs, Inc.	118 La Porte St, Unit C and D	Arcadia	CA	91006	Los Angeles	(626)447-1888	2778	ELAP
	Commercial	Advanced Technology Laboratories	3275 Walnut Avenue	Signal Hill	CA	90755	Los Angeles	(562) 989-4045	02107CA	NELAP
	Commercial	Advanced Technology Laboratories	3275 Walnut Avenue	Signal Hill	CA	90755	Los Angeles	(562) 989-4045	1838	ELAP
	Industrial	AES Alamitos LLC Laboratory	690 North Studebaker Road	Long Beach	CA	90803	Los Angeles	(562) 493-7384	2470	ELAP
	Industrial	AES Redondo Beach Unit 7&8 Laboratory	1100 North Harbor Drive	Redondo Beach	CA	90277	Los Angeles	(310) 318-7470	2498	ELAP
	Commercial	Alpha Scientific Corporation	16760 Gridley Road	Cerritos	CA	90703	Los Angeles	(562) 809-8880	2633	ELAP
	Commercial	American Analytics	9765 Eton Avenue	Chatsworth	CA	91311	Los Angeles	(818) 998-5547	1894	ELAP
	Commercial	American Analytics	9765 Eton Avenue	Chatsworth	CA	91311	Los Angeles	(818) 998-5547	2621	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	Commercial	American Analytics Inc.	9765 Eton Avenue	Chatsworth	CA	91311	Los Angeles	(818) 998-5547	1471	ELAP
	Commercial	American Environmental Testing Laboratory, Inc.	2834 and 2908 North Naomi Street	Burbank	CA	91504	Los Angeles	(818) 845-8200	1541	ELAP
	Commercial	American Scientific Laboratories, LLC	2520 N San Fernando Road	Los Angeles	CA	90065	Los Angeles	(323) 223-9700	2200	ELAP
	Commercial	Amerisci Los Angeles	24416 S Main Street Suite 308	Carson	CA	90745	Los Angeles	(310) 834-4868	2322	ELAP
	Commercial	Anachem Laboratories, LLC	140 Standard Street	El Segundo	CA	90245	Los Angeles	(310) 322-4993	1164	ELAP
	Public Water System	Antelope Valley-East Kern Water Agency	6500 West Avenue N	Palmdale	CA	93551	Los Angeles	(661) 943-3201	1460	ELAP
	Commercial	Applied Microbiological Services	1538 West Gaylord Street	Long Beach	CA	90813	Los Angeles	(562) 495-9500	1257	ELAP
	Commercial	Bioscreen Testing Services, Inc.	3904 Del Amo Blvd., Suite 801	Torrance	CA	90503	Los Angeles	(310) 214-0043	1565	ELAP
	Industrial	BP Operation Laboratory	1801 East Sepulveda Boulevard	Carson	CA	90745	Los Angeles	(310) 816-8719	2473	ELAP
	City	City of Burbank Water Reclamation Plant Laboratory	740 North Lake Street	Burbank	CA	91502-1642	Los Angeles	(818) 972-1115	1819	ELAP
	Public Wastewater System	Burbank City Water and Power	2030 North Hollywood Way	Burbank	CA	91502	Los Angeles	(818) 238-3500	1464	ELAP
	Commercial	C & E Laboratories, Inc. (Chemical & Environmental Laboratories, Inc.)	14148 East Firestone Boulevard	Santa Fe Springs	CA	90670	Los Angeles	(562) 921-8123	2268	ELAP
	Commercial	Caltech Environmental Laboratories, Inc.	6814 Rosecrans Avenue	Paramount	CA	90723-3146	Los Angeles	(562) 272-2700	2424	ELAP
	Public Water System	Castaic Lake Water Agency	27234 Bouquet Canyon Road	Santa Clarita	CA	91350-2173	Los Angeles	(661) 297-1600x223	2104	ELAP
	Commercial	Chem Pro Laboratory, Inc.	941 West 190th Street	Gardena	CA	90248	Los Angeles	(310) 532-8611	1265	ELAP
	Commercial	Chemtek Environmental Laboratories Inc.	13554 Larwin Circle	Santa Fe Springs	CA	90670	Los Angeles	(562) 926-9848	2629	ELAP
	Commercial	Chemtek Environmental Laboratories, Inc.	13554 Larwin Circle	Santa Fe Springs	CA	90670	Los Angeles	(562) 926-9848	1435	ELAP
	City	City of Avalon Wastewater Treatment Facility Laboratory	123 Pebbly Beach Road	Avalon	CA	90704	Los Angeles	(310) 510-0731	1899	ELAP
	Commercial	Clean Earth Environmental Testing Laboratory	1639 11th Street, Suite 114	Santa Monica	CA	90404	Los Angeles	(310) 399-4447	2622	ELAP
	Industrial	Clean Harbors Environmental Services, Inc.	5756 Alba Street	Los Angeles	CA	90058	Los Angeles	(323) 277-2501	2560	ELAP
	Industrial	Conoco Phillips Company Los Angeles Refinery Laboratory	1660 West Anaheim Street	Wilmington	CA	90744	Los Angeles	(310) 952-6178	2497	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	Industrial	Crosby & Overton Analytical Laboratory	1655 Canal Street	Long Beach	CA	90813	Los Angeles	(562) 432-5445x273	1568	ELAP
	Commercial	Demenno / Kerdoon	2000 North Alameda Street	Compton	CA	90222	Los Angeles	(310) 537-7100	2037	ELAP
	In-house	DS Waters of America, Inc.	1449 N Avenue 46	Los Angeles	CA	90041	Los Angeles	(323) 551-5716	2578	ELAP
	Commercial	EMAX Laboratories, Inc.	1835 West 205th Street	Torrance	CA	90501	Los Angeles	(310) 618-8889	02116CA	NELAP
	Commercial	EMAX Laboratories, Inc.	1835 West 205th Street	Torrance	CA	90501	Los Angeles	(310) 618-8889	2672	ELAP
	Commercial	EMS Laboratories, Inc.	117 West Bellevue Drive	Pasadena	CA	91105	Los Angeles	(626) 568-4065	1119	ELAP
	Commercial	Enviro-Chem, Inc.	1214 East Lexington Avenue	Pomona	CA	91766	Los Angeles	(909) 590-5905	1555	ELAP
	Public Wastewater System	Environmental Monitoring Div. (EMD) Lab at LA/G Water Reclamation Plant (LA/GWRP)	4600 Colorado Blvd	Los Angeles	CA	90039	Los Angeles	(213) 972-1307	1451	ELAP
	Public Wastewater System	Environmental Monitoring Division (EMD) Lab. at Dct Water Reclamation Plant (DCTWRP)	6100 Woodley Avenue	Van Nuys	CA	91406	Los Angeles	(818) 778-4217	1477	ELAP
	Public Wastewater System	Environmental Monitoring Div. (EMD) Lab. at Terminal Island Water Reclamation Plant (TIWRP)	445 Ferry Street	San Pedro	CA	90731	Los Angeles	(310) 732-4712	1546	ELAP
	Public Wastewater System	Environmental Monitoring Div. Lab. at Hyperion Treatment Plant	12000 Vista Del Mar	Playa Del Rey	CA	90293	Los Angeles	(310) 648-5262	1723	ELAP
	Commercial	Exova, Inc. (fka Bodycote Testing Group & fka West Coast Analytical Service)	9240 Santa Fe Springs Road	Santa Fe Springs	CA	90670	Los Angeles	(562) 948-2225	2652	ELAP
	Industrial	Exxon Mobil Oil Corporation Torrance Refinery Water Laboratory	3700 West 190th Street	Torrance	CA	90504-5733	Los Angeles	(310) 212-2829	1695	ELAP
	Commercial	Forensic Analytical Laboratories, Inc	2959 Pacific Commerce Drive	Rancho Dominguez	CA	90221	Los Angeles	(310) 763-2374	1366	ELAP
	Commercial	Frog Environmental - Lab Services	800 East Ocean Boulevard suit #105	Long Beach	CA	90802	Los Angeles	(310) 241-1367	2692	ELAP
	Commercial	Hygeia Laboratories, Inc.	82 West Sierra Madre Boulevard	Sierra Madre	CA	91024-2434	Los Angeles	(626) 355-4711	1269	ELAP
	City	City of Los Angeles Dept of Water & Power Environmental Lab.	1630 North Main Street, Building 7	Los Angeles	CA	90012	Los Angeles	(213) 367-7270	2553	ELAP
	City	City of Los Angeles Dept of Water & Power	1630 North Main Street, Building 7	Los Angeles	CA	90012	Los Angeles	(213) 367-7270	1207	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	City	City of Los Angeles - Standards Testing Laboratory	2319 Dorris Place	Los Angeles	CA	90031	Los Angeles	(213) 485-2242	1292	ELAP
	County	Water Pollution Control Laboratory	1102 North Eastern Avenue	Los Angeles	CA	90063	Los Angeles	(323) 267-2333	1825	ELAP
	County	Los Angeles County Agricultural Commissioner / W&M	11012 Garfield Avenue, Building B	South Gate	CA	90280	Los Angeles	(562) 622-0437	1430	ELAP
	Public Wastewater System	Joint Water Pollution Control Water Quality Lab	24501 South Figueroa Street	Carson	CA	90745	Los Angeles	(310) 830-2400	1034	ELAP
	Public Wastewater System	Lancaster Treatment Plant Laboratory	1865 West Avenue D	Lancaster	CA	93534	Los Angeles	(661) 723-8537	1051	ELAP
	Public Wastewater System	Long Beach Treatment Plant Laboratory	7400 Willow Street	Long Beach	CA	90815	Los Angeles	(562) 421-8612	1033	ELAP
	Public Wastewater System	Los Coyotes Treatment Plant Laboratory	16515 Piuma Avenue	Cerritos	CA	90701	Los Angeles	(562) 860-2390	1031	ELAP
	Public Wastewater System	Pomona Treatment Plant Laboratory	295 Humane Way	Pomona	CA	91766	Los Angeles	(909) 623-6721	1068	ELAP
	Public Wastewater System	San Jose Creek Analytical Plant Laboratory	1965 South Workman Mill Road	Whittier	CA	90601	Los Angeles	(562) 908-4288	1032	ELAP
	Public Wastewater System	San Jose Creek Water Quality Laboratory	1965 South Workman Mill Road	Whittier	CA	90601	Los Angeles	(562) 908-4288	1052	ELAP
	Public Wastewater System	Saugus Treatment Plant Laboratory	26200 Springbrook Avenue	Saugus	CA	91350	Los Angeles	(661) 259-6846	1040	ELAP
	Public Wastewater System	Valencia Treatment Plant Laboratory	28185 The Old Road	Valencia	CA	91335	Los Angeles	(661) 257-2575	1041	ELAP
	Public Wastewater System	Whittier Narrows Treatment Plant Laboratory	301 North Rosemead Boulevard	El Monte	CA	91733	Los Angeles	(626) 443-2954	1036	ELAP
	Commercial	LA Testing - South Pasadena Laboratory	520 Mission Street	South Pasadena	CA	91030	Los Angeles	(800) 303-0047	2283	ELAP
	Public Water System	Las Virgenes Municipal Water District Laboratory	731 Malibu Canyon Road	Calabasas	CA	91302	Los Angeles	(818) 251-2333	1533	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	City	Long Beach Water Department Water Quality Laboratory	2950 Redondo Avenue	Long Beach	CA	90806	Los Angeles	(562) 570-2482	1409	ELAP
Y	City	Long Beach Public Health Laboratory	2525 Grand Avenue, Room 260	Long Beach	CA	90815	Los Angeles	(562) 570-4075	2368	ELAP
Y	County	Los Angeles County Public Health Laboratory	12750 Erickson Avenue	Downey	CA	90242	Los Angeles	(562) 658-1330	1398	ELAP
	Public Water System	Los Angeles Dept. of Water & Power	555 East Walnut Street	Pasadena	CA	91101-1658	Los Angeles	(213) 367-8487	1336	ELAP
	County	Malibu Mesa Water Reclamation Plant Lab	3863 South Malibu Country Drive	Malibu	CA	90265	Los Angeles	(310) 456-1470	2135	ELAP
	Commercial	Michelson Laboratories, Inc.	6280 Chalet Drive	Commerce	CA	90040-3761	Los Angeles	(562) 928-0553	1198	ELAP
	Commercial	Micron Environmental Labs, Inc.	3565 Lexington Avenue	El Monte	CA	91731	Los Angeles	(626) 454-4782	2297	ELAP
	Commercial	Mobile American Environmental Testing Laboratory (MAETL)	2834 & 2908 North Naomi Street	Burbank	CA	91504	Los Angeles	(818) 845-8200	2402	ELAP
	Public Water System	Metropolitan Water District of So. Ca. - F.E. Weymouth WTP Laboratory	700 Moreno Avenue	La Verne	CA	91750	Los Angeles	(909) 392-5294	1615	ELAP
	Public Water System	Metropolitan Water District of So. Ca. - Henry J. Mills WTP Lab	550 East Alessandro Boulevard	Riverside	CA	92508	Los Angeles	(909) 392-5294	1069	ELAP
	Public Water System	Metropolitan Water District of So. CA.-Joseph Jensen WTP Lab.	13100 Balboa Boulevard	Granada Hills	CA	91344	Los Angeles	(909) 392-5065	1367	ELAP
	Public Water System	MWD - La Verne Water Quality Laboratory	700 Moreno Avenue	La Verne	CA	91750	Los Angeles	(909) 392-5065	1618	ELAP
	Commercial	MWH Laboratories, a Division of MWH Americas, Inc.	750 Royal Oaks Drive, Suite 100	Monrovia	CA	91016	Los Angeles	(626) 386-1100	01114CA	NELAP
	Commercial	MWH Laboratories, a Division of MWH Americas, Inc.	750 Royal Oaks Drive, Suite 100	Monrovia	CA	91016	Los Angeles	(626) 386-1100	1422	ELAP
	Industrial	Nestle Waters Quality Assurance Laboratory	1544 East Washington Boulevard	Los Angeles	CA	90021	Los Angeles	(213) 763-1350	1698	ELAP
	Industrial	New Cure, Inc.	2550 Greenwood Avenue	Monterey Park	CA	91755	Los Angeles	(323) 720-9775	1901	ELAP
	Commercial	Pacific Coast Analytical Services	15751 Roxford Street, Unit F	Sylmar	CA	91342	Los Angeles	(818) 364-7470	2667	ELAP
	Public Wastewater System	Palmdale Treatment Plant Laboratory	39300 30th Street East	Palmdale	CA	93550	Los Angeles	805-723-8537	2802	ELAP
	Public Water System	Palmdale Water District	700 East Avenue S	Palmdale	CA	93550	Los Angeles	(661) 947-4111x306	1776	ELAP
	City	City of Pasadena Water Quality Laboratory	245 West Mountain Street	Pasadena	CA	91103	Los Angeles	(626) 744-4411	1473	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	Private WW System	Point Dume Club Water Reclamation Plant Laboratory	29500 Heathercliff Road	Malibu	CA	90265	Los Angeles	(310) 457-1481	2230	ELAP
	City	Port of Los Angeles Testing Laboratory	514 Pier A Street - Berth 21	Wilmington	CA	90744	Los Angeles	(310) 372-3588	2707	ELAP
	Commercial	Positive Lab Service	781 East Washington Boulevard	Los Angeles	CA	90021	Los Angeles	(213) 745-5312	1131	ELAP
	Commercial	Positive Lab Service	781 East Washington Boulevard	Los Angeles	CA	90021	Los Angeles	(213) 745-5312	2534	ELAP
	In-house	Raytheon Company	2000 E. El Segundo Blvd, E1/Room 1344	El Segundo	CA	90245	Los Angeles	(310) 647-4370	1016	ELAP
	Public Water System	City of Santa Monica Water Quality Laboratory	1228 South Bundy Drive	Los Angeles	CA	90025	Los Angeles	(310) 826-6712	1469	ELAP
	Industrial	Siemens Industry, Inc.	5375 South Boyle Avenue	Vernon	CA	90058	Los Angeles	(323) 277-1500	2313	ELAP
	Commercial	Siemens Water Technology Corp.	5375 South Boyle Avenue	Los Angeles	CA	90058	Los Angeles	(323) 277-3083	2325	ELAP
	In-house	Southern California Gas Company	8101 South Rosemead Boulevard	Pico Rivera	CA	90660	Los Angeles	(562) 806-4344	1744	ELAP
	Commercial	Strata-Analysts Group, Inc	3302 Industry Drive	Signal Hill	CA	90755	Los Angeles	(562) 426-0199	2052	ELAP
	Public Water System	Three Valleys Municipal Water District	1021 East Miramar Avenue	Claremont	CA	91711	Los Angeles	(909) 621-5568	1581	ELAP
	Federal	NAVFAC Southwest San Clemente Island Laboratory	Building 60195 (located apprx. 60 miles off the Coast of San Diego	San Clemente Island	CA	92135	Los Angeles	(619) 524-9380	2796	ELAP
	Public Water System	Walnut Valley Water District	271 South Brea Canyon Road	Walnut	CA	91789	Los Angeles	(909) 595-1268	2644	ELAP
	Commercial	Weck Laboratories, Inc.	14859 East Clark Avenue	City of Industry	CA	91745	Los Angeles	(626) 336-2139	04229CA	NELAP
	Commercial	Weck Laboratories, Inc.	14859 East Clark Avenue	City of Industry	CA	91745	Los Angeles	(626) 336-2139	1132	ELAP
	City	West Basin Water Quality Laboratory	1935 South Hughes Way	El Segundo	CA	90245	Los Angeles	(310) 414-0183	2111	ELAP
	Commercial	A & R Laboratories	1401 Research Park Drive, Suite 100	Riverside	CA	92507	Riverside	(951) 779-0310	2789	ELAP
	City	City of Banning WWTP Laboratory	2242 East Charles Street	Banning	CA	92220	Riverside	(951) 922-3310	2499	ELAP
	Public Wastewater System	Coachella Sanitary District	87-075 Avenue 54	Coachella	CA	92236	Riverside	(760) 391-5008x101	2472	ELAP
	Public Water System	Coachella Valley Water District Laboratory	85-995 Avenue 52	Coachella	CA	92236	Riverside	(760) 398-2651	1780	ELAP
	Recycling Facility	Desert Water Agency	1200 Gene Autry Trail South	Palm Springs	CA	92264	Riverside	(760) 323-4971	1370	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	Public Wastewater System	E.V.M.W.D. Regional Laboratory	14980 Strickland Avenue	Lake Elsinore	CA	92531	Riverside	(951) 674-3146	2169	ELAP
	Public Water System	Eastern Municipal Water District	2270 Trumble Road	Perris	CA	92570	Riverside	(951) 928-3777	1379	ELAP
	Commercial	Edward S. Babcock & Sons, Inc.	6100 Quail Valley Court	Riverside	CA	92507	Riverside	(951) 653-3351	02101CA	NELAP
	Commercial	Edward S. Babcock & Sons, Inc.	6100 Quail Valley Court	Riverside	CA	92507	Riverside	(951) 653-3351	2698	ELAP
	Commercial	Microbac Laboratories	1401 Research Park Drive, Suite 100	Riverside	CA	92507	Riverside	(951) 779-0310	2747	ELAP
	Public Wastewater System	Mission Springs Water District	14601 Verbena Avenue	Desert Hot Springs	CA	92240	Riverside	(760) 329-6278	1093	ELAP
	Public Water System	Metropolitan Water District of So. Ca. - Robert A. Skinner WTP Lab	33740 Borel Road	Winchester	CA	92396	Riverside	(909) 392-5294	1042	ELAP
	Public Wastewater System	Palm Springs Wastewater Treatment Plant	4375 Mesquite Avenue	Palm Springs	CA	92264	Riverside	(760) 323-8166	1089	ELAP
	City	City of Riverside - Laboratory Services	5950 Acorn Street	Riverside	CA	92504	Riverside	(951) 351-6016	1311	ELAP
Y	County	Riverside County Public Health Laboratory	4065 County Circle Drive	Riverside	CA	92503	Riverside	(951) 358-5070	2715	ELAP
	Public Ww	Santa Rosa Water Reclamation Facility Laboratory	26266 Washington Street	Murrieta	CA	92562	Riverside	(951) 296-6900	2555	ELAP
	Public Wastewater System	Valley Sanitary District	45-500 Van Buren Street	Indio	CA	92201	Riverside	(760) 347-2356	1053	ELAP
	Commercial	Analytical Chemical Labs, Inc.	1123 West Morena Boulevard	San Diego	CA	92110-3853	San Diego	(619) 276-1558	2505	ELAP
	Commercial	Clarkson Laboratory and Supply, Inc.	350 Trousdale Drive	Chula Vista	CA	91910	San Diego	(619) 425-1993	1055	ELAP
	Commercial	D-Tek Analytical Laboratories, Inc.	2722 Loker Avenue West, Suite B	Carlsbad	CA	92010	San Diego	(760) 930-2555	2344	ELAP
	Commercial	EMSL Analytical Inc.	7916 Convoy Court	San Diego	CA	92111	San Diego	(858) 499-1302	2713	ELAP
	Industrial	Encina Power Station Laboratory	4600 Carlsbad Boulevard	Carlsbad	CA	92008	San Diego	(760) 268-4070	2547	ELAP
	Public Wastewater System	Encina Wastewater Authority Laboratory	6200 Avenida Encinas	Carlsbad	CA	92011	San Diego	(760) 268-8861	1441	ELAP
	Commercial	Enviromatrix Analytical, Inc.	4340 Viewridge Avenue., Suite A	San Diego	CA	92123	San Diego	(858) 560-7717	2564	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	Commercial	Environmental Engineering Laboratory, Inc	3538 Hancock Street	San Diego	CA	92110	San Diego	(619) 298-6131	2616	ELAP
	City	City of Escondido Water Quality Laboratory	1521 South Hale Avenue	Escondido	CA	92029-3052	San Diego	(760) 839-6274	1625	ELAP
	Public Wastewater System	Fallbrook Public Utility District	1425 South Alturas	Fallbrook	CA	92028	San Diego	(760) 728-1125x2106	2005	ELAP
	Commercial	H&P Mobile Geochemistry, Inc.	2470 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 804-9678	2743	ELAP
	Commercial	H&P Mobile Geochemistry, Inc.	2470 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 804-9678	2745	ELAP
	Commercial	H&P Mobile Geochemistry as Mobile One Laboratories	2470 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 804-9678	2742	ELAP
	Commercial	H&P Mobile Geochemistry, Inc. - Lab 6	2470 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 804-9678	2744	ELAP
	Commercial	H&P Mobile Geochemistry Inc.	2470 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 804-9678	2740	ELAP
	Commercial	H&P Mobile Geochemistry, Inc.	2470 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 804-9678	2741	ELAP
	Commercial	H&P Mobile Geochemistry Inc.	2470 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 804-9678	2754	ELAP
	Commercial	H.M. Pitt Labs, Inc.	2434 Southport Way, Suite L	National City	CA	91950	San Diego	(619) 474-8548	2481	ELAP
	Public Water System	Helix Water District	9550 Lake Jennings Park Road	Lakeside	CA	92040	San Diego	(619) 667-6248	1610	ELAP
	Commercial	JMR Environmental Services, Inc.	4560 Alvarado Canyon Road, Suite 2D	San Diego	CA	92120	San Diego	(619) 858-7260	2468	ELAP
	Public Water System	John C. Bargar Water Treatment Plant	505 Black Canyon Place	Ramona	CA	92065	San Diego	(760) 788-2236	1135	ELAP
	Commercial	Motile Laboratory Services	537 Vine Street	Oceanside	CA	92054	San Diego	(760) 840-0577	2720	ELAP
	Commercial	Nautilus Environmental, LLC	4340 Vandever Avenue	San Diego	CA	92120	San Diego	(858) 587-7333	1802	ELAP
	City	City of Oceanside Water Utilities Department Laboratory	3950 North River Road	Oceanside	CA	92054	San Diego	(760) 435-5948	1740	ELAP
	Recycling Facility	Otay Water District	11901 Singer Lane	Spring Valley	CA	91978	San Diego	(619) 670-2294	1658	ELAP
	Commercial	Pacific Chemical Labs, Inc	905 South 33rd Street	San Diego	CA	92113	San Diego	(619) 218-4191	2774	ELAP
	Recycling Facility	Padre Dam Water Recycling Laboratory	12001 North Fanita Parkway	Santee	CA	92701	San Diego	(619) 258-4692	1045	ELAP
	Public Water System	R.E. Badger Filtration Plant	18535 Aliso Canyon Road	Rancho Santa Fe	CA	92067	San Diego	(858) 756-2569	1553	ELAP
	Public Wastewater System	Alvarado Wastewater Chemistry Lab.	5530 Kiowa Drive	La Mesa	CA	91942-1331	San Diego	(619) 668-3213	1609	ELAP
	City	City of San Diego's Industrial Waste Laboratory	5530 Kiowa Drive	La Mesa	CA	91942	San Diego	(619) 668-3256	1985	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	City	City of San Diego - Marine Microbiology Laboratory	2392 Kincaid Road	San Diego	CA	92101-0811	San Diego	(619) 758-2311	2185	ELAP
	Public Wastewater System	Metro Biosolids Center Wastewater Chemistry	5240 Convoy Street	San Diego	CA	92111	San Diego	(619) 668-3213	2478	ELAP
	City	City of San Diego Public Utilities Dept. Toxicology Laboratory	2392 Kincaid Road	San Diego	CA	92101	San Diego	(619) 758-2341	1989	ELAP
	Public Wastewater System	North City Wastewater Chemistry Lab	4949 Eastgate Mall	San Diego	CA	92121	San Diego	(619) 668-3213	2477	ELAP
	Public Wastewater System	Point Loma Wastewater Chemistry Lab	1902 Gatchell Road	San Diego	CA	92106	San Diego	(619) 668-3214	2474	ELAP
	Public Wastewater System	South Bay Wastewater Chemistry Laboratory	2411 Dairy Mart Road	San Diego	CA	92173	San Diego	(619) 668-3215	2539	ELAP
	City	City of San Diego Water Quality Laboratory	5530 Kiowa Drive	La Mesa	CA	91942-1331	San Diego	(619) 668-3232	1058	ELAP
Y	County	San Diego County Public Health Laboratory	3851 Rosecrans Street, Suite 716	San Diego	CA	92110-3115	San Diego	(619) 692-8500	1730	ELAP
	Utility	San Diego Gas & Electric Environmental Analysis Laboratory	6555 Nancy Ridge Road, Suite 300	San Diego	CA	92121-3221	San Diego	(619) 260-5747	1289	ELAP
	Public Wastewater System	San Elijo Joint Powers Authority Laboratory	2695 Manchester Avenue	Cardiff by the Sea	CA	92007	San Diego	(760) 753-6203	1104	ELAP
	Utility, Power Plant	San Onofre Nuclear Generating Station	5000 Pacific Coast Highway	San Clemente	CA	92674	San Diego	(949) 368-9597	1917	ELAP
	Public Water System	Sweetwater Authority	100 Lakeview Avenue	Spring Valley	CA	91977	San Diego	(619) 409-6813	1412	ELAP
	Public Water System	Twin Oaks Valley Water Treatment Plant	3566 North Twin Oaks Valley Road	San Marcos	CA	92069	San Diego	(760) 752-7320	2708	ELAP
	Commercial	Ultimate Labs Inc	5940 Pacific Mesa Court #209/210	San Diego	CA	92121	San Diego	(858) 677-9297	2783	ELAP
	Commercial	UMB Analytical, Inc	6153 Fairmount Ave, Suite 104	San Diego	CA	92120	San Diego	(619) 501-7698	2771	ELAP
	Federal	SPAWAR Systems Center San Diego Bioassay Laboratory	53475 Strothe Road, Building 111 Room 116	San Diego	CA	92152	San Diego	(619) 553-0886	2601	ELAP

Fee Exempt	Type	Lab Name	Street	City	State	Zip	County	Phone	Cert No.	Program
	Public Wastewater System	Valley Center Municipal Water District Laboratory	8711 Circle R Drive	Escondido	CA	92026	San Diego	(760) 749-1600	2736	ELAP
	Public Water System	Vista Irrigation District	1391 Engineer Street	Vista	CA	92081	San Diego	(760) 597-3143	1761	ELAP
	Commercial	Weston Solutions, Inc.	2433 Impala Drive	Carlsbad	CA	92010	San Diego	(760) 795-6900	2613	ELAP

Appendix C - Annotated Outline for Program Protocols

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1 Introduction

As part of the 2014 Coachella Valley IRWM Plan Update, a Disadvantaged Community (DAC) Water Quality Evaluation was conducted to assess water quality in DACs where groundwater was the primary source of drinking water. Out of this evaluation came the Coachella Valley Disadvantaged Community Residential Groundwater Treatment Program, which provided a work plan for entities seeking to implement an effective point-of-use (POU) treatment system program. Sample documents were created for each task outlined in the DAC Residential Groundwater Treatment Program that could be used as templates or guides for entities implementing similar programs.

This sample document was developed to provide an outline of the recommended Program Operations Protocols that would be required for a successful DAC Residential Groundwater Treatment Program, as described in the *Coachella Valley IRWM DAC Residential Groundwater Treatment Program*. These protocols should be specific to the method and mode by which the POU treatment systems will be purchased, stored, distributed, and tracked, and include the means for tracking installed units. The outline provided here should be completed with the information described in each bullet, as appropriate to the individual region, program, and selected treatment system(s).

2 Program Operations Protocol Outline

1.0 Program Purpose

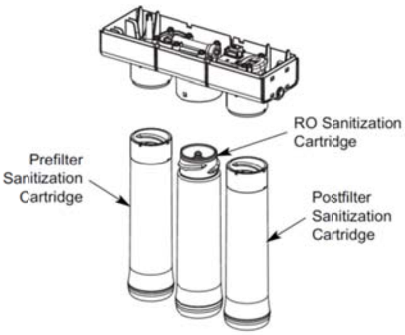
- Assist local disadvantaged communities (DAC) in eliminating public health issues as it relates to drinking water quality.
- Provide Point of Use (POU) reverse osmosis (RO) residential water treatment units to homeowners for a nominal fee.
- Maintain the POU RO units for homeowners as part of the rental agreement.
- Ensure treated water quality meets drinking water standards.

2.0 System Identification

- Identify which POU RO treatment system you want to use
  - Systems are available from major retailers such as Lowe’s, Home Depot, and online (via Amazon, for example)
  - Systems may also be obtained through direct contract with manufacturer
  - Systems currently used by non-governmental organizations doing similar programs in the Coachella Valley include Nimbus Water Systems used by Pueblo Unido Community Development Corporation (PUCDC) and a General Electric (GE) unit used by Desert Environmental for Community Empowerment (DACE)

Manufacture	Model Number	Stages	Warranty
ISPRING	RCC7, RCC7AK, RCC7AK-UV	5-7	1
Perfect Water Technologies	TMAFC, TMULTRA	6-7	5
Purenex	RO-5-50	5-7	1
Nimbus Water Systems	WM5-50	5	1
Krystal Pure	KR10, KR15	4	4-5
Watts Premier	531411	4	3
Whirlpool	WHER25	3	1
DuPont	WFRO60X	3	3
EcoPure	ECOP309	3	1
General Electric	GXRM10RBL	3	1
Hydro-Logic	HLRO100	3	1

- System configuration
  - Most treatment units have are a 3-stage system with pre- and post-filters plus the main RO membrane.
  - Some units have additional stages (up to 6) with the additional stages providing treatment for improved odor and taste, disinfection, softening and stabilization.
- Need to match treatment system with local water quality; look at the system requirements as part of your selection criteria.



3.0 Program Management

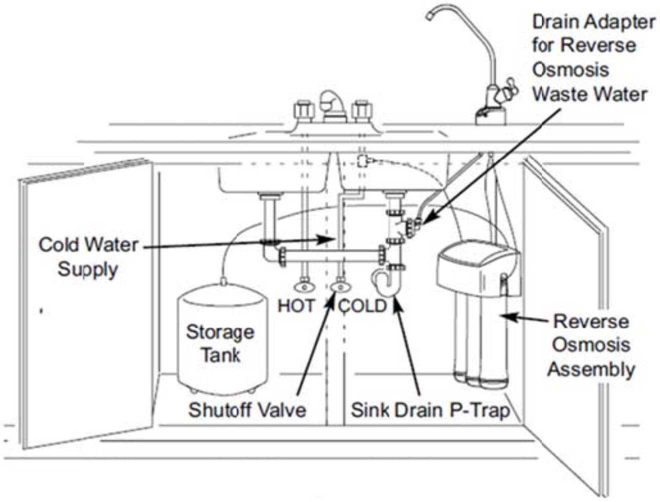
- Figure out how many units to order.
- Figure out how much replacement materials to purchase and what types (filters, membranes, valves, plumbing fixtures, etc.).
- Determine where equipment and materials will be stored and how it will be distributed/checked out (for monitoring equipment).
- Determine if surrogate monitoring will be conducted (recommended)
  - What surrogate will be used?
  - How will you monitor for it in the field?
  - What equipment and meters do you need to measure the surrogate accurately?
  - How are you going to correlate surrogate levels to constituent levels in water quality samples?
- Tracking/Recordkeeping
  - Who's going to maintain the records? Where and how?
  - EXCEL spreadsheet for keeping track of all activities related to the program
    - Purchase, Storage, and Installation of Treatment Units
      - Record number of treatment units purchased and received
      - Assign a unique number to each purchased unit
      - Make sure that the unit number is on all documentation relating to the treatment system
      - Make sure the unit number is linked to the installed location and unit renter
      - Track volume of materials in warehouse
    - System Service Tracking
      - Record installation date, installer, and maintenance record

        - Update at least once per year
        - Track number of units due for replacement and/or maintenance in any period
    - Water quality data monitoring records
        - Record water quality data both pre- and post- installation; link to unit number and in-field surrogate analyses
        - Monitor both feed water and product water quality to ensure system performance
        - Annual comparison of water quality to determine if there is any system degradation
- Plan out training
    - o How are you going to solicit volunteers for installation and/or maintenance?
    - o Where will the training sessions be held?
    - o How often will the training sessions be held?
    - o Will there be refresher courses?
    - o How will you track who's trained?
    - o How will you fund any training-related expenses (site and/or equipment rental, copies, refreshments, etc.)?

4.0 Water Quality Testing

Feed Water Parameters	Requirements
Temperature	40 F – 100F
Pressure	40 psi – 80 psi
[Cl]	<1.0 mg/L
Hardness @ 6.9 pH	10 gpg
TDS	<2,000 mg/L
pH	4-8
Turbidity	<1.0 NTU
SDI	< 5
Nitrate as N	<27 mg/L
Nitrite as N	<3mg/L
Others	Free from iron, manganese or hydrogen sulfide

- Pre-installation water quality testing
    - o Establish baseline water quality
    - o Make sure feed water condition meets manufacture's requirements
        - Hardness is too high - add ion exchange unit
        - Organic content is high – add CTO unit (block carbon filter)
        - Pathogens are present - add UV disinfection unit
        - pH is too low - add alkaline unit
- Post-installation water quality test
    - o After system purging
    - o Regularly monitor feed and product water
    - o Determine if proposed installation provide safe drinking water for DAC communities
- Routine monitoring
    - o Regularly monitor feed water and product water to ensure system performance
    - o For product water, test for arsenic, uranium, fluoride, nitrate and hexavalent chromium meet drinking water standards
    - o Post-maintenance standards to establish continued performance to meet required standards
- Recordkeeping – introduced in program management (above)



  - Installation record, document manufacture/unit selected, installer’s name, installation date and location
  - Owner name and contact information, pre- and post-installation water quality data.
  - Renters agreements
  - Financial records (basic bookkeeping)
  - Annual comparison of water quality data

5.0 System Installation

- Preparation
  - Make sure all parts and manual are included in the package
  - Make sure have all the required tools (knife, scissors, electric drill and drill bits, screwdrivers, Teflon tape, file, hammer, pinchers, pliers or pipe wrench)
  - Plan all parts visually so that connection tubes won’t loop or dip after installation
- Adaptors
  - Install feed water adaptor to cold water supply
  - Install drain saddle to sink drain pipe
- RO assembly
  - Install filter and membrane cartridges on the assembly
  - Mount/set in place
- Storage Tank
  - Connect and seal tubing to storage tank
  - Mount/set in place
- Faucet
  - Find best place for Faucet as planned, drill hole on sink/countertop if necessary.
  - Connect tubing for product water and drain
  - Set up any electronic tracking device for filter replacements
- Finish Connections
  - Connect tubes for feed water, drain, storage tank and product water to the RO assembly
- Sanitize the system
  - Using household bleach
  - Essential for initial disinfection of the system
- Purge the system
  - Depend on manufacture’s recommendation, Purging for 24 hours may be required.
  - Remove air bubbles and carbon particles from filter
- Post-installation monitoring – check for links, drops in system performance

6.0 Maintenance

- Replace filters and disinfect system annually per manufacture’s requirement. In general, filters need to be replaced every 6 – 12 months.
- Monitor RO membrane performance. Typically needs to be replaced every 3 years.
- Collect water quality samples regularly (annually at minimum); conduct both in-field (surrogate) measurements and laboratory analyses
- Maintain system more frequently depending on monitoring and performance results

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Appendix D - Annotated Outline for Installation Manual

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1 Introduction

As part of the 2014 Coachella Valley IRWM Plan Update, a Disadvantaged Community (DAC) Water Quality Evaluation was conducted to assess water quality in DACs where groundwater was the primary source of drinking water. Out of this evaluation came the Coachella Valley Disadvantaged Community Residential Groundwater Treatment Program, which provided a work plan for entities seeking to implement an effective point-of-use (POU) treatment system program. Sample documents were created for each task outlined in the DAC Residential Groundwater Treatment Program that could be used as templates or guides for entities implementing similar programs.

This sample document was developed to provide an outline of a potential installation manual that should be developed as part of Task 3: Program Documentation Preparation. An installation manual should be developed prior to installation of treatment units, and should include information specific to the system and region on the appropriate protocols for system installation and testing, and can be used to train local community members how to install the selected water treatment systems. Content of the installation manual should, at a minimum, include: 1) procedures for system installation, 2) common troubleshooting, 3) the importance of and process for pre- and post-installation water quality testing, and 4) manufacturer contact information. The outline provided here should be completed with the information described in each section, as appropriate to the individual region, program, and selected treatment system(s).

2 Installation Manual Outline

1.0 Introduction/Background

- Describe program, including where units will be installed (include map)
- Describe general installation and testing of units

2.0 System Selection

2.1 Point of Use (POU) Reverse Osmosis (RO) System Description

- Name of selected RO unit
- Unit specifications, including manufacturer, model number, number of stages, NSF certification, flow rate and any other relevant information

2.2 Feed Water Requirements

Point of Use RO treatment systems are functional under certain water supply constraints. The feed water (water coming into the house) must be from a potable water resource that's free from iron, manganese or hydrogen sulfide.

If feed water quality is lower than that specified in Table 1, additional pre-treatment may be required. Some manufacturers provide additional pre-treatment modules as optional upgrades to the POU treatment system.

The feed water pressure to the unit should be no less than 40 psi and no greater than 80 psi. Feed water pressure out of this range may require an additional booster pump or pressure regulator to provide enough pressure/pressure reduction to allow it to fall within the operational range.

All of the systems require that if water is microbiologically unsafe or unknown quality, then disinfection must be added to the system. Some treatment units offer added disinfection steps as optional upgrades.

Table 1: Feed Water Specifications

Feed Water Parameters	Requirements
Temperature	40^{o}F – 100^{o}F
Pressure	40 psi – 80 psi
Cl^-	<1.0 mg/L
Hardness @ 6.9 pH	10 gpg
TDS	<2,000 mg/L
pH	4-8
Turbidity	<1.0 NTU
SDI	< 5
Nitrate as N	<27 mg/L
Nitrite as N	<3 mg/L
Others	Free from iron, manganese or hydrogen sulfide

Note: These requirements cover most of the commercially-available products. The manufacture's installation and maintenance manual for the selected system may allow for different operational ranges.

3.0 System Installation

3.1 Site Preparation

Before installation of POU RO system, check to confirm that all the contents from product package is included by comparing contents with the manufacture's packaging list. Typical POU RO treatment system includes the following materials in the package:

- Reverse Osmosis assembly with pre-filter and post-filter units
- Product water storage tank
- Air gap faucet assembly
- Tubing connections and valves for feed water, product water and drain
- Accessories, such as batteries, fittings, adapters, connectors and brackets
- Manufacture's installation manual.

General tools required for installation include:

- Knife
- Scissors
- Electric drill and drill bits

- Screwdrivers
- Teflon tape
- File
- Hammer
- Pinchers
- Pliers or pipe wrench,

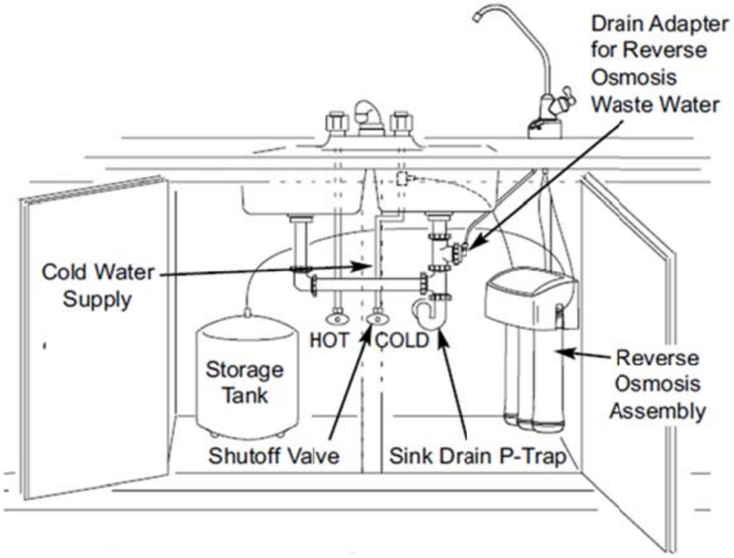
Note that additional plumbing materials, such as PVC piping, piping glue, valves and drains, may be required to correct substandard plumbing at the installation location. A variety of general plumbing materials should also be brought to the installation site on a contingency basis.

In preparation for unit installation:

1. Close the hot and cold water shutoff valves.
2. Temporarily place the tank and filter assembly into the planned location.
3. Check the position of items and space required for proper installation and for accessibility.
4. Remove tank and filter from planned location and set aside.

It is important to note that compliance is maintained with all local plumbing codes.

Below is an example of the location of various plumbing items.



3.2 Install Feed Water Connection

Feed water should be connected to the existing cold-water (potable) pipe. Before installing the feed water connection, make sure that water supply is turned off and open a faucet to drain the pipe.

Remove the nut that connects the cold-water faucet to cold-water plumbing, and thread water supply fitting onto the pipe. Reconnect the nut to the bottom of fitting.

3.3 Install Drain Connection

A drain point is needed for discharging the RO reject water. Most treatment products provide fittings for the sink drain pipe under the sink and above the P-trap. The connection between the sink P-trap and the sink tailpiece needs to be removed first.

After cleaning the tailpiece, the drain adapter could be installed directly onto the sink tailpiece. The adapter needs to be positioned such that the drain tubing from the RO faucet will run straight to the adapter, with no dips, loops, or kinks.

3.4 Install RO Unit

Some units ship the RO filter assembly directly, while others require the user to assemble them before mounting under the sink. The units will generally include the following:

- Sediment trap
- Granulated Activated Carbon (GAC) filter unit
- CTO (Chlorine, Taste, Order) cartridge (often also referred to as Block Carbon Filter)
- RO membrane

Booster pumps or pressure reducing values are added if required to ensure that the system water pressures remain within the specified range. Some treatment units also include optional stages, such as:

- Mineralized Ball Filter
- UV Sterilizer
- Magnetization Filter

It should be noted that the RO assembly can also be mounted on hanger washers.

3.5 Install Storage Tank

The treatment system storage tank is typically prefilled with air to provide the pressure needed for normal usage. To install, apply thread sealing tape to the threads on the nipple at the top of the tank and then tighten the tubing connector onto the tank nipple, but don’t connect the tube yet. This connection is made later.

3.6 Install Faucet

To install the faucet, first a location for the faucet must be selected. Typical options include:

- Using the existing sink top hole for the spray hose or soap dispenser.
- Drilling a new hole for the faucet location.

Note that the air gap faucet has three pipes connecting to the faucet, therefore the hole needs to be 1-3/8” in diameter (confirm with the manufacturer’s installation instructions). In addition, the tubing needs to be connected to the RO assembly, storage tank and drain pipe without kinking.

Visually review the routing of the tubes and make sure there is adequate tube routing space. Make sure that RO faucet will mount flat against the mounting surface. If necessary, drill a new hole in the sink or in the countertop next to the sink. Drilling should only be performed by an installer who is qualified for drilling such materials.

After the faucet and connections have been located, connect the product water tube, drain tube and tub from tank to the bottom of the faucet. Refer to manufacture's guide on exact connection of these three tubes. Make sure all of the fittings are connected firmly.

Insert the tubes into the sink hole until the faucet is mounted flat against the sink or base, with a rubber gasket installed between the surface and the faucet base.

Finally, some faucets are equipped with batteries to include a timer that tracks usage. Please read the manufacture's manual to make sure that the batteries are installed correctly to indicate when filters need to be replaced.

3.7 Connect Tubes

Referring to the manufacture's manual, make the following main connections for the RO assembly. These include connecting the feed water tube, product water tube, tube for the drain saddle and tubing to the storage tank.

3.8 Additional Treatment Stages

Some treatment units offer additional treatment stages either as post-filters or as optional upgrades. These may include:

- Pre-filters such as chlorine/taste/odor (CTO) units and deionization (DI) units
- Post-filters such as alkalinity units or ultraviolet (UV) disinfection units

The manufacturer's installation instructions should be followed for connecting these units

3.9 Sanitize the Treatment System

After installation, the treatment system should be sanitized. This can be done by adding home bleach to the system before its first use. The manufacturer's instructions should be followed for system sanitizing.

3.10 System Purging

After sanitizing, the treatment system should be purged. This is accomplished by implementing the following general tasks:

1. Turn on cold water supply valve and feed water valve, but close the tank ball valve.
2. Open the faucet and check for system leaks.
3. Water should start dripping out from faucet in 5 to 20 minutes. Let the water drip for 10 minutes. Some blackening of the water may occur due to loss of carbon from the GAC filter being flushed out. The water should run clear after approximately 10 minutes.
4. Close the faucet and fill up the pressure tank. This may take 2-1/2 to 3-1/2 hours, depending on local water pressure.
5. Water production will stop when tank is full. Drain the tank completely by opening the faucet again.

6. Close the faucet and start RO treatment again to refill the tank (this should take around 2-1/2 hours).
7. After the second tank is filled, the system can be used.
8. Check the system daily for leaks during the first week of operation and periodically thereafter.
9. If treated water has a milky color, this is due to air bubbles in the water; it is safe to drink.
10. Remember, don't push and release the air valve on the pressure tank

Some manufacturers require adding bleach to the system after installation (see step 3.9, sanitizing the system, above). Please follow the manufacturer's recommendations as some manufacturers require the system to be flushed once while others recommend purging the system for 24 hours after pressure build up.

4.0 Monitoring Protocols

- Water samples to be collected both prior to and after system installation.
- Samples should be collected from the tap per approved procedures. Describe the sampling procedures
- Water samples to be analyzed per EPA-approved methods at a pre-determined State certified analytical lab. (See sample Pilot Sampling and Analysis Plan for recommended analytical methods and information.)
- Onsite surrogate monitoring may be approved for routine monitoring (but not for establishing compliance with MCLs). These surrogate monitoring parameters should also be analyzed both before and following treatment system installation.
- Surrogate sampling involves using a water parameter that can be measured in the home with a handheld device. Typical surrogate parameters include electrical conductivity (EC) and/or turbidity.
  - In sampling surrogate parameters, use calibrated field (handheld) devices to ensure POU devices are working adequately between compliance samples and to help anticipate and plan for device replacement or service
  - Results of field samples should be recorded in maintenance logs kept by trained personnel
  - Type of field sampling depends on the constituents of concern and the type of POU treatment device
  - Pilot testing can evaluate and consider the most effective surrogate and test methodology based on factors such as accuracy, precision, cost-effectiveness, test device portability, ease of use, calibration needs, operator training, etc.
  - Include manufacturer's recommendation and calibration method for field-testing equipment in appendices of the Monitoring and Maintenance Plan.

5.0 Troubleshooting Guide

- This section of the manual may have limited information initially. This manual should be updated regularly as information is gained regarding system installation.
- Typical troubleshooting problems are as follows:

Table 2: Typical Installation Problems

Problem	Cause
Low/slow production	Low water pressure Crimps in tubing Clogged pre-filters Fouled membrane
Milky colored water	Air in system
Water constantly running; unit will not shut off	Low water pressure Crimp in supply tube High water pressure High pressure in storage tank Low pressure in storage tank
Water from faucet vent hole or noise from drain	Crimp or restriction in drain line Drain tube clogged
Small amount of water in storage tank	System is starting up Low water pressure Too much air in storage tank

6.0 Record Keeping & Reporting

- Records regarding the installation of POU systems should be maintained for at least five years.
- Also maintained should be any and all records associated with any contracts, lease agreements, maintenance records, logs of installed devices, legal documents, educational materials, and sampling results.
- At a minimum, the following information should be recorded for each POU unit installed:
  - Where, when, and by whom the equipment was installed
  - Problems encountered during installation
  - Sampling collection for monitoring (both pre- and post-installation)
  - Results of lab analyses (both pre- and post-installation)
  - Customer billing
- If any devices are not in compliance, notes should be made as to what the problem was and actions taken to return the device to compliance.
- Riverside County Department of Environmental Health or others may require reporting pertaining to testing of installed POU devices.

Appendices

- Manufacturer’s Installation instructions
- Manufacturer’s recommendation and calibration method for field-testing equipment
- Installation logs

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Appendix E - Annotated Outline for Monitoring and Maintenance Manual

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1 Introduction

As part of the 2014 Coachella Valley IRWM Plan Update, a Disadvantaged Community (DAC) Water Quality Evaluation was conducted to assess water quality in DACs where groundwater was the primary source of drinking water. Out of this evaluation came the Coachella Valley Disadvantaged Community Residential Groundwater Treatment Program, which provided a work plan for entities seeking to implement an effective point-of-use (POU) treatment system program. Sample documents were created for each task outlined in the DAC Residential Groundwater Treatment Program that could be used as templates or guides for entities implementing similar programs.

This sample document was developed to provide an outline of a potential Monitoring and Maintenance Manual, a Task 3 deliverable. Such a manual should include the protocols for maintaining the selected point-of-use (POU) treatment system, as well as manufacturer information for replacement parts and recommended testing procedures. Manual contents should include: 1) system specifications, 2) process for purchasing and installing replacement filters, 3) maintenance and replacement schedules, 4) annual testing, and 5) manufacturer contact information. This manual should be used during training sessions for community members (see Task 4 for the DAC Residential Groundwater Treatment Program). The manual outline provided here should be completed with the information described in each section, as appropriate to the individual region, program, and selected treatment system(s).

2 Monitoring and Maintenance Manual Outline

1.0 Introduction/Background

- Describe program, including where units will be installed (include map).
- Describe general installation and testing of units.

2.0 Point of Use (POU) Reverse Osmosis (RO) System Description

- Name of selected RO unit
- Unit specifications, including manufacturer, model number, number of stages, NSF certification, flow rate and any other relevant information

3.0 RO Treatment System Maintenance

Long-term success of POU treatment systems will depend on regular, aggressive yet practical maintenance program. POU maintenance issues typically include routine maintenance, replacement of parts or devices, emergency maintenance. In compiling/preparing a maintenance program, one must consider the following:

- Manufacturer’s recommended maintenance program
- Location of POU unit as this will affect how easy it is to inspect and service the unit (and therefore the costs and frustrations associated with maintaining the unit)
- Life expectancy of POU unit. The manufacturer should recommend a maintenance schedule that includes replacement of the device and/or components. Costs associated with replacement parts needs to be considered and planned for

- Plan for changes/adjustments to the maintenance program as experience with the system is gained

Key parts of the maintenance system should include the following:

3.1 Scheduled Maintenance

- A substantial factor of customer safety should be built into the maintenance schedule. Plan to conduct the maintenance before the system requires it (preventive maintenance)
- Regular maintenance of the system will help to stave off small problems (i.e. leaks) before they become large problems and will build up customer confidence
- Routine maintenance should be scheduled to coincide with routine compliance sampling
- Provide a maintenance schedule for an 'average' household. This schedule should be based on the results of the pilot testing and the vendor/manufacturer recommendations. Include the manufacturer maintenance instructions in an appendix and reference it here
- General scheduled maintenance measures should include:
    1. Changing filters at least once a year
    2. Checking treated water with field devices (such as conductivity monitoring) once per year
    3. Checking conductivity sensor and alarm once a year
    4. Disinfecting the entire system once a year
    5. Changing the RO membrane element when necessary (approximately every 2 to 5 years – again, reference the manufacturer maintenance manual)

3.2 Unscheduled Maintenance

- Urgent or emergency maintenance is required whenever:
    - a device's mechanical warning mechanism is activated
    - if a device fails to deliver water
    - if a leak occurs, or
    - if the water has an unusual taste or odor
- A technician should be available for unscheduled maintenance calls
- A stock of replacement parts and additional devices should be maintained in case emergency maintenance is necessary

3.3 Replacing Filters and RO Membrane

- List information regarding treatment capacity of filters and membrane; reference manufacturer maintenance information
- List expected life of activated carbon filters (which can be measured during pilot testing) and RO membranes. Effective life of RO membranes can be difficult to predict when serious scaling or fouling problems occur, like scaling caused by precipitation of minerals on the membrane. Reference manufacturer maintenance information
- Provide any useful information regarding membrane operations that can be obtained from homeowners and water treatment companies in areas with that use similar equipment (i.e. how often do they have to replace the RO membranes)

- All replacement filters and membranes used should be certified by NSF International or equivalent organization

3.4 Disinfection

- Due to the possibility of bacteria growth on the system, the entire system should be disinfected annually. Reference manufacturer maintenance information as appropriate.
- Change carbon filters when doing annual disinfection
- General disinfection steps are as follows:
    1. Replace activated carbon filters and inspect membrane
    2. Fill filter and membrane housing with a 3% hydrogen peroxide solution
    3. Reconnect the filter and membrane housing
    4. Turn on water to the system and allow storage tank to fill
    5. Allow hydrogen peroxide solution to remain the system for several hours
    6. Open the faucet and drain the storage tank

3.5 Estimating Maintenance Costs

- A scheduled maintenance call should be made to every POU unit at least once a year to change activated carbon filters, disinfect the system, change the RO element (if necessary) and do compliance testing. Each of these, and other identified yearly maintenance activities, should be included in maintenance cost estimates.
- Maintenance is largest single cost component and affected by labor, maintenance time, maintenance schedule, replacement parts, and travel and lab costs.
- Each yearly scheduled maintenance activity, including sampling, should be conducted during the same scheduled visit. This will minimize the burden associated with gaining access to individual residences and reduce administrative costs and travel time.

4.0 Routine Compliance Sampling

- Water samples to be collected from the tap per approved procedures. Describe the sampling procedures
- Water samples to be analyzed per EPA-approved methods at a pre-determined State certified analytical lab. (See sample Pilot Sampling and Analysis Plan for recommended analytical methods and information)
- Onsite surrogate monitoring may be approved for routine monitoring (but not for establishing compliance with MCLs). Consider establishing these surrogate monitoring procedures jointly with Riverside County Department of Environmental Health.
- Surrogate sampling involves using a water parameter that can be measured in the home with a handheld device. Typical surrogate parameters include electrical conductivity (EC), turbidity and/or total dissolved solids (TDS)
    - In sampling surrogate parameters, use calibrated field (handheld) devices to ensure POU devices are working adequately between compliance samples and to help anticipate and plan for device replacement or service

  - Results of field samples should be recorded in maintenance logs kept by trained personnel
  - Type of field sampling depends on the constituents of concern and the type of POU treatment device
  - Pilot testing can evaluate and consider the most effective surrogate and test methodology based on factors such as accuracy, precision, cost-effectiveness, test device portability, ease of use, calibration needs, operator training, etc.
  - Include manufacturer's recommendation and calibration method for field-testing equipment in appendices of the Monitoring and Maintenance Plan.

5.0 Waste Handling

- The Monitoring and Maintenance Plan must have a method for disposal of the POU devices.
- POU devices generate solid and liquid waste residuals. Although the USEPA's guidance document on POU and POE devices state that 'residuals generated by POU or POE devices installed in residences are considered household waste and exempt from being regulated as a hazardous waste under the Resource Conservation and Recovery Act (RCRA)' other regulations or ordinances may apply; consultation with the Riverside County Department of Environmental Health is recommended.

6.0 Record Keeping & Reporting

- Records regarding the maintenance of POU systems should be maintained for at least 5 years.
- Also maintained should be any and all records associated with any contracts, lease agreements, maintenance records, logs of installed devices, legal documents, educational materials, and sampling results.
- At a minimum, the following information should be recorded for each POU unit installed and maintained:
  - Where, when, and by whom the equipment was installed
  - All scheduled and unscheduled maintenance visits
  - Sampling collection for monitoring
  - Results of lab analyses
  - Customer billing
- If any devices are not in compliance, notes should be made as to what the problem was and actions taken to return the device to compliance.
- Riverside County DEH or others may require reporting pertaining to monitoring and maintenance of POU devices.

Appendix F - POU RO Program Logistics Tracking Table

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Task 3 Sample Document: Sample Program Tracking Spreadsheet

POU RO Program Logistics Tracking Table

Tracking Serial Number	Manufacture	Model Number	Date of Purchase	Storage Location	Date of Installation	Installation Location

Task 3 Sample Document: Sample Program Tracking Spreadsheet

POU RO System Service Tracking Table

Model Number:
Date of Purchase:
Date of Installation:
Installed By:
Maintenance Record:

Dates (Maximum Time Interval = 6 Months)	**Inspection/Replacement Frequencies**		
	6 Months	12 Months	2 years and above
	Parts Name	Parts Name	Parts Name
	(*Parts Number*)	(*Parts Number*)	(*Parts Number*)

POU RO System Water Quality Tracking Table

Model Number:
Date of Purchase:
Date of Installation:
Installed By:
Maintenance Record:

Dates (Maximum Time Interval = 6 Months)	Feed Water										Product Water				
	Temperature	pH	Pressure	chlorine	hardness	TDS	Turbidity	Iron	Manganese	Hydrogen Sulfide	Arsenic	Uranium	Fluoride	Nitrate	Cr^{6+}
	^{0}F	-	psi	mg/L	mg/L	mg/L	NTU	mg/L	mg/L	mg/L	µg/L	µg/L	mg/L	mg/L	mg/L
Pre-installation															
Post-installation															
Every 6 months															

Task 3 Sample Document: Sample Program Tracking Spreadsheet

POU Parts Replacement Record

Service Record
Model Number:
Date of Purchase:
Date of Installation:
Installed By:

Manufacture	Model Number(s)	Stages	Inspection/Replacement Frequencies			Warranty
			6 Month	12 Month	2 years and above	
			Parts Name (Parts Number)	Parts Name (Parts Number) [Parts with Specific Period]	Parts Name (Parts Number) [Parts with Specific Period]	Years
ISPRING	RCC7, RCC7AK, RCC7AK-UV	5-7	1st Stage Sediment (FP15), 2nd Stage GAC (FG15), 3rd Stage CTO (FC15), 6th Stage DI (FD15), 6th Stage Alkaline (FA15)	5th Stage Inline Carbon (FT15), 6th or 7th Stage UV Lamp (UVB11)	4th Stage Membrane (MC7/ MC1) [2 Years]	1
Perfect Water Technologies	TMAFC, TMULTRA	6-7	-	Sediment Filter, Carbon Filter(s), IRON Filter, UV Bulb, Artesian Filter	Membrane [3-5 Years]	5
Purenex	RO-5-50	5-7	PP Spun Filter	Carbon Filter Block Carbon Filters Post Carbon Filters	RO Membrane [2-3 Years]	1
Nimbus Water Systems	WM5-50	5	4-Stage Cartridge (104592) including: Sediment Pre-filter, GAC Prefilter, RO membrane, GAC postfilter	GAC post-filter (104803)	TBD	1
Krystal Pure	KR10, KR15	4	Battery, Sediment Pre-filter (P1 #136-1110-1)	Carbon Pre-filter (CB05 #135-1210-1), Carbon Post-Filter (CB #135-1210-2), /Carbon M.A.P (CB-A #135-1210-2)	RO Membrane (TFC-24 #138-124-1) [2-5 Years]	4-5
Watts Premier	531411	4	Battery, Sediment Filter (105311), Carbon Pre-Filter (105351)	Sediment Pre-filter (105311), Carbon Pre-filter (105351), Carbon Post-Filter (105341)	Membrane (105331) [2-5 Years]	3
Whirlpool	WHER25	3	Battery, Pre-filter (WHEERF), Post-Filter (WHEERF)	RO Cartridge (WHEERM) [6 mo - 18 mo]	TBD	1
DuPont	WFRO60X	3	Battery, Pre-filter (WFQTC30001), Post-Filter (WFQTC30001)	RO Cartridge (WFROM1000) [6 mo - 18 mo]	TBD	3
EcoPure	ECOP309	3	Battery (7314183), Pre-filter (ECOROF), Post-Filter (ECOROF)	RO Cartridge (ECOROM) [6 mo - 18 mo]	TBD	1
General Electric	GXRM10RBL	3	Battery, Pre-filter Cartridge (FX12P), Post-Filter Cartridge (FX12P)	RO Cartridge (FX12M) [?]	TBD	1
Hydro-Logic	HLRO100	3	Sediment Filter (22125) [6 mo - 12 mo] Carbon Filter (22110) [1,250 gal of purified water]	Membrane Element (22120) [6 mo - 24 mo]	TBD	1

Appendix G - POU RO Treatment Program Training Template

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COACHELLA VALLEY DISADVANTAGED COMMUNITY (DAC) RESIDENTIAL GROUNDWATER TREATMENT PROGRAM

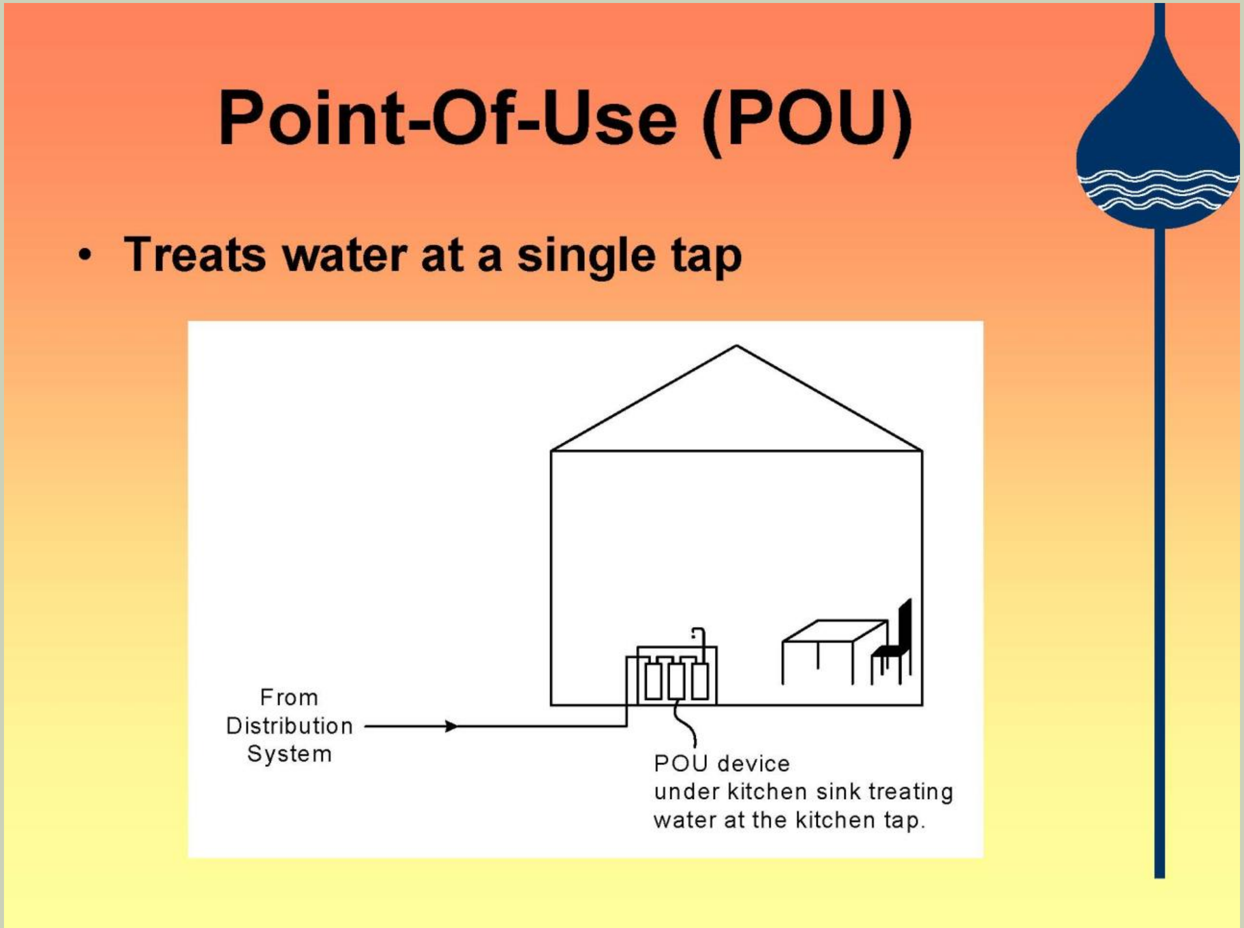
Treatment Unit Installation Training

Date

PURPOSE

- Assist local DAC communities in eliminating public health issues related to poor drinking water quality.
- Demonstrate appropriate installation of Point of Use (POU) Reverse Osmosis (RO) treatment systems.
- Provide training for appropriate field sampling and analysis and water quality sample collection.
- Demonstrate appropriate treatment system maintenance and troubleshooting.

POU SYSTEM TREATS WATER FROM SINGLE TAP



Point-Of-Use (POU)

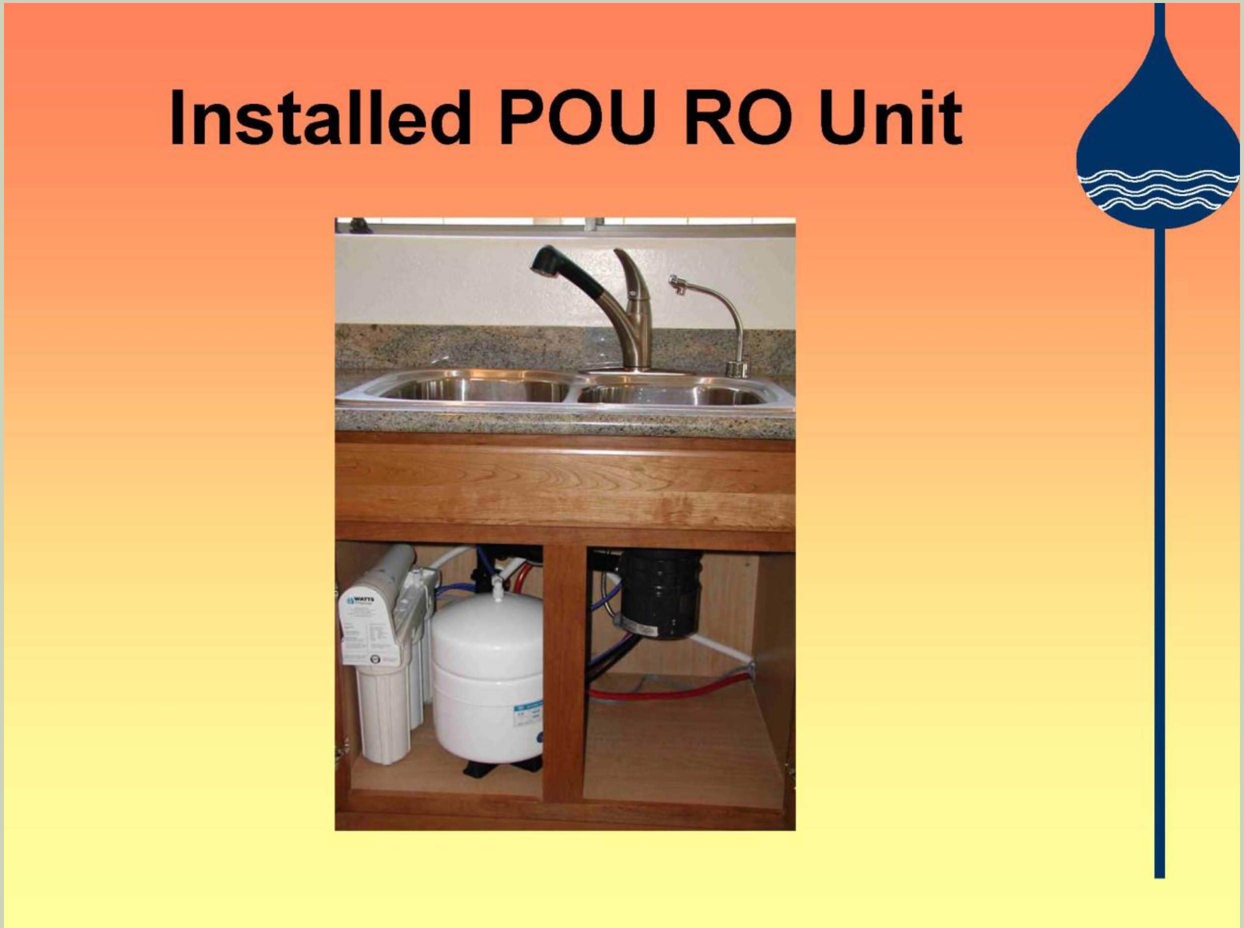
- Treats water at a single tap

Task 4 Sample Document: POU RO Treatment Program Training Template

SYSTEM IDENTIFICATION

- Describe selected treatment system (provide pictures and photographs as available)
- Provide information on system components – including identification of all parts and connections

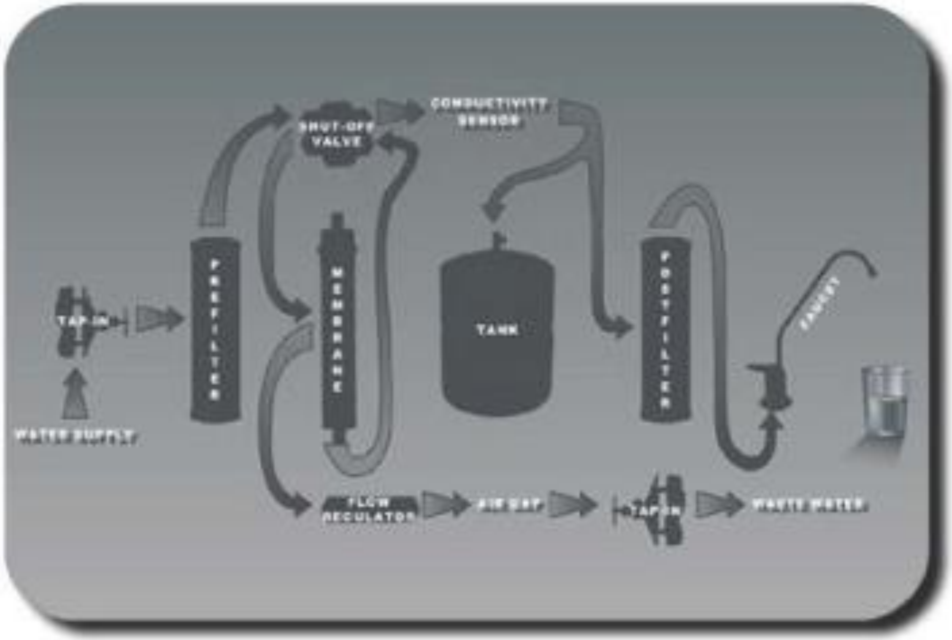
SYSTEM EXAMPLE



Installed POU RO Unit

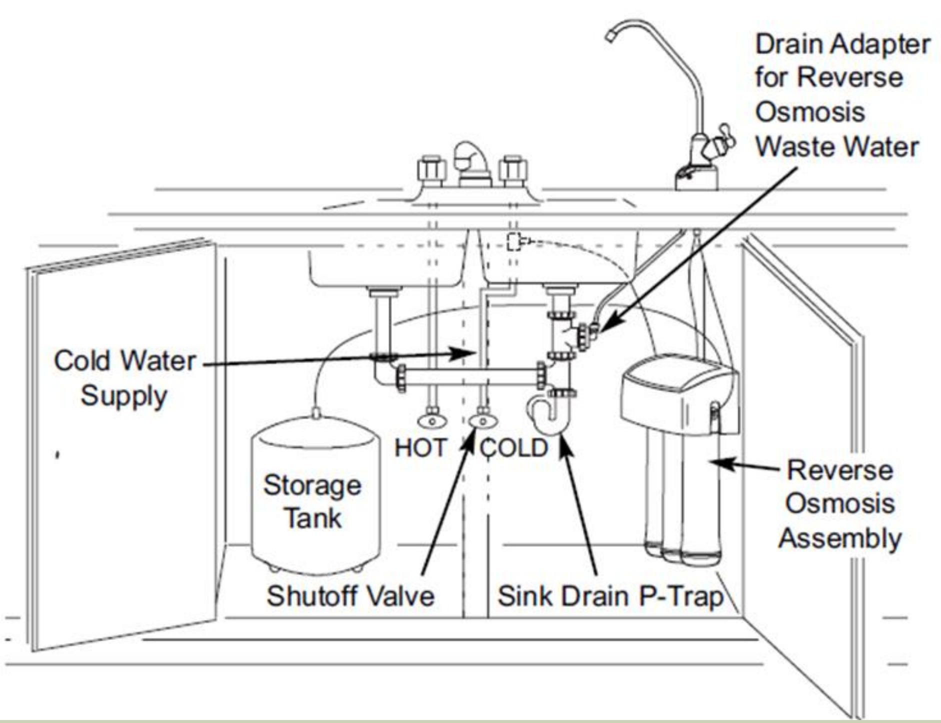
BASIC SYSTEM COMPONENTS

- Activated carbon block pre-filter
- Spiral-wound RO membrane module
- Activated carbon post-filter
- Storage tank
- Feed water saddle valve
- Faucet assembly



SYSTEM INSTALLATION

- Preparation
- Adaptors
- RO assembly
- Storage Tank
- Faucet
- Finish Connections



SITE PREPARATION

- Have all materials in hand at start of installation
- Have additional plumbing materials to address sub-standard plumbing if necessary
- Turn off water at shutoff valves
- Place unit in selected location – plan for space and accessibility (for installation, maintenance and monitoring)

INSTALLATION

1. Install Feed Water Connection
2. Install Drain Connection
3. Install RO Unit
4. Install Other Pre- or Post-treatment Units (as required)
5. Install Storage Tank
6. Install Faucet
7. Connect tubes

AFTER INSTALLATION

- Sanitize the system
  - Disinfect system with household bleach
- Purge the system
  - Remove air bubbles and carbon particles from the filter

WATER QUALITY TESTS

- Pre-installation – water samples and surrogate measurements
- Post-installation– water samples and surrogate measurements
- Routine Monitoring– water samples and surrogate measurements
- Record keeping

WATER QUALITY PARAMETERS

- Arsenic (EPA Method 200.8)
- Uranium (EPA Method 200.8)
- Fluoride (EPA Method 300.0)
- Nitrate (EPA Method 300.0)
- Hexavalent Chromium (EPA Method 218.7)

SURROGATE PARAMETERS

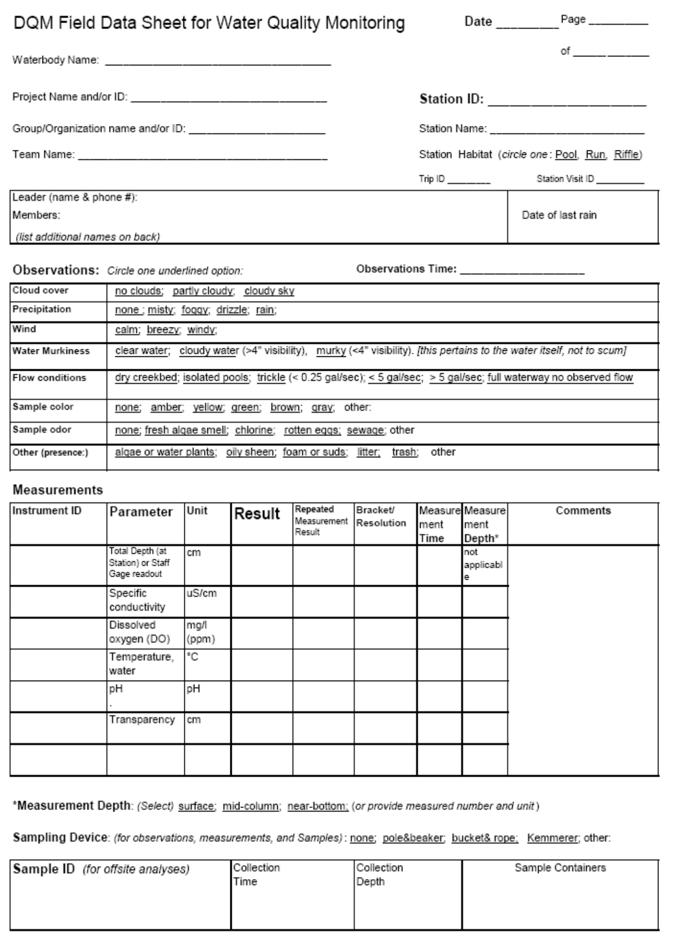
- Measured in field at site
- Correlated to constituent of concern <describe correlation here>
- Selected surrogate parameter is <insert surrogate parameter here>
- In-field measurement by <insert name of monitoring equipment here>

SAMPLE COLLECTION AND SHIPPING

- Calibrate all in-field equipment
- Grab samples from faucet after running water for at least one minute
- Collect two 500mL sterile plastic bottles and one 250mL sterile plastic bottle
- Collect sample for in-field surrogate analysis
- Inspect sample and record any visual observations (color, smell, clarity)
- Measure sample in field and record measurements
- Label samples in plastic bottles with sample number, sampling location, date, time and name of sampler
- Place samples in cooler with ice packs or loose ice in double ziplock bags
- Keep samples under 8°C and get to lab within 24 hours

FIELD NOTES

- **Field notes should contain:**
  - Calibration of field equipment
  - Purpose of sampling
  - Location and description of the sampling point
  - Name and address of field contact
  - Documentation of procedures for preparation of reagent or supplies which become an integral part of the sample (e.g., field blanks)
  - Type of sample (e.g., tap water)
  - Number and volume of sample taken
  - Sample type taken (e.g., primary sample, replicate, field blank)
  - Sampling methodology
  - Sample preservation
  - Date and time of collection
  - Weather conditions
  - Sample distribution and how transported (e.g., name of the laboratory and shipping agent)
  - Reference such as maps of the sampling site
  - Field observations
  - Any field measurements made
  - Signature and date by the personnel responsible for observations
  - Decontamination procedures



DQM Field Data Sheet for Water Quality Monitoring

Date ________ Page ________ of ______

Waterbody Name: ______________________________

Project Name and/or ID: ___________________________

Station ID: ____________________

Group/Organization name and/or ID: ____________________

Station Name: ____________________

Team Name: _________________________________

Station Habitat (*circle one* : Pool, Run, Riffle)

Trip ID ________

Station Visit ID ________

Leader (name & phone #): Members: *(list additional names on back)*	Date of last rain

Observations: *Circle one underlined option:*

Observations Time: ____________________

Cloud cover	no clouds; partly cloudy; cloudy sky
Precipitation	none ; misty; foggy; drizzle; rain;
Wind	calm; breezy; windy;
Water Murkiness	clear water; cloudy water (>4" visibility), murky (<4" visibility). *[this pertains to the water itself, not to scum]*
Flow conditions	dry creekbed; isolated pools; trickle (< 0.25 gal/sec); < 5 gal/sec; > 5 gal/sec; full waterway no observed flow
Sample color	none; amber; yellow; green; brown; gray; other:
Sample odor	none; fresh algae smell; chlorine; rotten eggs; sewage; other
Other (presence:)	algae or water plants; oily sheen; foam or suds; litter; trash; other

Measurements

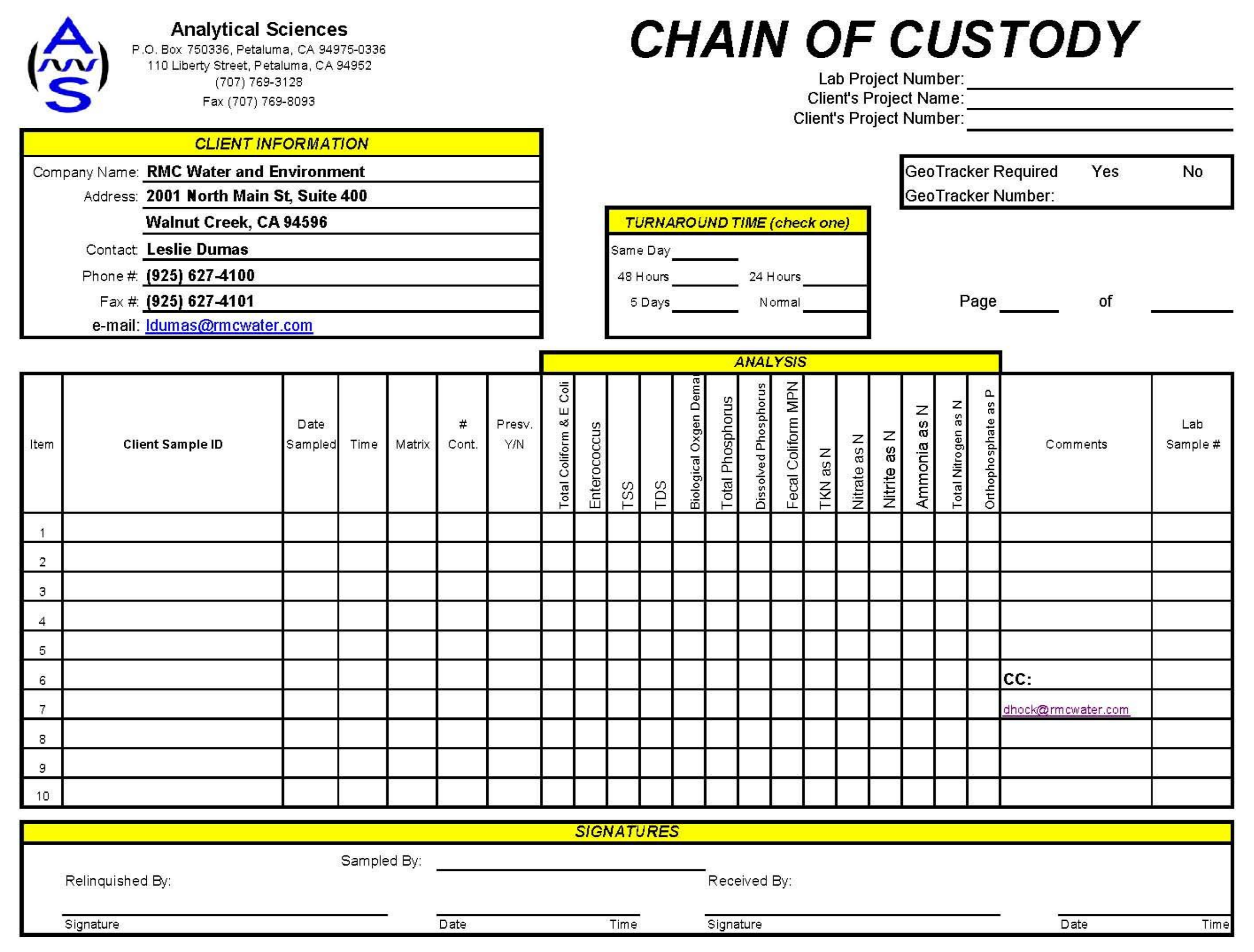
Instrument ID	Parameter	Unit	Result	Repeated Measurement Result	Bracket/ Resolution	Measurement Time	Measurement Depth*	Comments
	Total Depth (at Station) or Staff Gage readout	cm					not applicable	
	Specific conductivity	uS/cm						
	Dissolved oxygen (DO)	mg/l (ppm)						
	Temperature, water	°C						
	pH .	pH						
	Transparency	cm						

***Measurement Depth**: *(Select)* surface; mid-column; near-bottom; *(or provide measured number and unit)*

Sampling Device: *(for observations, measurements, and Samples)* : none; pole&beaker; bucket& rope; Kemmerer; other:

Sample ID *(for offsite analyses)*	Collection Time	Collection Depth	Sample Containers

CHAIN OF CUSTODY FORM



Analytical Sciences
P.O. Box 750336, Petaluma, CA 94975-0336
110 Liberty Street, Petaluma, CA 94952
(707) 769-3128
Fax (707) 769-8093

CHAIN OF CUSTODY

Lab Project Number: ____________________
Client's Project Name: ____________________
Client's Project Number: ____________________

CLIENT INFORMATION

Company Name: **RMC Water and Environment**
Address: **2001 North Main St, Suite 400**
Walnut Creek, CA 94596
Contact: **Leslie Dumas**
Phone #: **(925) 627-4100**
Fax #: **(925) 627-4101**
e-mail: ldumas@rmcwater.com

GeoTracker Required Yes No
GeoTracker Number:

TURNAROUND TIME (check one)

Same Day ______
48 Hours ______ 24 Hours ______
5 Days ______ Normal ______

Page ______ of ______

							ANALYSIS																
Item	Client Sample ID	Date Sampled	Time	Matrix	# Cont.	Presv. Y/N	Total Coliform & E Coli	Enterococcus	TSS	TDS	Biological Oxgen Dema	Total Phosphorus	Dissolved Phosphorus	Fecal Coliform MPN	TKN as N	Nitrate as N	Nitrite as N	Ammonia as N	Total Nitrogen as N	Orthophosphate as P	Comments	Lab Sample #
1																						
2																						
3																						
4																						
5																						
6																					CC:	
7																					dhock@rmcwater.com	
8																						
9																						
10																						

SIGNATURES

Sampled By: ____________________
Relinquished By: ____________________ Received By: ____________________
Signature Date Time Signature Date Time

WATER QUALITY TESTING FREQUENCY

- Once prior to treatment system installation
- Once immediately following treatment system installation
- Routinely – at least once per year

MAINTENANCE

- Replace filters and disinfect system per manufacturer’s requirement at least once every year
- Inspect system for leaks or other defects
- Collect water quality samples regularly (annually at minimum) and test for system performance and drinking water safety
- Monitor system and replace RO membrane as needed
- Replace treatment unit at end of useful life [XX years]

TREATMENT SYSTEM DISINFECTION

1. Replace activated carbon filters and inspect membrane
2. Fill filter and membrane housing with a 3% hydrogen peroxide solution
3. Reconnect the filter and membrane housing
4. Turn on water to the system and allow storage tank to fill
5. Allow hydrogen peroxide solution to remain the system for several hours
6. Open the faucet and drain the storage tank

WASTE HANDLING

- Typical wastes include used filters and membranes
- Describe how wastes should be handled

RECORD KEEPING

- Record unit number, location and leasee
- Record maintenance conducted on unit
- Record post-maintenance water quality (both in-field measurements, visual observations, and samples collected and sent to laboratory)
- Describe any other maintenance conducted on unit
- Record name of person doing maintenance and date of maintenance

PROGRAM LOGISTICS

- Purchase, Storage, Installation Records
- System Maintenance Tracking
- Continuous Water Quality Data Monitoring

Appendix H - Sample Financing Plan Spreadsheet

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Task 5 Sample Document: Sample Financing Plan Spreadsheet

Point of Use Treatment System Maintenance Cost Calculator

Notes to user:

🟩 input cells: adjusted by user

See notes adjacent to each cell for more information regarding calculator inputs and outputs

Program Costs	
RO Unit Capital Cost	$ -
Replacement Filter Cost	$ -
Replacement RO Membrane	$ -
Monitoring Equipment	$ -
Monthly Charge to Renter	$ -
Total # of units in use	-

Enter the cost of a POU RO treatment unit

Enter the cost of the replacement GAC filter

Enter the cost of the replacement RO membrane

Enter the estimated cost of treatment unit rental

Enter the total number of treatment units presently being rented

Maintenance Timing/Life		
Component	Months	Years
RO Unit Replacement	0	0
RO Membrane Replacement	0	0
GAC Filter Replacement	0	0
Training Timing	0	0
Monitoring Equipment	0	0

Enter the estimated treatment unit life

Enter the estimated RO membrane life (typically 3 to 5 years)

Enter the estimated GAC filter life (typically 1 year)

How often will training occur (i.e. one a year [or every 12 months])

How often will monitoring of the treatment system occur?

Monthly Charge Allocation		
Component	%	$
RO Unit Replacement	0%	$ -
RO Membrane Replacement	0%	$ -
GAC Filter Replacement	0%	$ -
Training Timing	0%	$ -
Monitoring Equipment	0%	$ -
Total	**0%**	**$ -**

For each category, what percentage of monthly rent goes to each cost category?

Note: this must total 100%

Funding Available for Program Components		
Component	Per Unit	Target Savings
RO Unit Replacement	$ -	$ -
RO Membrane Replacement	$ -	$ -
GAC Filter Replacement	$ -	$ -
Training Timing	$ -	$ -
Monitoring Equipment	$ -	$ -
Total	**$ -**	**$ -**

Funds available per category when replacement is needed; adjust percent by category above to ensure sufficient funds are available when needed.

Target savings = how much money you need to be saving to service all units.

Comparison of Savings to Anticipated Costs		
Component	Anticipated Annual Maintenance Cost	Target Annual Savings
RO Unit Replacement	$ -	$ -
GAC Filter Replacement	$ -	$ -
RO Membrane Replacement	$ -	$ -
Training Timing	-	$ -
Monitoring Equipment	$ -	$ -
Total	**$ -**	**$ -**

This table tells you if you are saving enough for replacing the various system components and/or covering costs for training, etc. Note, this is for all units currently being rented.

Task 5 Sample Document: Sample Financing Plan Spreadsheet

Point of Use Treatment System Maintenance Cost Calculator: EXAMPLE

Notes to user:

🟩 input cells: adjusted by user

See notes adjacent to each cell for more information regarding calculator inputs and outputs

Program Costs	
RO Unit Capital Cost	$ 125.00
Replacement Filter Cost	$ 25.00
Replacement RO Membrane	$ 75.00
Monitoring Equipment	$ 225.00
Training Class	$ 500.00
Monthly Charge to Renter	$ 12.00
Total # of units in use	125

Enter the cost of a POU RO treatment unit

Enter the cost of the replacement GAC filter

Enter the cost of the replacement RO membrane

Enter the cost of the in-field monitoring equipment

Enter the estimated costs associated with each training class

Enter the estimated cost of treatment unit rental. If cell is **red,** the monthly rent needs to be increased to have adequate annual savings for the program.

Enter the total number of treatment units presently being rented

Maintenance Timing/Life		
Component	Months	Years
RO Unit Replacement	120	10
RO Membrane Replacement	60	5
GAC Filter Replacement	12	1
Training Timing	12	1
Monitoring Equipment	36	3

Enter the estimated treatment unit life

Enter the estimated RO membrane life (typically 3 to 5 years)

Enter the estimated GAC filter life (typically 1 year)

How often will training occur (i.e. once a year [or every 12 months])

How often will monitoring of the treatment system occur?

Monthly Charge Allocation		
Component	%	$
RO Unit Replacement	10%	$ 1.14
RO Membrane Replacement	11%	$ 1.37
GAC Filter Replacement	19%	$ 2.28
Training Timing	3%	$ 0.37
Monitoring Equipment	57%	$ 6.84
Total	**100%**	**$ 12.00**

For each category, what percentage of monthly rent goes to each cost category? Note that these percentages are calculated directly based on the information presented above.

Note: this must total 100%

Funding Available for Program Components		
Component	Per Unit	Target Savings
RO Unit Replacement	$ 136.88	$ 17,110
RO Membrane Replacement	$ 82.13	$ 10,266
GAC Filter Replacement	$ 27.38	$ 3,422
Training Timing	$ 4.38	$ 548
Monitoring Equipment	$ 246.39	$ 30,798
Total	**$ 497.16**	**$ 62,144**

Funds available per category when replacement is needed; adjust percent by category above to ensure sufficient funds are available when needed.

Target savings = how much money you need to be saving to service all units.

Comparison of Savings to Anticipated Costs		
Component	Anticipated Annual Maintenance Cost	Target Annual Savings
RO Unit Replacement	$ 1,563	$ 1,711
RO Membrane Replacement	$ 1,875	$ 2,053
GAC Filter Replacement	$ 3,125	$ 3,422
Training Timing	$ 500	$ 548
Monitoring Equipment	$ 9,375	$ 10,266
Total	**$ 16,438**	**$ 18,000**

This table tells you if you are saving enough for replacing the various system components and/or covering costs for training, etc. Note, this is for all units currently being rented.

The Total Target Annual Savings. If the Total Target Annual Saving is **red** , increase the monthly rental charge to users (above).

Appendix VII-D: Participation in Integrated Regional Water Management

This appendix includes a report describing the challenges to disadvantaged communities' participation in IRWM planning and efforts and potential ways to overcome those challenges.

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Coachella Valley
Disadvantaged Community
Outreach Program

Participation in Integrated Regional Water Management

Prepared by:

RMC
Water and Environment

In Association with:

INTEGRATED PLANNING
AND MANAGEMENT INC.
GENERATING VALUE THROUGH INTEGRATION

October 2013

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List of Abbreviations

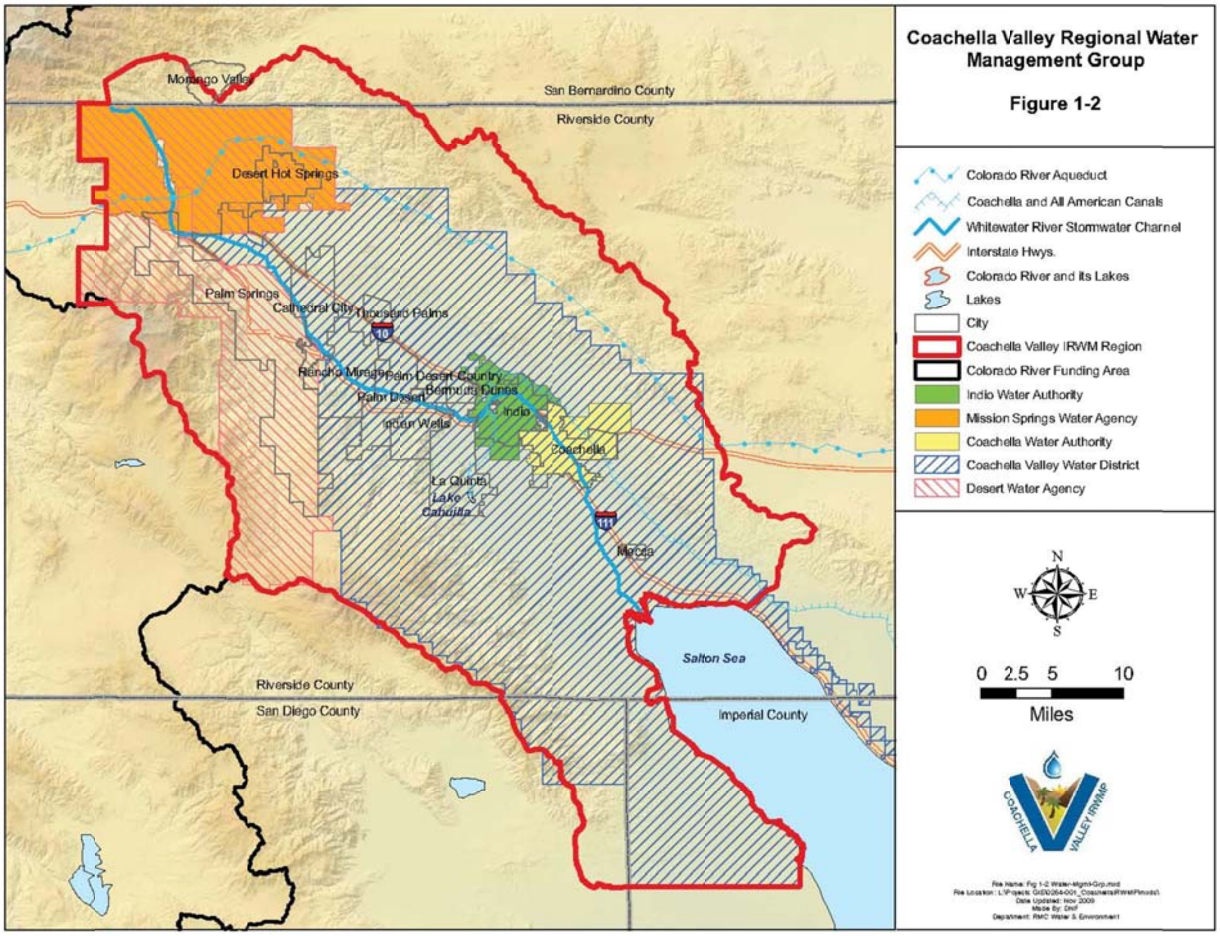
CVRWMG	Coachella Valley Regional Water Management Group
DAC	Disadvantaged Community
DAC Outreach Program	Coachella Valley DAC Outreach Program
DWR	California Department of Water Resources
IRWM	Integrated Regional Water Management
Region	Coachella Valley Integrated Regional Water Management Region

Executive Summary

The Coachella Valley Water District (CVWD), representing the Coachella Valley Regional Water Management Group (CVRWMG), has entered into a contract with the Department of Water Resources (DWR) to develop a Disadvantaged Community (DAC) Outreach Demonstration Program (DAC Outreach Program) for the Coachella Valley Integrated Regional Water Management Region (Region).

The DAC Outreach Program was implemented from 2012 to 2013 and had the overall purpose of developing and implementing methods to improve DAC participation in the Coachella Valley IRWM process. The DAC Outreach Program coordinated with and complemented the update of the Coachella Valley Integrated Regional Water Management (IRWM) Plan. The data and experience gained from the DAC Outreach Program will assist DWR in developing a model DAC Outreach Program for other similar areas in California. The Region, shown in **Figure 1-1** below, is managed by the CVRWMG, which is comprised of the five Coachella Valley water purveyors: Coachella Water Authority, Coachella Valley Water District, Desert Water Agency, Indio Water Authority, and Mission Springs Water District.

Figure 1 - 1: Coachella Valley IRWM Region



Section 1 Overview and Process

The overall purpose of this report is to describe the list of challenges that have historically prevented or discouraged DAC involvement in IRWM planning activities, and focuses on challenges that are specific to IRWM planning in the Coachella Valley. This report also includes information about outreach techniques and other methods that could be implemented to overcome those challenges and promote DAC involvement in IRWM planning activities. Information included in this report will be included in the 2014 Coachella Valley IRWM Plan Volume I (an update to the 2010 Coachella Valley IRWM Plan), which is currently being developed.

Many sources were used to gather the information included in this report. Notably, observations were made during DAC outreach efforts that were conducted during development of the 2010 IRWM Plan and directed DAC Outreach conducted in 2012 and 2013 for the DAC Outreach Program and 2014 IRWM Plan. Furthermore, information was provided by non-profit partners (El Sol Neighborhood Educational Center, Pueblo Unido Community Development Corporation, and Loma Linda University) as part of their individual contracts for the DAC Outreach Program. Lastly, the CVRWMG has provided input on challenges and opportunities regarding DAC participation in the IRWM Program based on extensive work that has been conducted with the agencies throughout the Coachella Valley IRWM planning process (2009 to present).

In accordance with the DAC Outreach Program contract with DWR, this report will be submitted to DWR, the CVRWMG, and the Planning Partners (IRWM Program stakeholders) for additional review and comment. A final draft approved by DWR will be released to the public for review and incorporation into the DAC Outreach Plan. Further information about the DAC Outreach Program can be found on the CVRWMG website: http://cvrwmg.org/dac.php

Section 2 Historical Challenges

The CVRWMG has long recognized that there are challenges to DAC involvement in the Coachella Valley IRWM Program. As there are many components of the IRWM Program, challenges are varied and extensive. These challenges provided the impetus for the CVRWMG to seek out additional grant funding from DWR to implement the DAC Outreach Program. The information presented below discusses the historical challenges to IRWM involvement for the various components of the IRWM Program, including: general participation and grant funding.

In addition to the challenges presented below, which are specific to the Coachella Valley IRWM Region, in April of 2013 a consortium of community leaders, residents, and social justice organizations that work with DACs in California submitted a letter to DWR stating that, "…the IRWM process has failed to reach its full potential to meaningfully and substantially address the needs of DACs…" This letter included comments on continued and ongoing challenges for DACs within IRWM Regions, and included some specific issues as they pertain to the Coachella Valley in relation to grant funding. The issues raised in the aforementioned letter pertaining to the Coachella Valley are provided under Section 2.2 Grant Funding, #1 Grant Funding Delays.

2.1 General Participation

General participation refers to stakeholder involvement in the IRWM Program. As discussed in detail in *Chapter 5, Stakeholder Involvement* of the 2010 Coachella Valley IRWM Plan and *Chapter 7, Stakeholder Involvement* of the 2014 Coachella Valley IRWM Plan Volume I, the IRWM Program has a governance structure that is heavily reliant upon input from stakeholders. Stakeholders are convened through a primary stakeholder group, the Planning Partners, which include several groups that represent DACs. In addition to the Planning Partners, a formal DAC Issues Group was formed in 2009 to provide specific feedback on the IRWM Program from a DAC perspective. Although DACs are very involved in the Coachella Valley IRWM Program, there are still substantial barriers to DACs with regards to ideal participation in the program.

Issues that may prevent DACs from participating in IRWM grant funding are discussed below.

1. IRWM Program Complexity: The IRWM Program is notoriously complex, involving extensive programmatic guidelines that dictate how an IRWM Plan is prepared, how IRWM regions conduct outreach, and how projects may receive IRWM funds. The IRWM Program also involves a complicated long-term process, requiring many stages and steps to yield a successful outcome. The IRWM Program also changes relatively frequently –IRWM grant application requirements change with every grant opportunity (through the various Proposal Solicitation Packages) and Program Guidelines change every few years. The complexity, complications, and fluctuating nature of the IRWM Program provide a barrier to participation by all stakeholders that may exhaust staff capacity and cause a loss of interest or trust when consistency is not maintained. This is a particular barrier to DACs who may not have a high level of trust in government programs already, or are represented by organizations that generally have limited staff capacity.

   IRWM Program complexity is not limited to the process, it is also technically complex. The IRWM Program is rife with jargon and technical requirements that provide a challenge to any layperson who is interested in becoming an IRWM stakeholder. Technical requirements for the IRWM Plan, such as climate change, make IRWM Plans bulky, complicated, and potentially meaningless if such issues are not pertinent to regional stakeholders. The technical complexity of IRWM planning may be a particular barrier to DACs who are not necessarily water resources managers and may not be aware of statewide issues and mandates that are required to be addressed by the local IRWM regions.

2. Role of the IRWM Program: Throughout the DAC Outreach Program two consistent and conflicting messages were repeatedly expressed by DAC stakeholders. Upon hearing about the IRWM Program, some stakeholders were immediately inspired to believe that help was available and would soon solve their problems, while other stakeholders failed to believe that this government-mandated program would result in change and continued to be disengaged. Stakeholders were generally confused about the role of the IRWM Program and asked questions such as what were its purpose, limitations, and breadth, and why was the outreach being conducted? Given the complexity of the IRWM Program (see point #1 above) and an existing amount of distrust among DAC stakeholders, it can difficult to implement the IRWM Program in a way that is understandable and meaningful to DAC stakeholders. An unclear understanding of the role of the IRWM Program can exacerbate these problems as distrust and disenchantment with the Program may lead to reduced participation.
3. Organizational Shifts and Spatial Coverage: The Coachella Valley IRWM Program has been actively involved in stakeholder outreach to DACs since the Program's official formation in 2009. Since the start of the Program's DAC outreach process, there has been a notable amount of turnover in the staff of some DAC organizations. Further, because the organizations are responsive to their stakeholders' needs and funding opportunities, their focus and available staff can shift over time. Such organizational shifts create discontinuity, requiring new staff members to quickly learn how the IRWM Program works, which is difficult given inherent complexities of the IRWM Program (see point #1 above). In addition to a discontinuity within DAC organizations, DAC participation can be affected by the spatial coverage of representative organizations. Many DAC organizations are local, sometimes highly localized, and may not represent the issues of a large DAC constituency. Additionally, statewide groups provide some broad-based representation but often lack the regional information to meaningfully represent specific local DAC needs, effectively created a gap in DAC representation for areas not within a local DAC organization's service area. This spatial discontinuity within which DAC areas are addressed can be a barrier to effective DAC communication, involvement, and participation in the IRWM Program.
4. Persistent Resistance to Engagement: Non-profit partners that participated in the DAC Outreach Program noted that some DAC stakeholders will experience a persistent resistance to engagement in large government-sponsored programs such as the IRWM Program. They noted that issues such as immigration status and language barriers may prevent some stakeholders from participating and limit others because they do not feel comfortable or welcome as participants. Non-profit partners also noted that past history and cultural beliefs may lead DAC stakeholders to feel as though there is no value to

investing time in large-scale government-sponsored planning efforts such as the IRWM Program. The reasons for this are many, including that the programs are not focused, take too long to produce results, undermine other interests of the community, or that there is a belief that the program will not solve real problems. While a general lack of staff, engagement, and sense of value in the IRWM Program may be a barrier to all stakeholders, information from the non-profit partners indicates that these are significantly more pervasive with DACs.

2.2 Grant Funding

Grant funding through Proposition 84 is a major component of the Coachella Valley IRWM Program; to date, the Region has been awarded $5 million and applied for an additional $5.24 million in IRWM grant funding.

To date, the Region has funded several projects that would directly benefit DACs, and has funded three projects to two entities that represent DACs (Pueblo Unido Community Development Corporation and Torres-Martinez Desert Cahuilla Indians). Although DACs have directly benefitted from IRWM-funded projects and DAC groups have directly received IRWM grant funding, substantial barriers to DACs remain with regards to IRWM grant funding.

Issues that may prevent DACs from participating in IRWM grant funding are discussed below.

1. Grant Funding Delays: The Proposition 84 Implementation Grant process requires grantees to expend funds, submit invoices for expended funds to DWR, then wait for DWR to reimburse them for expended funds. The Coachella Valley IRWM Region has experienced substantial funding delays in receiving grant reimbursements from DWR, and in some instances the time between invoice submittal and repayments has been six months. While funding delays impact all grantees, organizations that represent DACs are often small non-profit organizations that may be more severely impacted by funding delays due to limited access to capital funds and additional burdens due to the cost of funds if they cannot access project financing. Most non-profits work with small operating capital funds compared with government or for-profit businesses. Without adequate capital beyond their operating cash flow, non-profit organizations that receive IRWM grant funding have been forced to wait to receive reimbursements from DWR before they can continue implementing projects. Therefore, funding delays stall project implementation and may present a significant barrier to DACs in applying for IRWM grant funding.

   In the April 2013 DAC letter to DWR described above, it was noted that, "…in the Coachella Valley, the local sponsor organization is challenged to find a cash flow to purchase reverse osmosis filtration units and be reimbursed later. The real human cost is heartbreaking as hundreds of families facing high levels of arsenic in their groundwater are desperately waiting for this resource to have drinking water." This is a very specific and real example of how funding delays and DWR's reimbursement requirements impact DACs. Foreign aid programs have experienced similar impacts, and have found that without operating capital support it is possible to bankrupt the very organization that is being used to help deliver essential services to DACs.

2. Technical Complexity of IRWM Grants: Proposition 84 Implementation grant applications are highly complicated, requiring detailed cost benefit analyses and technical evaluations of projects. The complexity of IRWM Grants makes preparing applications costly and technically challenging. Both the cost and technical complexity of grant applications deter DAC organizations from participating in the grant program, because they may not have the funds or resources necessary to complete successful applications.

   IRWM grant applications also generally require projects to have significant planning and design work completed so that there is adequate information to complete a successful economic analysis for the grant application. Therefore, project applicants typically must expend their own operating funds and staff resources to prepare projects simply to be eligible for IRWM funding. These pre-project expenditures are a deterrent for small projects, DACs, and economically disadvantaged tribes, because they require allocation of scarce operating funds and technical resources before any commitment to the project is made. Project preparation is therefore a financial risk to the project sponsor, potentially to the point where the project is not submitted for IRWM grant opportunities.

3. Grant Funding Restrictions: The manner in which IRWM funds (specifically Proposition 84 Implementation Grant funding) can be expended is highly restricted. As mentioned above, grantees are required to expend funds that are later reimbursed by DWR. In addition, grantees are required to provide a minimum 25% funding match; while the funding match requirement may be waived for DACs, submitting a DAC funding match waiver adds an additional layer to the application complexity that may present a barrier to DACs in completing a successful application. The IRWM grants themselves have additional restrictions in that certain project components, such as sewer connection fees, may not be covered by the grant. The Proposition 84 Implementation Grant, for example, is not intended to pay for organizational delivery cost, general planning, or pilot testing work required to develop and deliver successful projects. While many IRWM regions, including the CVRWMG, have expressed these grant funding restriction problems to DWR, DWR has not been willing or able to amend the grant requirements. DWR however, continues to require that a certain amount of the IRWM grant funding be used to fund projects that directly benefit DACs.

   DWR restrictions that disproportionately impact DACs in conjunction with requirements that applications include DAC projects put IRWM regions in a very difficult situation similar to an un-funded mandate placed upon local agencies. To be compliant with IRWM grant requirements, IRWM regions must include DAC projects in applications, but because virtually no DAC organization can provide funding or technical work needed for the application and grant implementation process, IRWM regions are in effect mandated to provide this service to ensure that DAC projects are included in the application. In the Coachella Valley this predicament has an additional layer of complexity as many DACs are located outside the service areas of the CVRWMG agencies. Due to funding restrictions on general government in Proposition 13, county agencies and districts are reducing planning staff and funding unless directly paid by a grant, a development applicant, or in response to litigation, meaning that DAC organizations cannot readily receive support from the county agencies within which they lie. Additionally, Proposition 218 modified the State Constitution to require a direct nexus between the services provided and the cost charged by the agency providing the service. Since then, case law has even further restricted use of rate payer funding. Therefore, the CVRWMG agencies may not expend tax proceeds or rate payer funds outside of their service area for the benefit of those who are not rate payers, including DACs in the eastern Coachella Valley. In the Coachella Valley IRWM Region, DACs located outside of the agencies’ service areas must rely on what was previously scarce, and is now non-existent, funding from County agencies or provide their own funding and technical resources to receive and successfully use IRWM grant funds.

Section 3 Overcoming Challenges – Recommended Techniques

One of the goals of the DAC Outreach Program was to determine techniques that could potentially be implemented to overcome historic challenges to DAC participation and promote DAC involvement in IRWM planning. Table 1 below provides a summary of the issues explained in Section 2, and a brief description of the techniques that are recommended to potentially overcome each issue. Each of the recommended techniques is described in further detail in Section 3.1 and Section 3.2 below. Items in italics are those activities that the Coachella IRWM Program has implemented to improve DAC participation in the IRWM Program during Proposition 84 Implementation Grant applications and the Plan Update process.

Table 1: Overall Issues and Recommended Techniques

Category	Issue	Sub-Issue	Recommended Technique
General Participation	IRWM Program Complexity	Changing Requirements	• Provide regional transparency to explain why requirements are changing. • DWR respond to comment letters. • DWR heavily support outreach and education to increase statewide knowledge of IRWM.
		Complicated Requirements	• Reduce burdensome requirements of the IRWM Guidelines and allow IRWM regions to complete planning that is of local relevance. • DWR ensure resources necessary to implement the program are available.
	Role of the IRWM Program	Want IRWM Program to "help"/don't believe in change	• Provide continuous long-term transparent information and education about the IRWM Program, what it is, what can be done, and highlight successes, especially in DAC communities. • Utilize organizations that already have strong relationships with DACs to participate in outreach efforts.
	Organizational Shifts and Spatial Coverage		• Use successful entities to develop and mentor organizations in other areas to expand spatial coverage and delivery of water-related projects to DAC areas.
	Persistent resistance to engagement	Cultural beliefs, immigration status, language barriers	• Empower communities with tools to make them successful and expand their capacity. • Recognize and support longer- term engagement with established organizations that have succeeded in navigating outreach difficulties or who are trying to do so. • Co-support/sponsor community forums and existing efforts outside water-related issues to inform and educate the community about water resources and related opportunities to support their needs. • Bring together diverse groups (regulators, land owners, county entities, and residents) to develop projects and improve working relationships.

Category	Issue	Sub-Issue	Recommended Technique
Grant Funding	Grant Funding Delays		• Revise grant funding approach for DAC and rural areas to provide operating and project capital or significantly streamline invoicing and payment to a normal industry payment duration (i.e., 30 days).
	Technical Complexity of IRWM Grants		• Reduce technical and economic analysis requirements, especially for DAC projects, in the application process, potentially requiring only a workplan as the first phase of a project.
	Grant Funding Restrictions		• Modify grant funding restrictions to meet identified DAC needs.

3.1 Recommended Techniques to increase General Participation

Issue: IRWM Program Complexity - Changing Requirements

Recommended Techniques: Provide regional transparency to explain why requirements are changing. DWR respond to comment letters and heavily support outreach and education to increase statewide knowledge of the IRWM Program.

Given the frequency of changes to the IRWM Program (through the IRWM Guidelines) and the IRWM Grant Requirements (through the Proposal Solicitation Packages), a potential technique to increase DAC involvement is for DWR to increase its communication with IRWM regions and conduct outreach to DACs to provide full disclosure and transparency regarding any changes that are anticipated to the IRWM Program or IRWM Grant Requirements. This information should be carried down from DWR to the IRWM regions which can use existing stakeholder communications (meetings, e-mail lists, webpage announcements) to communicate those changes to stakeholders. Increasing transparency will reduce some of the knowledge gaps seen with local stakeholders, who often do not understand why IRWM regions are conducting various planning activities, and will therefore help to reduce the perception that the IRWM Program is overly complex and difficult to understand.

Another technique that can be implemented to increase DAC involvement is responding to comment letters. When new IRWM Program Guidelines or Proposal Solicitation Packages are released, DWR holds public comment periods before finalizing each document. While IRWM regions and stakeholders appreciate the opportunity to provide comments, there is a perception that the comments are not considered by DWR. This perception occurs because DWR does not respond to comment letters and has historically not amended IRWM Program Guidelines or Proposal Solicitation Packages to address concerns. As indicated in this report, there are many concerns with the IRWM Program that are specific to DACs. Issues that are particular to DACs have been expressed to DWR via comment letters from a number of organizations throughout the state and across IRWM regions. Without a DWR response to these comment letters, DAC stakeholders continue to feel as though their concerns are not being considered and that highly necessary changes to the IRWM Program will not occur. Conversely, a DWR response to comment letters would help stakeholders and IRWM regions better understand limitations of the IRWM Program, legislature directives, or other items that may dictate IRWM Program requirements and prevent programmatic flexibility in responding to stakeholder concerns.

Due to the complexity of the IRWM Program and the steep learning curve for stakeholders, ongoing and continuous outreach is necessary to provide information about the IRWM Program, its purpose, limitations, and future activities. DWR should support outreach and education to increase knowledge of IRWM planning and the IRWM Program across the State of California. Further, more support should be provided to IRWM Regions to provide transparency on the IRWM Program to local stakeholders. This outreach and education will raise awareness of the IRWM Program and help to break down some knowledge gaps that may be preventing DAC participation in the IRWM Program.

Issue: IRWM Program Complexity – Complicated Requirements

Recommended Techniques: Reduce burdensome Guideline requirements and allow IRWM regions to complete planning that is of local relevance. DWR to ensure the resources necessary to implement the IRWM Program are available.

To reduce the impediments to DAC participation in the IRWM Program due to the complexity of program requirements, the IRWM Guidelines should be revised with less-complex or fewer requirements and a higher focus on local issues. Allowing IRWM regions to focus on planning efforts that are of local importance will help to increase involvement by all stakeholders, including DACs, who generally have locally-specific issues. In addition, by requiring less stringent requirements, IRWM regions will have the flexibility to choose how to prioritize their efforts and will be able to spend the time and resources necessary to address stakeholder concerns and implement the techniques recommended in this paper to increase DAC involvement in IRWM processes.

More financial support should be provided by DWR to ensure that IRWM regions have the resources necessary to implement the IRWM Program as required by DWR. Given the complexity of the IRWM Program Guidelines, IRWM regions must expend limited resources conducting planning studies while simultaneously implementing extensive outreach to retain stakeholder input and participation. The requirements stipulated by DWR can be expensive to implement, requiring substantial staffing and time commitments by IRWM regions. Therefore, to ensure that IRWM processes are implemented in accordance with the IRWM Guidelines and in a manner that ensures participation by DACs, it would be appropriate for DWR to provide the funding necessary for IRWM regions to meet these requirements.

In the Coachella Valley IRWM Region, the CVRWMG has historically provided DACs with substantial support to overcome complicated requirements associated with the state’s IRWM Program. For example, the CVRWMG provided technical assistance to all stakeholders (including DACs) who requested technical support for entering projects into the online project database. These workshops were initiated by the CVRWMG to increase project submittal by all IRWM stakeholders, especially those who may not have otherwise submitted projects without technical support. Similarly, the CVRWMG provided extensive technical support to DACs whose projects were selected for inclusion in the regional Proposition-84 grant applications for work associated with completing economic analyses. Although the CVRWMG would like to carry on the practice of holding technical support workshops and providing technical assistance with completing grant applications in the future, there needs to be recognition of the time and expense required to conduct these items. As indicated in Section 2.2, DWR needs to acknowledge funding limitations of regional agencies and provide additional funding support to carry-out work that is necessary to maintain DAC involvement.

Issue: Role of the IRWM Program - Want IRWM Program to "help"/don't believe in change

Recommended Techniques: Provide continuous long-term transparent information and education about the IRWM Program, especially in economically disadvantaged communities. Utilize organizations that already have strong relationships with DACs to participate in outreach efforts.

The recommended techniques explained above for increasing transparency and participation by DACs regarding the IRWM Program also serves to clarify the role that the IRWM Program can play in addressing DAC issues and implementing DAC projects. Effective outreach will assist in developing realistic expectations of the IRWM Program, including the often lengthy timeframe for projects and funding limitations (see Section 3.2). Increasing communication and transparency will also help improve relationships between DACs and other stakeholders involved in IRWM processes. Improved trust, based on collaboration and open communication, in association with information about the goals and limitations of the IRWM Program will help overcome perception barriers about the IRWM Program's role in participating in DAC issues and needs.

In addition to increasing transparency regarding the IRWM Program through general outreach, another technique that could be implemented to clarify the role of the IRWM Program is to utilize the services of non-profits and other organizations that regularly work with DACs. Given that organizations that serve DACs tend to have trust and established relationships among DAC stakeholders, utilizing such organizations to provide information to DAC stakeholders will increase the likelihood that information about the IRWM Program will be communicated in an effective manner. This specific outreach technique was implemented in the Coachella Valley through the DAC Outreach Program. The technique did result in intended benefits as non-profit partners were able to conduct outreach and gain involvement from new members of DACs and helped the CVRWMG to implement new outreach methods through bilingual translation to increase the effectiveness of communication with DACs.

Issue: Organizational Shifts and Spatial Coverage

Recommended Technique: Use successful entities to develop and mentor organizations in other areas to expand spatial coverage and deliver water-related projects to DAC areas.

Organizational shifts are frequently a result of limited resources and a response to the immediate needs of DACs served by DAC organizations. Because organizational shifts are common for many DAC organizations, those that are successful can be used as a guide and a resource for other organizations to improve longevity and continuity. Leveraging the success of DAC organizations to increase the success of other DAC organizations can help to benefit DAC participation in IRWM planning as increased longevity and continual participation in the IRWM Program is critical to reducing knowledge gaps and understanding the technical complexity of the IRWM Program (see above).

Further, in the Coachella Valley and other areas of the state, DAC issues are often localized and successful DAC organizations may be limited in spatial coverage as they are focused on addressing issues in a single place. In order to expand coverage of DAC issues throughout an

IRWM Region, successful DAC organization models can be replicated to focus on DAC areas and issues that are not provided support by existing organizations. Additional support for those organizations that have proven successful could provide the resources necessary to expand their programs, and in this way serve a larger area and address the needs of more DACs in the IRWM Region.

Issue: Persistent resistance to engagement - cultural beliefs, immigration status, language barriers

Recommended Techniques: Empower communities with tools to make them successful and expand their capacity. Recognize and support longer term engagement with established organizations that have succeeded in navigating the difficulties. Co-support or sponsor community forums and existing efforts outside water-related issues to inform and educate the community about water resources, and related opportunities to support their needs. Bring together diverse groups (regulators, land owners, county entities and residents) to develop projects and improve working relationships.

Culture, immigration status, and language barriers can all contribute to a persistent resistance to engagement in IRWM processes. Building relationships with and empowering DACs, and fostering relationships between DAC organizations will help overcome the barriers to participation. An effort should be made to build knowledge and capacity in DACs, and develop relationships between DACs and other stakeholders in IRWM regions. This can be accomplished by empowering communities with tools to make them successful and expand their capacity, provide support for long-term engagement with organizations with a proven history of success, provide support for community forums, create opportunities to address DAC needs, and foster working relationships between diverse stakeholders. Education and outreach should seek to build knowledge and technical capacity, while financial support or incentives can be used to build to expand DAC capacity in other ways. By showing active interest and support, and connecting DACs with established organizations that have successfully navigated the IRWM processes, or have knowledge of how to navigate other programs that might be able to address DAC needs, will both help DACs participate in the IRWM program and build trust between DWR, the IRWM program, DACs, and other stakeholders. This specific outreach technique was implemented in the Coachella Valley through the DAC Outreach Program. Through the local non-profit partner organizations, outreach surveys were conducted with direct help from members of the community. This effort served to strengthen engagement with members of DACs as well as educate residents about issues and increase coordination among members of DACs.

Further, DWR and individual IRWM regions should take advantage of community forums and other established outreach mechanisms to build relationships with DACs and provide education and outreach on water resource issues and opportunities. DAC community members may not be able to attend multiple meetings per month, quarter, or year, so participation in community meetings will provide an opportunity for IRWM efforts to reach a wider audience compared to hosting individually-sponsored IRWM meetings. Regional IRWM programs can also build trust with DACs by bringing together diverse groups to develop projects and working relationships. As these interactions continue in a supportive environment, relationships and trust will grow between DACs and other groups or agencies, providing opportunities for effective or creative integrated solutions to address DAC-specific and regional issues.

3.2 Recommended Techniques for Grant Funding Issues

Issue: Grant Funding Delays

Recommended Technique: Revise grant funding approach for DAC and rural areas to provide operating and project capital or significantly streamline invoicing and payment to typical industry payment durations (i.e., 30 days).

One of the most significant barriers to addressing DAC needs is a lack of capital to fund project implementation. Lack of existing capital is generally why DACs and DAC organizations seek out grant funding from such programs as the IRWM program, and why DACs are not required to meet the minimum funding match required for other projects. As described above in Section 2, lack of capital funding also delays DAC projects from progressing during implementation and potentially discourages DACs from participating in the IRWM Program. A technique to overcoming this challenge would be for DWR to revise the requirement to reimburse only after work has been paid for or completed, and instead release funds to DACs at an earlier stage in the process. This would provide sufficient capital to keep DAC projects moving forward and encourage DACs to participate in the IRWM Program. If pre-payment prior to expenditures is not possible, reimbursement for DAC projects should be prioritized and invoicing and payments should be streamlined such that repayments from DWR are received in a manner consistent with industry standards (approximately 30 days). This technique, if successfully implemented by DWR on a long-term basis, would provide project sponsors with additional trust in the reliance of receiving timely reimbursements, and could potentially increase DAC involvement in the IRWM Program.

Issue: Technical Complexity of IRWM Grants

Recommended Technique: Reduce technical and economic analysis requirements in the application process, especially for DAC projects, potentially requiring only a workplan as the first phase of a project.

The technical and economic analyses necessary to prepare grant applications for IRWM funding have proven to be a significant obstacle to DAC participation in IRWM programs, and should be re-examined by DWR. Without a guarantee of grant funding, especially in the regions like the Coachella Valley where implementation grants are highly competitive, expending the time and money to prepare grant applications is potentially risky given that those expenditures may not result in the receipt of grant funding. Reducing these technical requirements for DAC projects during the application process would increase the number of DAC projects submitted for inclusion in IRWM funding applications and could potentially increase DAC participation in the IRWM Program. Recognizing that DWR may not be able to completely remove the economic and technical analyses requirements for DAC projects, these analyses could be required as part of the first phase of DAC projects along with the resulting workplan, rather than during the application process.

Issue: Grant Funding Restrictions

Recommended Technique: Modify grant funding restrictions to meet identified DAC needs.

As discussed in Section 2, restrictions on grant funding are found in multiple levels of the IRWM grant process, including project eligibility, the application process, grant administration, and implementation. Each of these restrictions presents impediments to participation in the IRWM Program, and has particular consequences to DAC participation as organizations that represent DACs may have a more difficult time complying with IRWM grant requirements than other organizations.

To increase DAC participation, the IRWM grant restrictions should be modified or eased for all grantees, but especially for DACs. Of particular concern in the Coachella Valley is the issue of providing the technical support necessary to include DAC projects in the IRWM grant application even though a large portion of DAC areas are located outside of the CVRWMG agencies' service areas. In order to overcome this challenge, DWR could provide funding necessary to prepare grant applications for DAC projects or, as discussed above, could substantially reduce requirements for DAC projects.

The other primary concern in the Coachella Valley is grant restrictions that do not allow IRWM funding to readily pay for those services that are most needed for DACs. Projects that connect DACs to municipal services (both water and sewer) are considered a priority for DACs, and also meet the DWR definition of addressing critical water supply or water quality issues for DACs. Despite the importance of these projects, DWR representatives have continually stated that the IRWM grant funding may not pay for portions of these projects such as connection fees. Considering the local funding restrictions associated with Proposition 13 and Proposition 218 (see Section 2), the CVRWMG agencies may not use their ratepayer funds to cover these costs, and therefore may be required to exclude DAC projects from grant applications. To increase the implementation of those projects that would meet critical DAC needs, it is imperative that DWR reduce restrictions associated with IRWM funding for DACs or that DWR provide local funding to DAC projects to cover additional fees that may not be covered by the IRWM grant itself.

Section 4 DAC Outreach Participation

The Coachella Valley has had success with DAC participation in its IRWM Program, but realized early in the IRWM process that additional measures were required to increase DAC participation. As such, the CVRWMG implemented one of the techniques explained in Section 3.1 and contracted with existing DAC organizations to conduct outreach for the IRWM Program. Through this collaboration with local DAC organizations, the CVRWMG was able to implement some of the solutions to DAC participation barriers described above, and found the end result to be, for the most part, highly successful. Section 4.1 explains the process undertaken to contract and work with local DAC organizations to implement IRWM Program outreach. Section 4.2 explains the relative success of the DAC partnership approach implemented by the CVRWMG, and Section 4.3 explains challenges to the approach.

4.1 Approach for Partnering with DAC Organizations

The scope of work for the DAC Outreach Program included contracting with DAC organizations (non-profit organizations) to support the implementation of DAC outreach efforts in the Coachella Valley IRWM Region for three tasks: conducting outreach activities, completing refined DAC mapping, and providing information about DAC participation in the IRWM Program. The process to contract with non-profit organizations that would implement the three aforementioned tasks began in the fall of 2012, and is described in detail below.

The first step for contracting with local non-profit organizations involved an evaluation of the eligible organizations (non-profit organizations) in the Coachella Valley IRWM Region that work with DACs. After completing this evaluation, the CVRWMG sent information to those identified non-profit organizations to let them know about the DAC Outreach Program and the three tasks that needed to be completed. In addition, the CVRWMG announced the non-profit partnering opportunity to all IRWM stakeholders through the existing website (www.cvrwmg.org), through the stakeholder email list, and through flyers that were distributed at IRWM-related meetings and workshops.

Following outreach to eligible and interested organizations throughout the Coachella Valley, six organizations expressed interest in participating in the DAC Outreach Program. Those organizations included: Loma Linda University, Pueblo Unido Community Development Corporation (PUCDC), California Rural Legal Assistance Foundation (CRLAF), Inland Congregations United for Change (ICUC), Desert Alliance for Community Empowerment (DACE), and Poder Popular. Prior to initiating interviews with the interested DAC organizations, the CVRWMG identified specific considerations and criteria that should be used to determine whether or not the organizations would be able to participate in the DAC Outreach Program. The considerations the CVRWMG used to assess DAC organizations include:

- Established history and relationship with DAC areas in the Coachella Valley
- Willingness or desire to participate in the IRWM Program
- Ability to provide technical services required to complete the required tasks
- Ability to complete required tasks on-time, on-budget, and in a professional manner

- Willingness to contract with the CVRWMG through a DWR contract and complete invoicing and deliverables in accordance with DWR requirements

Following the interview process four of these organizations (CRLAF, ICUC, DACE, and Poder Popular) notified the CVRWMG that they would not be able to participate in the DAC Outreach Program to complete the required outreach tasks. Some of the challenges described in Section 2 prevented these organizations from participating, including a lack of personnel or resources, concern with meeting DWR invoicing requirements, and organizational focus shifts.

The two remaining organizations, Loma Linda University and PUCDC were able to provide support on all three required DAC Program Outreach tasks. Despite these organizations' ability to provide the necessary support, the CVRWMG was concerned that the two organizations did not provide full geographic coverage throughout the IRWM Region and that there was a need to locate an additional non-profit partner with existing experience in the western Coachella Valley. Following additional outreach, El Sol Neighborhood Educational Center (El Sol) was identified as an existing organization that had the resources, experience, and interest necessary to participate in the DAC Outreach Program. Following an additional interview process with El Sol, the CVRWMG officially contracted with Loma Linda University, PUCDC, and El Sol.

Through the three DAC organizations, outreach efforts were conducted throughout the spring and summer of 2013, and final deliverables for each task were completed by September 2013. Work completed by the three DAC organizations included public outreach meetings, door-to-door surveys, soliciting feedback on the identified DAC issues, needs, and barriers to participation, providing information on potential projects and project types to address DAC needs, and updated mapping and issues reports based on the outreach meetings and door-to-door surveys. The three DAC organizations will attend and speak at the final DAC Outreach Workshop to present information and findings to DAC stakeholders on November 6, 2013.

4.2 Success of Approach

Part of the CVRWMG's goal in utilizing the DAC organizations for outreach efforts was to determine if working through established organizations with personal connections to DAC areas would increase DAC participation and involvement in the IRWM Program. Outreach efforts demonstrated that the DAC organizations did impart this benefit, because prior to the DAC Outreach Program, few DAC community members (members of the public in DACs) attended any IRWM Program meetings. In contrast, the DAC Outreach Program workshops, held in June, 2013 and co-hosted/sponsored by the DAC organizations, saw over 100 attendees, most of whom were local residents. This outcome demonstrates that the existing trust and relationships these organizations have with the DACs they serve contributed strongly to resident participation in the DAC workshops. Furthermore, services provided by the DAC organizations such as bilingual translation for meeting materials and meeting facilitation are believed to have encouraged additional involvement in the DAC workshops.

The use of Loma Linda University, El Sol, and PUCDC provided multiple benefits to the DAC Outreach Program beyond using their trusted relationships with DACs to increase meeting attendance. Many DAC members speak Spanish and have limited English, especially for some of the more technical components of IRWM planning. Loma Linda University, El Sol, and PUCDC provided translation services at the DAC workshops, for handouts provided at the workshops, and for a variety of outreach materials that were handed out prior to the workshops to advertise the workshops. In addition, the surveys that were conducted by the three organizations throughout the Coachella Valley were conducted bilingually through teams that were comprised of students from Loma Linda University and either promoters (promotores) from El Sol or staff/volunteers gathered by PUCDC. Using the translation services and conducting outreach in both Spanish and English is thought to have provided additional benefits in reaching out to DAC stakeholders as this has allowed the CVRWMG to demonstrate that they understand some of the barriers to DAC participation, and are willing to implement solutions necessary to overcome barriers. The bilingual outreach efforts have also helped start building positive relationships between the CVRWMG and DAC residents by providing a means to have a meaningful conversation about the water needs and issues of DACs in the Region, and allowing DAC residents with the opportunity to express their concerns first-hand rather than through DAC organizations.

Partnerships with the three DAC organizations also enabled the CVRWMG to draw on the existing knowledge of how to work successfully with DACs in the Region. Given that the three organizations have extensive past working relationships with DACs, they were able to identify strategies that have worked for them in the past, and provide input on proposed outreach efforts. For example, the three DAC organizations noted that outreach materials should advertise the availability of child care at meetings, and meetings should be held in the evenings in familiar locations to increase attendance by local residents. In addition, the DAC organizations recommended that bilingual door knob hangers be developed to advertise the workshops and that the hangers should be placed on the doors of those residents who were not home when surveyors came by to conduct surveys and alert residences to the upcoming workshops. This recommended outreach mechanism, which was successfully implemented with translation assistance from the DAC organizations, allowed for broad advertisement of the DAC workshops across the Coachella Valley.

In collaboration with the partner DAC organizations, the DAC Outreach Program has been able to implement some of the outreach techniques identified in Section 3 to improve DAC participation in the IRWM Program. These efforts have been quite successful in the Coachella Valley IRWM Region, as evidenced by the strong turnout at bilingual DAC outreach meetings, development of an expanded, detailed, and refined discussion of DACs and DAC issues and needs in the 2014 Coachella Valley IRWM Plan Volume I, and project development and design for four DAC projects that may be submitted for consideration during the next round of IRWM funding. As a result of these efforts, the Coachella Valley IRWM Program was able to build or strengthen trust and relationships between the CVRWMG and DAC residents.

4.3 Challenges to Approach

Though the approach taken by the DAC Outreach Program proved successful in many ways, it was not implemented without challenges. As mentioned in Section 4.1, four of the DAC organizations that were interviewed did not end up participating as partners in the DAC Outreach Program. The Coachella Valley DAC Outreach Program was not designed to address internal instability and staff changes in its potential partner organizations, which contributed to the choice to opt-out of the program by several of the organizations. The formal contracting process also presented a challenge to formalizing partnerships with the DAC organizations. Though this challenge was ultimately overcome for the three DAC organizations that became partners, the contracting process took longer than initially anticipated and delayed initial project work while contracting was formalized. Some of the DAC organizations were not be accustomed to the requirements of the IRWM Program as administered by DWR, and had difficulty in submitting DWR-compliant invoices for completed work. Similar to how DACs have expressed concerns with grant contracting required for Proposition 84 Implementation Grants, DWR contracting for the DAC Outreach Program demonstrated that even with substantial time and effort, contracting and invoicing compliant with DWR standards proves to be an issue for DAC organizations.

The DAC organizations that participated in the IRWM Program also experienced difficulties in completing and submitting final deliverables in a timely fashion. Due to time and staffing constraints, deliverables were submitted by some of the organizations months later than expected, even after substantial support from the DAC Outreach Program and the CVRWMG. Further, some of the submitted deliverables were not of a quality or format appropriate for public release, requiring additional time and effort to revise and fine-tune reports and other deliverables prior to submittal to DWR and the public.

In the Coachella Valley, the organizations involved in the DAC Outreach Program were able to work well together and supported each other. Their contributions complemented one another, which further contributed to the success of the Coachella Valley DAC outreach approach. However, this may not always be the case for other regions, or if other organizations had been involved. Therefore the existing relationships between potential organizations should be considered if using this approach to DAC outreach and participation in other IRWM regions or in other efforts in the Coachella Valley. This approach can provide a means of bringing DAC organizations together and helping to exchange knowledge about successfully working with DACs (addressing the spatial coverage challenge), but may exacerbate existing conflicts between DAC organizations in some regions. If a region has extreme conflict between DAC organizations, this approach may not be appropriate.

Section 5 Next Steps

The biggest challenge facing DAC participation is how to continue engaging DACs in the IRWM Program and how to build upon the success of the DAC Outreach Program in the future. General participation in the Coachella Valley IRWM Program has historically diminished between Program milestones (e.g., IRWM Plan preparation, grant applications). Diminished participation can make it necessary to re-educate stakeholders prior to the initiation of each new milestone, which is a more extensive task than continuing outreach and education on an ongoing basis. While ongoing outreach is time consuming and expensive, continued engagement with DACs can provide value by reducing the extent of outreach necessary to engage stakeholders. If DAC outreach is continued in the Coachella Valley, additional outreach will build on the relationships initiated through the DAC Outreach Program, and position DACs for increased participation in future IRWM Program milestones. However, there are no funding mechanisms currently in place to support continued efforts to engage DACs. In addition, for reasons explained above in Section 2.2 the CVRWMG agencies cannot readily fund these activities, especially in the East Valley, because the DACs in those areas are not located within the agencies' service areas. Additionally, even with ongoing outreach, past experience in the Coachella Valley suggests that without an immediate opportunity for a real change (such as providing input on regional priorities in the IRWM Plan or obtaining funding for a project that would address a DAC need), DACs are not likely to commit their scarce resources to IRWM Program participation. Therefore, as the 2014 Coachella Valley IRWM Plan Volume I is completed and associated outreach efforts are finalized, there will not be funding or an IRWM Program milestone to continue DAC engagement and involvement in the IRWM Program until the next round (Round 3) of Implementation Grant funding is initiated.

During the Proposition 84 Round 2 Implementation Grant project solicitation and selection process, the CVRWMG held trainings for DACs on how to input projects into the project database and provided information in multiple venues about what attributes and components would make projects potentially successful for IRWM (Proposition 84) funding. This outreach increased the number of DAC projects submitted to the Coachella Valley IRWM project database, and resulted in the inclusion of three projects that would directly address critical water quality or water supply needs of DACs in the Region's grant application. Given the success of DAC outreach efforts during past IRWM grant application processes, it would be ideal for the upcoming Round 3 funding opportunity to be accompanied by DAC outreach efforts. However, as explained previously, there is no current funding mechanism to provide future outreach to DACs, including during the project solicitation and selection process.

Given that the next round (Round 3) of IRWM Grant funding is the next major IRWM Program milestone after completion of the 2014 Coachella Valley IRWM Plan Volume I, the first priority for a next step to continuing DAC Outreach in the Coachella Valley IRWM Program is to identify mechanisms for funding grant-related outreach efforts to DACs.

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Appendix VII-E: Disadvantaged Community Workshop Materials

This appendix includes bilingual meeting handouts and agendas from the two Disadvantaged Communities Outreach Public Workshops held in June 2013.

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Coachella Valley Integrated Regional Water Management Program (IRWMP)

Programa de Alcance para Comunidades en Desventaja (DAC)
Taller de Agua Comunitaria – Este del Valle de Coachella

Martes, 18 de Junio del 2013
5:00 p.m. – 7:00 p.m.

San Jose Community and Learning Center
69455 Pierce Street
Thermal, CA 92274

AGENDA

Orden del Día:

1. Bienvenida e Introducciones

2. Antecedentes y Propósito del Programa de Alcance DAC

3. DAC Estrategias del Mapeo y Proceso de Encuestas

4. Ejercicio Mapeo Comunitario

6. Preguntas y Comentarios

7. Próximos pasos

Junta de planeación IRWM para el Valle de Coachella:
12 de Septiembre del 2013

El sitio web del Valle de Coachella IRWMP:
www.cvrwmg.org

Coachella Valley Integrated Regional Water Management Program (IRWMP)

Coachella Valley Disadvantaged Community (DAC) Outreach Program

Community Water Workshop – Eastern Coachella Valley

Tuesday June 18th, 2013
5:00 p.m. – 7:00 p.m.

San Jose Community and Learning Center
69455 Pierce Street
Thermal, CA 92274

AGENDA

Agenda:

1. Welcome and Introductions
2. Background and Purpose of DAC Outreach Project
3. DAC Mapping and Surveying Approach
4. Community Mapping Exercise
5. Questions and Comments
6. Next Steps

Coachella Valley IRWM Planning Partners Meeting:
September 12, 2013

Coachella Valley IRWM website:
www.cvrwmg.org

Coachella Valley Integrated Regional Water Management Program (IRWMP)

Programa de Alcance para Comunidades en Desventaja (DAC)
Taller de Agua Comunitaria –Oeste del Valle de Coachella

Jueves, 20 de Junio del 2013
5:00 p.m. – 7:00 p.m.

DHS Family Resource Center
14201 Palm Drive, Suite 108
Desert Hot Springs, CA 92240

AGENDA

Orden del Día:

1. Bienvenida e Introducciones
2. Antecedentes y Propósito del Programa de Alcance DAC
3. DAC Estrategias del Mapeo y Proceso de Encuestas
4. Ejercicio Mapeo Comunitario
6. Preguntas y Comentarios
7. Próximos pasos

Junta de planeación IRWM para el Valle de Coachella:
12 de Septiembre del 2013

El sitio web del Valle de Coachella IRWMP:
www.cvrwmg.org

Coachella Valley Integrated Regional Water Management Program (IRWMP)

Coachella Valley Disadvantaged Community (DAC) Outreach Program

Community Water Workshop – Western Coachella Valley

Thursday June 20th, 2013
5:00 p.m. – 7:00 p.m.

DHS Family Resource Center
14201 Palm Drive, Suite 108
Desert Hot Springs, CA 92240

AGENDA

Agenda:

1. Welcome and Introductions
2. Background and Purpose of DAC Outreach Project
3. DAC Mapping and Surveying Approach
4. Community Mapping Exercise
5. Project Development Exercise
6. Questions and Comments
7. Next Steps

Coachella Valley IRWM Planning Partners Meeting:
September 12, 2013

Coachella Valley IRWM website:
www.cvrwmg.org

Lista Preliminar de Proyectos a Implementar en el Valle de Coachella
Programa de IRWM para el Valle de Coachella
Taller informativo brindado por Comunidades en Desventaja (DAC)

1. **Proyecto de Tratamiento de Aguas Subterráneas:** Este proyecto ha sido propuesto para desarrollar un sistema listo-para-proceder el cual trata en el sitio los problemas de calidad de agua potable subterráneas.

Adonde: Porfavor *déjenos saber cualquier ubicación (sea lo más específico posible), donde puede llevarse a cabo dicho proyecto.*

- ____
- ____
- ____

Quien: *Por favor déjenos saber si usted tiene conocimiento de alguien que esté interesado en implementar o participar en este proyecto.*

- ____
- ____
- ____

2. **Rehabilitación del sistema séptico o Proyecto de Reemplazo:** Este proyecto ha sido propuesto para desarrollar un sistema listo-para-proceder, el cual tratara problemas relacionados con fallos o fugas en los sistemas sépticos.

Adonde: Por favor *déjenos saber cualquier ubicación (sea lo más específico posible), donde puede llevarse a cabo dicho proyecto.*

- ____
- ____
- ____

Quien: *Por favor déjenos saber si usted tiene conocimiento de alguien que esté interesado en implementar o participar en este proyecto.*

- ____
- ____
- ____

3. **Coordinación de Control de Inundaciones**: Un proyecto propuesto para reconocer lugares de inundación y desarrollar ingeniería para resolver los problemas de inundación.

Adonde: Por favo*r déjenos saber cualquier ubicación (sea lo más específico posible), donde puede llevarse a cabo dicho proyecto.*

- ____
- ____
- ____

Quien: Por *favor déjenos saber si usted tiene conocimiento de alguien que esté interesado en implementar o participar en este proyecto.*

- ____
- ____
- ____

Otros: Por favor proporcione cualquier otra información sobre ideas de proyectos potenciales que pueden ser implementadas para resolver los problemas relacionados con el agua en el Valle de Coachella.

Preliminary List of Disadvantaged Community (DAC) Implementation Projects
Coachella Valley IRWM Program
DAC Workshop Information Form

1. **Onsite Groundwater Treatment Project:** A proposed project to develop ready-to-proceed onsite treatment systems to address localized groundwater quality issues for drinking water purposes.

   Where: *Please let us know any locations (be as specific as possible) where this project may be implemented.*

   - ______________________________
   - ______________________________
   - ______________________________

   Who: *Please let us know if you are aware of any parties that may be interested in implementing or participating in this project.*

   - ______________________________
   - ______________________________
   - ______________________________

2. **Septic System Rehabilitation or Replacement Project:** A proposed project to develop a ready-to-proceed septic system rehabilitation or replacement program to address issues associated with failing or leaking septic systems.

   Where: *Please let us know any locations (be as specific as possible) where this project may be implemented.*

   - ______________________________
   - ______________________________
   - ______________________________

   Who: *Please let us know if you are aware of any parties that may be interested in implementing or participating in this project.*

   - ______________________________
   - ______________________________
   - ______________________________

3. **Flood Control Coordination:** A proposed project to clarify flood locations and develop concept-level engineering to resolve flooding issues.

   Where: *Please let us know any locations (be as specific as possible) where this project may be implemented.*

   - ______________________________
   - ______________________________
   - ______________________________

   Who: *Please let us know if you are aware of any parties that may be interested in implementing or participating in this project.*

   - ______________________________
   - ______________________________
   - ______________________________

OTHER: Please provide any other information regarding potential project concepts that may be implemented to resolve water-related issues in the Coachella Valley.

Appendix VII-F: Disadvantaged Communities Project 1 – Educational Materials

This appendix includes the educational materials developed through the DAC Outreach Program’s Project 1.

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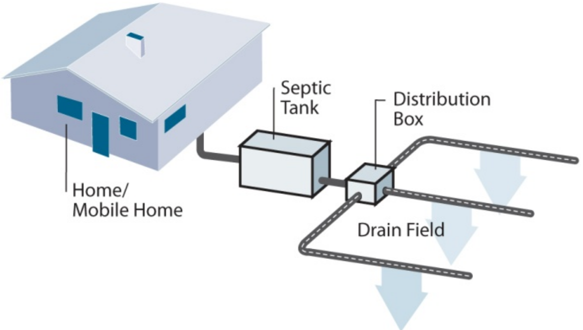
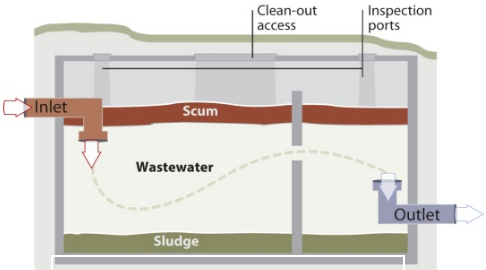
Basic Water and Wastewater Information for the Coachella Valley

How Septic Systems Work

There are two main parts to the basic septic system: the septic tank and the drainfield.

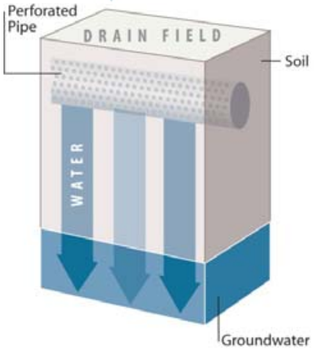


Water and waste from your house flows directly in to your septic tank. In the tank, heavy solids settle to the bottom forming a sludge layer and grease and light solids float to the top forming a scum layer. The sludge and scum remain in the tank where naturally occurring bacteria work to break them down.



Septic Tank

The separated wastewater in the middle layer of the tank is pushed out into the drainfield (leach field) as more wastewater enters the septic tank from the house.



Drainfields continue treatment of the wastewater by allowing it to trickle from a series of pipes with holes through a layer of gravel, and down through the soil. The soil acts as a natural filter and contains organisms that help treat the waste. If wastewater moves through a septic tank to quickly, solids can be carried with it to the drainfield and clog the small holes in the pipes and the surrounding gravel. This can lead to surfacing of water and waste or the risk of contaminating groundwater.

Ways to ensure your septic system runs properly include:

- Space out activities that use a lot of water, like laundry, over several days
- Do not use garbage disposals
- Do not use septic tank additives or commercial septic tank cleaners etc.
- Inspections by a professional every 3-5 years and pumped as recommended
- Keep roof drains and surface water away from the drainfield
- Maintain your plumbing to eliminate leaks
- Conserve water by using less water in the bathtub and take 3 minute showers
- Run full loads of clothes and dishwashers
- Install high-efficiency shower heads and low-flow toilets
- Turn off faucets while shaving or brushing teeth

How to Address Water Quality

Many water quality problems are caused by old or substandard piping or fixtures, low pressure or damage, often causing rust or water with an odor. These issues are not a problem with the water as much as the piping and fixtures and often a qualified plumber can assist with an initial assessment.

Items that cannot go down the drain or toilet:

- Food scraps
- Coffee Grounds
- Cigarette butts
- Oil/waste oil
- Cotton swabs
- Cat litter
- Diapers
- Dental Floss
- Condoms
- Tampons or pads
- Paper towels
- Flushable wipes
- Prescriptions
- Medications
- Pesticides
- Hazardous waste
- Paints, Varnishes
- Thinners

If you think you have water quality issues beyond plumbing, it is important to know where your water is coming from so you know who to contact for assistance.

- ***Municipal (Public) Water Service*** is provided by the city or water district in your area. These systems are highly regulated and required to perform testing in order to meet high water quality standards. They provide clean drinking water at economical prices, avoiding the need for expensive bottled water.
- ***Small Systems*** are those with 5 to 14 connections that are regulated by the County of Riverside. Small systems may have their drinking water come from wells in a given area but serve a small community such as a mobile home park. County Environmental Health can assist you if believe your system is not providing water that meets the standards.
- ***Individual Wells*** that have less than 5 connections and serve less than 25 people are for the most part unregulated and not required to perform frequent water quality testing. If you obtain water from your own well or from one of these systems, you can have a laboratory or Coachella Valley Water District test your water for a nominal fee.

Other Issues and Code Enforcement

Many other issues and problems are indirectly related to water and wastewater problems and impact the quality of life and health and safety of Coachella Valley residents. IVAN Coachella, (http://ivan-coachella.org/) is a web and smart phone App-based environmental reporting tool for the Coachella Valley that allows residents, groups and agencies to report environmental problems and related information. Government agencies monitor the network and assist in problem solving. Table 2 provides a reference to assist with related issues and problems.

Table 2: Need Help - Who to Call

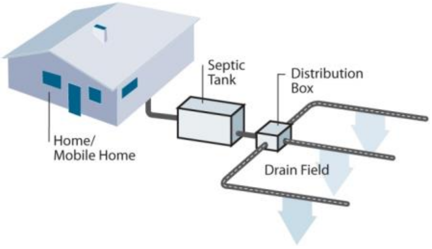
Issue or Problem	Agency or District to Contact	Phone Number
Septic systems, water system permitting, well evaluation, water sampling/testing, hazardous materials/waste, vector control	Riverside County, Department of Environmental Health	(888) 722-4234
Dangerous electrical, substandard mobile homes/structures, illegal dumping	Riverside County, Code Enforcement	(951) 955-2004
Mobile home development standards	Riverside County, Economic Development Agency	(951) 955-8916
Flood control	Riverside County, Flood Control or Coachella Valley Water District	(951) 955-1200 (760) 391-9600
Water issues for Municipal Service Water and waste water issues	Coachella Valley Water District Desert Water Agency Mission Springs Water District City of Coachella/Coachella Water Authority City of Coachella/Coachella Sanitation District City of Indio/Indio Water Authority City of Indio/Valley Sanitary District Myoma Dunes Mutual Water Company Salton Community Services District Or call your city	(760) 391-9600 (760) 323-4971 (760) 329-6448 (760) 398-3502 (760) 391-5008 (760) 391-4038 (760) 347-2356 (760) 772-1967 (760) 394-4446
Stray cats and dogs	Riverside County Department of Animal Services	(951) 358-7387
Street paving and improvements in an incorporated city	Your city department	

This document was developed for the Disadvantaged Communities in the Coachella Valley and was funded by California Department of Water Resources, Disadvantaged Community Outreach Demonstration Program for the Coachella Valley.

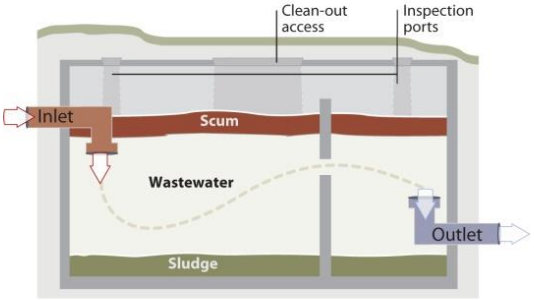
Información para el Valle de Coachella:
Servicios Básicos de Agua y Aguas Residuales

¿Cómo Funcionan los Sistemas Sépticos?

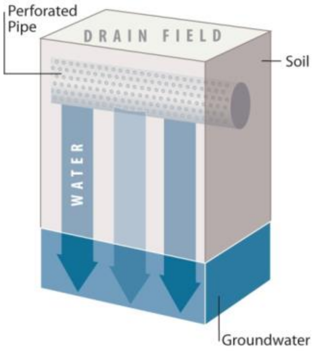
Hay dos partes principales para el sistema séptico: el tanque séptico y el campo de filtración.



El agua y los residuos de su casa fluyen directamente de su fosa séptica. En la fosa séptica, los sólidos pesados se hunden en la parte inferior formando una capa lodosa de grasa y en la parte superior los líquidos forman una capa pequeña de agua y espuma. Las bacterias naturales que están presentes en la fosa séptica trabajan para descomponer el lodo y la espuma.



Las aguas residuales que están entre la capa inferior y la capa superior fluyen de la fosa séptica al campo de filtración cuando las aguas residuales de la casa entran en la fosa séptica.



El campo de filtración continúa con el tratamiento de las aguas residuales a través de filtración en la tierra. El campo de filtración consiste en una serie de tuberías con agujeros pequeños, y el agua de la fosa séptica fluye a través de los tubos hacia la tierra. La tierra actúa como un filtro natural y contiene organismos que ayudan a tratar los residuos en el agua.

Si las aguas residuales se mueven a través de la fosa séptica rápidamente, en vez de quedarse en la fosa séptica los sólidos de las aguas residuales fluyen al campo de filtración. Los sólidos pueden obstruir los pequeños agujeros en las tuberías. Como consecuencia de la obstrucción, las aguas residuales pueden romper la superficie o causar el riesgo de contaminar las aguas subterráneas.

Formas de Garantizar que su Sistema Séptico Funcione Correctamente:

- No hacer actividades que consuman gran cantidad de agua (como lavar la ropa y duchase) al mismo tiempo
- Realizar inspecciones por un profesional cada 3-5 años, y bombear como es recomendado
- No utilizar aditivos para fosas sépticas o limpiadores comerciales para las fosas sépticas
- Dar mantenimiento a los drenajes de la casa y las aguas de superficie del campo de filtración
- No utilizar trituradores de basura
- Dar mantenimiento regular a las tuberías para eliminar fugas
- Efectuar cargas completas de ropa en su lavadora y vajilla en su lava platos
- Instalar una regadera eficiente en su baño y no llene tanto de tanque del inodoro
- Cerrar la llave del lavamanos mientras se afeita o se lava los dientes
- Conservar el agua usando menos agua en la bañera y tomar duchas de 3 minutos

Los elementos que no pueden ir por el desagüe o el inodoro:

- Restos de comida
- Granos de Café
- Colillas de Cigarro
- Aceite y Residuos
- Hisopos de Algodón
- Piedras Sanitarias para Gatos
- Pañales
- Hilo Dental
- Preservativos
- Tampones o Toallas Higiénicas
- Papel Desechable
- Medicamentos
- Pesticidas
- Residuos Peligrosos
- Pinturas o Diluyente de Pintura

Cómo Resolver la Calidad del Agua

Muchos problemas de la calidad del agua son causados porque hay tuberías dañadas, viejas, o de calidad inferior, que resultan en presión baja, óxido, o un mal olor en el agua. Estos problemas son resultado de las tuberías o instalaciones y generalmente no son un problema de la calidad del agua misma. Si usted piensa que tiene problemas con la calidad del agua más allá de la plomería, es importante conocer el origen de donde proviene el agua y pedir ayuda.

- ***Servicio de Agua Municipal (Público)*** es proporcionado por la ciudad o el distrito del agua en su área. Estos sistemas están regulados y están obligados a realizar pruebas con el fin de cumplir con los estándares más altos de calidad del agua. Estos sistemas proporcionan agua potable a precios económicos, evitando la necesidad de comprar botellas de agua que son caras.
- ***Sistemas Pequeños*** son los que tienen de 5 a 14 conexiones que están regulados por el Condado de Riverside. Los sistemas pequeños pueden tener el agua potable que provienen de pozos en un área determinada, pueden servir a una comunidad pequeña como un parque de casas móviles. El Departamento de Salud Ambiental del Condado puede ayudarle si cree que su sistema no está proporcionando agua que cumpla con los estándares de calidad.
- ***Pozos Individuales*** que tienen menos de 5 conexiones y dar servicio a menos de 25 personas. En general los pozos individuales no tienen regulaciones y no es necesario realizar las pruebas de calidad del agua con frecuencia. Si obtiene el agua de su propio pozo o de uno de estos sistemas individuales, puede tener una prueba de su agua de un laboratorio o del Distrito del Agua del Valle de Coachella por un precio significativo.

Otros Problemas y la Aplicación del Código Municipal o de Condados

Algunos otros asuntos o problemas están indirectamente relacionados con el agua, incluyendo los problemas de aguas residuales que afectan la calidad de la vida, la salud, y la seguridad de los residentes del Valle de Coachella. IVAN Coachella, (http://ivan-coachella.org/) es una aplicación del teléfono inteligente/smart y una herramienta de información ambiental para el Valle de Coachella que permite a los residentes, grupos, y agencias que informen problemas ambientales y ofrecer información relacionada al problema. Las agencias gubernamentales supervisan la red y ayudan a dar soluciones. La Tabla 1 proporciona referencias que ayudan con estas situaciones.

Tabla 1: A Quién Llamar si Necesita Ayuda

Asunto o Problema	**Agencia o Distrito de Contacto**	**Número de Teléfono**
Las fosas sépticas, permisos del sistema de agua, toma de pruebas de agua, materiales peligrosos, control de vectores	Condado de Riverside, Departamento de Salud Ambiental	(888) 722-4234
Peligros eléctricos, casas/estructuras móviles deficientes, vertidos ilegales	Condado de Riverside, aplicación del Código	(951) 955-2004
Estándares para el desarrollo de casas móviles	Condado de Riverside, Agencia de Desarrollo Económico	(951) 955-8916
Control de inundaciones	Condado de Riverside, Control de Inundaciones o el Distrito de Agua del Valle de Coachella	(951) 955-1200 (760) 391-9600
Problemas del agua para el Servicio Municipal de Agua y cuestiones de aguas residuales	Distrito de Agua del Valle de Coachella Agencia del Agua del Desierto Distrito de Agua en Mission Springs Ciudad de Coachella/Autoridad de Agua en Coachella Ciudad de Coachella/Distrito Sanitación de Coachella Ciudad de Indio/ Autoridad de Agua en Indio Ciudad de Indio/ Distrito Sanitario del Valle Myoma Dunes Compañía del Agua mutua Servicios Comunitarios del Distrito de Salton O llame a su ciudad	(760) 391-9600 (760) 323-4971 (760) 329-6448 (760) 398-3502 (760) 391-5008 (760) 391-4038 (760) 347-2356 (760) 772-1967 (760) 394-4446
Gatos y perros callejeros	Condado de Riverside, Departamento de Servicios de Animales	(951) 358-7387
Pavimentación de calles y mejoras (Ciudad)	Su departamento de la ciudad	

Este documento fue desarrollado por las Comunidades en desventaja en el Valle de Coachella y fue financiado por el Departamento de Recursos Hídricos, Programa de recursos económicos para la Demostración de Alcance Comunitario en el Valle de Coachella.

Appendix VII-G: Public Utility Connection Opportunities in Disadvantaged Communities

This appendix includes a technical memorandum about potential connection opportunities for DACs to connect to municipal water and wastewater systems. This technical memorandum was developed through the DAC Outreach Program's Project 2.

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Coachella Valley Integrated Regional Water Management Program

Disadvantaged Community Outreach Demonstration Project

Public Utility Connection Opportunities in Disadvantaged Communities

Final Report

Prepared by:

RMC
Water and Environment

February 2014

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Appendices

This technical memorandum (TM) provides a summary of the analysis conducted to evaluate the feasibility of connecting disadvantaged communities (DACs) to existing public water and wastewater systems. This TM presents the results of that analysis and recommendations to the Coachella Valley Regional Water Management Group (CVRWMG) as part of its Disadvantaged Community (DAC) Outreach Demonstration Program. Specifically, this TM assesses the challenges of connecting each DAC to the nearest public water distribution system pipeline and/or wastewater collection system.

1 Project Background and Purpose

The Coachella Valley Water District, representing the CVRWMG, has entered into a contract with the Department of Water Resources (DWR) to develop the Disadvantaged Community Outreach Demonstration Program (DAC Outreach Program) for the Coachella Valley Integrated Regional Water Management (IRWM) Region (Region). The goal of the DAC Outreach Program is to develop and implement methods to improve DAC participation in the overall Coachella Valley IRWM planning process. The DAC Outreach Program identified potential project concepts that could be implemented to directly benefit DACs and resolve high-priority water-related issues in DACs. To move the project concepts forward, the DAC Outreach Program scope included additional work to develop in-depth mapping and assessment as needed to address identified needs. Through a series of public workshops in 2013, the Region’s stakeholders identified a need to conduct more detailed evaluation of where mobile home park sites in DACs may be located within proximity of municipal water and sewer services, and could therefore be connected in a cost-effective way. This TM presents the results of that analysis, using the data made available by IRWM stakeholders.

The CVRWMG is composed of five Coachella Valley water purveyors: Coachella Water Authority (CWA), Mission Springs Water District (MSWD), Coachella Valley Water District (CVWD), Desert Water Agency (DWA), and Indio Water Authority (IWA). Each of these water agencies have DACs within their jurisdiction that may or may not be connected to the public water distribution system. Those DACs that are not connected typically rely on groundwater from private wells. Similarly, DACs not connected to the centralized wastewater collection system typically rely on the use of onsite wastewater treatment systems (OWTS or septic systems). Evaluated herein are the DACs located within or adjacent to the wastewater jurisdictional areas served by Coachella Sanitary District (CSD), CVWD, DWA, MSWD, and Valley Sanitary District (VSD). The wastewater jurisdictional areas served by the City of Palm Springs were also included within this analysis.

DACs are sometimes composed of mobile home park (MHP) dwelling units or some form of unpermitted housing. Many DACs are not within urban areas; the remote location of DACs can make connecting these communities to public systems even more difficult. The goal of the DAC Outreach Demonstration Program is to understand the water supply and wastewater management issues within the region’s DACs and find as many opportunities as possible to provide DACs with a safer and more reliable water supply and wastewater disposal means. While this study aims to find the most feasible MHP sites for connecting to public water and wastewater systems, from a civil engineering standpoint, this does not necessarily mean that homeowners or landlords at those sites will agree to the connection. Additional factors, such as cost of connection, changes in water quality, and community impact, will play an important role in the homeowners’ or landlords’ final decision regarding whether or not to connect to the public system. An evaluation of these factors is beyond the scope of this project.

2 Methodology

The following summarizes the methodology used in assessing the feasibility of connecting a DAC to a public water system and/or wastewater collection system:

- Collect geocoded data of DACs within the Coachella Valley Groundwater Basin and within the Coachella Valley IRWM Region;

- Assemble a Geographic Information Systems (GIS) map containing water and wastewater infrastructure data from CVRWMG members;
- Map DAC locations and determine for each DAC:
    - The location of the nearest existing water and wastewater infrastructure for connection
    - Length of pipeline required for that connection
    - Any easily observable challenges to the connection (based on aerial imagery review)
    - The possibility of connecting additional, non-geocoded, mobile home parks to the proposed pipeline alignment
- Summarize results and make recommendations for next steps.

2.1 DAC Data

Data regarding the DACs were provided by Dr. Ryan Sinclair of the Loma Linda University School of Public Health. Dr. Sinclair's research team surveyed DACs within the IRWM Region and recorded self-reported information from residents such as address, number of household members, and the perceived source of tap water and perceived wastewater treatment service provided to each residence. The self-reported opinion data collected through the survey were then provided to RMC Water and Environment for use in this analysis.

It is important to note that data available are opinions reported by DACs, were not verified, and were not consistent across all DAC sites due to varying knowledge and information regarding the DACs utility connections and services as noted by each interview subject.

2.1.1 Data Processing

The DAC survey data contained opinion-based information for 320 different households. Some of these households are located within the same community (DAC), but all households within that DAC were not necessarily interviewed as part of the survey. For example, a mobile home park with 15 households may be represented by only two DAC data points—possibly with the same address information but also possibly with slightly different address information.

The DAC address information was reviewed and corrected for errors by Ryan Sinclair's team in order to get the address field formatted as best possible to enable geocoding[1]. ArcGIS, a geospatial information software program, was used to geocode each of the addresses within DAC database. The unmapped locations may have failed to geocode because of data entry errors in the address fields or the inability of the software to find some of the rural or unpermitted locations.

2.1.2 Water and Wastewater Utility Information

GIS data were requested from the water and wastewater agencies serving the Coachella Valley in order to accurately place utility infrastructure information within the GIS maps. GIS-formatted data were received from CVWD, IWA, VSD, and MSWD. These data covered the jurisdiction of all of the agencies involved in this study. The agencies noted that some aspects of the utility information may not have been as up-to-date as their existing network.

DWA, CWA, and CSD did not have utility information in GIS format, but were able to provide it in Computer-Aided Design (CAD) format. The CAD information from CWA and CSD was imported into the GIS software with no issues. However, there were some issues with the import of CAD information from DWA, including:

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[1] Geocoding involves processing a text field containing address information through a database of mapping data which includes counties, states, streets, etc. The quality and accuracy of the geocoding is dependent on both the quality of address data and the quality of the georeferencing database used to map the address data.

- The CAD files did not have a spatial coordinates system attached.
- The utilities did not scale correctly when projected into the map's coordinate system.
- The map was not oriented to north.

For these reasons, the converted DWA GIS infrastructure data for water and wastewater utilities are not considered reliable for future *detailed* analysis in other studies; however, the data was modified to a degree sufficient enough to allow for an analysis that was appropriate for this level of effort.

Neither GIS data nor CAD data regarding utility infrastructure was received from the City of Palm Springs.

2.2 DAC Site Review

Each mapped DAC site was reviewed with an aerial image background to evaluate the potential pipeline alignments that would connect a DAC to an existing water or wastewater main. As described in Section 2.1 above, the information that was the basis of this analysis (whether or not specific DACs are connected to municipal water or wastewater services) was based on self-reported opinions from the survey conducted by Dr. Ryan Sinclair. As described in detail below, a process was undertaken to verify if the DACs included in this study are connected to municipal services.

Review of aerial imagery allowed for additional assessments of the DACs, some of which determined that the community may have a utility main immediately near the property but may lack a customer service connection to the site. Based on the site review, each DAC site was then assigned to a category characterizing its utility connection status; these categories were "Main Immediate", "High Feasibility Connection", "Medium Feasibility Connection" or "Low Feasibility Connection". In some cases, information about the DAC utility status was unclear. For example, the source of the potable water supply was not completely clear, or if the DAC was, in fact, connected to a public utility and who owned that public utility (i.e. CVWD or Salton Community Services District). For these sites, the site was assigned to a "Need Additional Data" category under the anticipated lead agency.

The following examples summarize some of the assessments attributed to DACs which contributed to the data evaluation process and the final results.

2.2.1 DACs Near the Public Utility System

Many of the sites evaluated showed DACs (represented by a green stars in the figure below) in an area immediately adjacent to existing water mains (represented by blue lines) or wastewater mains (not shown in the example figures below), or surrounding sites with water and/or wastewater main connections. For these DAC sites, it was often determined that the site is either not connected to the public water and/or wastewater system or is connected to a municipal system through a master meter. These sites were classified as "Main Immediate" and were deemed to either have no service connection despite the ability to easily connect to the public system or to already be connected via a master meter, in which case additional follow-up work with the applicable agency is required. As the IRWM outreach project does not provide for service connections, these sites, once their connection status is confirmed, will be removed from the connection feasibility list. **Figure 2-1** below illustrates an example of a site where the "Main Immediate" determination was made, resulting in the site being placed on a "Main Immediate" list for review and confirmation by the agency responsible for the main.

Figure 2-1: Example of DAC Classified as "Main Immediate"

Footnote: Main Immediate sites represented by green stars.

2.2.2 High Feasibility Connection Sites

DAC sites that could be relatively easily connected to a public water or sewer system and which have a public water or wastewater main within 0.25 miles of the entrance to the property were classified as a *High Feasibility* connection site. All feasibility classifications only considered the distance of pipeline involved for site connection and did not take into account other possible engineering, permitting or legal challenges such as highway crossings, creek crossings, easement issues, or on-site service piping. **Figure 2-2** below illustrates an example of a site with a commercial property across the street and a potable water line approximately 700 feet northeast of the property entrance.

Figure 2-2: Example of High Feasibility for Connection Site

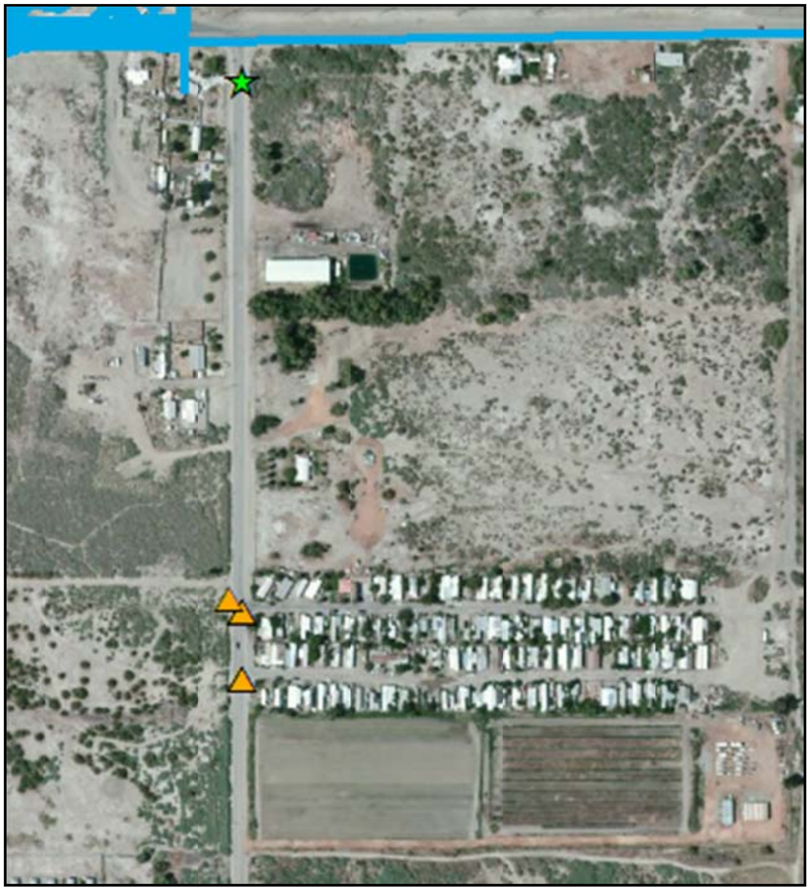
Footnote: High Feasibility sites represented by green circles.

2.2.3 Medium and Low Feasibility Connection Sites

DAC sites that are further away from existing public water or wastewater mains were identified as medium feasibility and low feasibility sites. Typically, a site requiring between 0.25 miles and 0.5 miles of pipeline would be considered a *Medium Feasibility* site**,** and sites further than 0.5 miles would be considered *Low Feasibility* sites. **Figure 2-3** and

Figure 2-4, below, show examples of these two types of sites.

Figure 2-3: Example of Medium Feasibility Connection Site



Footnote: Medium feasibility sites represented by orange triangles.

Figure 2-4: Example of Low Feasibility Connection Site

Footnote: Low feasibility sites represented by red squares.

2.2.4 Grouping Multiple Sites under One Pipeline Project

In some cases, multiple mobile park sites were clustered close together such that multiple sites could be served by a single pipeline extension project. For these cases, a single pipeline project was assumed even if it required, for example, an additional 500 feet of pipe extension to reach an additional DAC.

In **Figure 2-5**, below, a single pipeline would be extended (represented as a red, dashed line) to the DACs to the far west. The pipe extension would allow for water service to two different DACs.

Figure 2-5: Example of Grouped DACs for Singular Pipeline Project

In general, for clusters of sites that were more than one mile from an existing utility line, a single project would be conceived to connect the multiple clusters if it could be done with minimal pipe branching. If significant pipe branching would be required, or if the downstream clusters were several miles away from a preceding cluster, then multiple projects would be utilized to address the various sites.

2.3 Pipeline Assumptions

2.3.1 Pipeline Alignment

After the DAC site review process, each site assigned to a high, medium, and low feasibility category for connection was reviewed at a cursory level for possible pipeline alignments and connection to the main. In general, the alignments remained in the public right-of-way, primarily along roads, and avoided crossing through any land that appeared to be private property.

Pipeline length only considered the length of pipeline required to extend the existing water or wastewater system main to the front of the DAC property. Almost all of the sites will require additional service lines within the site to provide water and wastewater service to each of the individual dwelling units. It is assumed that each DAC would be responsible for paying for service lines installed on-site.

Each pipeline measurement was evaluated as a standalone project such that the pipeline distance was measured all the way to an existing water and/or wastewater main and did not include any potential future pipelines of another DAC project that might share a part of the alignment (i.e. there can be some duplication of pipeline alignment among adjacent DACs).

2.3.2 Additional Parcels Served

Low feasibility projects typically involved a pipeline exceeding one mile in length. To evaluate the possibility of deriving more value from the project, all of the parcels along the alignment were reviewed through aerial imagery to determine if there were additional mobile home parks that could also be connected to the pipeline. All of these sites will require follow-up field verification and confirmation by relevant utility agencies regarding the connection status of the sites.

There were three different projects for water connections that could have added a total of 7 parcels to the various alignments. There were seven different projects for wastewater connections that could have added a total of 17 potential sites to the various alignments. A summary of these additional parcels is provided in Appendix B.

3 Results

The following tables summarize high feasibility, medium feasibility, and low feasibility projects by agency jurisdiction. Each of the locations in the tables below should be further reviewed by the relevant agencies to confirm that the DACs are not currently being served by that agency.

Table 3-1 lists potential water connection projects (number of potential projects) by each feasibility classification and by each water agency included in this evaluation. Table 3-2 lists potential water connection sites (number of potential sites) by each feasibility classification and by each water agency included in this evaluation. The difference between Table 3-1 and Table 3-2 is that a single project may include multiple DAC sites due to the ability to potentially connect multiple sites with one project as described above in Section 2.2.4.

The information presented in Table 3-1 and 3-2 is also presented in maps in Figures 3-1 through Figure 3-8. Please note that due to the size of CVWD's service area, the CVWD service area was broken up into several maps to show the potential sites at a finer scale. The overall map of CVWD's service area, presented in Figure 3-1, has three boxes that correspond to the specific quadrants shown in Figure 3-2, Figure 3-3, and Figure 3-4, which show the potential sites at a closer scale so that each potential site is more visible.

Each individual site shown in Figure 3-1 through Figure 3-8 is numerically coded with a Project ID number. The Project ID numbers included within the figures correspond to the Project ID numbers included within the tables in Appendix A, which show each of the potential site connections by agency with a corresponding address and community.

Table 3-1: Summary of Number of Water Connection Projects by Feasibility

Agency	High Feasibility	Medium Feasibility	Low Feasibility	Main Immediate
Coachella Valley Water District	2	4	13	14
Coachella Water Authority	0	0	1	1
Desert Water Agency	0	0	0	0
Indio Water Authority	0	0	0	1
Mission Springs Water District	0	1	0	5

Footnote: A single project may include multiple DAC sites. Project 303-G has sites within Coachella Valley Water District and Coachella Water Authority service areas and is listed as a project under both agencies.

Table 3-2: Summary of Number of Water Connection Sites by Feasibility

Agency	High Feasibility	Medium Feasibility	Low Feasibility	Main Immediate
Coachella Valley Water District	3	5	61	14
Coachella Water Authority	0	0	2	1
Desert Water Agency	0	0	0	0
Indio Water Authority	0	0	0	2
Mission Springs Water District	0	1	0	8

Footnote: Appendix A contains a detailed list of these sites.

Table 3-3 lists potential wastewater connection projects (number of potential projects) by each feasibility classification and by each water agency that was included in this evaluation. Table 3-4 lists potential wastewater connection sites (number of potential sites) by each feasibility classification and by each water agency that was included in this evaluation. The difference between Table 3-3 and Table 3-4 is that a single project may include multiple DAC sites due to the ability to potentially connect multiple sites with one project as described above in Section 2.2.4.

The information presented in Table 3-3 and 3-4 is also presented in maps in Figures 3-9 through Figure 3-17. Please note that due to the size of CVWD's service area, the CVWD service area was broken up into several maps to show the potential sites at a finer scale. The overall map of CVWD's service area, presented in Figure 3-9, has four boxes that correspond to the specific quadrants shown in Figure 3-10, Figure 3-11, Figure 3-12, and Figure 3-13, which show the potential sites at a closer scale so that each potential site is more visible.

Each individual site shown in Figure 3-9 through Figure 3-17 is numerically coded with a Project ID number. The Project ID numbers included within the figures correspond to the Project ID numbers included within the tables in Appendix A, which show each of the potential site connections per agency with a corresponding address and community.

Table 3-3: Summary of Number of Wastewater Connection Projects by Feasibility

Agency	High Feasibility	Medium Feasibility	Low Feasibility	Main Immediate	Needs Additional Data
Coachella Valley Water District	2	2	13	7	3
Coachella Sanitary District	0	0	1	1	0
Desert Water Agency	0	0	2	0	0
Valley Sanitary District	0	0	0	1	0
Mission Springs Water District	1	1	3	0	0

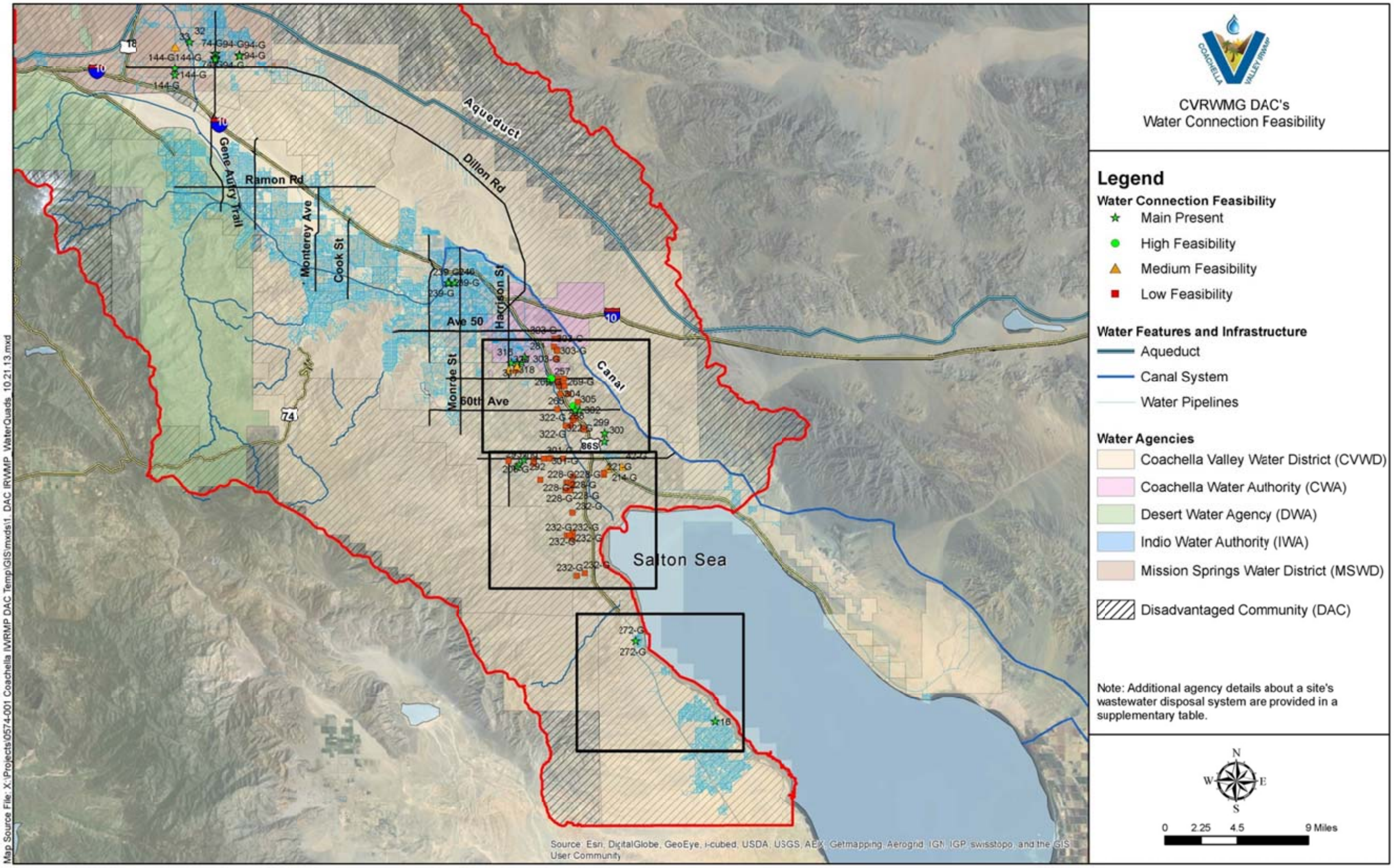
Footnote: A single project may include multiple DAC sites. Project 303-G has sites within Coachella Valley Water District and Coachella Sanitary District service areas and is listed as a project under both agencies.

Table 3-4: Summary of Number of Wastewater Connection Sites by Feasibility

Agency	High Feasibility	Medium Feasibility	Low Feasibility	Main Immediate	Needs Additional Data
Coachella Valley Water District	3	3	73	7	5
Coachella Sanitary District	0	0	3	1	0
Desert Water Agency	0	0	6	0	0
Valley Sanitary District	0	0	0	2	0
Mission Springs Water District	1	1	7	0	0

Footnote: Appendix A contains a detailed list of these sites. As indicated within Appendix A, the wastewater sites listed within DWA's service area are within the wastewater service area of the City of Palm Springs.

Figure 3-1: <u>Coachella Valley Water District</u> Water Connection Feasibility - Overall

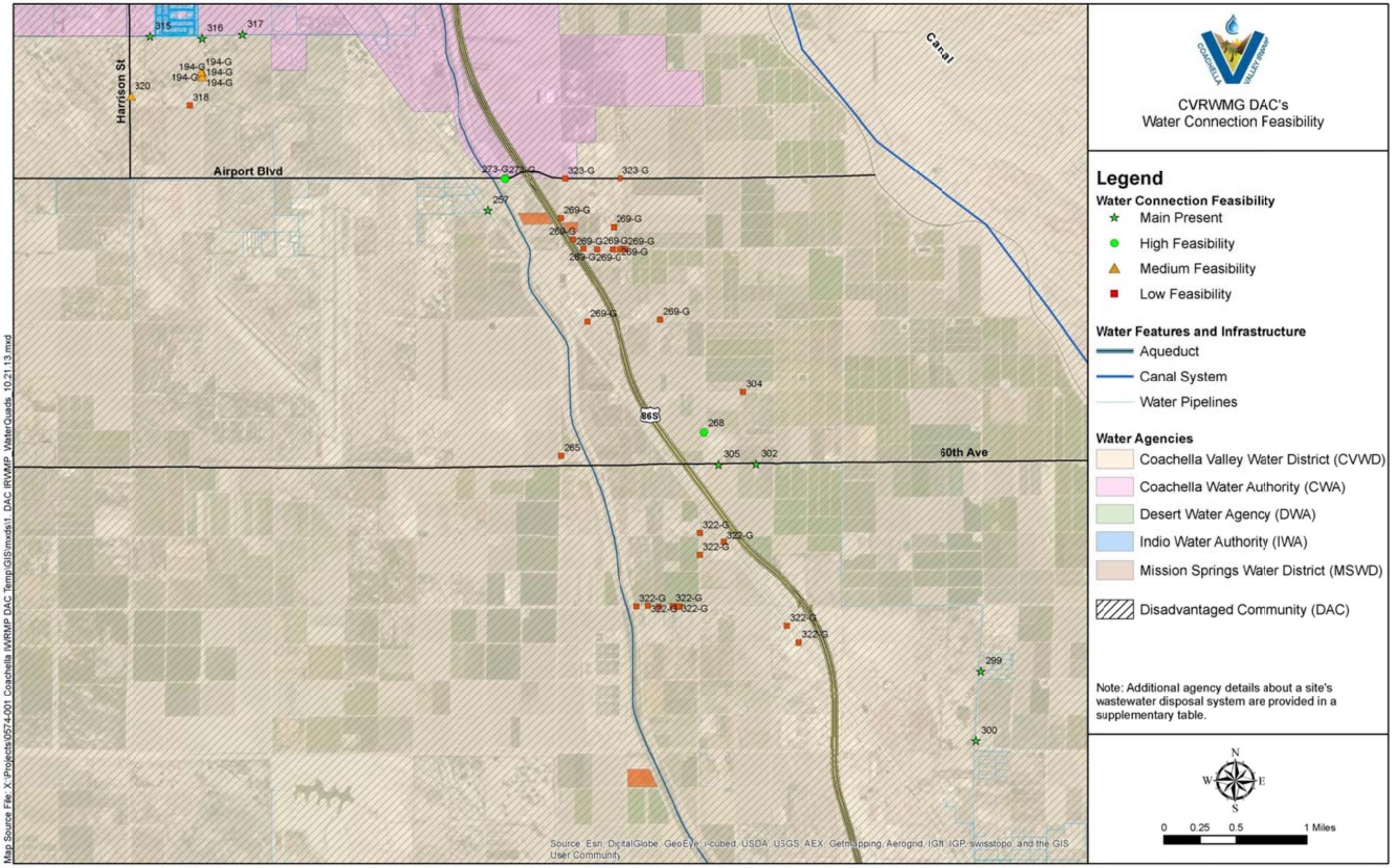


Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1_DAC IRWMP_WaterQuads_10.21.13.mxd

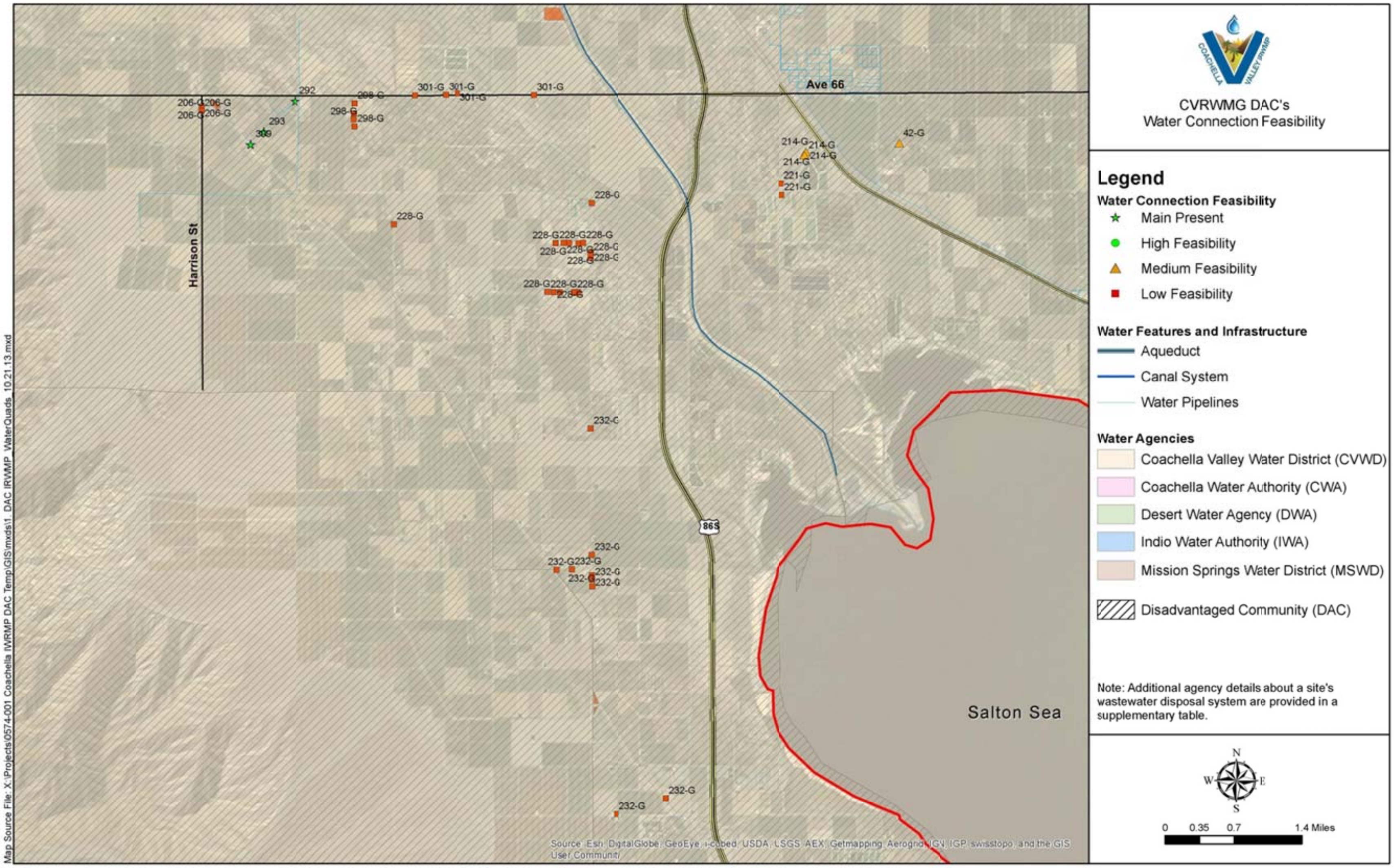
Figure 3-2: Coachella Valley Water District Water Connection Feasibility – East Valley Quadrant 1



Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 3-3: Coachella Valley Water District Water Connection Feasibility – East Valley Quadrant 2

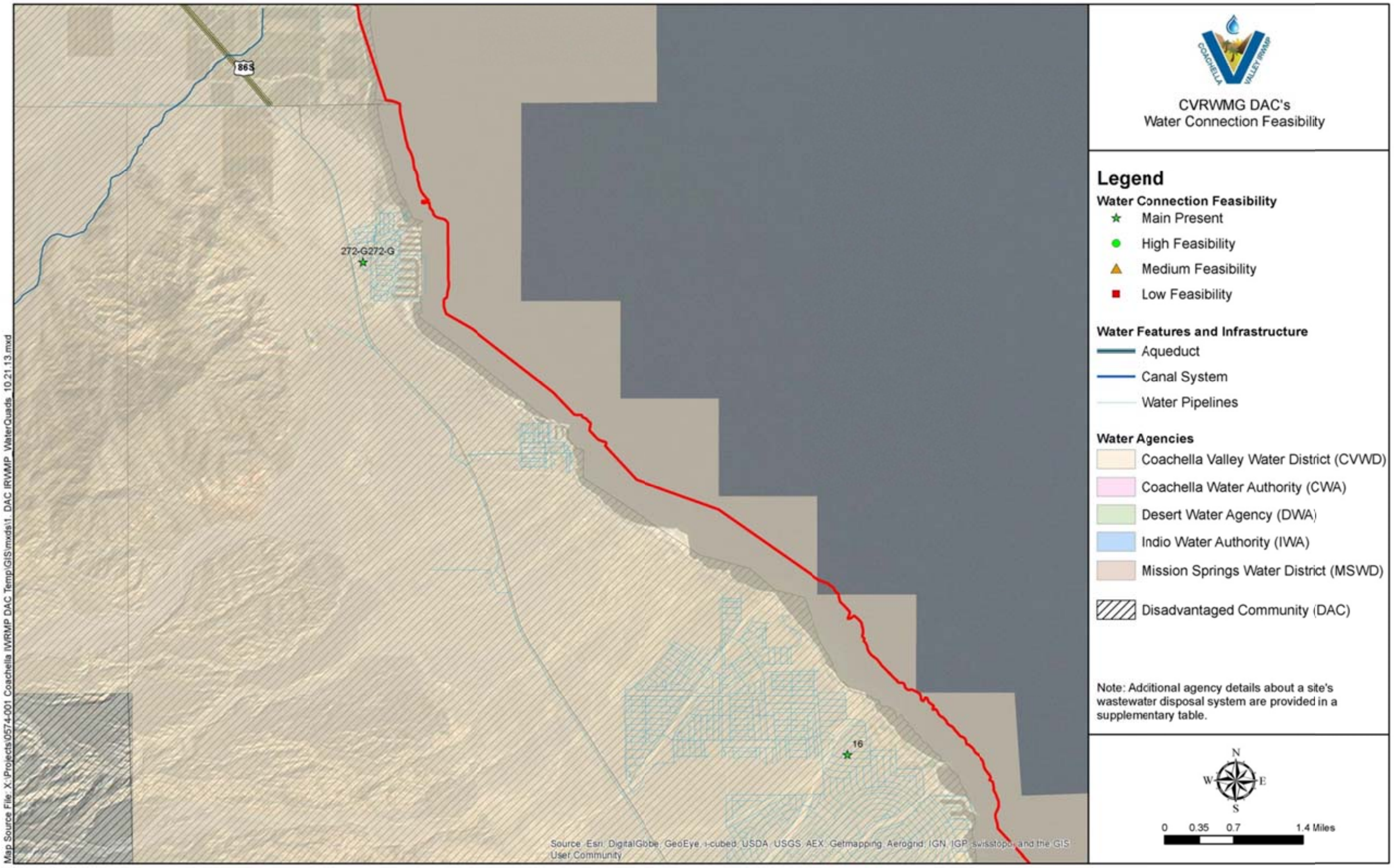


Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1. DAC IRWMP WaterQuads 10.21.13.mxd

Figure 3-4: <u>Coachella Valley Water District</u> Water Connection Feasibility – East Valley Quadrant 3

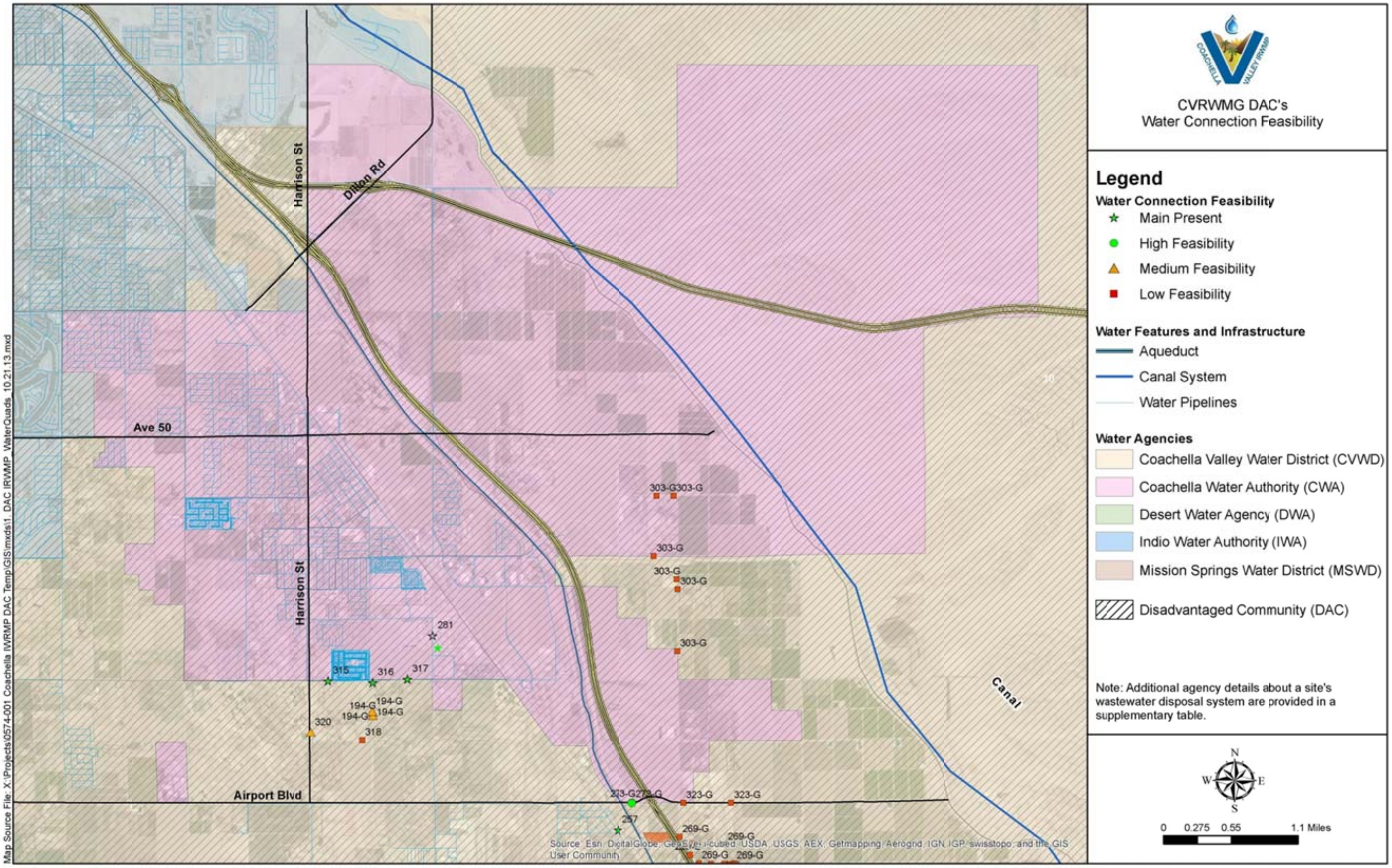


Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1. DAC IRWMP WaterQuads 10.21.13.mxd

Figure 3-5: Coachella Water Authority Water Connection Feasibility



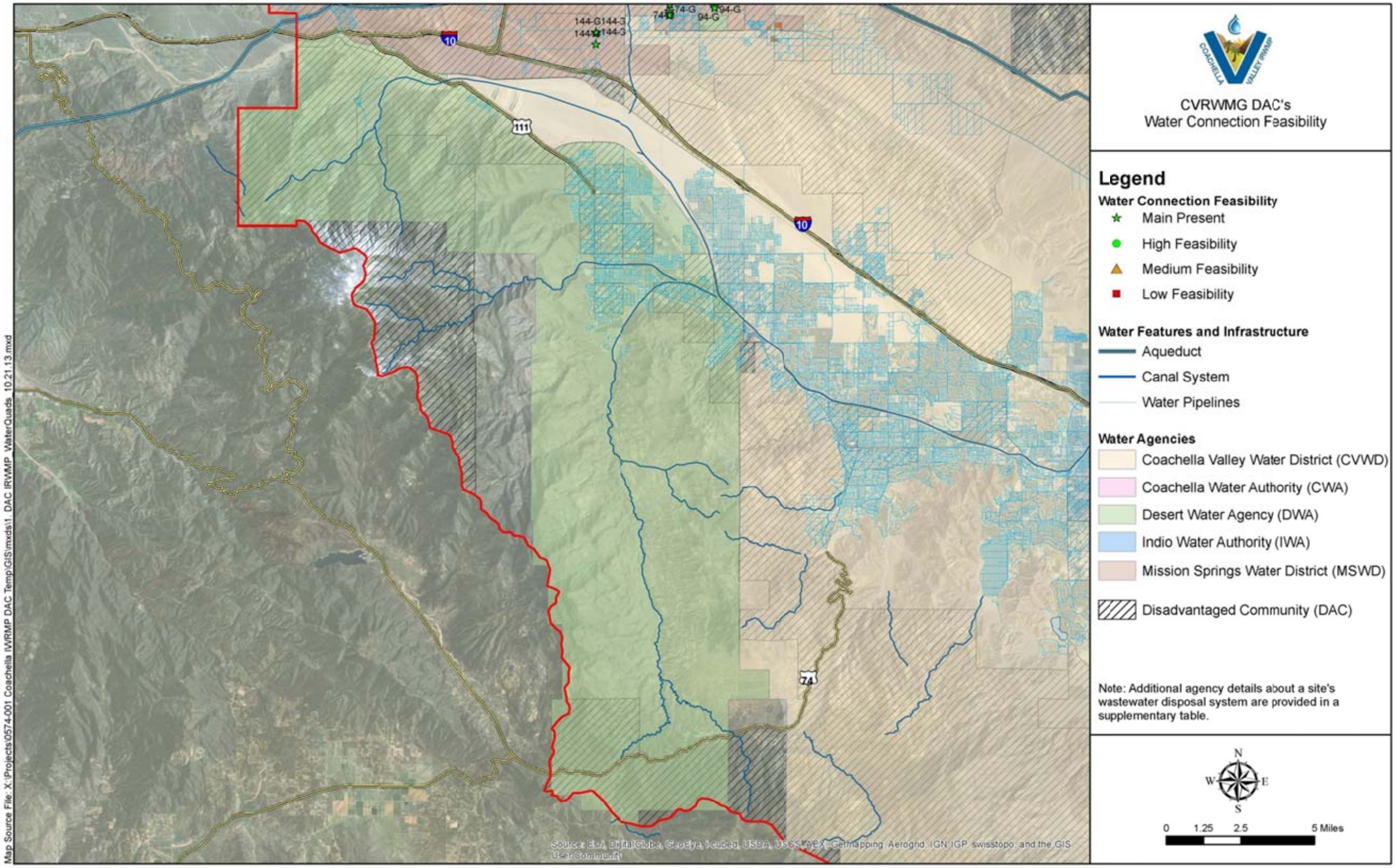
Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1. DAC IRWMP_WaterQuads_10.21.13.mxd

Figure 3-6: Desert Water Agency Water Connection Feasibility

There are no identified water connection sites located within the Desert Water Agency Service area

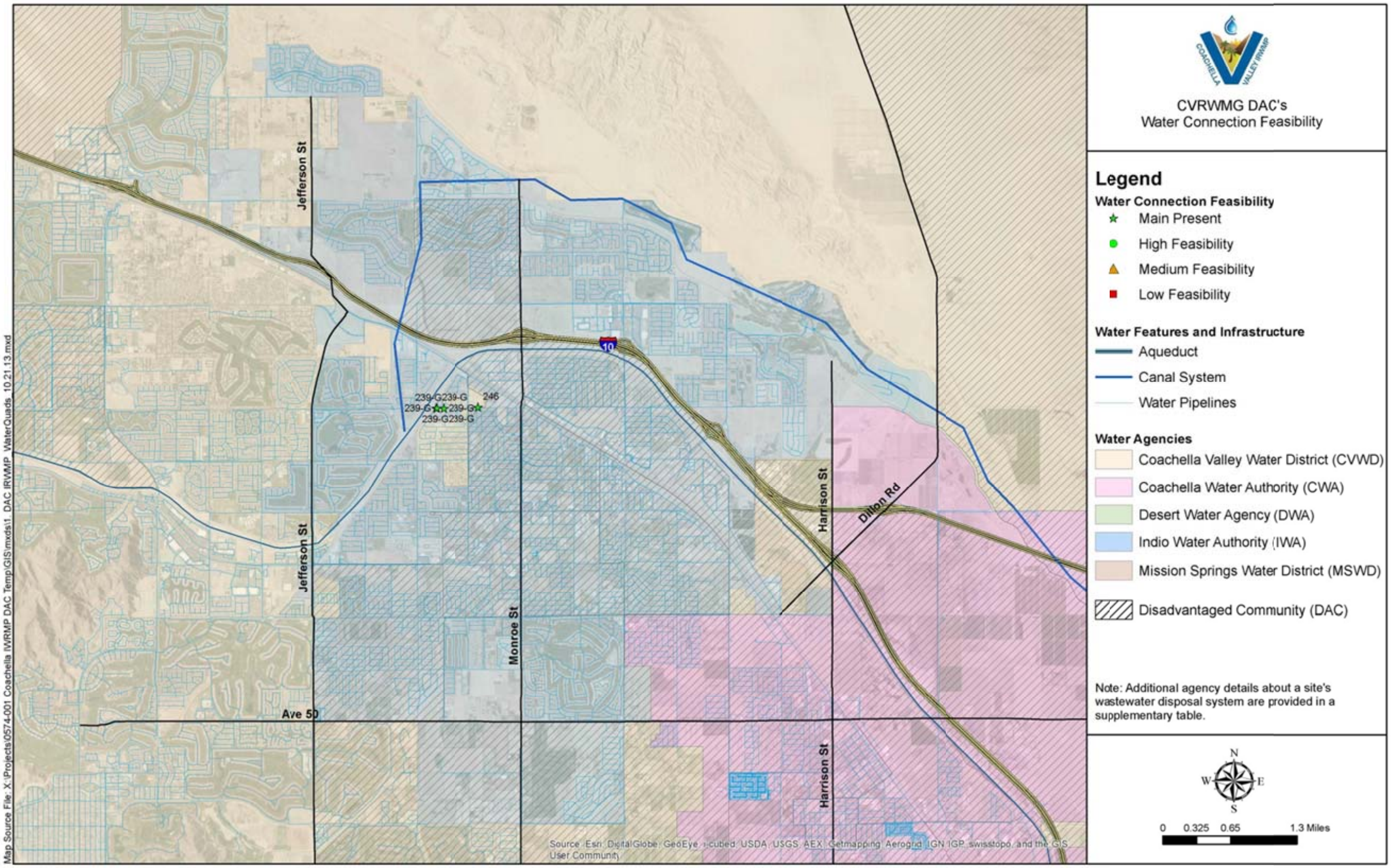


Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1. DAC IRWMP_WaterQuads_10.21.13.mxd

Figure 3-7: <u>Indio Water Authority</u> Water Connection Feasibility



Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1_DAC IRWMP_WaterQuads_10.21.13.mxd

Figure 3-8: Mission Springs Water District Water Connection Feasibility

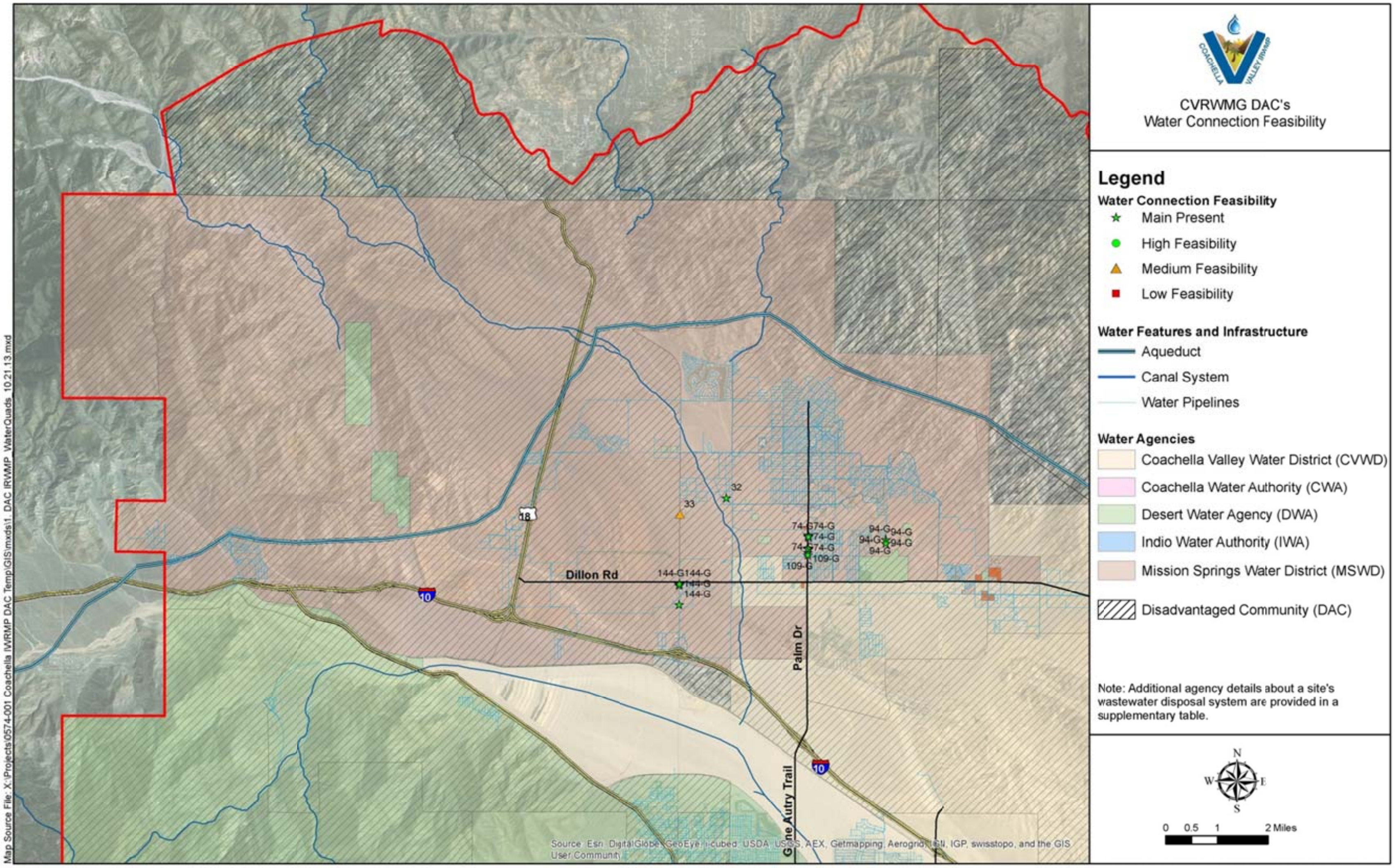
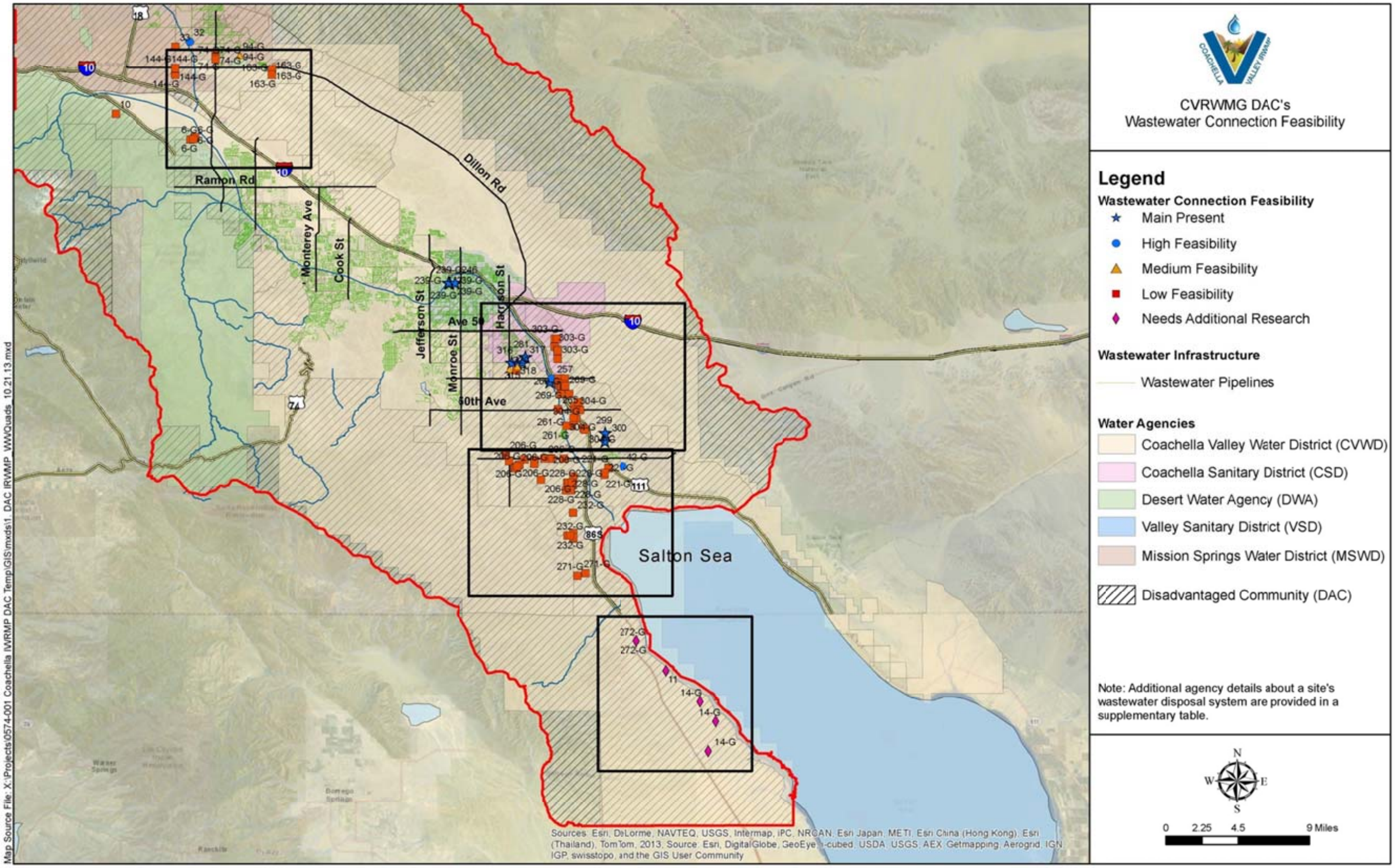
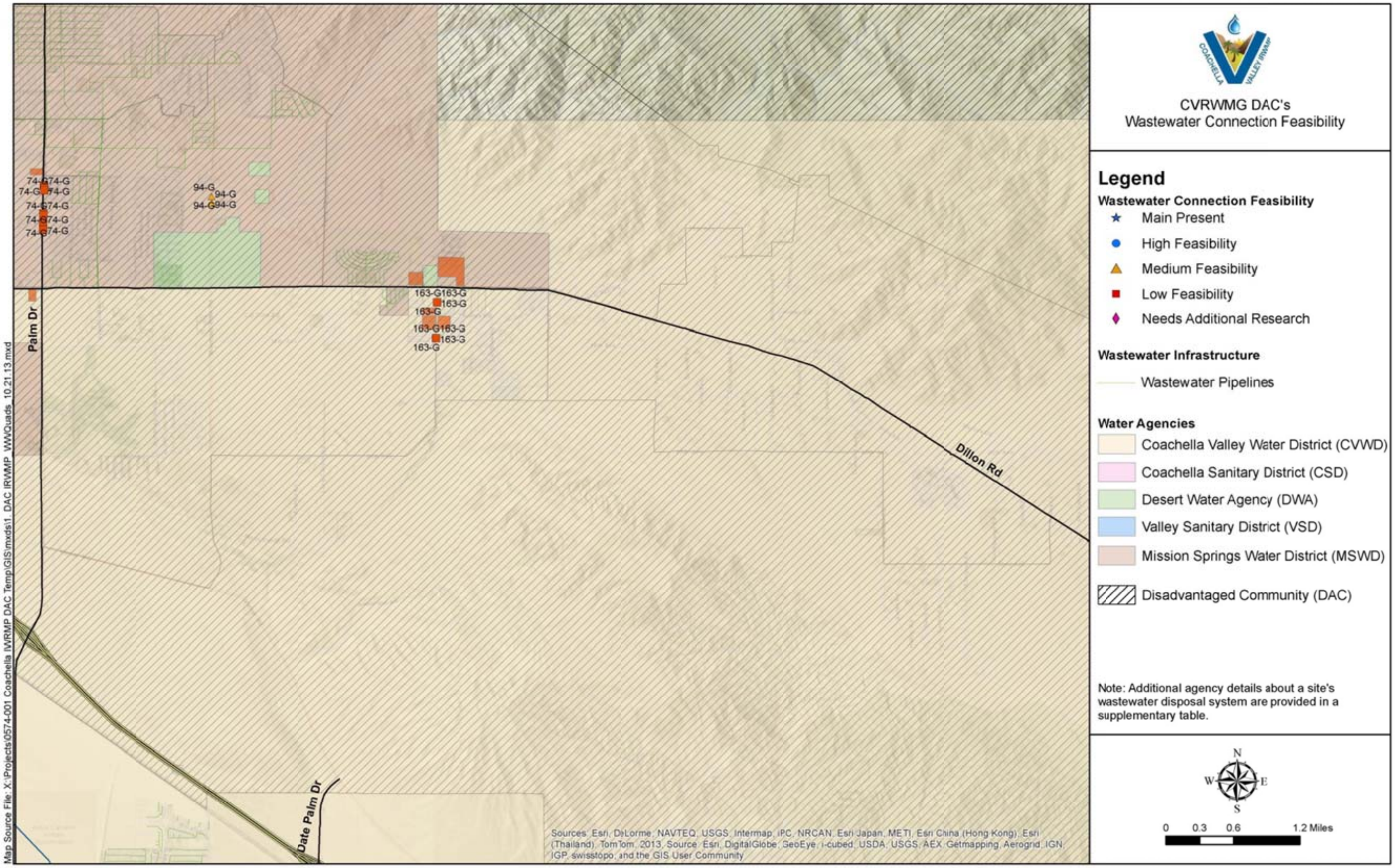


Figure 3-9: Coachella Valley Water District Wastewater Connection Feasibility - Overall



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013. Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 3-10: Coachella Valley Water District Wastewater Connection Feasibility – West Valley Quadrant

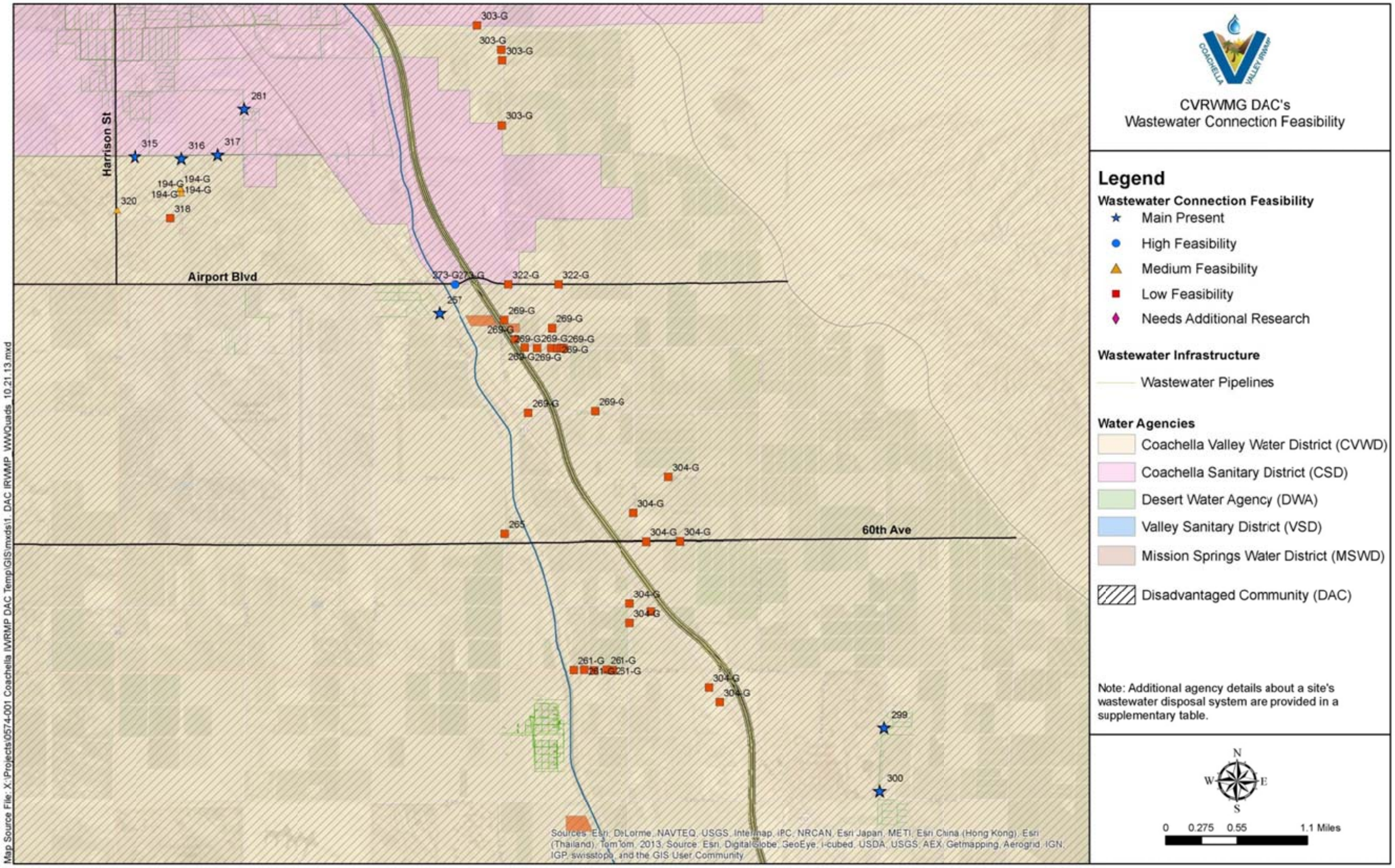


Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013. Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1_DAC IRWMP_WWQuads_10.21.13.mxd

Figure 3-11: Coachella Valley Water District Wastewater Connection Feasibility – East Valley Quadrant 1

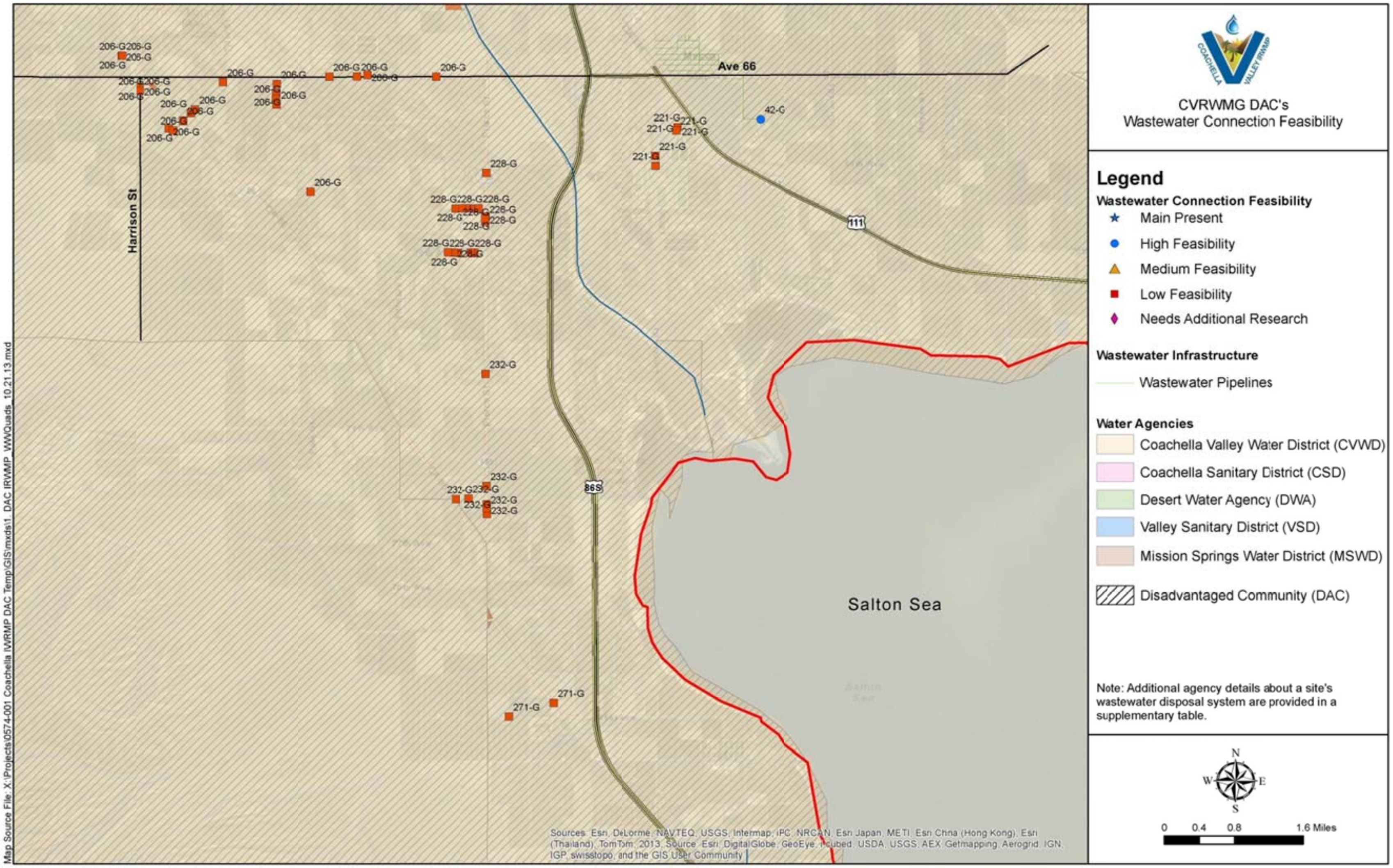


Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013; Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1. DAC IRWMP_WWQuads_10.21.13.mxd

Figure 3-12: Coachella Valley Water District Wastewater Connection Feasibility – East Valley Quadrant 2

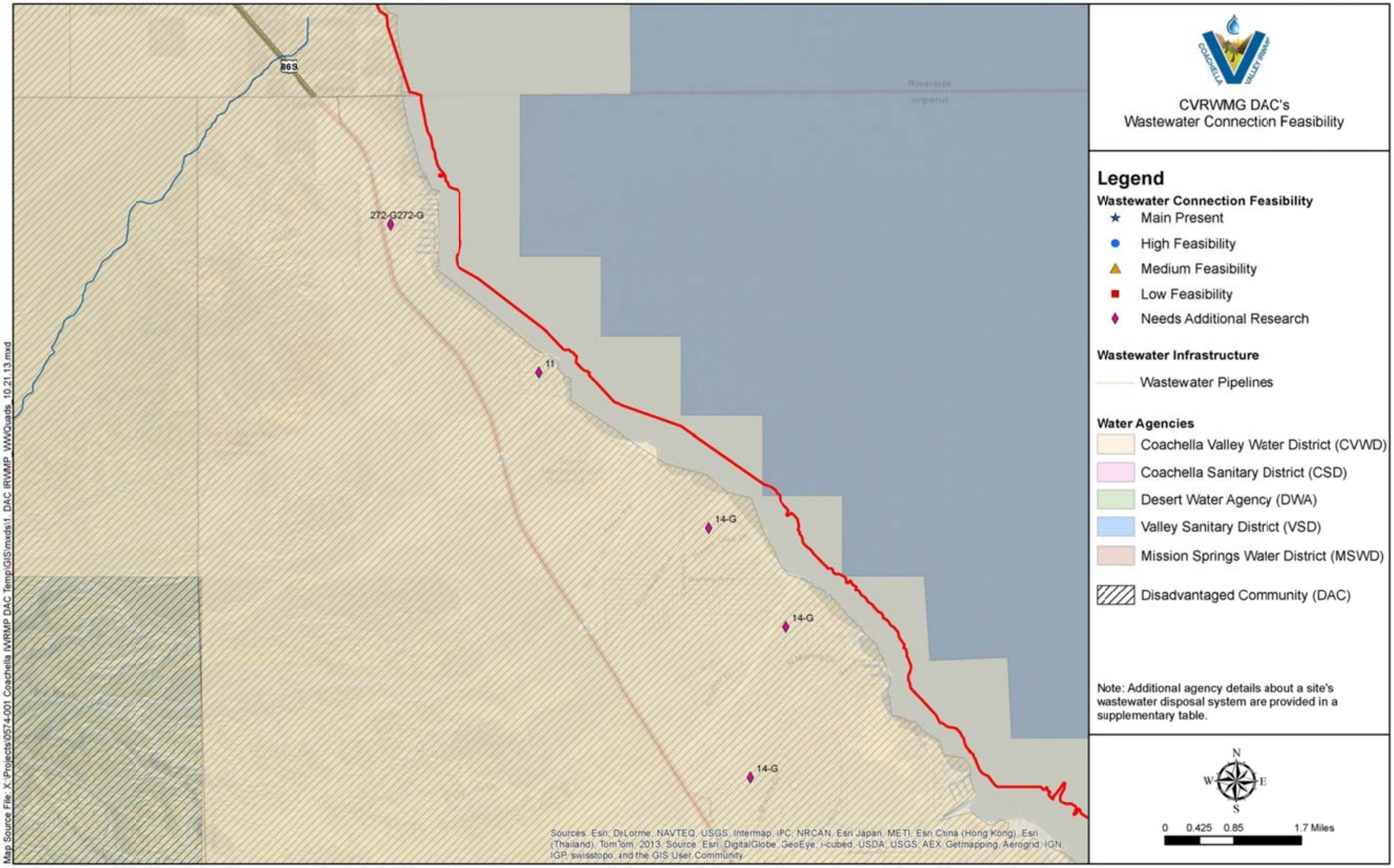


Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013. Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1_DAC IRWMP_WWQuads_10.21.13.mxd

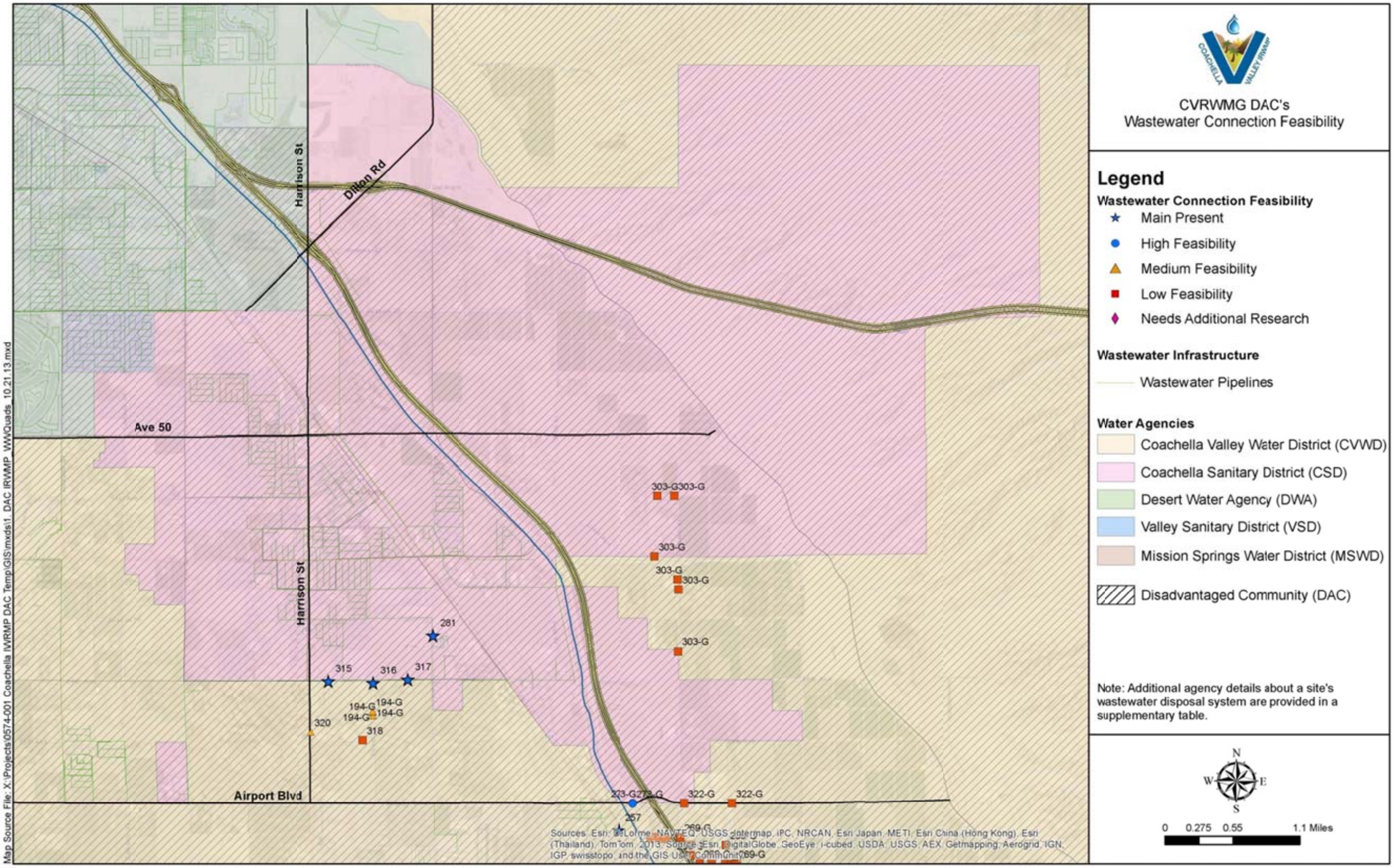
Figure 3-13: Coachella Valley Water District Wastewater Connection Feasibility – East Valley Quadrant 3



Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013. Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 3-14: Coachella Sanitary District Wastewater Connection Feasibility



Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013; Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Figure 3-15: Desert Water Agency Wastewater Connection Feasibility

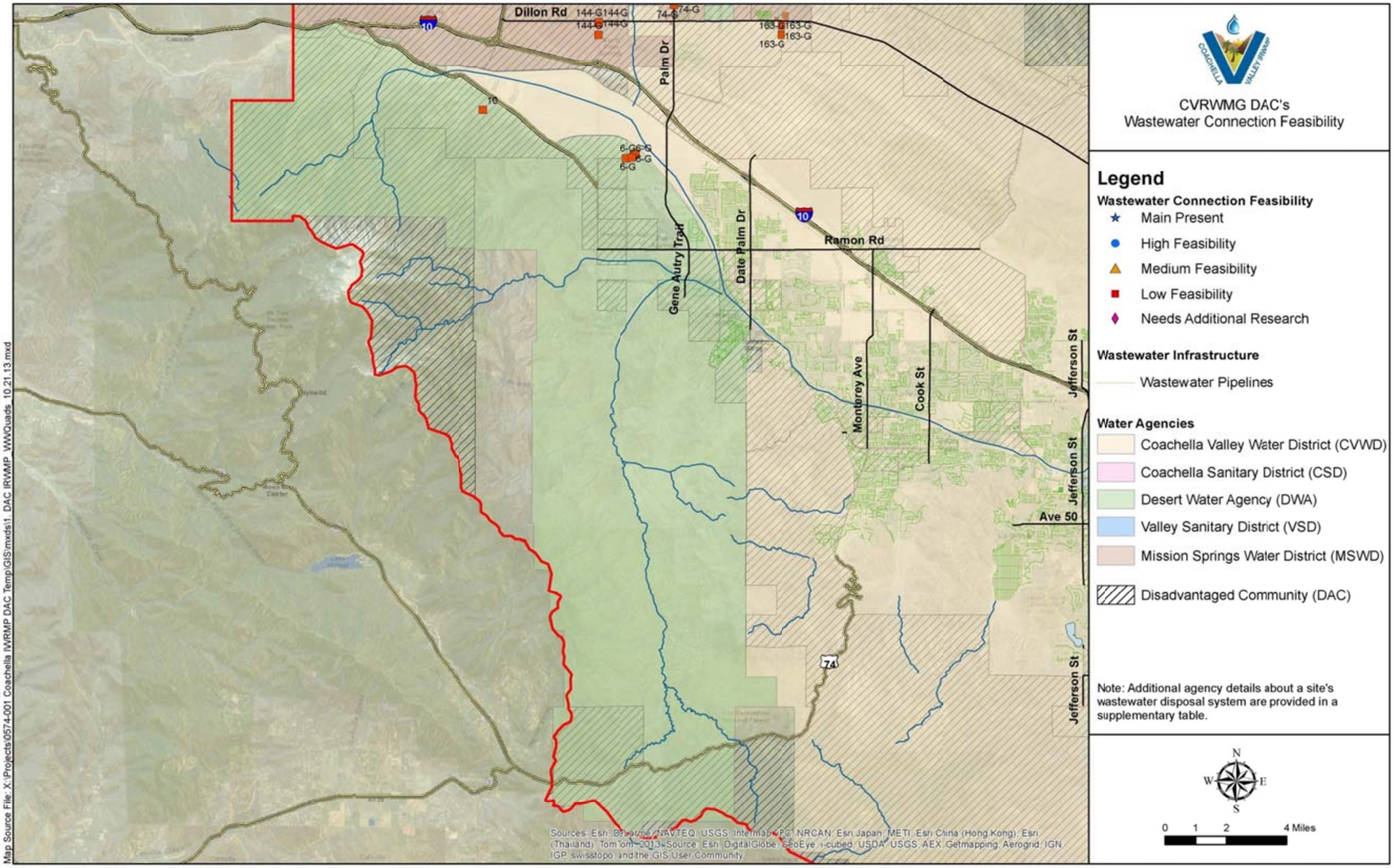


Figure 3-16: Valley Sanitary District Wastewater Connection Feasibility

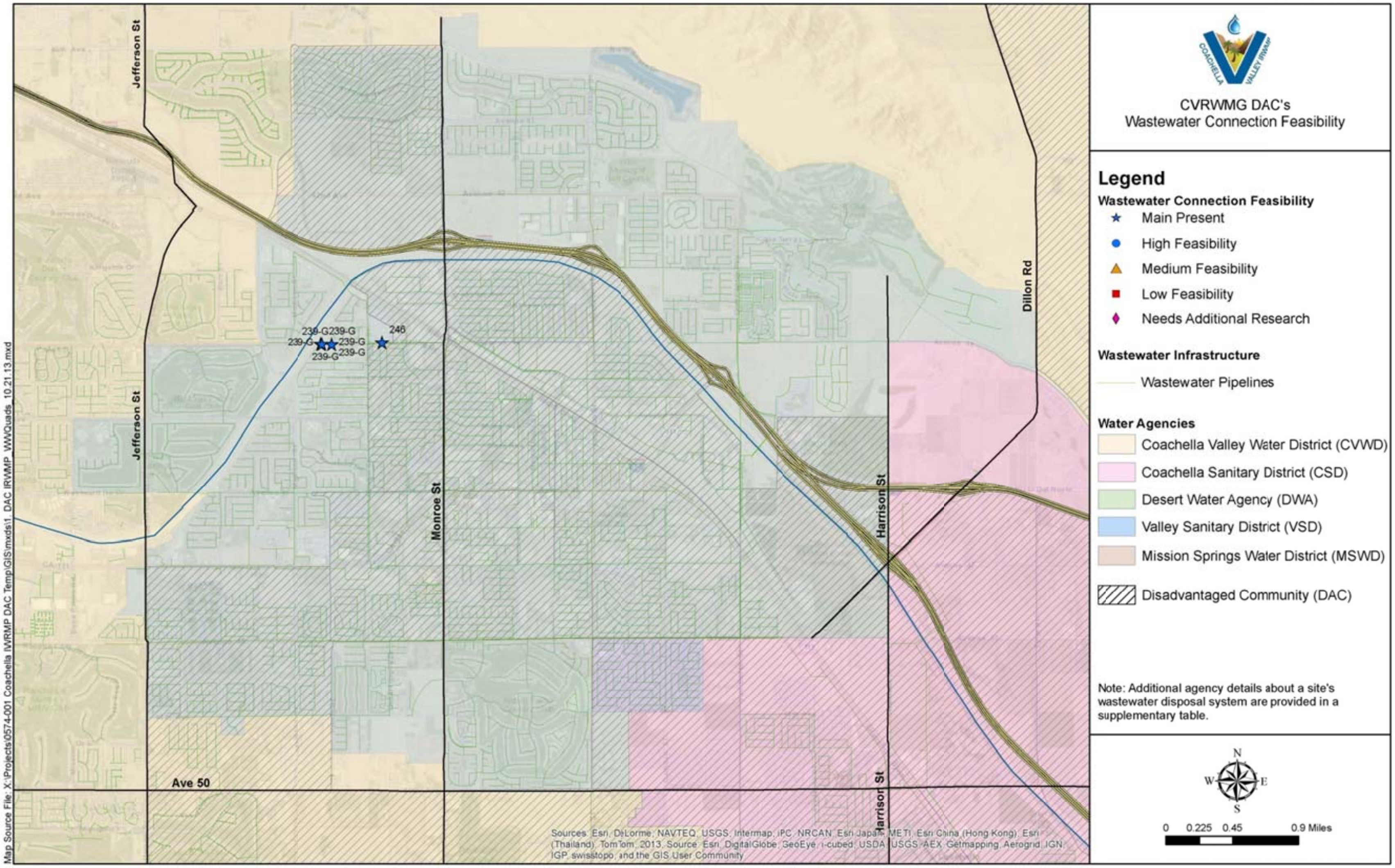
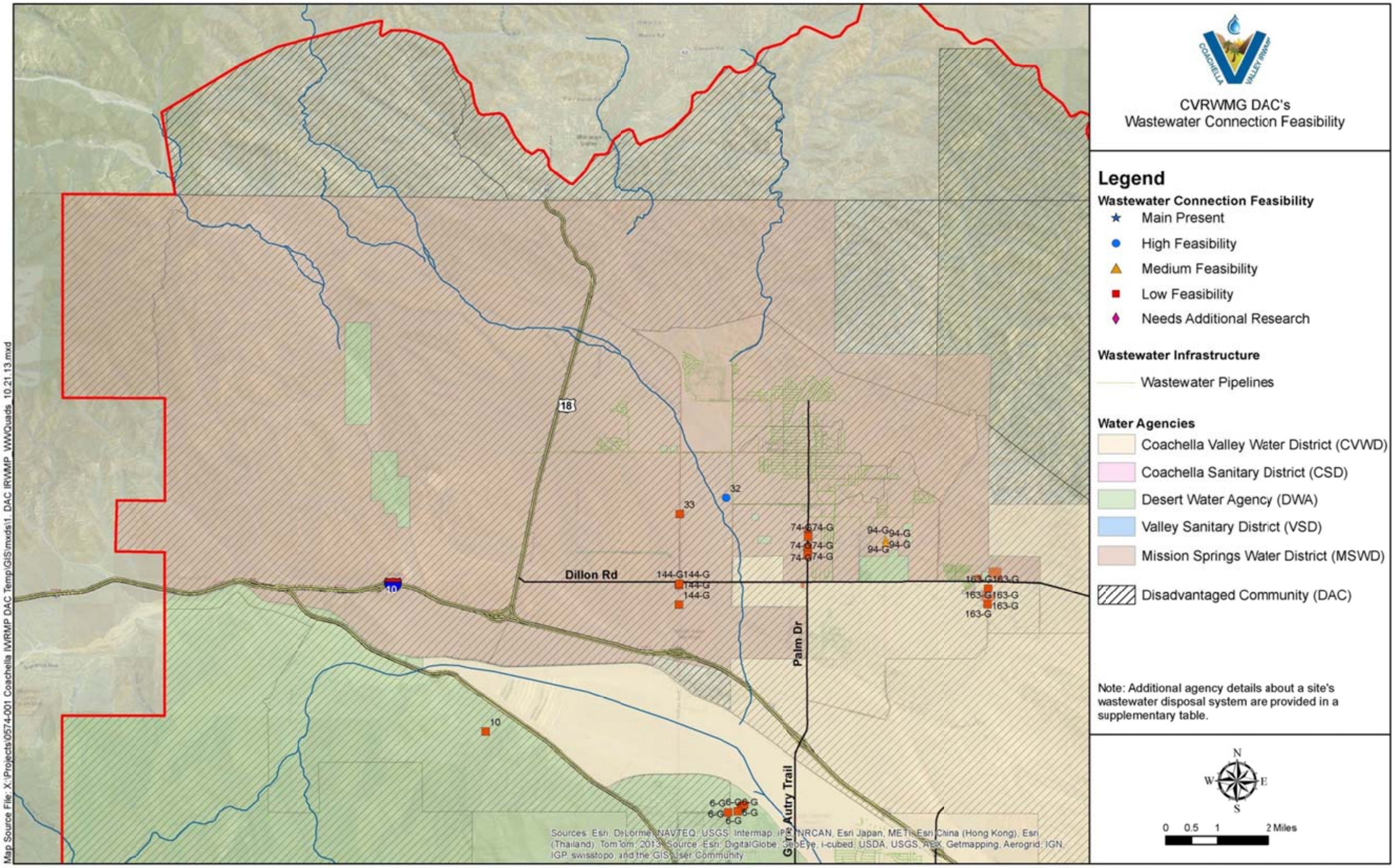


Figure 3-17: Mission Springs Water District Wastewater Connection Feasibility



Note: Additional agency details about a site's wastewater disposal system are provided in a supplementary table.

Sources: Esri, DeLorme, NAVTEQ, USGS, Intermap, iPC, NRCAN, Esri Japan, METI, Esri China (Hong Kong), Esri (Thailand), TomTom, 2013; Source: Esri, DigitalGlobe, GeoEye, i-cubed, USDA, USGS, AEX, Getmapping, Aerogrid, IGN, IGP, swisstopo, and the GIS User Community

Map Source File: X:\Projects\0574-001 Coachella IWRMP DAC Temp\GIS\mxds\1. DAC IRWMP_WWQuads_10.21.13.mxd

4 Recommendations

Based on the preliminary findings, it is recommended that all high feasibility DACs be confirmed by the applicable agencies to verify that they are not, in fact, connected to the municipal system. Once the sites have been confirmed as not connected, it is recommended that all high feasibility sites be connected to nearby water and/or wastewater infrastructure. Sites categorized as "Main Immediate" should also be confirmed by the appropriate agency, but because the IRWM project will not fund homeowner service connections, no further action would likely be required after this confirmation. Each of the low feasibility sites will also need to be reviewed in more detail to assess the challenges involved for site connection and to determine if it is still reasonable to pursue that option. Further, each of the high feasibility and main immediate sites should be assessed to determine the extent to which infrastructure improvements in the public right-of-way are necessary to complete connections.

Along with confirmation by the applicable agencies, outreach and communication should be conducted with owners of small mobile home parks or other residences that could potentially connect to the municipal water and sewer system. The purpose of this outreach would be to discuss the landowner's willingness to work with the IRWM Program and potentially connect to the municipal system.

While there were additional non-geocoded mobile home park sites that could be added to some of the low feasibility sites, the number of sites and dwelling units were typically not significant enough to substantially improve the cost-effectiveness of the project. In the case that outside funding becomes available to supplement these more rural and expensive DAC connections, the feasibility and priority of these sites for connection could be improved.

In addition to further DAC connection status research, additional evaluation should be conducted to determine potential health hazards that may exist within existing un-connected sites and how service piping and metering within the DAC sites would be implemented, including financing and maintenance. These additional considerations may re-prioritize the recommendations noted above. Finally, while sites have been categorized as High Feasibility or Main Immediate, this does not necessarily mean that homeowners at those sites will agree to connect to the public utility system. Additional factors, such as cost of connections, change in water quality, and community impact, will be important factors in the homeowner's final decision in connecting to a public water and/or wastewater system.

After the aforementioned analyses and outreach items are completed, the CVRWMG should continue activities such as Planning Partners meetings and other outreach efforts that encourage landowners, residents, municipal service providers, regional and state funding agencies, and other stakeholders to work together to support collaborative projects. Collaborative projects may include development of a comprehensive, regional plan to extend services to communities that rely on private water and wastewater facilities and could feasibly connect to the municipal system. It is also recommended that the CVRWMG work with relevant stakeholders to determine potential connection projects that could be implemented through the IRWM Program. This work will entail analyzing projects for their potential viability to receive IRWM or other grant or loan funding that could increase the cost-effectiveness and viability of municipal sewer and water connection projects. Potential connection projects will be assessed for their technical and financial feasibility; any projects implemented by the CVRWMG agencies must be implemented in accordance with relevant local policies such as those that require new development and infrastructure projects to be implemented without financially impacting existing customers.

Appendices

Appendix A: Feasibility Status for Connection of Mobile Home Parks to the Public Water and Wastewater Systems

The following tables summarize water and wastewater connection opportunities by feasibility class for each agency. The information in the following tables is preliminary, and will be updated after further consultation with each agency. Please note that not all of the addresses listed below have Project ID numbers – those sites without Project ID numbers are individual sites that are considered part of a larger project (refer to Section 2.2.4) that has already been given a designated Project ID number.

Coachella Valley Water District Connection Feasibility for Water Service

Coachella Valley Water District: Water Feasibility	Project ID	Site Name	Address
CVWD: Main Immediate	16	Single Trailer	1148 Caspian Ave.
	246	Bermuda Palms Apartment Homes	81600 Fred Waring Dr.
	257	Thermal Trailer Park	56335 Hwy 111
	292	Unknown Name	85777 Middleton Street
	293	Unknown Name	85641 Middleton Street
	299	Chapultepec Apartments	62600 Lincoln Ave, Mecca
	300	Heroes 2	62552-62898 Lincoln Street
	302	Rancho Lemus	89000-89448 60th Ave
	305	Farm Castro	89000-89448 60th Ave
	309	Near Spates Manufacturing	85422-85424 Middleton St, Thermal
	315	Unknown Name	54th Ave, Thermal
	316	Unknown Name	54317 Shady Ln, Thermal
	317	Unknown Name	85755 54th Ave, Coachella
	272-G	Desert View Mobile Home Park	87629 DESERT VIEW
CVWD: High Feasibility	268	Unknown Name	59600 Pierce St
	273-G	Unknown Name	87620 Airport Blvd, Thermal
		Desert View Mobile Home Park	87629 Airport Blvd, Thermal
CVWD: Medium Feasibility	320	Mora	54878 Hwy 86, Thermal
	194-G	Am** camp	54540 Shady Ln
		Garcia Ranch	54596 Shady Ln
	214-G	Saint Anthony's park	67075 Hwy 111, Mecca, CA
	42-G	Unknown Name	National Ave, Mecca
CVWD: Low Feasibility	265	Se Vende Traila	Fillmore St
	304	home	88785-89399 59th Ave
	318	Unknown Name	85-400 55th Ave, Thermal
	206-G	Polanco1	64975 Harrison St
		Unknown Name	66190 Harrison St
	221-G	Polanco 2	67959 LINCOLN
		Unknown Name	Lincoln Street

Coachella Valley Water District: Water Feasibility	Project ID	Site Name	Address
	228-G	Duros Mobile Home Park	68507 Pierce St
		El Mesquit	88000-88998 69th Ave, Thermal
CVWD: Low Feasibility		Gamez Trailer Park	69353 Pierce St
		Los Gatos Mobile Home Park	88740 Ave 70
		Oasis Gardens LLC	68555 Polk St, Thermal
		Oasis Mobile Home Park	88700 Ave 70
		Unknown Name	88701 Ave 70
		Unknown Name	88740 Ave 70
		Polanco 6	88510 69th Ave
		Polanco7	88773 69th Ave
		Unknown Name	
		Unknown Name	69th Ave, Thermal
		Unknown Name	70th Ave
	232-G	Unknown Name	81st Ave
		Angel's Ranch	72753 Pierce St
		B.C. Ranch	75655 Pierce St
		D & D Oasis Mobile Home Park	76250 Pierce St
		D&D MHP	76086 Pierce St
		Polanco 3	76250 Pierce St
		Unknown Name	80627 Harrison St
		Unknown Name	88598-88634 76th Ave, Thermal
		Unknown Name	88715-88999 76th Ave, Thermal
	269-G	Unknown Name	56540 Fillmore St, Thermal
		Unknown Name	8441 58th Ave
		Unknown Name	88100 Fillmore St, Thermal
		Unknown Name	88210 Fillmore St, Thermal
		Unknown Name	88275 Fillmore St, Thermal
		Unknown Name	88330 Fillmore St, Thermal
		Unknown Name	88420 57th Ave, Thermal
		Unknown Name	88455 57th Ave, Thermal
		Unknown Name	8867 58th Ave
		Unknown Name	John Deere St
	298-G	Unknown Name	66242 Martinez Road
		Unknown Name	66355 Martinez Road
		Unknown Name	Martinez Road
	301-G	Unknown Name	66th Ave, Thermal
		Unknown Name	87125 66th Ave, Thermal
		Unknown Name	87742 66th Ave, Thermal
		Unknown Name	87850 66th Ave, Thermal

Coachella Valley Water District: Water Feasibility	Project ID	Site Name	Address
	303-G	Unknown Name	52219 Fillmore St
		Unknown Name	52742 Fillmore St, Thermal, CA
	322-G	Duarte	62775 Hwy 111
		Lopez mobile home park	62325 Hwy 111
CVWD: Low Feasibility		Los Gatos Mobile Home Park	88705 62nd Ave
		Unknown Name	88705 62nd Ave
		Polanco 8	88847 62nd Ave
		Ramirez	88811
		Unknown Name	50970 61st Ave
		Unknown Name	62nd Ave
		Unknown Name	Pierce St
		Unknown Name	Hwy 111
		Unknown Name	88835 62nd Ave
	323-G	Unknown Name	88375 Airport Blvd, Thermal
		Valley View Trailer Park	88-041 Airport Blvd, Thermal

Footnote: Project ID 303-G is duplicated in the CWA table below as that ID has sites that fall within both the CVWD and CWA agency boundaries.

Coachella Water Authority Connection Feasibility for Water Service

Coachella Water Authority: Water Feasibility	Project ID	Site Name	Address
CWA: Main Immediate	281	Unknown Name	Tyler Ave
CWA: Low Feasibility	303-G	mobiles	Along Fillmore
		Unknown Name	800 Ave 51

Footnote: Project ID 303-G is duplicated in the CVWD table as that ID has sites that fall within both the CVWD and CWA agency boundaries.

Desert Water Agency Connection Feasibility for Water Service

There are no feasible water connections to be considered in the Desert Water Agency service area.

Indio Water Authority Connection Feasibility for Water Service

Indio Water Authority: Water Feasibility	Project ID	Site Name	Address
IWA: Main Immediate	239-G	Bermuda Palms Apartment Homes	81225 Fred Waring Dr.
		Unknown Name	81235 Fred Waring Dr.

Mission Springs Water District Connection Feasibility for Water Service

Mission Springs Water District: Water Feasibility	Project ID	Site Name	Address

Mission Springs Water District: Water Feasibility	Project ID	Site Name	Address
MSWD: Main Immediate	32	SFH	13695 United Rd
	109-G	Palm Drive Mobile Estates	15685 Palm Drive
		Unknown Name	15686 Palm Drive
		Unknown Name	15687 Palm Drive
	144-G	Care Free Mobile Home Park	17069 N. Indian Ave
	74-G	Vista Montana	15300 Palm Drive
		Whispering Sands	15225 Palm Drive
MSWD: Main Immediate	94-G	Mountain View Park	15525 Mountain View Rd
MSWD: Medium Feasibility	33	Two Springs Resort	14200 N. Indian Canyon Drive

Coachella Valley Water District Connection Feasibility for Wastewater Service

Coachella Valley Water District: Wastewater Feasibility	Project ID	Site Name	Address
CVWD: Main Immediate	246	Bermuda Palms Apartment Homes	81600 Fred Waring Dr.
	257	Thermal Trailer Park	56335 Hwy 111
	299	Chapultepec Apartments	62600 Lincoln Ave, Mecca
	300	Heroes 2	62552-62898 Lincoln Street
	315	Unknown Name	54th Ave, Thermal
	316	Unknown Name	54317 Shady Ln, Thermal
	317	Unknown Name	85755 54th Ave, Coachella
CVWD: High Feasibility	273-G	Unknown Name	87620 Airport Blvd, Thermal
		Desert View Mobile Home Park	87629 Airport Blvd, Thermal
	42-G	Unknown Name	National Ave, Mecca
CVWD: Medium Feasibility	320	Mora	54878 Hwy 86, Thermal
	194-G	Am** camp	54540 Shady Ln, Thermal
		Garcia Ranch	54596 Shady Ln
CVWD: Low Feasibility	265	Se Vende Traila	Fillmore St
	318	Unknown Name	85-400 55th Ave, Thermal
	163-G	Casa Del Sol Mobile Home Park	17300 Corkhill Rd
		Corkhill Park	17989 Corkhill Rd
	206-G	MHP2	85390 Middleton St
		Unknown Name	85396 Middleton St
		Near Spates Manufacturing	85422-85424 Middleton St, Thermal
		Oasis Gardens LLC	68555 Polk St, Thermal
		Polanco 5	85691 Middleton St
		Polanco1	64975 Harrison St
		Unknown Name	66190 Harrison St

Coachella Valley Water District: Wastewater Feasibility	Project ID	Site Name	Address
		Sunbird Mobile Home Park	84950 Echols Rd
		Unknown Name	66242 Martinez Road
		Unknown Name	66355 Martinez Road
		Unknown Name	66th Ave, Thermal
		Unknown Name	85641 Middleton Street
		Unknown Name	85777 Middleton Street
		Unknown Name	87125 66th Ave, Thermal
		Unknown Name	87742 66th Ave, Thermal
CVWD: Low Feasibility		Unknown Name	87850 66th Ave, Thermal
		Unknown Name	Martinez Road
	221-G	Polanco 2	67959 Lincoln
		Saint Anthony's park	67075 Hwy 111
		Unknown Name	Lincoln Street
	228-G	Duros Mobile Home Park	68507 Pierce St
		el mesquite	88000-88998 69th Ave, Thermal
		Gamez Trailer Park	69353 Pierce St
		Los Gatos Mobile Home Park	88740 70th Ave
		Oasis Mobile Home Park	88700 70th Ave
		Unknown Name	88701 70th Ave
		Unknown Name	88740 70th Ave
		Polanco 6th	88510 69th Ave
		polanco7	88773 69th Ave
		Unknown Name	
		Unknown Name	69th Ave, Thermal
		Unknown Name	70th Ave
	232-G	Angel's Ranch	72753 Pierce St
		B.C. Ranch	75655 Pierce St
		D & D Oasis Mobile Home Park	76250 Pierce St
		D&D Mobile Home Park	76086 Pierce St
		Polanco 3	76250 Pierce St
		Unknown Name	88598-88634 76th Ave, Thermal
		Unknown Name	88715-88999 76th Ave, Thermal
	261-G	Los Gatos Mobile Home Park	88705 62nd Ave
		polanco8	88847 62nd Ave
		Ramirez	88811
		Unknown Name	62nd Ave
		Unknown Name	88835 62nd Ave
	269-G	Unknown Name	56540 Fillmore St, Thermal
		Unknown Name	8441 58th Ave

Coachella Valley Water District: Wastewater Feasibility	Project ID	Site Name	Address
		Unknown Name	88100 Fillmore St, Thermal
		Unknown Name	88210 Fillmore St, Thermal
		Unknown Name	88275 Fillmore St, Thermal
		Unknown Name	88330 Fillmore St, Thermal
		Unknown Name	88420 57th Ave, Thermal
		Unknown Name	88455 57th Ave, Thermal
		Unknown Name	8867 58th Ave
		Unknown Name	John Deere St
	271-G	Unknown Name	81st Ave
		Unknown Name	80627 Harrison St
CVWD: Low Feasibility	303-G	Unknown Name	52219 Fillmore St
		Unknown Name	52742 Fillmore St, Thermal, CA
	304-G	Duarte	62775 Hwy 111
		Farm Castro	89000-89448 60th Ave
		Home	88785-89399 59th Ave
		Lopez Mobile Home Park	62325 Hwy 111
		Rancho Lemus	89000-89448 60th Ave
		Unknown Name	50970 61st Ave
		Unknown Name	59600 Pierce St
		Unknown Name	Pierce St
		Unknown Name	Hwy 111
	322-G	Unknown Name	88375 Airport Blvd, Thermal
		Valley View Trailer Park	88-041 Airport Blvd, Thermal
CVWD: Needs Research	11	MHP1	246 Coachella Ave.
	14-G	SFH	1249 California Dr.
		Unknown Name	1330 Beacon Dr.
		Single Trailer	1148 Caspian Ave.
	272-G	Desert View Mobile Home Park	87629 Desert View

Footnote: Project ID 303-G is duplicated in the CSD table as that ID has sites that fall within both the CVWD and CSD agency boundaries.

Coachella Sanitary District Connection Feasibility for Wastewater Service

Coachella Sanitary District: Wastewater Feasibility	Project ID	Site Name	Address
CSD: Main Immediate	281	Unknown Name	Tyler Ave
CSD: Low Feasibility	303-G	mobiles	Along Fillmore
		Unknown Name	800 Ave 51
		Unknown Name	87510 52nd Ave

Footnote: Project ID 303-G is duplicated in the CVWD table as that ID has sites that fall within both the CVWD and CSD agency boundaries.

Desert Water Agency Connection Feasibility for Wastewater Service

Desert Water Agency: Wastewater Feasibility	Project ID	Site Name	Address
DWA: Low Feasibility	10	Western Village Mobile Home Park	125 Pioneer Trail
	6-G	Golden Sands Park	1900 E San Rafael
		Unknown Name	24 Douglas Drive
		Unknown Name	42 Karen Ln
		Unknown Name	44 Karen Ln
		Unknown Name	69 Lynette Ln

Footnote: All of the sites listed within the Desert Water Agency table are located within the wastewater service area of the City of Palm Springs. These sites have not yet been confirmed with the City of Palm Springs.

Valley Sanitary District Connection Feasibility for Wastewater Service

Valley Sanitary District: Wastewater Feasibility	Project ID	Site Name	Address
VSD: Main Immediate	239-G	Bermuda Palms Apartment Homes	81225 Fred Waring Dr.
		Unknown Name	81235 Fred Waring Dr.

Mission Springs Water District Connection Feasibility for Wastewater Service

Mission Springs Water District: Wastewater Feasibility	Project ID	Site Name	Address
MSWD: High Feasibility	32	SFH	13695 United Rd
MSWD: Medium Feasibility	94-G	Mountain View Park	15525 Mountain View Rd
MSWD: Low Feasibility	33	Two Springs Resort	14200 N. Indian Canyon Drive
	144-G	Care Free Mobile Home Park	17069 N. Indian Ave
	74-G	Palm Drive Mobile Estates	15685 Palm Drive
		Unknown Name	15686 Palm Drive
		Unknown Name	15687 Palm Drive
		Vista Montana	15300 Palm Drive
		Whispering Sands	15225 Palm Drive

Appendix B: Potential Additional Parcels Identified for Inclusion in Utility Connection Projects

The parcels listed by APN number in the table below were identified for potential inclusion with the project identified in the first column. For example, Project 232 had four potential sites that were not a part of the geocoded DAC sites that could possibly be added to Project 232. Each of these APN's would require additional field verification and review by the appropriate agency.

Table B-1: Additional Parcels Identified for Possible Inclusion for Water Utility Connection

Water Connection Project ID	APN
206	751120010
232	755231001
	755231014
	755231015
	755231016
269	757080018
	757110031

Table B-2: Additional Parcels Identified for Possible Inclusion for Wastewater Utility Connection

Wastewater Connection Project ID	APN
144	657220010
163	654160009
	654160010
	654170043
	654170057
	654170058
	654180014
	654200055
206	751120010
228	749320015
269	757080018
	757110031
271	755231001
	755231014
	755231015
	755231016
74	656030010

Appendix VII-H: Regional Program for Septic Rehabilitation

This appendix includes the project report for the Regional Program for Septic Rehabilitation, developed in support of the DAC Outreach Program to provide a framework for planning septic system rehabilitation for small mobile home parks.

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Coachella Valley Integrated Regional Water Management Program

Disadvantaged Community Outreach Demonstration Project

Regional Program for Septic System Rehabilitation

Final Report

Prepared by:

RMC
Water and Environment

In Association with:

Pueblo Unido CDC
EASTERN COACHELLA VALLEY

February 2014

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List of Abbreviations

BOD	Biological Oxygen Demand
CDPH	California Department of Public Health
CUP	Conditional Use Permit
CVRWMG	Coachella Valley Regional Water Management Group
CVSC	Coachella Valley Stormwater Channel
CVWD	Coachella Valley Water District
DAC	Disadvantaged Community
DWR	California Department of Water Resources
gpd	gallons per day
IRWM	Integrated Regional Water Management
MSL	Mean Sea Level
NGO	Non-Governmental Organization
OWTS	Onsite Wastewater Treatment System
PUCDC	Pueblo Unido Community Development Corporation
RWQCB	Regional Water Quality Control Board
SWIS	Subsurface Wastewater Infiltration System
USDA	United States Department of Agriculture
MHP	Mobile Home Park

1 Introduction and Background

This chapter presents the project background and purpose, the scope of this study, and the grant funding made available to conduct this work.

1.1 Project Background and Purpose

The Coachella Valley Water District (CVWD), representing the Coachella Valley Regional Water Management Group (CVRWMG), has entered into a contract with the Department of Water Resources (DWR) to develop a Disadvantaged Community (DAC) Outreach Demonstration Program (DAC Outreach Program) for the Coachella Valley Integrated Regional Water Management (IRWM) Region (Region). The goal of the DAC Outreach Program is to develop and implement methods to improve DAC participation in the overall Coachella Valley IRWM planning process. The DAC Outreach Program identified potential project concepts that could be implemented to directly benefit DACs and resolve high-priority water-related issues in DACs. To move the project concepts forward, the DAC Outreach Program scope included additional work to develop in-depth engineering and project management plans for priority DAC projects. The data and experience gained from the DAC Outreach Program will help to address specific DAC issues in the Coachella Valley and will also assist DWR in developing a model DAC Program for other similar areas in California.

In June of 2013 the CVRWMG and non-profit partners hired to work on the Coachella Valley DAC Outreach Program developed general project concepts that would address major issues identified by DAC stakeholders in the Coachella Valley pertaining to water resources management. Onsite Wastewater Treatment System (OWTS) rehabilitation or replacement was identified as one of the concepts to address issues associated with aging or failing OWTSs. Aging or failing OWTSs have been cited as a serious public health concern and a potential source of water quality constituents such as bacteria and nitrates in local water resources.

Due to the importance of local groundwater quality throughout the Coachella Valley, there is a need to rehabilitate or replace aging or failing OWTSs to protect the Region's groundwater supplies and prevent constituents of concern from entering agricultural drains and the Salton Sea in areas where failing OWTSs are located in the shallow groundwater aquifer. Stakeholders in the Region, particularly in the eastern Coachella Valley, have noted that failing OWTSs may not be properly designed and therefore fail because they cannot handle the amount of wastewater produced by residents. Stakeholders have also noted that regular maintenance of septic systems may not occur due to a variety of monetary and technical capability reasons.

OWTSs can be a reliable and sanitary method for treating and disposing of wastewater, provided that systems are appropriately designed and maintained. Due to the large number of OWTSs throughout the Coachella Valley, it is possible that OWTS rehabilitation or replacement projects could provide a significant positive impact to the community by:

1. Assessing current issues with failing OWTS (determine why they are failing), and
2. Implementing actions necessary to resolve OWTS issues – replacing, rehabilitating, or performing maintenance on the systems, based on identified issues.

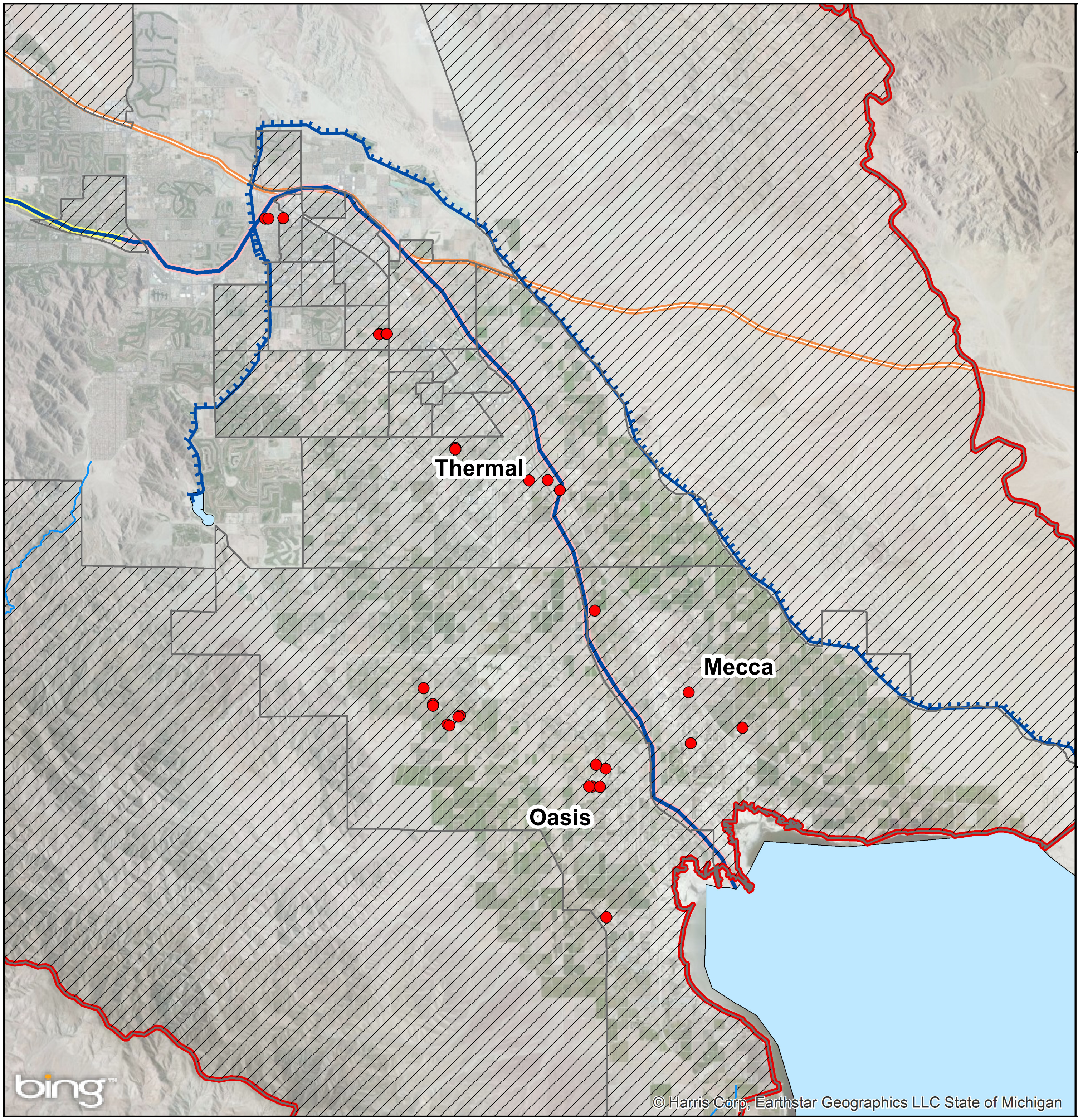
OWTS rehabilitation and replacement projects are optimal in areas that are located at far distances from municipal sewer systems, and in communities where connecting to the municipal sewer system may be too costly due to collection system expansion into remote areas. The purpose of this project was to develop an affordable onsite wastewater treatment option in instances where connecting to the municipal sewer system is not feasible due to location or costs. Affordability of septic rehabilitation may be improved with clustering of nearby communities, and should be considered for future implementation. As a result of feedback from the non-profit partners hired to work on the DAC Outreach Program, it was recommended that a rehabilitation program for OWTSs should target small mobile home parks in the eastern Coachella Valley. The locations of perceived OWTS failures as reported by local DACs in the eastern Coachella Valley are shown in Figure 1-1.

The purpose of this project is to address OWTS failure issues in eastern Coachella Valley through the following steps:

- Step 1: Work with the non-governmental organizations (NGOs) to determine representative sites with average conditions that could be considered representative of other DACs in the East Valley and that are ready and willing to participate in an OWTS rehabilitation project.
- Step 2: Conduct soils testing, prepare preliminary engineering reports, and prepare design plans for the representative sites. The work performed would determine: 1) how to design or rehabilitate existing onsite wastewater systems to achieve code compliance and 2) what onsite wastewater treatment systems could be installed to address public health concerns.
- Step 3: Identify operations and maintenance requirements and prepare a maintenance schedule that outlines and describes actions that need to occur on a regular basis to operate and maintain functioning onsite wastewater treatment systems.
- Step 4: Prepare the project report. Given the goal of replicating this process throughout other DACs, the work performed under this project would not only be site-specific, but would also indicate potential rehabilitation and treatment options for a range of onsite conditions. The report would also consider emerging technologies and advanced treatment for OWTSs in order to provide nutrient removal.

Perceived OWTS Issues from Opinion Survey

Figure 1-1



Disadvantaged communities are considered those who earned less than $48,706 (80% Statewide MHI)

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Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

1.2 Scope of Study

RMC teamed with Pueblo Unido Community Development Corporation (PUCDC), a local non-profit organization that responds to the needs of rural communities in the eastern Coachella Valley. PUCDC has provided much-needed assistance during development of community projects, including design and permitting assistance for small mobile home parks that rely on OWTS for wastewater treatment and disposal.

The scope of this study includes:

- **Identify Representative DAC Sites** – PUCDC helped identify four DAC sites for assistance with evaluation and design of a new or rehabilitated OWTS. The sites were known by PUCDC to have unpermitted and/or failing OWTSs through their work with the Riverside County Department of Environmental Health (Riverside County DEH). The sites are all small mobile home parks that are very common throughout the eastern Coachella Valley, and are therefore considered representative of other sites.
- **Soils Testing** – Soils testing and reports were prepared by Earth Systems Southwest for three of the identified DAC sites. One of the DAC sites had a recent soils report on file with PUCDC and did not require additional soil-related work. Soils testing and reporting was performed in accordance with the requirements of Riverside County DEH.
- **Preparation of OWTS Design Plans** – PUCDC prepared the design drawings with review and assistance from RMC as the engineer and review by Earth Systems Southwest in accordance with Riverside County DEH requirements.
- **Identify Permitting Requirements** – RMC contacted Riverside County and worked with PUCDC to develop a flow chart and description of permitting requirements for DAC communities in the eastern Coachella Valley.
- **Evaluation of Treatment Alternatives** – RMC identified and evaluated various OWTS treatment and disposal alternatives and identified which conditions would merit the use of various technologies. As part of this task, RMC included a brief discussion of larger centralized and de-centralized wastewater collection and treatment facilities, although these types of systems are not considered a near-term solution for the project Study Area. This task also included identifying examples of emerging technologies for OWTSs to provide further treatment such as nutrient removal. RMC evaluated the applicability of these technologies to the Study Area based on the benefits these systems provide.
- **Prepare a Project Report** - This report is meant to provide a road map for an OWTS rehabilitation program that can be replicated by local non-governmental organizations and other interested parties. The study articulates appropriate environmental conditions, sizing procedures, preferred retrofit/rehabilitation techniques and recommendations, and maintenance protocols for OWTS. Appendix C of this report includes a work plan in a style consistent with the 2012 IRWM Grant Program – Proposal Solicitation Package for Round 2 Implementation Grants. This work plan is designed as a template for a regional septic rehabilitation program to be included in future IRWM grant applications, and provides information about the work that was completed for this report so that interested entities can potentially replicate this process to rehabilitate other OWTS in the Coachella Valley.

1.3 Grant Funding

This study is part of the Coachella Valley Disadvantaged Community Outreach Program (DAC Outreach Program), which was funded through a grant from the California Department of Water Resources. Due to limited participation by DACs in IRWM planning efforts throughout the State of California, DWR provided additional funding via grants to six IRWM regions in the state, including the Coachella Valley.

The purpose of the DAC Outreach Program in the Coachella Valley is to conduct outreach, mapping, project development, and other work to increase DAC involvement in the Coachella Valley IRWM Program and address identified DAC issues and needs. The information collected and the work products prepared for the Coachella Valley DAC Outreach Program will be sent to DWR for input on how to increase DAC participation in statewide IRWM planning efforts.

The Regional Program for Septic System Rehabilitation will also help DACs in the Coachella Valley position for additional funding sources for implementation of OWTS upgrades. One of the issues identified as part of the DAC Outreach Program is that IRWM grants provided by DWR (specifically, Proposition 84 Implementation Grants) are most suitable for construction/implementation projects. The Proposition 84 Implementation Grant applications are rigorous and require a substantial amount of technical information to successfully complete; therefore, projects that have already completed design and engineering work and are closer to implementation are generally more competitive than those that are in more conceptual phases. As such, the Regional Program for Septic System Rehabilitation provides an identified need for DAC projects as this program will get the four representative sites farther along towards implementation (by completing soils testing and design work), and will therefore increase their potential competitiveness for Proposition 84 Implementation Grant funding. In addition, there are other grants available to rural communities such as the USDA Rural Assistance Grants, which are only for construction work and will not cover costs associated with planning, design, and engineering work. Therefore, the Regional Program for Septic System Rehabilitation will also allow the four representative sites analyzed as part of the program to increase their competitiveness for other funding streams such as USDA funding.

2 Study Area and Setting

This chapter provides a description of the Study Area and conditions within the Study Area that have an impact on onsite wastewater treatment, primarily general groundwater and soil conditions. Study Area Description

2.1 Study Area Location

The Coachella Valley lies in the northwestern portion of a great valley, the Salton Trough, which extends from the Gulf of California in Mexico northwesterly to the Cabazon area. The eastern portion of the Coachella Valley IRWM Region is the focus of this study, and is shown in Figure 2-1: Project Study Area.

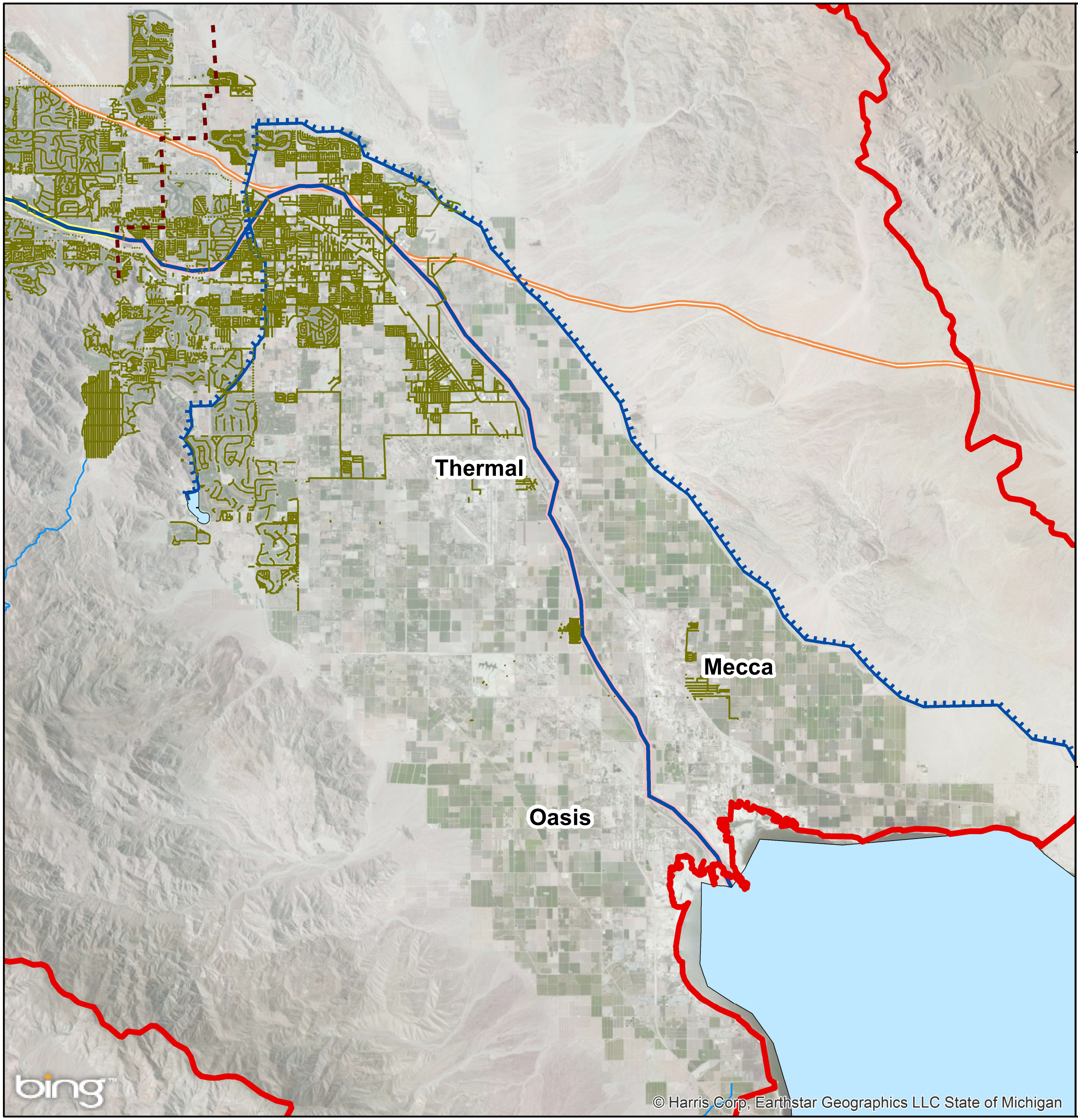
The Study Area is underlain by a series of groundwater basins, the largest of which is the Indio/Whitewater River Sub-Basin. The Coachella Valley is ringed with mountains on three sides. On the north and west sides are the San Bernardino Mountains, San Jacinto, and Santa Rosa, which rise more than 10,000 feet above mean sea level (MSL). To the northeast and east are the Little San Bernardino Mountains, which attain elevations of 5,500 feet above MSL.

The Coachella Valley is geographically divided into the West Valley and the East Valley. The boundary between the East Valley and West Valley extends from Washington Street and Point Happy northeast to the Indio Hills near Jefferson Street. The East Valley is considered the area southeast of the boundary line, and the West Valley is northwest of the boundary line (refer to Figure 2-1: Project Study Area). The geographic divide between East Valley and West Valley is widely used for water resources planning purposes, because the Region’s geology varies between the East Valley and West Valley. The West Valley is generally underlain by coarse-grain sediments that allow surface water to percolate to the Region’s groundwater basins. In contrast, the East Valley is underlain by several impervious clay layers (an aquitard) that impedes groundwater recharge. Section 2.3 includes further information about the Region’s soil and groundwater conditions.

Generally, the West Valley, which includes the cities of Palm Springs, Cathedral City, Rancho Mirage, Indian Wells and Palm Desert, is contained within the service areas of the Mission Springs Water District, the Desert Water Agency, or the Coachella Valley Water District, and residents within this area receive municipal water and wastewater services. In general the East Valley, which includes the cities of Coachella, Indio, and La Quinta and the communities of Mecca, Oasis and Thermal (located within Riverside County), is lower in population density. The unincorporated communities that are located within Riverside County are also rural in nature and include a high proportion of the Region’s agricultural industry. Portions of the East Valley are provided water and wastewater services by three of the five CVRWMG agencies, including the Coachella Valley Water District, the Indio Water Authority, the Coachella Water Authority, and an additional agency, the Valley Sanitary District. The East Valley communities that are not located within incorporated cities or within the service areas of the aforementioned agencies generally do not receive municipal water or wastewater services due to their geographic distance from existing water and wastewater infrastructure. Figure 2-1: Project Study Area, which shows the Study Area, also shows that there is a particular lack of existing wastewater infrastructure within the East Valley communities of Mecca, Oasis and Thermal.

Project Study Area

Figure 2-1



Division between West and East Valley

Wastewater Pipelines

Colorado River Aqueduct

Coachella and All American Canals

Whitewater River Storm Water Channel

Coachella Valley Storm Water Channel

Highways

Water Bodies

Coachella Valley IRWM Region

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Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

2.2 General Soil and Groundwater Conditions

The Coachella Valley Groundwater Basin encompasses much of the Coachella Valley floor. Geologic faults and structures divide the basin into five sub-basins. Two of the sub-basins, Whitewater River (also referred to as Indio) and Desert Hot Springs, fall within the project Study Area. The locations of these groundwater sub-basins are shown in Figure 2-2: Groundwater Basins in Coachella Valley Study Area.

The Indio/Whitewater River Sub-basin is the largest groundwater sub-basin in the Coachella Valley. The sub-basin has a storage capacity of approximately 30 million acre-feet (AF) (DWR, 1964). The geology of the basin varies with coarse-grained sediments located in the vicinity of Whitewater and Palm Springs (West Valley), gradually transitioning to fine-grained sediments near the Salton Sea (East Valley).

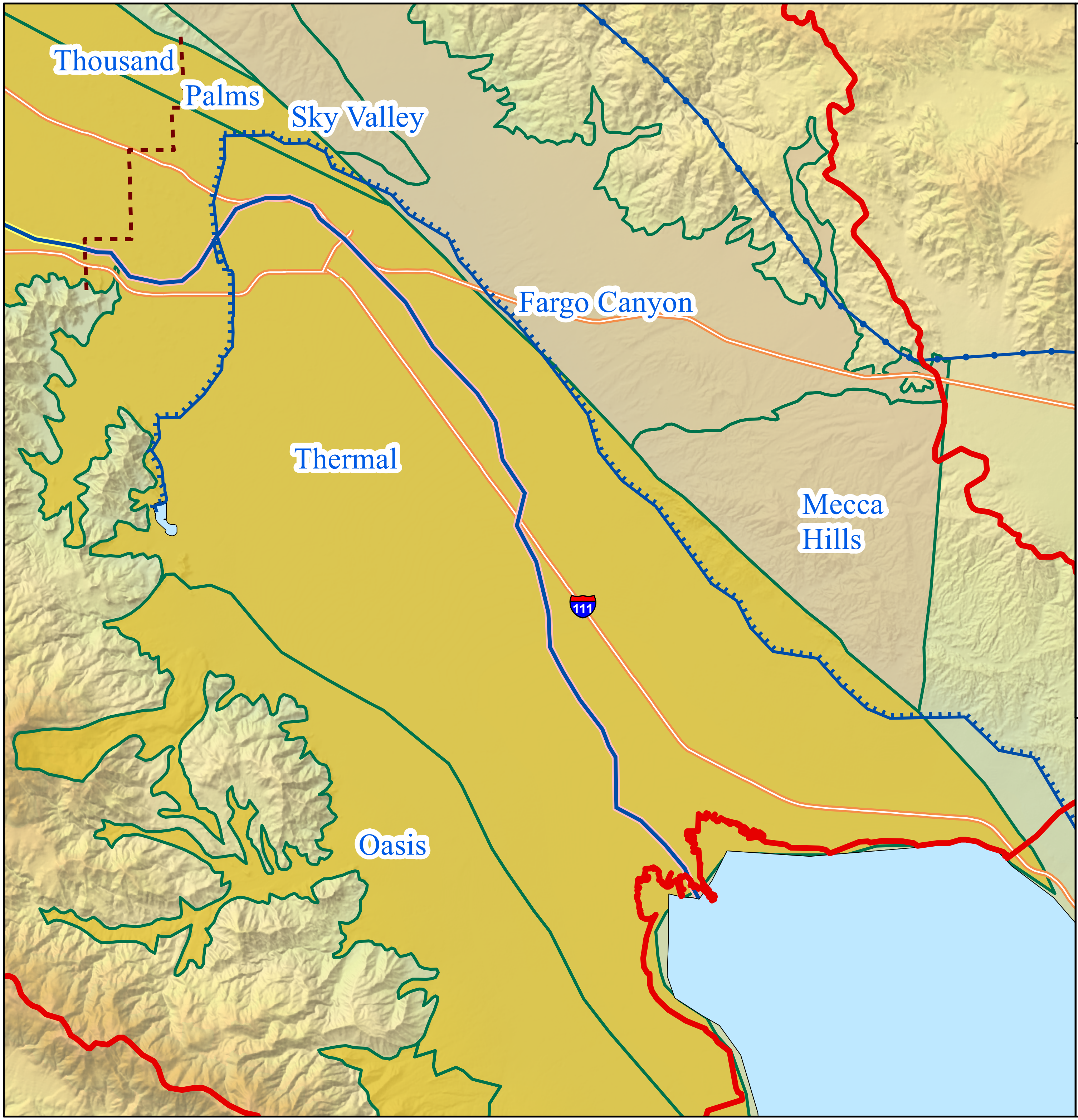
Due to high percolation potential in the West Valley, discharges from OWTSs in the West Valley area may reach the underlying groundwater basin and could potentially impact groundwater quality. Due to nitrate and bacteria content within OWTS discharges, septic discharge is highly regulated in several areas in the West Valley. According to the last *Water Quality Control Plan for the Colorado River Basin* (Basin Plan) adopted by Colorado River Basin Regional Water Quality Control Board (RWQCB), OWTS discharge restrictions have been placed in specific locations within the West Valley.

In the East Valley, several impervious silt and clay layers (collectively referred to as an aquitard) lie between the ground surface and the main groundwater aquifer. Formed by remnants of ancient lake beds, this aquitard layer generally impedes percolation into groundwater aquifers in the East Valley. As a result, for portions of the East Valley underlain by the aquitard, discharges from OWTS do not likely make contact with groundwater in the deep aquifers, and the Basin Plan does not include discharge restrictions within the East Valley. There are portions of the East Valley that have permeable soil; within these areas OWTS discharges may flow to the underlying groundwater basin. Even with the presence of the aquitard, surface water in the East Valley that percolates into the shallow groundwater aquifer ultimately flows to agricultural drains and potentially to the Salton Sea. Although there is no site-specific water quality data for the existing OWTSs, it is suspected that insufficiently treated wastewater from the OWTSs percolates to and potentially contaminates the underlying shallow groundwater aquifer. The presence of a high groundwater table and poor percolation rates in the East Valley can also negatively impact the operation of the OWTSs, and may result in the subsurface flow of water from the septic system to adjacent agricultural drains.

The general soil and groundwater conditions of the West Valley compared to the East Valley are another reason that the Study Area only focused on OWTS rehabilitation and retrofitting options in the East Valley. Given Basin Plan restrictions on OWTS in the West Valley, rehabilitating OWTS in this area was not considered as part of this study. However; this study did consider the potential to implement additional treatment methods, which would be most beneficial in areas of the West Valley as they can reduce nitrate levels and other constituents from the OWTS waste byproducts (refer to Section 3.2 of this report for more information).

Groundwater Basins in Study Area

Figure 2-2



Source: DWR Bulletin 118 & 2010 Coachella Valley Water Management Plan

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\03_GIS\MXD\Figure Updates_Public Draft
Date Updated: November 4, 2013
Department: RMC Water & Environment

3 Wastewater Treatment Alternatives

This chapter presents wastewater treatment options for rural residential communities, such as those located within the eastern Coachella Valley. Countless variations of wastewater collection and treatment technologies are available on the marketplace today; therefore, every possible wastewater treatment option cannot be included in this report. This report focuses on options which are most applicable to the Study Area.

3.1 Conventional OWTS

Installation of conventional OWTS or upgrades to existing systems in remote rural communities is often the most cost-effective and preferred option for addressing existing wastewater treatment issues. This is because OWTSs are effective and simple if properly designed and maintained, and are therefore a good option in remote areas where connection to a larger municipal system is not feasible. Conventional OWTSs are described below.

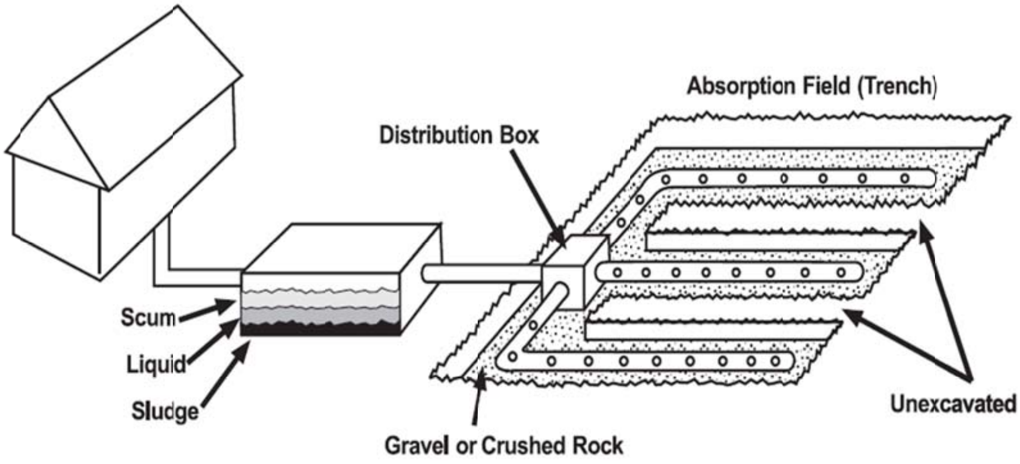
3.1.1 Description

Conventional OWTSs have the ability to remove suspended solids, floatable grease and scum, nutrients, and pathogens from wastewater discharges. The typical OWTS consists of two main components:

- Septic tank
- Disposal system (including the soil)

A typical OWTS is shown in Figure 3-1. The particular system shown in the figure below has a soil absorption field Surface Wastewater Infiltration System (SWIS) to dispose of septic tank effluent. Other septic tank SWIS options are available and are sometimes required based on site restrictions. Alternative disposal systems that do not discharge to the soil are also available.

Figure 3-1: Conventional Onsite Wastewater Treatment System



Source: EPA OWTS Manual 2002

Septic tanks remove most settleable and floatable material and function as an anaerobic bioreactor that promotes partial digestion of retained organic matter. Septic tank effluent, which can contain significant concentrations of pathogens and nutrients, is discharged to soil, sand, or other media absorption fields for further treatment through biological processes, adsorption, filtration, and infiltration by the underlying soils.

Conventional OWTSs are passive, effective, and inexpensive treatment systems due to the assimilative capacity of many soils, which can transform and recycle most pollutants found in domestic wastewater. Soil characteristics, lot size, and the proximity of sensitive water resources affect the use of conventional OWTS.

3.1.2 Regulations

Since 2005, septic system discharges have been gradually restricted in portions of the West Valley to protect deep groundwater aquifers from potential contamination. The aquitard protects the deep groundwater aquifers in the East Valley from potential contamination, and the Basin Plan does not restrict OWTS usage in the East Valley. According to current regulations, new septic systems that generate more than 5,000 gallons per day (gpd) from a single lot are required to apply for general discharge permit from the RWQCB. Smaller users with projected sewer flows lower than 5,000 gpd may apply for Conditional Use Permits (CUPs) according to guidelines established by Riverside County.

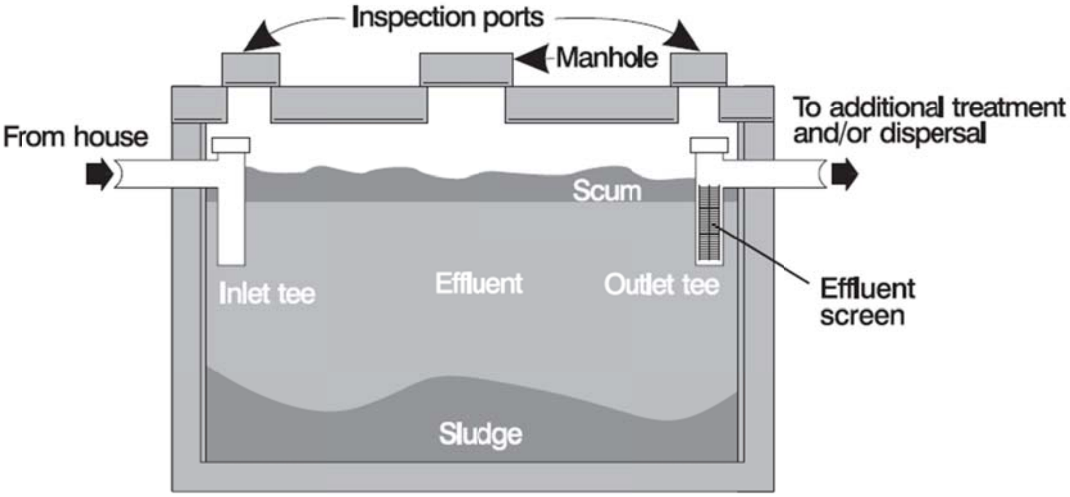
Riverside County continually updates their Technical Guidance Manual for Onsite Wastewater Treatment Systems according to the best available knowledge and technology. As a result, existing systems in the Study Area may not be designed according to the most current guidance manual available. Despite this fact, all existing OWTSs do not necessarily need to be rehabilitated, and rehabilitation of all of the existing systems may be cost-prohibitive and unnecessary. As a first step, OWTS owners should hire a C-42 State-licensed plumber to evaluate their existing systems for proper functionality. Systems that are determined to be operating under normal conditions can be certified as existing subsurface disposal systems. Riverside County may approve properly certified existing systems during the CUP application process based on performance, even though their configuration may be slightly different from the most current design requirements.

The most recent update to the Basin Plan will incorporate the 2012 OWTS Policy from the State Water Resources Control Board (State Board), which has a more stringent guideline on OWTS usage. The State Board will give an initial five-year waiver period to local jurisdictions to incorporate the OWTS Policy into local codes; this waiver period expires in May of 2018. Currently, Riverside County recommends following the existing design manual for implementing this proposed septic rehabilitation program, because the Region’s local regulations regarding OWTS will not change for five years. As long as existing facilities are properly functional at the time the OWTS Policy is implemented, the existing OWTS will be in automatic compliance with the new OWTS Policy as properly functional existing systems. Specific guidelines regarding conventional septic system design is discussed in following sections.

3.1.3 Septic Tank

The septic tank is the most commonly used wastewater pretreatment unit for onsite wastewater systems. The septic tank is connected to the house sewer main and is the first treatment process in an OWTS. The septic tank provides primary treatment inside a covered, watertight vessel. In addition to primary treatment, the septic tank stores and partially digests settled and floating organic solids in sludge and scum layers. The process can reduce sludge and scum volumes by as much as 40 percent. At the same time, the septic tank conditions the wastewater by breaking down organic molecules for subsequent treatment in the soil or by other unit processes. Gasses generated from digestion of the organic matter are vented back through the building sewer and out of the house plumbing vent. Inlet structures are designed to limit short-circuiting of incoming wastewater across the tank to the outlet, while outlet structures retain the sludge and scum layers in the tank and draw effluent only from the zone between the sludge and scum layers. The outlet should be fitted with an effluent screen to retain larger solids that might be carried in the effluent to the SWIS, where it could contribute to clogging and eventual system failure. Risers are provided to allow access for inspection and maintenance. See Figure 3-2 for a cross section of a typical septic tank.

Figure 3-2: Typical Single Compartment Septic Tank



Source:
National Small Flows Clearinghouse (NSFC). 2000. Small Flows Quarterly. Vol.1, No.4, Summer 2000. National Environmental Service Center, West Virginia University. Morgantown,WV.

Riverside County has specific requirements for septic tanks, including:

1. Risers and effluent filters must be provided that meet the requirements defined in Riverside County Ordinance Number 650.
2. A minimum of two risers must be provided, one on the influent side and the other on the effluent side. The risers should extend to within 4 inches of the final grade, must be sealed off with an approved lid, and be accessible from the ground surface.
3. Liquid capacity shall conform to the Uniform Plumbing Code based on the number of bedrooms and the estimated waste/sewage design flow rate or the number of plumbing fixture units, whichever is greater. Sizes for typical septic tanks are presented below in Table 3-1.

Table 3-1: Typical Septic Tank Liquid Volume Requirements

Septic Tank Sizes	Uniform Plumbing Code (gallons)
Minimum	750
1-2 Bedrooms	750
3 Bedrooms	1,000
4 Bedrooms	1,200
5 Bedrooms	1,500
Additional Bedrooms (each)	Add 150

Water-tightness of the septic tank is critical to the performance of the entire OWTS. Infiltration of clear water to the tank from the building’s storm sewer or groundwater adds to the hydraulic load of the system and can upset the treatment processes. Exfiltration of water from the septic tank can threaten groundwater quality with partially treated wastewater if the liquid level is lowered below the outlet baffle and the outlet baffle becomes fouled with scum.

3.1.4 Disposal Systems

Disposal systems can be divided into two main categories:

- Subsurface water infiltration systems (SWIS), which discharge water to the surrounding soil, and
- Systems that do not discharge to the surrounding soil

Riverside County DEH currently allows systems that dispose of effluent through evapotranspiration (plant uptake) where SWIS systems are not feasible due to site conditions. Evapotranspiration systems are discussed as alternatives to SWIS below. Many other types of disposal systems are available, but the systems below are the most applicable to the Study Area at this time and are currently allowed by Riverside County DEH.

Subsurface Wastewater Infiltration System (SWIS)

There are many different types of SWISs as disposal systems for septic tank effluent. Systems which have been permitted in Riverside County are discussed in this section and include soil absorption fields, seepage pits, and mound systems. The purpose of this part of the OWTS is to disperse primary treated effluent from the septic tank to the soil for further treatment.

SWIS applications differ in their geometry and location in the soil profile (vertical location with respect to the ground surface). Trenches have a large length-to-width ratio, while seepage pits are deep, circular excavations that rely almost completely on sidewall infiltration. Three types of SWISs that are permitted in Riverside County are presented below.

SWISs disperse septic tank effluent to the soil for further treatment. Effluent is transported from the infiltration system through three zones in the soil. These three soil zones are described below:

- Infiltration zone: The infiltration zone is a transition zone between the disposal system and the soil interface. The infiltration zone is only a few centimeters thick, is the most biologically active zone, and is often referred to as the "biomat." Carbon-rich material in the wastewater is quickly degraded in this zone, and nitrification occurs immediately below this zone if sufficient oxygen is present.
- Vadose zone: The vadose zone is an unsaturated zone beneath the infiltration zone. The vadose zone provides a significant pathway for oxygen diffusion to re-aerate the infiltration zone, and it is also the zone where most absorption reactions occur because the negative moisture potential in the unsaturated zone causes percolating water to flow into the finer pores of the soil, resulting in greater contact with the soil surfaces. Much of the phosphorus and pathogen removal occurs in this zone
- Saturated Zone: Below the vadose zone, the fluid passes through the saturated zone. In this zone treated wastewater can be carried from the site by fluid movement.

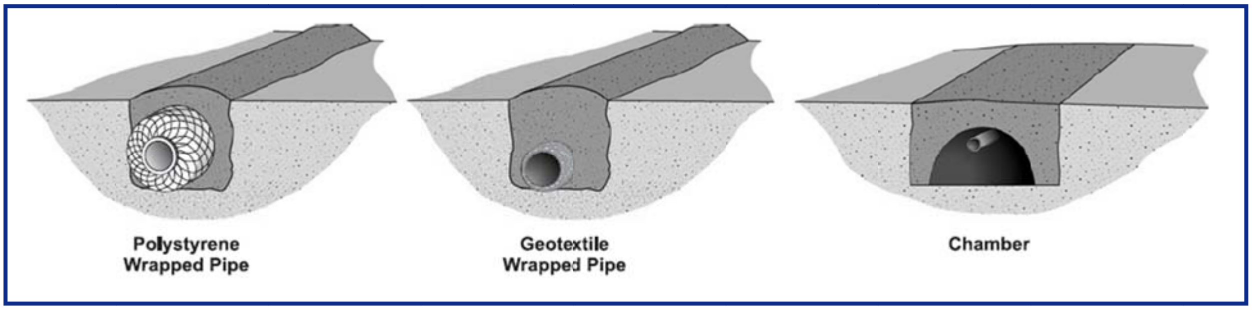
Soil Absorption Field or Leach Field

In soil absorption fields, infiltration surfaces may be created in natural soil or imported fill material. Most traditional systems are constructed below ground surface in natural soil. In some instances, a restrictive (impermeable) soil type above a more permeable soil type may be removed during the time of excavation.

The performance of conventional systems relies primarily on the treatment of the wastewater effluent in the soil horizon below the dispersal and infiltration components of the SWIS. SWIS are the most commonly used systems for the treatment and dispersal of onsite wastewater. As the wastewater infiltrates and percolates through the soil, it is treated through a variety of physical, chemical, and biochemical processes and reactions. The primary infiltrative surface is the bottom of the buried excavations. Perforated pipe is installed on top of the infiltrative surface to distribute the wastewater over the infiltration surface. A porous medium, typically gravel or crushed rock, is placed in the excavation below and around the distribution piping to support the pipe and spread the localized flow from the distribution pipes across the excavation cavity. However, other gravel-less or "aggregate-free" system components may be substituted (refer to Figure 3-3: Various Gravel-less Systems). Natural soil is typically used for backfilling, and the surface of the backfill is usually slightly mounded and seeded with grass.

A leaching chamber is one of the commonly used "gravel-less" systems for a leach field (Figure 3-3: Various Gravel-less Systems). These systems can be installed with small equipment and in hand-dug trenches where conventional gravel systems would not be possible. Leaching chambers have two key functions: to disperse the effluent from septic tanks and to distribute flow throughout the trenches. A typical leaching chamber consists of several high-density polyethylene injection-molded arch-shaped chamber segments. There are gravel-less systems that have drain field chambers with no bottoms and plastic chamber sidewalls, available in a variety of shapes and sizes.

Figure 3-3: Various Gravel-less Systems



Source:
National Small Flows Clearinghouse (NSFC). 2001. Pipeline. Vol.12, No.3, Summer 2001. National Environmental Service Center, West Virginia University. Morgantown,WV.

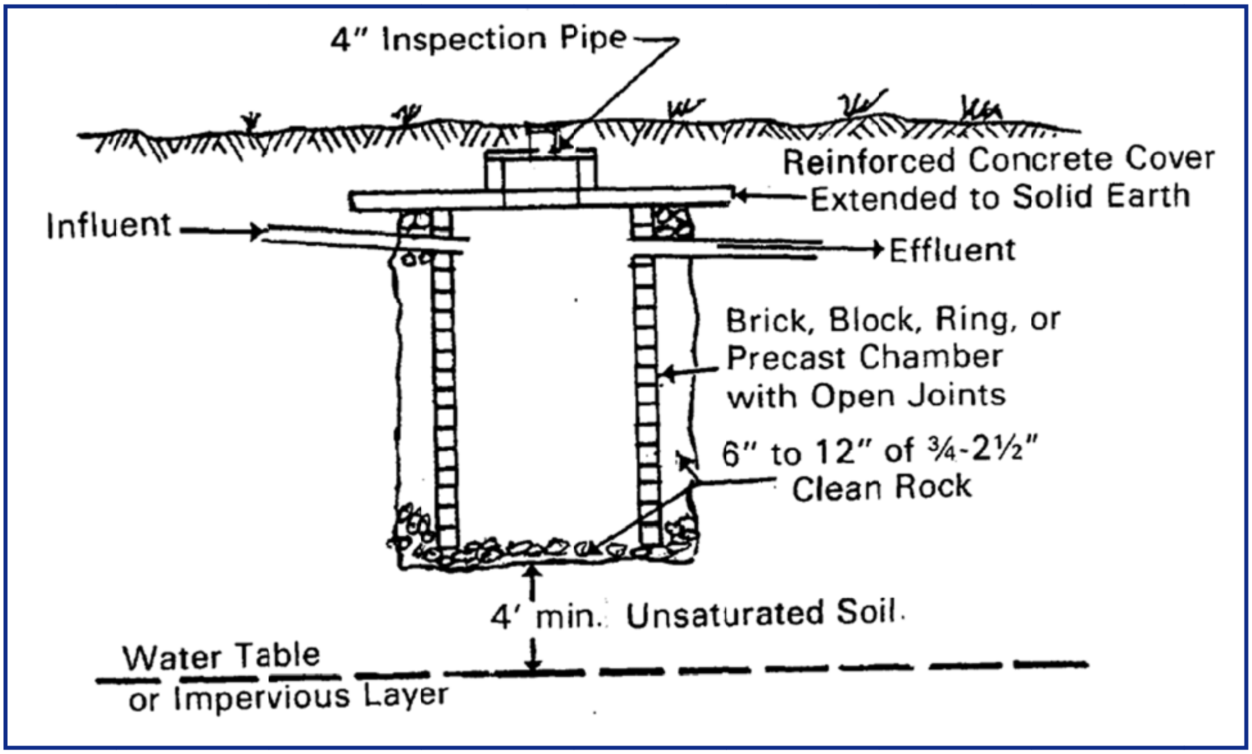
Riverside County has specific requirements for leach field systems. The guideline specifies the width of the leach fields, minimum separation between leach lines and minimum depth of soils between the bottom of the leach field and high groundwater level. Key requirements include:

- A minimum of 5 feet between the high groundwater level and the leach lines, except for some areas in the Coachella Valley where a minimum of 4 feet separation from groundwater is allowed.
- A minimum percolation rate for leach fields of 1 inch/hour (see Section 3.5 on soils, below).
- The width of the leach fields must be equal to 3 feet, with 4 feet minimum separation by sufficient natural and undisturbed soil between leach lines.
- Leach chamber must be laid level and the end of the line must be capped.

Seepage Pits

Seepage pits are deep excavations used for subsurface disposal of septic tank effluent. Covered porous-walled chambers are placed in the excavation chamber and surrounded by gravel or crushed rock. Wastewater enters the chamber where it is stored until it seeps out through the chamber wall and infiltrates the sidewall of the excavation. Seepage pits are used where land area is too limited for trench or the upper 3 to 4 feet of the soil profile is underlain by a more permeable unsaturated soil material of great depth. Site condition is similar to leach field except that soils with percolation rates slower than 30 minutes per inch are generally excluded. Seepage pits also require a minimum of 10 feet of soil between the groundwater and the bottom of a seepage pit and are therefore not often applicable in the project area. An example of a seepage pit is shown in Figure 3-4: Seepage Pit

Figure 3-4: Seepage Pit



Source: EPA OWTS Design Manual 1980

Riverside County has specific requirements for seepage pit systems. Those requirements include:

- A minimum of 10 feet between the high groundwater level and the leach lines.
- A minimum percolation rate for leach fields of 1.1 gallons per square foot of sidewall per day (see Section 3.5 on soils, below).
- The diameter of the seepage pit should be no less than 5 feet. The pit shall be lined with approved materials listed in Riverside County OWTS design manual.
- The sidewall should have a minimum of 10 feet below the inlet, and a maximum total depth of 40 feet.

Mound System

Placement of a SWIS infiltration surface may be below, at, or above the existing ground surface. Actual placement relative to the original soil profile at the site is determined by desired separation from a limiting condition. The mound system was originally developed to overcome problems with low-permeability soils (with slow permeation) and high water tables in rural areas. Mound systems are soil absorption systems that are elevated above the natural soil surface in a suitable fill material. The purpose of the design is to overcome site restrictions that prohibit the use of conventional SWISs. Such restrictions are:

1. Slowly permeable soils

2. Shallow permeable soils over porous bedrock
3. Permeable soils with high water tables

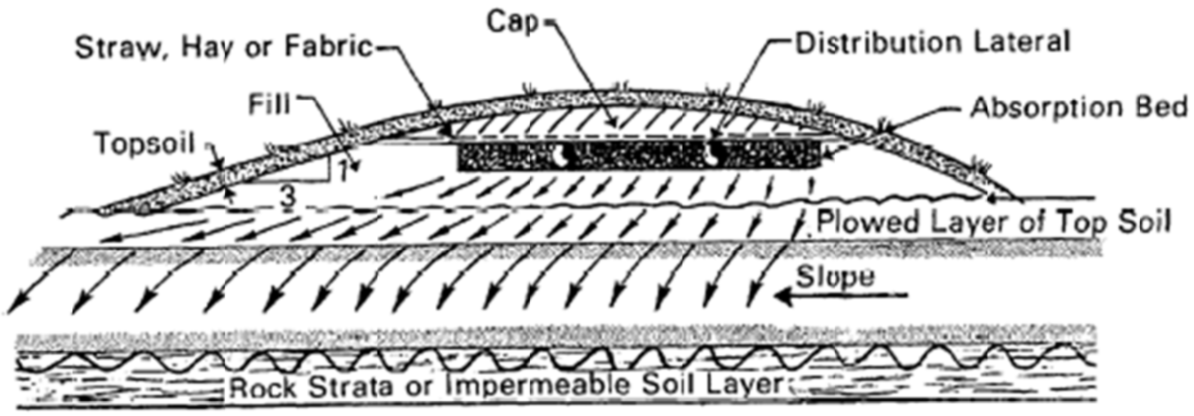
In slowly permeable soils, the mound serves to improve absorption of the effluent by utilizing the more permeable topsoil and eliminate construction in the wetter and more slowly permeable sub-soil. In permeable soils with high water tables (insufficient depth to groundwater) or over porous bedrock, the fill material in the mound provides the necessary treatment of the wastewater without relying on the natural soil below.

The mound system consists of:

1. A suitable fill material
2. An absorption area
3. A distribution network
4. A cap
5. Top soil

In a mound system, the effluent is pumped or siphoned into the absorption area through a distribution network located in the upper part of the coarse aggregate. Effluent passes through the aggregate and infiltrates the fill material. Treatment of the wastewater occurs as it passes through the fill material and the unsaturated zone of the natural soil. The cap sheds precipitation, and retains moisture for a good vegetative cover.

Figure 3-5: Typical Mound System



(a) Cross Section of a Mound System for Slowly Permeable Soil on a Sloping Site.

Source: EPA OWTS Design Manual 1980

The Riverside County Department of Environmental Health will allow mound systems on a limited basis. The only situation where a mound system will be approved is if the groundwater level is very close to the ground surface. Due to the relative small number of mound systems used in Riverside County, this type of system is evaluated case by case. Formal guidelines for design requirements are not provided in the OWTS manual developed by Riverside County.

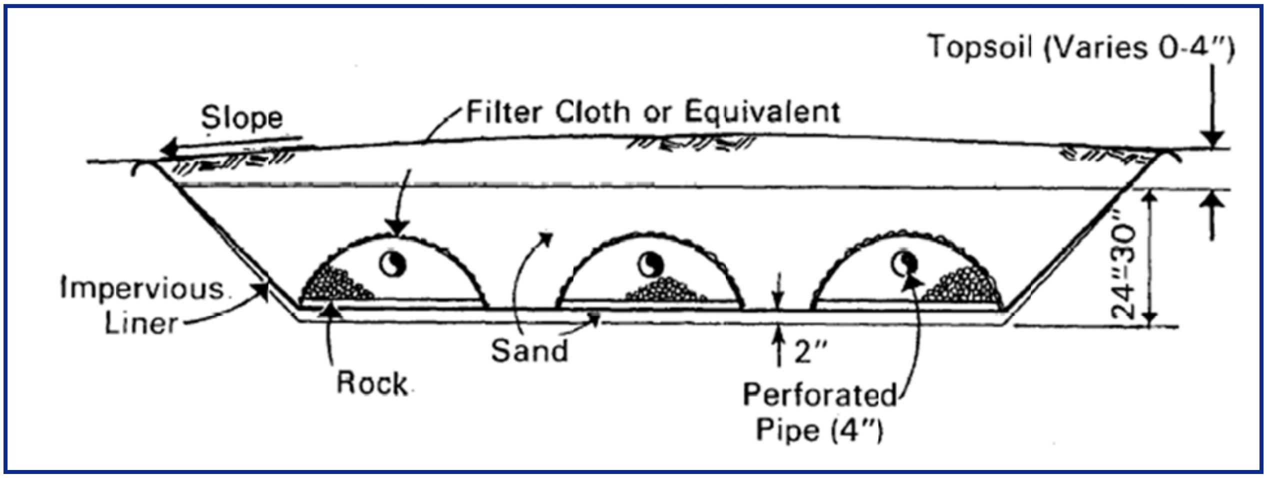
Alternative Disposal Methods (Evapotranspiration System)

A "last resort" solution is to dispose of wastewater to the atmosphere so that discharge to surface or groundwater is reduced or eliminated. An evapotranspiration (ET) system normally consists of a sand bed with an impermeable liner and effluent distribution piping. The surface of the sand bed may be planted with vegetation. An ET system functions by raising the effluent to the upper portion of the bed by capillary action in the sand, and then evaporating it to the atmosphere. In addition, vegetation transports water from the root zone to the leaves, where it is transpired. The design needs of ET systems are based on a correlation between available pan evaporation data and observed ET rates.

ET disposal systems are primarily used where geological limitations prevent the use of subsurface disposal, and where discharge to surface water is not permitted or feasible. The geological conditions that tend to favor the use of ET systems include very shallow soil mantle, high groundwater, relatively impermeable soils, or fractured bedrock. As with other disposal methods that require area-intensive construction, the use of ET systems can be constrained by limited land availability and site topography. Based on experience to date with ET disposal for year-around single-family homes, approximately 4,000 to 6000 square feet of available land is typically required.

By far the most significant constraint on the use of ET systems is climatic conditions. The evaporation rate is controlled primarily by climatic factors such as precipitation, wind speed, humidity, solar radiation, and temperature. Recent studies indicate that essentially all of the precipitation that falls on an ET bed infiltrates into the bed and becomes part of the hydraulic load that requires evaporation.

Figure 3-6: Typical Evapotranspiration System



Source: EPA OWTS Design Manual 1980

The Riverside County Department of Environmental Health will allow ET systems on a limited basis. The only situation where an ET system will be approved is if the groundwater level is very close to the ground surface. Due to the relative small number of ET systems used in Riverside County, this type of system is evaluated case by case. Formal guidelines for design requirements are not provided in the OWTS manual developed by Riverside County.

3.1.5 Site Conditions and Applicability of Disposal Systems

Soils testing conducted during the planning stage of OWTS design helps to select the appropriate disposal method. Riverside County requires a minimum of one percolation test and one 15-foot deep boring on each lot within the proposed site. Soil test results are generally valid for one year. If results were obtained longer than one year prior to design, a soil engineer needs to re-assess the site for significant changes in soil conditions, and submit a letter of update to Riverside County. Percolation tests and borings need to be conducted according to test procedures and details provide in Riverside County OWTS Design Manual.

Riverside County requires that soil in the area of the OWTS shall not have a percolation rate slower than 60 minutes per inch for absorption fields or 1.1 gallons per square foot of sidewall per day for seepage pits.

If the percolation rates are faster than 5 minutes per inch for leach lines or 10 gallons per square foot per day for seepage pits, the soil depths required must contain at least 10% fines smaller than 0.08 millimeters (fit through a #200 sieve).

If no groundwater is detected in the 15 foot boring, that high groundwater table would not impact OWTS performance according to Riverside County OWTS design manual. Otherwise, additional facts and findings need to be provided to demonstrate that groundwater table will not fluctuate to the point of encroachment. Table 3-2: Selection of OWTS Disposal Methods under Various Site Constraints includes a matrix of general site soil and groundwater conditions and the applicable disposal system that would be appropriate for each condition.

Table 3-2: Selection of OWTS Disposal Methods under Various Site Constraints

Systems	Site Constrains and Applicability								
	Soil Permeability			Depth to Bedrock			Water Table		Small Lot Size
	Rapid	Moderate	Slow	Shallow and Porous	Shallow and Nonporous	Deep	Shallow	Deep	
Leach field	-	Y	-	-	-	Y	-	Y	-
Seepage Pits	-	Y	-	-	-	Y	-	Y	Y
Evapotranspiration	-	Y	Y	Y	Y	-	Y	Y	-
Mound	Y	Y	Y	Y	Y	-	Y	Y	-

Footnotes: Y means system can function effectively with that constraint.

3.1.6 Operations and Maintenance Requirements

Operations and maintenance (O&M) of OWTS is relatively straightforward compared to more complex treatment alternatives. Because the systems are passive, there is no day-to-day operation required. The following are regular O&M requirements for a conventional OWTS:

- **Annual inspection and maintenance:** Including cleaning of the effluent filter or screen, checking sludge and scum accumulations, inspecting for structural soundness, water-tightness, and the condition of the inlet and outlet baffles and screens, and observing the condition of the leach field or disposal system for signs of overloading (such as water ponding). These inspections should not require entering the septic tank, as it is a confined space and entering can be extremely hazardous because of toxic gases and/or insufficient oxygen.
- **Septic tank pumping (every 3-5 years):** Periodic pumping of the septic tank is required to ensure proper system performance and reduce the risk of hydraulic failure. Septic tanks should be pumped when sludge and scum accumulations exceed 30 percent of the tank volume or are encroaching on the inlet and outlet baffle entrances, which, in general is every 3 to 5 years depending on the size of the tank, the number of building occupants, and household appliances and habits. Accumulated sludge and scum material (septage) stored in the tank should be pumped by a certified, licensed, and trained service provider and reused or disposed of in accordance with applicable codes. Most septage in California is treated at publicly owned sewage/wastewater treatment plants. The facilities accepting septage are generally larger municipal wastewater facilities.

3.1.7 Advantages/Disadvantages of Conventional OWTS

Conventional OWTSs are economical and can meet performance requirements in many applications, particularly when connection to a municipal wastewater collection system is infeasible. Conventional systems work well if they are installed in areas with appropriate soils and hydraulic capacities, designed to treat the incoming waste load to meet public health, groundwater, and surface water performance standards, installed properly, and maintained to ensure long-term performance. In most parts of the Study Area, soils are moderately permeable. Therefore the most appropriate SWIS is a leach field for the Study Area. Deep groundwater aquifers are protected from septic discharge impacts by the impermeable strata layer (aquitard). Even though nitrate and bacteria removal of conventional OWTS is lower than advanced systems (see Section 3.2), the combination of septic tank and leach field remains the method of choice for wastewater treatment by many rural communities in the Study Area. .

3.2 Advanced Treatment Options

Onsite nitrogen removal has been well-documented, and common treatment systems include conventional engineered systems as well as proprietary systems. In areas where there is no aquitard (West Valley) and nitrate is a concern, additional add-on components for nitrogen removal could be added to the conventional OWTS. The nitrogen removal treatment units could be connected between the septic tank and disposal system to provide enhanced nitrate removal. The process takes place in two steps: adding nitrifying bacteria to convert the ammonia to nitrate, then reducing the nitrate to nitrogen gas so it can be released to atmosphere.

There are many technologies available for advanced treatment for OWTS. Most systems fall under one of the following three categories: Aerobic treatment units (ATUs), sequencing batch reactor (SBR) or media filters.

All three of these categories of treatment are discussed below and two proprietary examples of the most common system (media filters) are presented. Many different technologies are available on the market, including systems that are combinations of the three main technologies discussed, or that do not fit into these categories altogether. Under the scope of this study, all options for advanced treatment cannot be presented or evaluated. A detailed study of OWTS treatment options is presented in the *Review of Technologies for Onsite Wastewater Treatment in California*, prepared for the California State Water Resources Control Board (UC Davis 2002).

3.2.1 Aerobic Treatment Units

Aerobic treatment units (ATUs) generally consist of two treatment processes, an aerobic reaction process and a clarification process. The aerobic reaction process uses air injection or blowers to aerate the wastewater and support bacterial growth to decompose organic material. This is followed by clarification (settling) to allow solids and bacteria to settle out of the wastewater before it is sent to the disposal system, which is any of the systems described above for conventional OWTS. Some of the solids and bacteria from the clarification process are returned to the aerobic reaction chamber for mixing and additional treatment. The process reduces total suspended solids (TSS) and biochemical oxygen demand (BOD) versus conventional OWTS.

3.2.2 Sequencing Batch Reactors

A sequencing batch reactor (SBR) utilizes the same treatment technology as ATUs but uses a single treatment tank to perform aeration and clarification through cycles. Wastewater enters the tank, then the full tank is aerated for biological treatment. After aeration, mixing halts, and the solids are settled. Effluent is decanted from a clear zone in the tank. The last phase of the cycle is an idle period to promote anaerobic conditions for nitrogen removal. SBRs reduce TSS, BOD and can also reduce nitrogen in effluent.

3.2.3 Media Filters

Likely the most common form of advanced treatment for OWTS, media filters consist of a watertight structure containing media that provides a surface for bacteria to grow. The wastewater is trickled through the media bed and the bacteria growing on the media provide treatment by decomposing organic matter and consuming nutrients in the effluent. The filter is maintained in an aerobic environment which promotes the establishment of beneficial aerobic microorganisms.

The process of identifying nitrogen reduction treatment systems began with reviewing the Environmental Protection Agency’s Environmental Technology Verification (ETV) Program. The ETV Program tested residential nutrient reduction technologies and verified the nitrogen reduction performance of systems designed to treat residential wastewater. Two media filtration companies that were evaluated through the ETV Program are Aquapoint and SeptiTech. These companies provide packaged wastewater treatment systems for residential homes and larger commercial systems. The systems are described in more detail below.

Aquapoint Bioclere

The Aquapoint Bioclere system is a modified trickling filter over a clarifier. Wastewater from the home is treated through the septic tank and flows into the baffled chamber of the Bioclere system. A cross-section view of the Bioclere system is shown in Figure 3-7.

With a Bioclere system, wastewater is passed through a media filter periodically through the day. Oxygen is distributed throughout the filter by a fan that draws external air into the Bioclere systems. Microorganisms living on the media filter (also called biomass) reduce the organic content of the wastewater. Biomass will grow and subsequently slough off the media and fall to the bottom of the clarifier. A sludge pump will pump the settled biomass from the clarifier back to the septic tank. Treated water will flow from the top of the clarifier past a floating sludge separator to a subsurface dispersal field.

To reduce nitrate in the effluent, biological nitrification/denitrification must occur. Nitrification occurs in the Bioclere via the aerobic (oxygenated) environment of the media filter. Denitrification will also occur in the trickling filter because diffused oxygen will be used up by the aerobic outer portion of the biomass and anoxic (lack of oxygen) conditions are created within the biological film. Denitrification is also achieved by re-circulating nitrified wastewater from the Bioclere back to the septic tank.

The Bioclere system is visible from the ground. The top of the clarifier unit rises 1-2 feet above the ground surface and has a vent located a few feet away from the unit. Vegetation can be planted around the treatment units to help camouflage them, but should not interfere with access for maintenance.

SeptiTech

The SeptiTech system is a biological trickling filter. Wastewater from the home is treated through the septic tank and flows by gravity to the SeptiTech system. A pump at the bottom of the treatment tank moves wastewater over the media filter, as shown in Figure 3-8. Biomass growth on the media reduces the organic load of the wastewater as well as performs nitrification/denitrification to remove nitrogen. Solids that settle at the bottom of the tank are pumped back to the septic tank. Similar to the Bioclere system, nitrified wastewater is pumped back to the septic tank for denitrification.

The SeptiTech system is hardly visible from the surface. Both the septic tank and treatment tank are completely buried with only access hatches reaching the ground surface. The treatment system can be camouflaged with vegetation, similarly to the Bioclere system. An air vent will be required, which can be located next to the house or another structure.

Figure 3-7: Cross-Section View of a Bioclere System

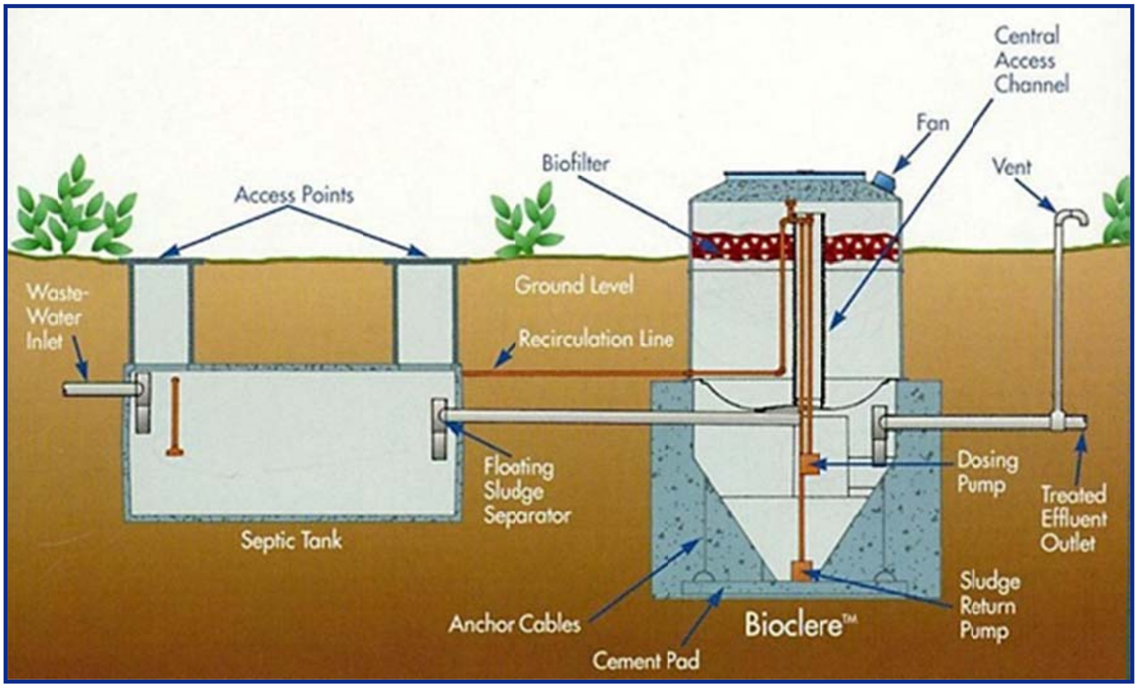
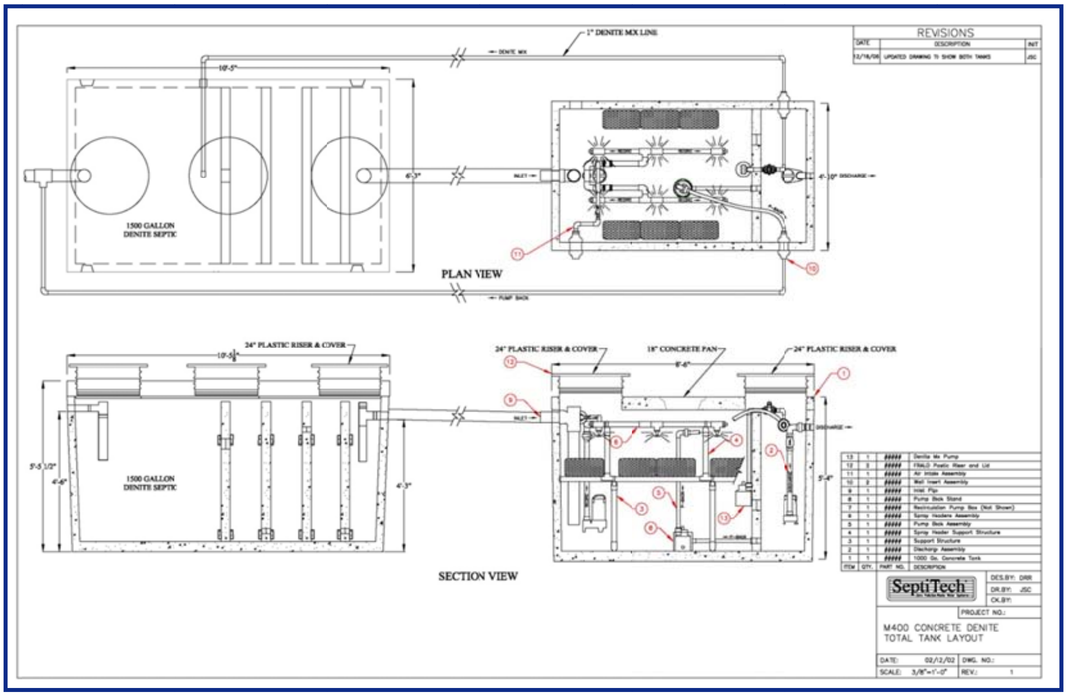


Figure 3-8: Schematic of a SeptiTech System



3.2.4 Applicability of Advanced Treatment

The nitrogen removal units are very effective in removing residual nitrogen content in wastewater. Commercial flows and residential flows from larger communities usually have high nitrogen concentrations and could potentially cause groundwater contamination in drinking water aquifers. The groundwater in the Study Area is isolated by the aquitard, and thus protected from potential nitrate contamination from OWTS discharges. Therefore, additional nitrogen removal processes are not required for the specific OWTS evaluated in this study. These technologies may be more applicable to areas of the West Valley, and could become applicable to areas within the East Valley in the future.

3.2.5 Operations and Maintenance

Annual service agreements can be made with manufacturers to provide maintenance to treatment systems. Manufacturer's representatives would also respond to alarms and address and other problems that arise. Most systems require electricity for pumps or aeration equipment, which is paid for by the homeowner. In addition, the standard operations and maintenance for conventional OWTS systems apply (inspection of the septic tank and regular pumping).

3.2.6 Advantages and Disadvantages

The alternative systems offer increased treatment capacity for higher biological oxygen demand (BOD) and nitrogen content. However, these added benefits also require more complicated maintenance programs for the OWTS. Incorporating additional treatment units will also increase the capital investment of people implementing the OWTS, which for purposes of this study are disadvantaged community members. Furthermore, the community members may not have the adequate training or budget to properly maintain these systems since the mechanical parts include various fans and pumps, which need additional inspection by an experienced professional. The costs from electricity required to run these systems year-round may increase the economic burden placed on those DACs implementing the OWTS. In conclusion, since Riverside County does not currently require additional nitrate removal treatment for the East Valley, no additional treatment needs to be added to the conventional OWTS analyzed for this project.

3.3 Decentralized Treatment

Decentralized systems are satellite collection and treatment systems that serve medium-sized communities with approximately 100 to 1,000 units. Because of the larger size, more constant flow conditions, and increased solid load of decentralized systems compared to singular OWTSs, more advanced technologies could be implemented for these systems. Some examples include sand filters, and small packaged mechanical treatment plants. These systems provide a higher level of treatment, which can be customized to provide a desired water quality and can have disinfection capabilities. These systems are often permitted to discharge to waterways through an NPDES permit, or could be designed to provide tertiary treated recycled water for irrigation or industrial use.

Decentralized treatment technology would be better-suited for clustered mobile home parks that could be grouped into a larger community. As communities grow, decentralized, clustered systems become more feasible and could be cost-effective compared to building and maintaining individual septic tanks.

Decentralized treatment is not considered a viable alternative for the Study Area at this time, because the disadvantaged communities included in this study usually have less than 20 units per community. Because of the limited number of units, the design flow generated will fall under the optimal design flow for packaged decentralized treatment facilities. That being said, if population and housing density increase in the area, several adjacent disadvantaged communities may be clustered into a small group and will then be able to generate the amount of flows that could best utilize the advantage of decentralized treatment systems.

3.4 Centralized Treatment

Centralized systems are wastewater treatment plants (WWTPs) operated by local agencies. These treatment plants collect large sewer flows from the districts' service areas through wastewater collection systems. Disadvantaged communities need to be connected to these collection systems to use centralized treatment.

The closest wastewater treatment facilities to the Study Area are CVWD’s Water Reclamation Plant (WRP)-4 Thermal (Mid Valley) and Salton Community Services District’s Desert Shores WWTP south. Other wastewater treatment facilities in the Study Area include the Salton City Wastewater Treatment Facility (WWTF), CVWD’s WRP-1, and CVWD’s WRP-2. The locations of these treatment plants are shown in Figure 3-9. The distance between the treatment facilities and the specific sites included in the Study Area ranges from 2 miles to 10 miles. The study conducted for a separate DAC Project in the 2014 Coachella Valley IRWM Plan Volume II, the *Public Utility Connection Opportunities in Disadvantaged Communities* (refer to Appendix VII-G of the 2014 Coachella Valley IRWM Plan Volume II) defined projects as “low feasibility” if they were low in population density and further than 0.5 miles from existing infrastructure. The “low feasibility” sites were deemed as such due to the low cost-effectiveness of connecting few users to distant infrastructure. Furthermore, connecting to existing infrastructure in the East Valley tends to be less cost-effective due to elevation. Given the flat nature of the East Valley (in general), water and wastewater systems require the construction and implementation of additional lift or pumping facilities to move water and wastewater to and from treatment facilities and customers. In the future, the centralized treatment alternative may become more feasible as the agricultural population grows to develop larger, more developed community clusters in the Study Area.

Centralized Wastewater Treatment Facilities

Figure 3-9

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COACHELLA VALLEY IRWMP

File Name: Fig 2-4_Wastewater and Recycled Water.mxd
File Location: L:\Projects GIS\0264-001_CoachellaIRWMP\mxds\
Date Updated: Nov 2010
Made By: DNF
Department: RMC Water & Environment

4 Sites for OWTS Rehabilitation

This chapter focuses on the sites chosen for OWTS rehabilitation under this project.

4.1 Introduction

The DACs that are the focus of this study are Polanco Mobile Home Parks. Polanco Mobile Home Parks are mobile home parks developed under the Polanco Bill passed in 1992 (Farm Labor Housing Protection Act, AB3526). To meet requirements of the Polanco Bill, mobile home parks must be occupied by farm workers and are limited to a maximum of 14 units, including a main dwelling unit, a second unit, and 12 mobile home park spaces. The Polanco Parks included within this report are considered economically disadvantaged community (DACs) per requirements established by DWR.

Polanco Parks are typically owned by farm workers and their family members. There are about 200 small mobile home parks in the East Valley today, 50 of which have obtained Conditional Use Permits (CUPs) from the County of Riverside and are therefore considered permitted Polanco Parks. The rest of mobile home parks do not have CUPs and therefore do not have entitlement permits from the County's Planning Department. The Polanco parks must receive clearances from the Environmental Health, Fire and Building and Safety departments before the County can properly issue a CUP. Existing OWTSs in the Polanco Parks can be a barrier to obtaining proper permitting, because the existing systems are typically not constructed according to regulatory ordinances and most of the unpermitted Polanco Parks do not have the engineering and economic resources to bring their existing OTWSs into compliance.

Pueblo Unido Community Development Corporation (PUCDC) is a non-profit organization that assists communities in the East Valley. The organization helped local DAC members on affordable housing and infrastructure improvement. The organization has identified several OWTSs that need to be properly redesigned and permitted.

RMC worked with PUCDC and Riverside County Department of Environmental Health (DEH) to identify Polanco Parks that require septic system rehabilitation. PUCDC has provided local migrant farmers with support on CUP applications, and has worked with DEH on various septic system projects. PUCDC selected parks without properly designed onsite wastewater treatment systems as project candidates. After that, RMC worked with PUCDC to develop design plans of OWTS for those communities willing to participate in the septic system rehabilitation program. The final deliverable from this project is a work plan (refer to Appendix C). This work plan includes specific tasks and deliverables that will help guide other entities in implementing similar programs to rehabilitate OWTS in the Coachella Valley. The septic rehabilitation program as described here was created in partnership with PUCDC, who considers the program feasible for local DACs as a short-term solution to resolving existing wastewater issues.

Future funding opportunities will provide further support on obtaining approval of the design of the OWTS from Riverside County DEH. Since septic system evaluation is part of the CUP application process, this project will ultimately make CUP possible for Polanco Park owners. In order to fully prepare for the CUP application, park owners are also required to provide plans to be approved by the Department of Building and File Department.

Through collaborative effort with PUCDC and Riverside County DEH, RMC has identified four Polanco Parks that need immediate assistance on OWTS rehabilitation. Detailed information on these parks and their proposed septic system designs are included in the following sections.

4.2 Don Jose Agricultural Housing

4.2.1 Description

The Done Jose Agricultural Housing mobile home park has six existing mobile homes with OWTSs installed. These systems were designed with 1,000 gallons of septic tank volume per mobile home park, and 40 square-feet of leach field per 100 gallons of septic tank volume. The existing OWTS have prepared a certification of existing subsurface disposal system conducted by C-42 state licensed plumbers. No CUP application has been submitted for this park. The certified existing septic systems have not been reviewed by the Riverside County DEH. In addition to the existing mobile homes, the park owner is planning to add five additional mobile homes to the park and connect them with an adequately sized OWTS. See Table 4-1 for information on this park and Figure 4-1 for a site layout.

Table 4-1: Don Jose Agricultural Housing Information

Items	Description
Status	Unpermitted
Address	89-860 64th Avenue, Thermal, CA 92274
APN	749-060-021
Owner	Sergio Mora, Sonia Mora and Jose Cervera
Existing Units	6
Planned Units	12

Figure 4-1: Aerial Site Layout of 89-960 64th Avenue, Thermal, CA 92274

4.2.2 Soil Tests

Southland Geotechnical conducted soil tests for the Don Jose Agricultural Housing mobile home park in 1997 and reached a conclusion that a portion of the site may be feasible for soil percolation. Twelve percolation tests and two deep borings were made according to standards set by Riverside County DEH. Groundwater was encountered 7.5 feet below the ground surface.

Under this project, Earth Systems Southwest provided a soil reports update on October 10, 2013. See Appendix A1 for the complete soil reports and update for Don Jose Agricultural Housing. The selected key findings and recommendations from the soil tests are as follows:

- The site has highly erratic soil percolation for septic tank systems. A portion of the site may be feasible for soil percolation while other portions are not. Each location chosen for percolation should be evaluated for the presence of silt soils, which may inhibit percolation.
- The soils encountered generally have more than 10% fines smaller than a #200 sieve.
- Results are consistent with previous report and recommendations from the previous report should be applied as amended and superseded.
- Based on a stabilized rate of 47 minutes per inch, conventional leach lines should be sized using 100 square feet of leaching area per 100 gallons of septic tank capacity.

4.2.3 OWTS Design Plans

The soil report update indicates that some areas in the park are suitable for leach line installation while others are not. Design plans show 40 square feet of leach field per 100 gallons of septic tank for existing systems, which should be adequate for existing systems to achieve C24 certification since the systems were inspected and are working properly. For the proposed new mobile homes the draft design plans must include 100 square feet of leach field per 100 gallons of septic tank based on the recent soil report update. Draft design plans are included in Appendix A1. Design criteria are listed in Table 4-2.

Table 4-2: OWTS Design Criteria for Don Jose Agricultural Housing

Item	Criteria	Unit 2,3,5,6,8	Unit 1,7,9	Unit 4,10,12	Unit 11
Septic Tank	Units per Tank (#)	1	1	1	1
	Minimum Tank Size (gal)	1,000	1,000	1,000	1,000
Leach fields	Minimum Area (sq.ft)	400	400	400	400
	Parallel Chambers (#)	2	2	2	2
	Minimum Length (ft)	67	67	67	67

4.2.4 Cost Estimates

Capital and operations and maintenance cost estimates are shown in Table 4-3.

Table 4-3: Don Jose Septic Rehabilitation Project Cost Estimate

Item	Unit Cost	Quantity	Unit	Total Cost
Capital Cost				
1-Unit System	$10,000	5	LS	$50,000
Contingency (20%)				$10,000
Total Capital Cost				**$60,000**
O&M Cost (Pumping)	$300	12	LS	**$3,600/5 yr**

4.3 Cisneros Mobile Home Park

4.3.1 Description

The Cisneros Mobile Home Park has 13 existing mobile homes. The current condition of the existing OWTS is unknown. No CUP application has been submitted for this park. The owner is planning to include 12 mobile homes in the septic rehabilitation improvement plan and connect them with an adequately sized OWTS. The park layout will change according to the proposed septic rehabilitation plan. Information on the park is listed in Table 4-4 and a site layout is shown in Figure 4-2.

Table 4-4: Cisneros Mobile Home Park Information

Items	Description
Status	Unpermitted
Address	88-410 Avenue 77, Thermal, CA 92274
APN	755-161-007
Owner	Carlos Cisneros
Existing Units	13
Planned Units	12

Figure 4-2: Aerial Site Layout of 88-410 Avenue 77, Thermal, CA 92274

4.3.2 Soil Tests

Sladden Engineering conducted soil tests in 1999 and reached a conclusion that the site is feasible for soil percolation. Eleven percolation tests and two explorative trenches were made according to standards set by Riverside County DEH. Groundwater was not encountered at 12 feet below ground surface, and was expected to be more than 15-feet deep in this area. Based on the design soil percolation rate of 7 minutes per inch, the leach field designed to this rate should be 20 square feet of leaching area per 100 gallons of septic tank capacity.

Sladden Engineering provided a letter update to the original soil reports on February 4, 2013. The soil engineering confirmed that the site condition is generally unchanged since the original soil tests. The original test report can be used as bases for OWTS design. See Appendix A2 for the complete soil reports and update for Cisneros Mobile Home Park.

4.3.3 OWTS Design Plans

The OWTS design plans uses a standard 40 square feet of leach field per 100 gallons of septic tank, more conservative than the soil engineer’s recommendation. The draft design plan is included in Appendix A2. Design criteria are listed in Table 4-5.

Table 4-5: OWTS Design Criteria for Cisneros Mobile Home Park

Item	Criteria	All Units
Septic Tank	Units per Tank (#)	2
	Minimum Tank Size (gal)	2,000
Leach fields	Minimum Area (sq.ft)	800
	Parallel Chambers (#)	5
	Minimum Length (ft)	53

4.3.4 Cost Estimates

Capital and operations and maintenance costs are shown in Table 4-6.

Table 4-6: Cisneros Septic Rehabilitation Project Cost Estimate

Item	Unit Cost	Quantity	Unit	Total Cost
Capital Cost				
2-Unit System	$15,000	6	LS	$90,000
Contingency (20%)				$18,000
Total Capital Cost				**$108,000**
O&M Cost (pumping)	$300	6	LS	**$1,800/5 yr**

4.4 Valenzuela Mobile Home Park

4.4.1 Description

Valenzuela Mobile Home Park has 11 existing mobile homes. The current condition of the existing OWTS is unknown. The park layout will change according to the proposed septic rehabilitation plan. No CUP application has been submitted for this park. The owner is planning to include eight mobile homes in the septic rehabilitation improvement plan and connect them with adequately sized OWTS. Information for the Valenzuela Mobile Home Park is listed in Table 4-7 and a site layout is shown in Figure 4-3.

Table 4-7: Valenzuela Mobile Home Park Information

Items	Description
Status	Unpermitted
Address	81-550 Harrison Rd, Thermal, CA 92274
APN	737110002
Owner	Francisco Valenzuela and Maria Valenzuela
Existing Units	11
Planned Units	8

Figure 4-3: Aerial Site Layout 81-550 Harrison Rd, Thermal, CA 92274

4.4.2 Soil Tests

Southland Geotechnical conducted the original soil test in 1999 and reached a conclusion that the site is feasible for soil percolation. Ten percolation tests and one deep boring were made according to standards set by Riverside County DEH. Groundwater was not encountered at 15 feet below ground surface, and was expected to be between 15 feet to 30 feet deep in this area. Based on a design soil percolation rate of 5 minutes per inch, the leach field designed to this rate should be 20 square feet of leaching area per 100 gallons of septic tank capacity.

Earth Systems Southwest provided the soil reports updates on October 10, 2013. See Appendix A3 for the complete soil reports and update for Valenzuela Mobile Home Park. The selected key findings and recommendations are as follows:

- The site is feasible for soil percolation and will support leach field application.
- The soils encountered generally have more than 10% fines smaller than a #200 sieve.
- Results are consistent with previous report and recommendations from the previous report should be applied as amended and superseded within.

- Based on a stabilized rate of 5 minutes per inch, conventional leach lines should be sized using 20 square feet of leaching area per 100 gallons of septic tank capacity.

4.4.3 OWTS Design Plans

The OWTS design plans uses standard at 40 square feet of leach field per 100 gallons of septic tank, more conservative than the soil engineering's recommendation. The design plan is included in Appendix A3. Design criteria are listed in Table 4-8.

Table 4-8: OWTS Design Criteria for Valenzuela Mobile Home Park

Item	Criteria	Unit 1-3	Unit 4-5	Unit 6-8
Septic Tank	Units per Tank (#)	3	2	3
	Minimum Tank Size (gal)	3,000	2,000	3,000
Leach fields	Minimum Area (sq.ft)	1,200	800	1,200
	Parallel Chambers (#)	4	3	4
	Minimum Length (ft)	100	89	100

4.4.4 Cost Estimates

Capital and operations and maintenance costs are shown in Table 4-9.

Table 4-9: Valenzuela Mobile Home Park Septic Rehabilitation Project Cost Estimate

Item	Unit Cost	Quantity	Unit	Total Cost
Capital Cost				
2 and 3 Unit System	$15,000	3	LS	$45,000
Contingency (20%)				$9,000
Total Capital Cost				**$54,000**
Annual O&M Cost	$300	3	LS	**$900/5 yr**

4.5 Gutierrez Mobile Home Park

4.5.1 Description

Gutierrez Mobile Home Park has four existing mobile homes with OWTS installed. The current condition of the existing OWTS is unknown. The park layout will change according to the proposed septic rehabilitation plan. No CUP application has been submitted for this park. The owner is planning to include all four mobile homes in the septic rehabilitation improvement plan and connect them with an adequately sized OWTS. Park information is listed in Table 4-10 and a site layout is shown in Figure 4-4.

Table 4-10: Gutierrez Mobile Home Park Information

Items	Description
Status	Unpermitted
Address	80-200 Hwy 86, Thermal, CA 92274
APN	755251010
Owner	Martha Barragan
Phone Number	
Existing Units	4
Planned Units	4

Figure 4-4: Aerial Site Layout 80-200 Hwy 86, Thermal, CA 92274

4.5.2 Soil Tests

Earth Systems Southwest conducted soil testing in September 2013 and reached a conclusion that the site is feasible for soil percolation. Sixteen percolation tests and two deep borings were made according to standards set by Riverside County DEH. Groundwater was encountered between 22.5 to 30 feet below ground surface. Based on a tentative design soil percolation rate of 3.2 minutes per inch, the leach field designed to this rate should be 20 square feet of leaching area per 100 gallons of septic tank capacity. See Appendix A4 for the complete soil reports and update for Gutierrez Mobile Home Park.

4.5.3 OWTS Design Plans

The design plans uses standard at 40 square feet of leach field per 100 gallons of septic tank, more conservative than the soil engineering’s recommendation. The draft design plan is included in Appendix A4. Design criteria are listed in Table 4-11.

Table 4-11: OWTS Design Criteria for Gutierrez Mobile Home Park

Item	Criteria	1-Unit System	2-Unit System
Septic Tank	Units per Tank (#)	1	2
	Minimum Tank Size (gal)	1,000	2,000
Leach fields	Minimum Area (sq.ft)	400	800
	Parallel Chambers (#)	2	3
	Minimum Length (ft)	67	89

4.5.4 Cost Estimates

Capital and operations and maintenance costs are shown in Table 4-12

Table 4-12: Gutierrez Mobile Home Park Septic Rehabilitation Project Cost Estimate

Item	Unit Cost	Quantity	Unit	Total Cost
Capital Cost				
1-Unit System	$10,000	2	LS	$20,000
2-Unit System	$15,000	1	LS	$15,000
Subtotal				$35,000
Contingency (20%)				$7,000
Total Capital Cost	$25,000			**$42,000**
Annual O&M Cost	$300	3	LS	$900/5 yr

5 Next Steps

This Regional Program for Septic System Rehabilitation has completed initial research, planning, and design work for four mobile home parks, which are described in Section 4. Following this initial design work, the next steps for these sites to complete OWTS upgrades would be to obtain proper permitting from the County of Riverside and move forward with project construction, as described in Section 5.1.1.

One of the purposes of the Regional Program for Septic System Rehabilitation is to provide information to other entities within the Coachella Valley who would be interested in planning and designing similar OWTS upgrades for applicable sites. The work plan included in Appendix C to this report explains the process undertaken for the Regional Program for Septic System Rehabilitation and also explains information about permitting and operations and maintenance considerations that are necessary to implement the OWTS upgrades described in this report. Funding for implementation of the Septic System Rehabilitation Program could take place through the IRWM Program (with Proposition 84 Funding); however, due to restrictions and potential expiration of this funding source, potential project proponents should consider other funding options that may be available to them. Potential sources of funding that could be used for such a project are listed in *Chapter 11, Framework for Implementation, Section 11.5 Finance* of the 2014 Coachella Valley IRWM Plan Volume I.

5.1.1 Permitting

The proposed OWTS rehabilitation for the four mobile home parks described in Section 4 of this report will provide adequate wastewater treatment capacity for existing and planned disadvantaged community members living within the parks. The septic system design plans must be submitted to the County of Riverside in order to obtain Conditional Use Permits (CUPs) prior to construction. OWTS improvements within mobile home parks in the County of Riverside are typically reviewed as part of a complete design plan along with other improvements required for the mobile home park to receive a CUP from the County of Riverside, which requires: water system improvements, street/access improvements, and fire suppression.

Given that OWTS design must be permitted as part of a larger package of other community improvements, rather than as an independent project, there are additional challenges to obtaining proper permitting for the mobile home parks described in this report. Packaging improvements together means that design and implementation of the other community improvements must be completed in order to implement the OWTS portion of the project. Furthermore, this process outlines a larger-picture issue that spans beyond the IRWM Program and water planning efforts in general, which is that the unpermitted mobile home parks often do not just have issues associated with water, but are unpermitted for a variety of factors and have a wide range of needs.

Once the mobile home parks have completed design plans for other onsite improvements (structural and electrical plans, a fire plan, and a water plan). The complete set of plans along with the design plans included within this report should be submitted together to the Department of Building and Safety, who will coordinate with the Fire and Environmental Health Departments for CUP application process and provide final issuance of CUP for project implementation. The overall application process is demonstrated in Figure 5-1 on the following page.

5.1.2 Continue Identifying Sites in Need of Assistance

The OWTS improvements identified for the mobile home parks included in this study can be used as an example for future sewer improvement projects in and outside of the Coachella Valley. As discussed earlier in this report, numerous Polanco Parks in the eastern Coachella Valley have not yet obtained CUPs and are therefore currently unpermitted. Information included within Appendix C is intended to provide a template or guidance document for other entities who are interested in implementing OWTS in mobile home parks similar to the ones described in this report.

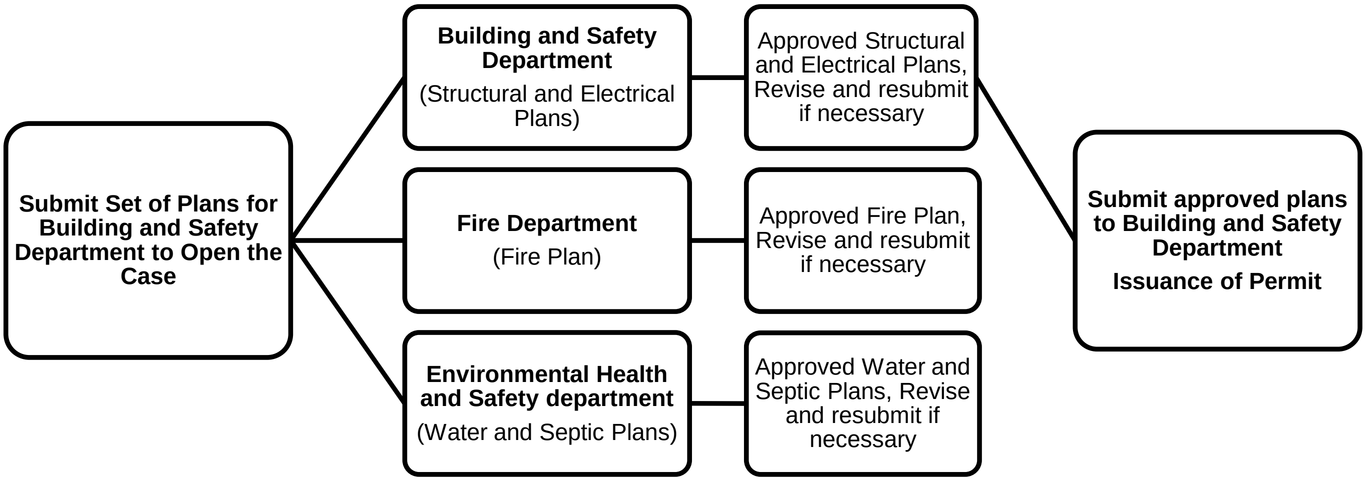

Figure 5-1: Conditional Use Permit Application Overview

Adapted based on information from: *Redevelopment Agency for the County of Riverside. 2010. Mobile Home Park Development Standards & Design Criteria. Available:* http://www.rivcoeda.org/LinkClick.aspx?fileticket=qcYkeHL%2BZTA%3D&tabid=57&mid=2389

6 References

EPA625/1-80-012. 1980. *Design Manual - Onsite Wastewater Treatment and Disposal Systems.* Available: < http://water.epa.gov/infrastructure/septic/upload/septic_1980_osdm_all.pdf >

EPA/625/R-00/008. 2002. *Onsite Wastewater Treatment Systems Manual.* Available: < http://water.epa.gov/aboutow/owm/upload/2004_07_07_septics_septic_2002_osdm_all.pdf>

County of Riverside. 2010. *Mobile Home Park Development Standards & Design Criteria*. Available: < http://www.rivcoeda.org/LinkClick.aspx?fileticket=qcYkeHL%2BZTA%3D&tabid=57&mid=2389>

County of Riverside DEH .2012. *Onsite Wastewater Treatment Systems Technical Guidance Manual*. Available: <http://www.rivcoeh.org/opencms/system/galleries/download/Environmental-Health/ERM/OWTS_Installation_Guide.pdf>

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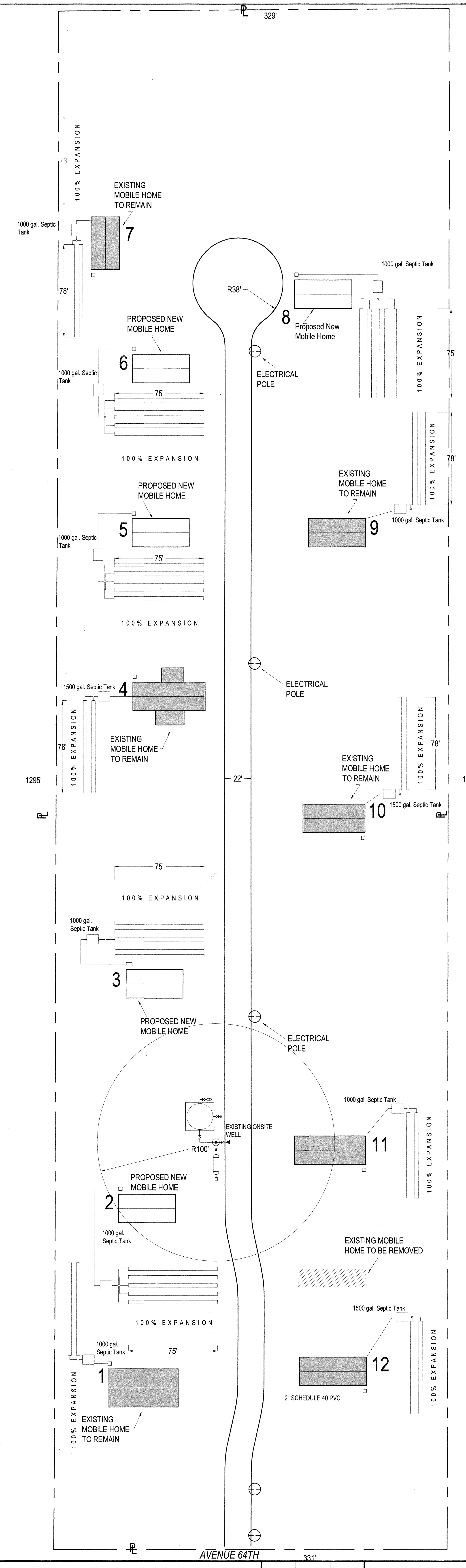
UC Davis. 2002. *Review of Technologies for the Onsite Treatment of Wastewater in California*. Available: < http://www.swrcb.ca.gov/water_issues/programs/owts/technosite.shtml>

Appendix A – OWTS Design Plans

Appendix A1 – Don Jose Agricultural Housing



Kevin Paul: - based on 100 sf/100 gal septic.
- septic tank sizing by others
- Earth Systems review was for general conformity to our report 8786-02, Doc. No. 13-10-706
- Report recommendations should be followed during construction.
- These plans prepared by others.

GENERAL NOTES:

1. THE INTENT OF SUBJECT DRAWINGS, NOTES AND GENERAL SPECIFICATIONS HEREIN IS TO FURNISH THE OWNER WITH A COMPLETE SET OF WORKABLE DRAWINGS FOR A WORKING SEPTIC SYSTEM.
2. THE SEPTIC SYSTEM PLAN IS SCHEMATIC AND THE CONTRACTOR SHALL AT ALL TIME BE GOVERNED BY THE APPLICABLE CODES AND OF ENVIRONMENTAL HEALTH ORDINANCES.
3. ALL MATERIALS AS CALLED OUT ON DRAWINGS SHALL BE NEW AND CODE APPROVED.
4. PIPE LENGHTS SHOWN ON PLANS ARE APPROXIMATE. ACTUAL RUN LENGTHS SHALL BE ALWAYS BE VERIFIED AT JOB SITE BY CONTRACTOR.

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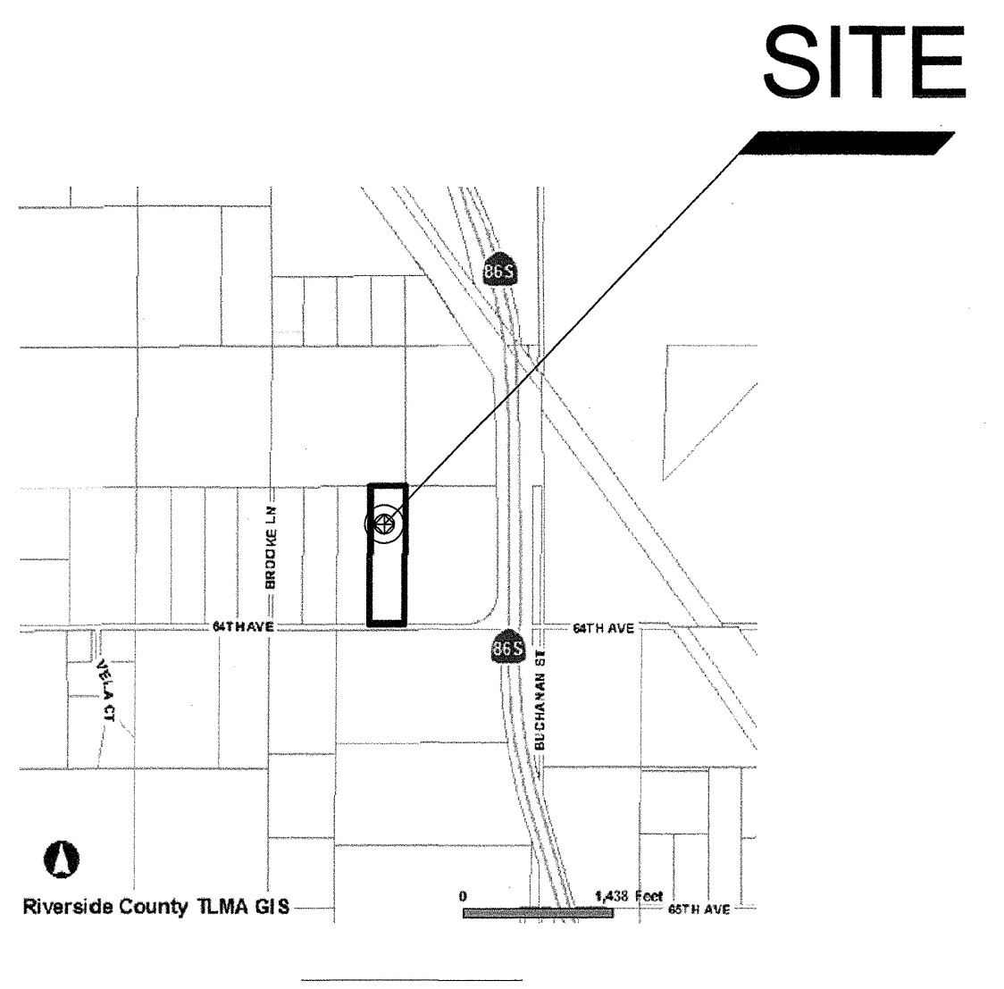
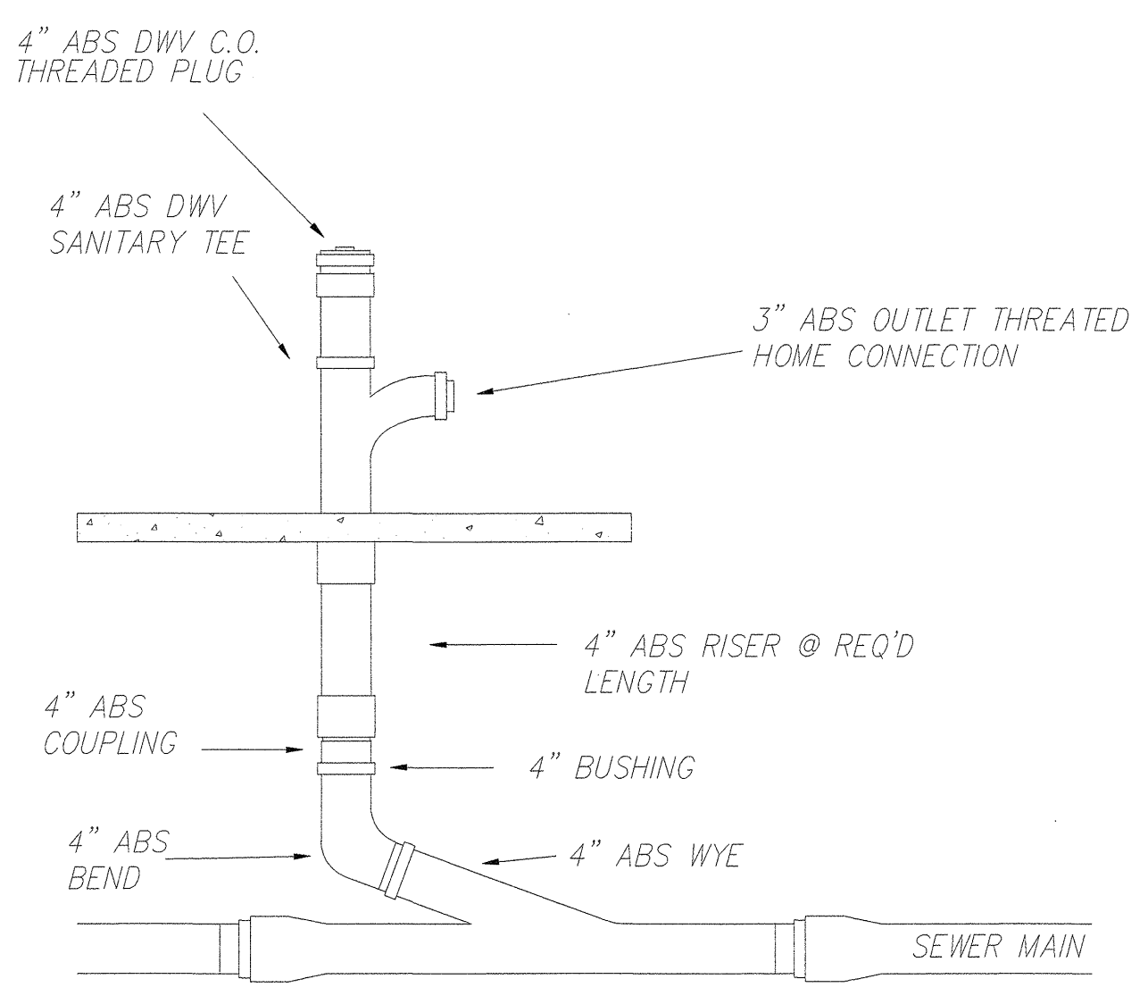
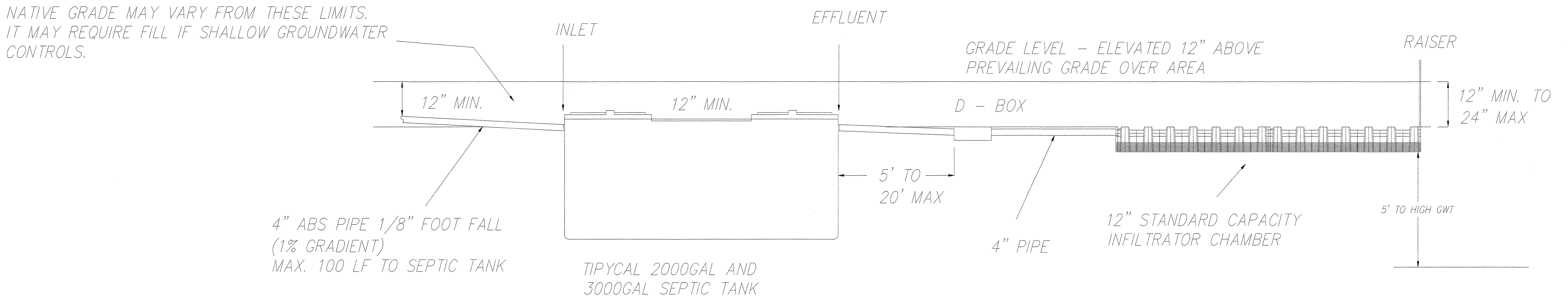
2. EACH DWELLING UNIT SPACE SHALL BE PROVIDED WITH A 3" DIAMETER SEWER DRAIN INLET.
3. SEWER CONNECTION AT EACH SPACE SHALL BE LOCATED WITHIN 18" OUTSIDE THE REAR HALF OF THE UNIT OR PROPOSED LOCATION OF BUILDING.
4. ALL MAIN LINE SEWER PIPE SHALL BE 4" ABS.
5. SEE DETAIL FOR SEWER RISER CONNECTION.
6. SEPTIC TANKS SHALL BE TYPICAL 3000 GAL. AS INDICATED
7. ANY CROSSINGS OF MAIN SEWER LINES WITH DOMESTIC WATER LINES OR DRAIN TILES LINES SHALL BE PROPERLY ENCASED.
8. BUILDINGS CONNECTING TO SERVICE RISER MUST BEAR THE CALIFORNIA INSIGNIA OF APPROVAL.



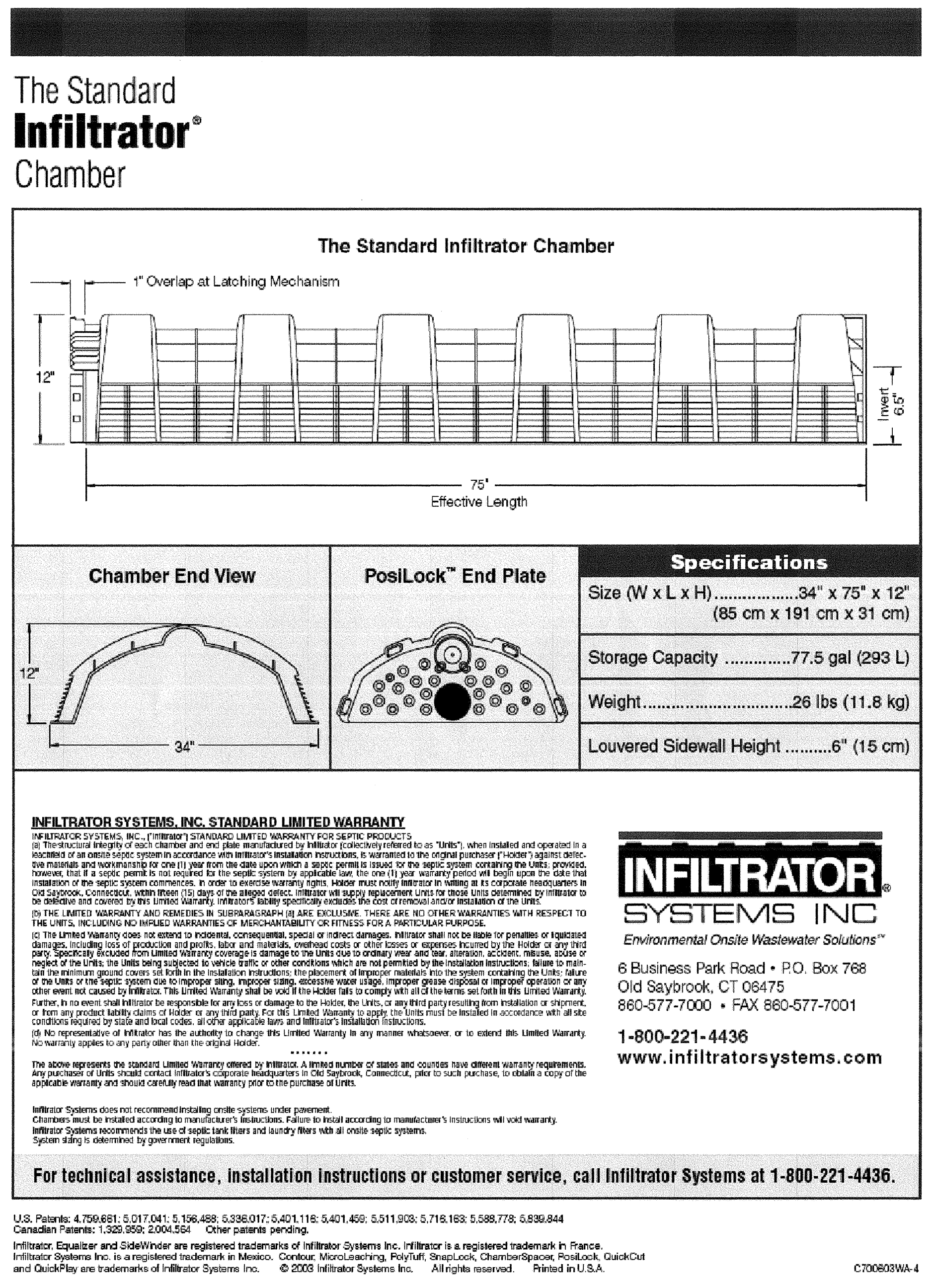
VICINITY MAP



SEWER SITE SERVICE DETAILS - NOT TO SCALE



GRADE LEVEL DETAILS - NOT TO SCALE



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The Standard Infiltrator Chamber

Specifications

Size (W x L x H)	34" x 75" x 12" (85 cm x 191 cm x 31 cm)
Storage Capacity	77.5 gal (293 L)
Weight	26 lbs (11.8 kg)
Louvered Sidewall Height	6" (15 cm)

INFILTRATOR SYSTEMS, INC. STANDARD LIMITED WARRANTY

INFILTRATOR SYSTEMS, INC., ("Infiltrator") STANDARD LIMITED WARRANTY FOR SEPTIC PRODUCTS
(a) The structural integrity of each chamber and end plate manufactured by Infiltrator (collectively referred to as "Units"), when installed and operated in a leachfield of an onsite septic system in accordance with Infiltrator's installation instructions, is warranted to the original purchaser ("Holder") against defective materials and workmanship for one (1) year from the date upon which a septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required for the septic system by applicable law, the one (1) year warranty period will begin upon the date that installation of the septic system commences. In order to exercise warranty rights, Holder must notify Infiltrator in writing at its corporate headquarters in Old Saybrook, Connecticut, within fifteen (15) days of the alleged defect. Infiltrator will supply replacement Units for those Units determined by Infiltrator to be defective and covered by this Limited Warranty. Infiltrator's liability specifically excludes the cost of removal and/or installation of the Units.

(b) THE LIMITED WARRANTY AND REMEDIES IN SUBPARAGRAPH (a) ARE EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE UNITS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

(c) The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage is damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting, improper sizing, excessive water usage, improper grease disposal or improper operation or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty.

Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party. For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes, all other applicable laws and Infiltrator's installation instructions.

(d) No representative of Infiltrator has the authority to change this Limited Warranty in any manner whatsoever, or to extend this Limited Warranty. No warranty applies to any party other than the original Holder.

....

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Infiltrator Systems does not recommend installing onsite systems under pavement.
Chambers must be installed according to manufacturer's instructions. Failure to install according to manufacturer's instructions will void warranty.
Infiltrator Systems recommends the use of septic tank filters and laundry filters with all onsite septic systems.
System sizing is determined by government regulations.

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www.infiltratorsystems.com

For technical assistance, installation instructions or customer service, call Infiltrator Systems at 1-800-221-4436.

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Canadian Patents: 1,329,959; 2,004,564 Other patents pending.

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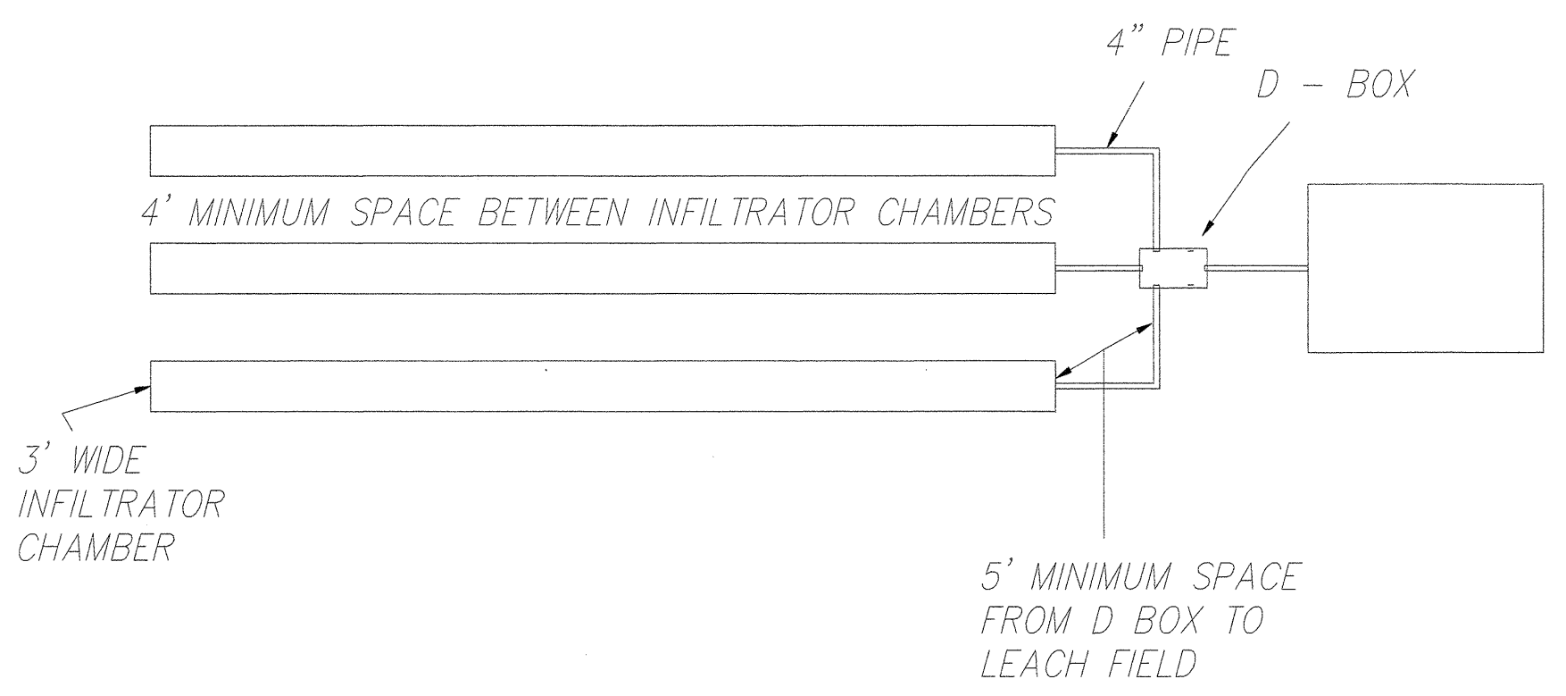

LEACH FIELD DETAILS - NOT TO SCALE

PUEBLO UNIDO CDC
POLANCO REHABILITATION ASSISTANCE PROGRAM
78-115 CALLE ESTADO, LA QUINTA, CA 92253
PHONE (760) 427-0985 FAX (760) 771-0271

DATE	BY	MARK		APPR	DATE
	ENGINEER				COUNTY

SEAL COUNTY

SEAL ENGINEER
KEVIN L. PAUL
No. C 70084
No. GE 2930
Exp. 9/30/2014
Earth Systems Southwest.

Earth Systems Southwest
GEOTECHNICAL ENGINEERING
79-811B COUNTRY CLUB DRIVE
BERMUDA DUNES, CA 92201
PHONE (760) 345-1588 FAX (760) 345-7315

ASSESSOR PARCERL NUMBER : 749-060-021
PROJECT ADDRESS:
89-860 64TH AVE
THERMAL, CA 92274

SCALE
H 1" = 40' V N/A

COUNTY OF RIVERSIDE
DON JOSE AGRICULTURAL HOUSING
SEPTIC SYSTEM PLAN

FOR:
W.O.
COUNTY FILE NO.

SHEET NO.
S-1

DATE: 12/28/13

Appendix A2 – Cisneros Mobile Home Park

GENERAL NOTES:

1. THE INTENT OF SUBJECT DRAWINGS, NOTES AND GENERAL SPECIFICATIONS HEREIN IS TO FURNISH THE OWNER WITH A COMPLETE SET OF WORKABLE DRAWINGS FOR A WORKING SEPTIC SYSTEM.
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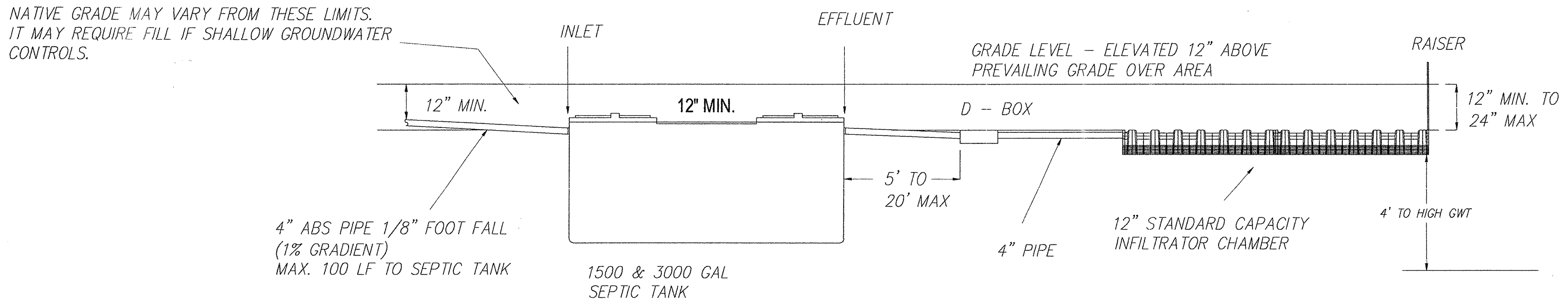
6. SEPTIC TANKS SHALL BE TYPICAL 1,500, AND 3000 GAL. AS INDICATED
7. ANY CROSSINGS OF MAIN SEWER LINES WITH DOMESTIC WATER LINES OR DRAIN TILES LINES SHALL BE PROPERLY ENCASED.
8. BUILDINGS CONNECTING TO SERVICE RISER MUST BEAR THE CALIFORNIA INSIGNIA OF APPROVAL.

ADDITIONAL ETI SYSTEM NOTES:

EFFLUENT FROM SEPTIC TANK MUST DRAIN BY GRAVITY FLOW TO JUNCTION BOX, MAY REQUIRE CAREFUL SITE LAYOUT AND POSSIBLE ELEVATED SEPTIC TANK WITH THE TOP ABOVE EXISTING GROUND SURFACE FOR NEARLY LEVEL SITE.



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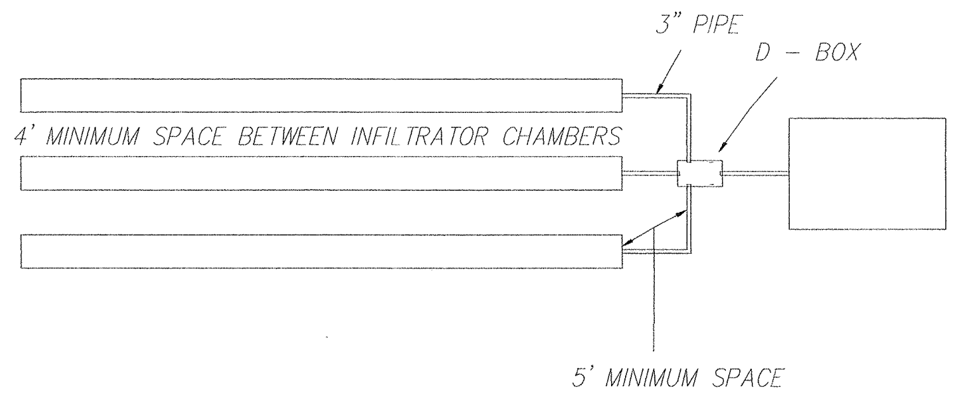

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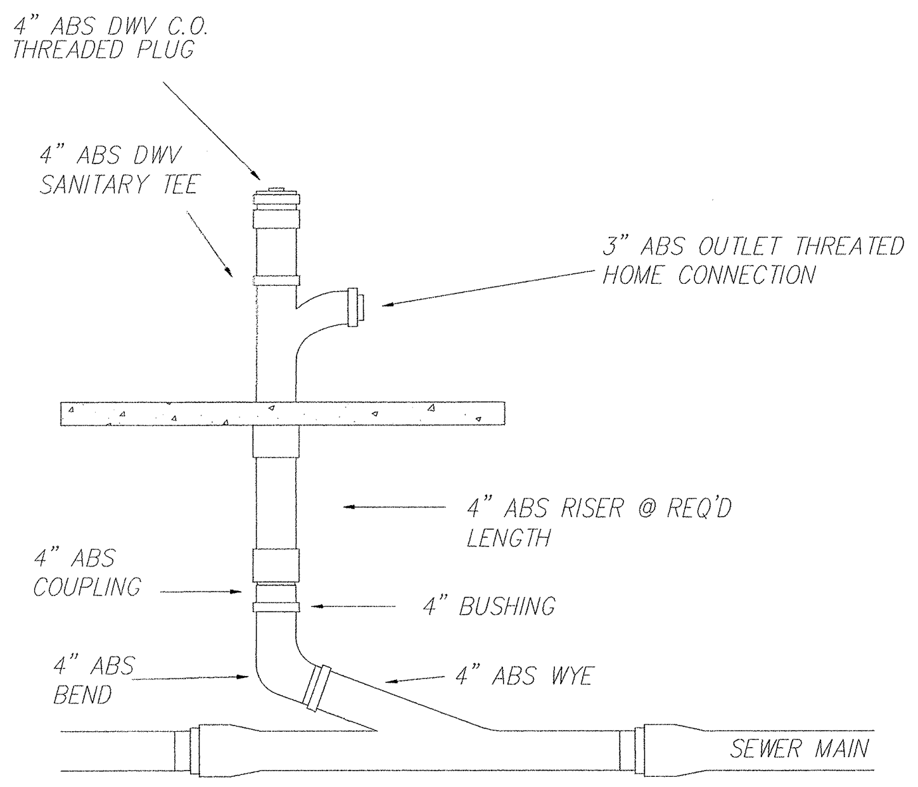

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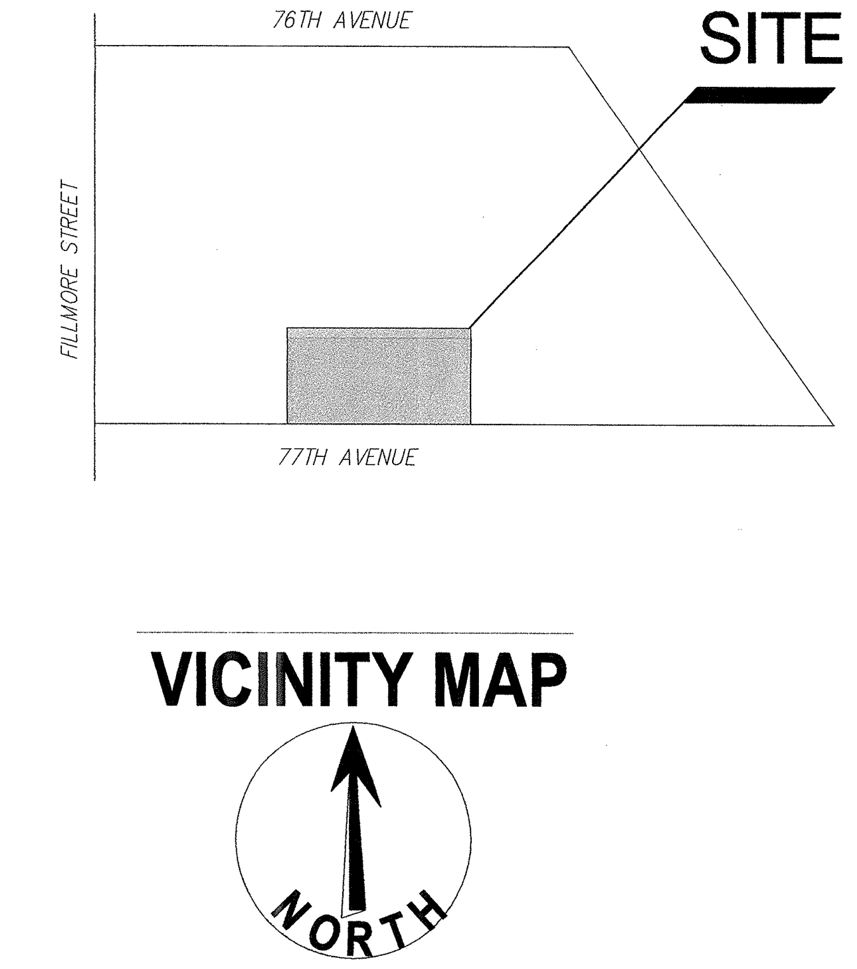
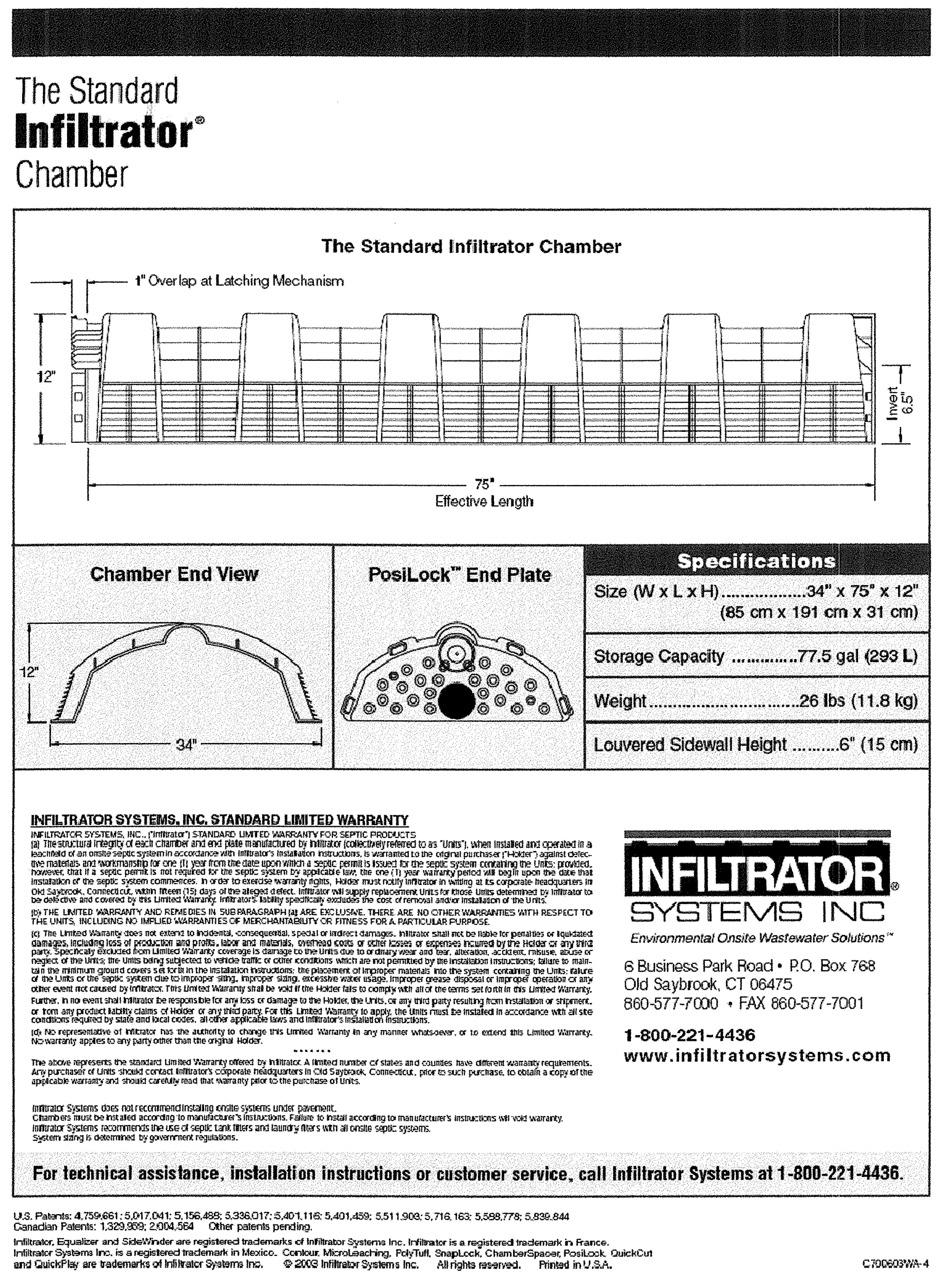


VICINITY MAP



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Infiltrator®
Chamber

The Standard Infiltrator Chamber

1" Overlap at Latching Mechanism
12"
Invert 6.5"
75" Effective Length

Chamber End View
12"
34"

PosiLock™ End Plate

Specifications
Size (W x L x H)..................34" x 75" x 12" (85 cm x 191 cm x 31 cm)
Storage Capacity ....77.5 gal (293 L)
Weight..................................26 lbs (11.8 kg)
Louvered Sidewall Height ....6" (15 cm)

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* * *

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Infiltrator Systems recommends the use of septic tank filters and laundry filters with all onsite septic systems.
System sizing is determined by government regulations.

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www.infiltratorsystems.com

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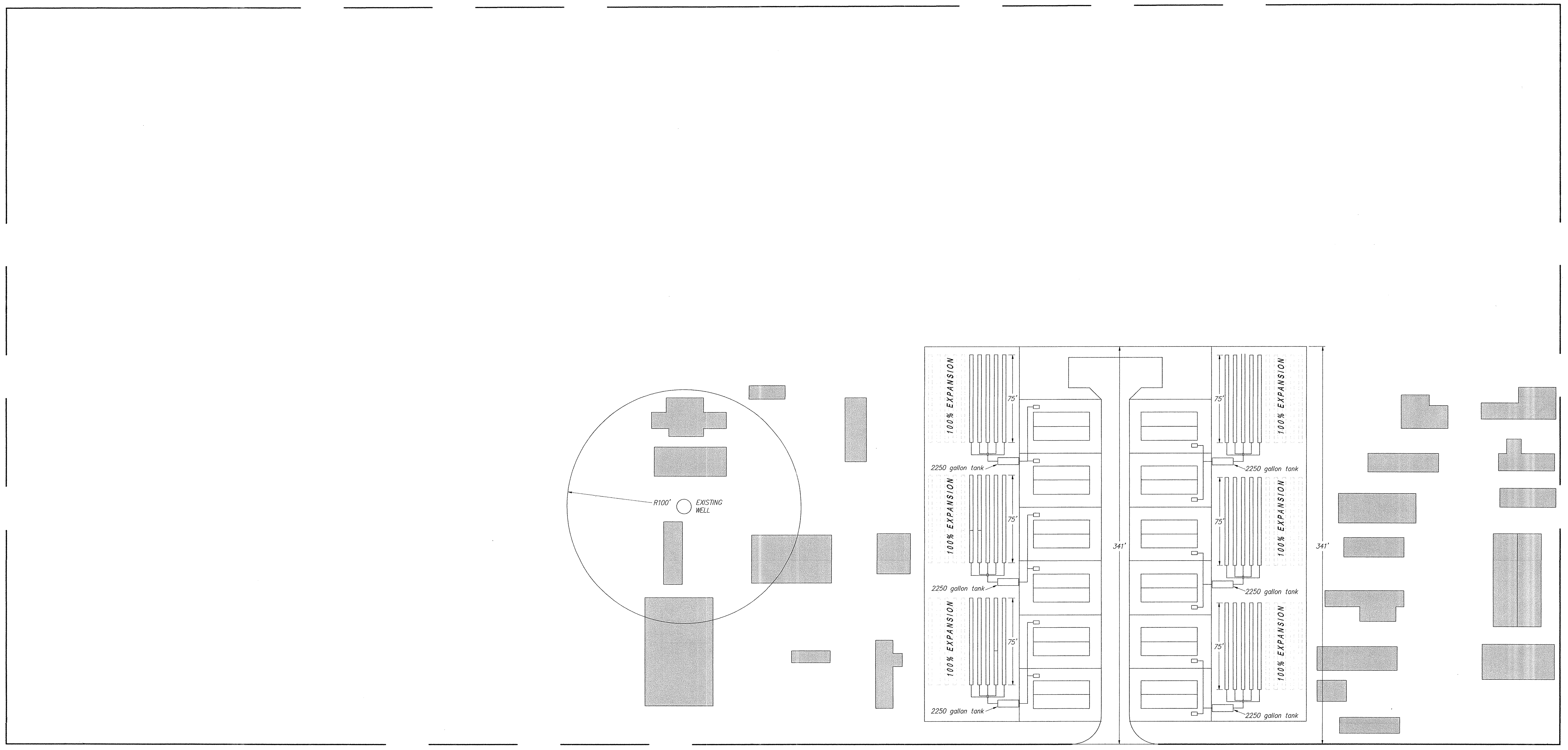


PUEBLO UNIDO CDC
AGRICULTURAL WORKER HOUSING REHABILITATION PROGRAM
53040 AVENIDA MENDOZA
LA QUINTA, CA 92253
PHONE (760) 427-0985 FAX (760) 777-7550

DATE	BY	MARK		APPR	DATE
ENGINEER				COUNTY	

SEAL COUNTY

SEAL ENGINEER
BRETT L. ANDERSON
No. C45389
Exp. 9/30/14
11/25/13

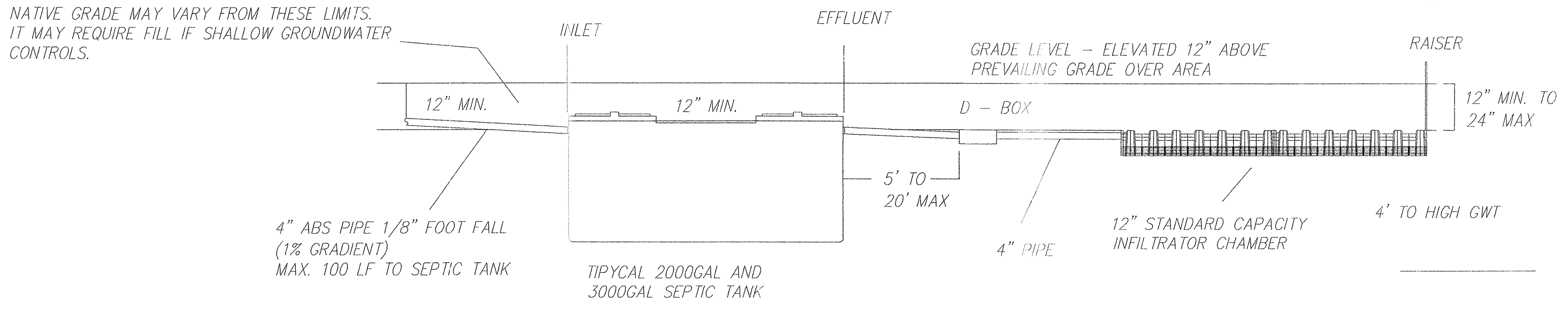
SLADDEN ENGINEERING
49090 GOLF CENTER PARKWAY
INDIO, CA 92201
(760) 772-3893 FAX (772-3895)

ASSESOR PARCEL NUMBER: 755-161-007
PROJECT ADDRESS:
88410 AVENUE 77TH
THERMAL, CA 92274
BMK#
SCALE
H 1" = 60' V N/A

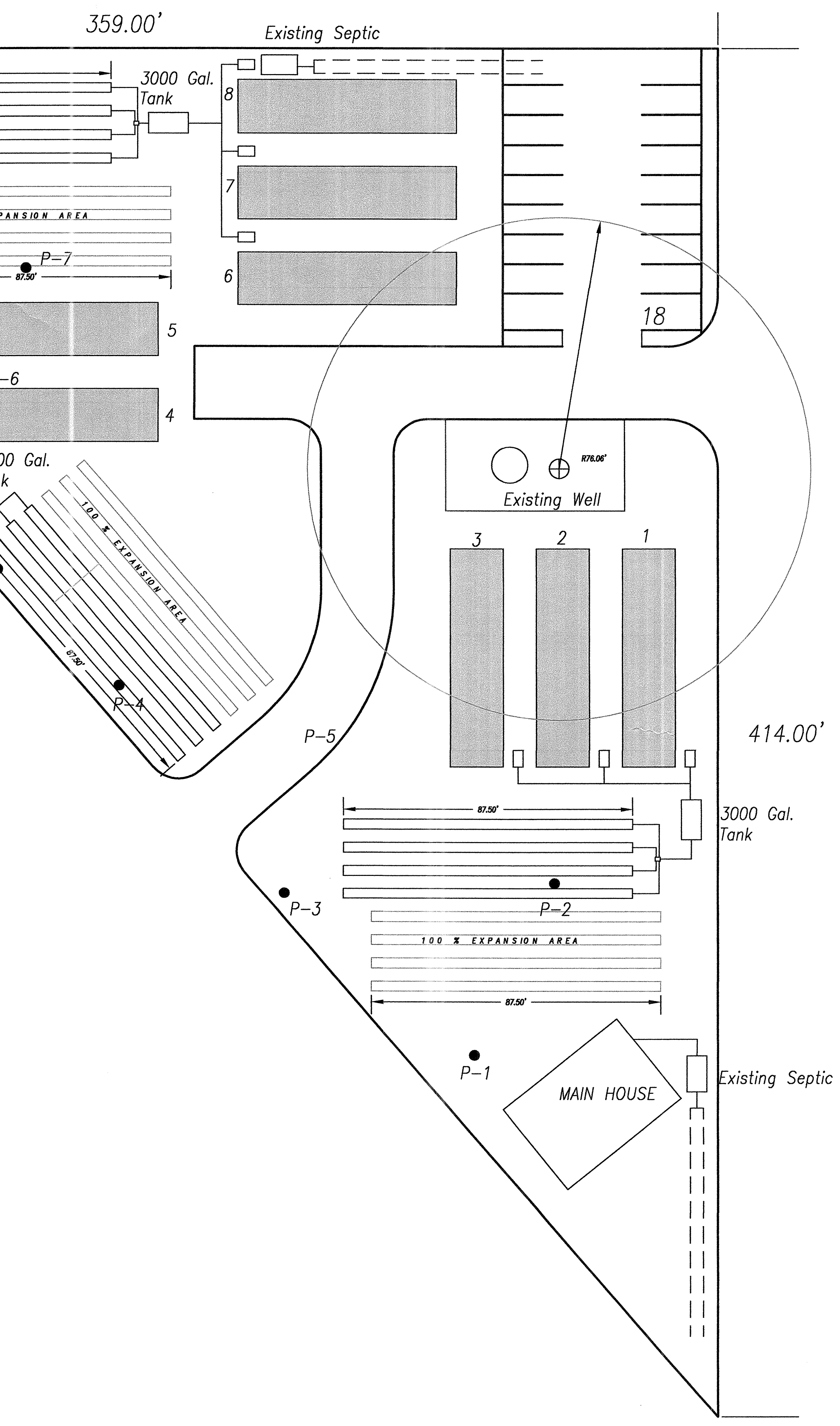
COUNTY OF RIVERSIDE
CISNEROS AHC
SEPTIC SYSTEM
FOR:
W.O.
COUNTY FILE NO.

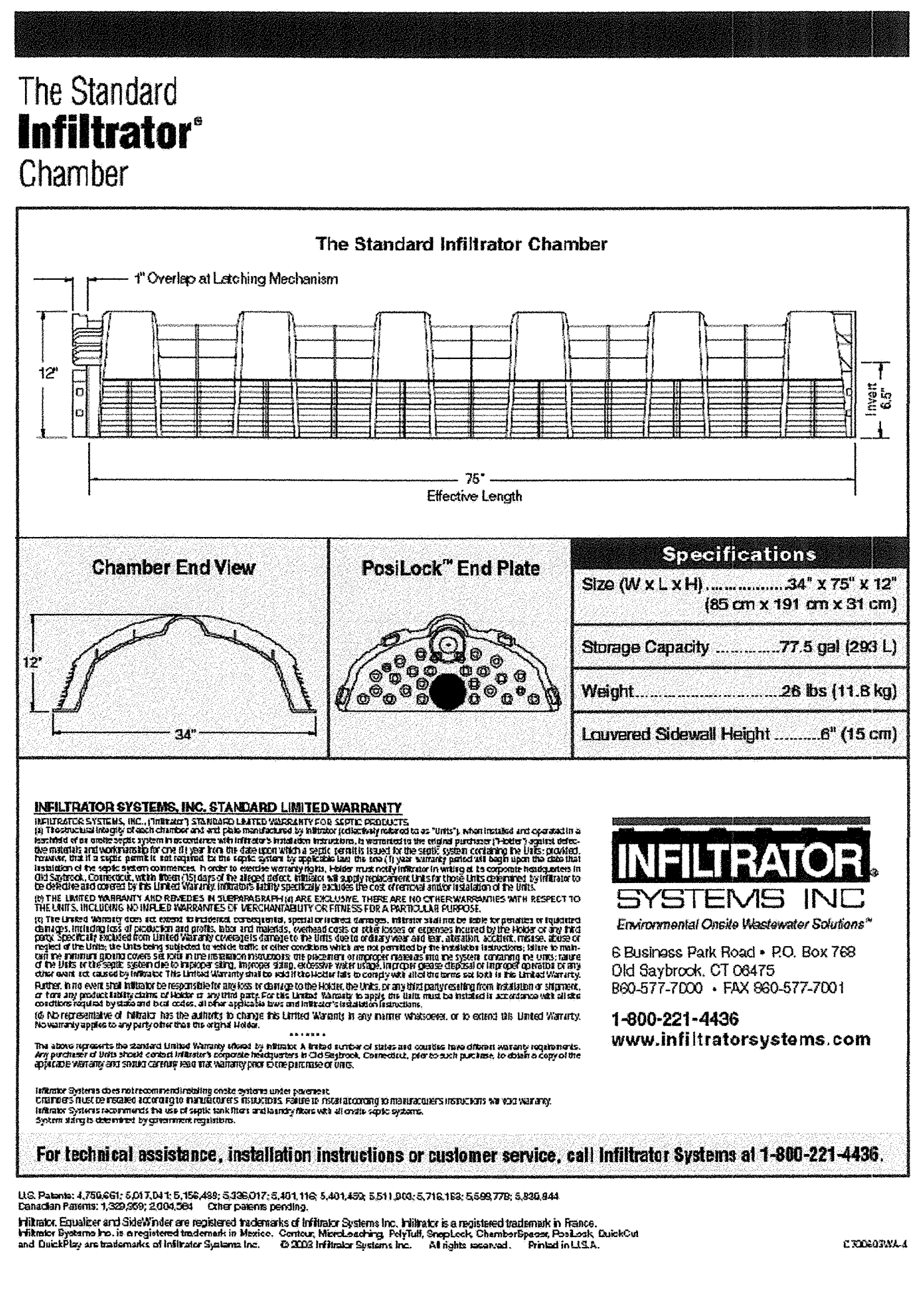
SHEET NO.
S
DATE: OCTOBER 29,2013

Appendix A3 – Emma Valenzuela Mobile Home Park



GRADE LEVEL DETAILS - NOT TO SCALE




The Standard
Infiltrator®
Chamber

The Standard Infiltrator Chamber

Specifications	
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Old Saybrook, CT 06475
860-577-7000 • FAX 860-577-7001
1-800-221-4436
www.infiltratorsystems.com

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2. THE SEPTIC SYSTEM PLAN IS SCHEMATIC AND THE CONTRACTOR SHALL AT ALL TIME BE GOVERNED BY THE APPLICABLE CODES AND OF ENVIRONMENTAL HEALTH ORDINANCES.
3. ALL MATERIALS AS CALLED OUT ON DRAWINGS SHALL BE NEW AND CODE APPROVED.
4. PIPE LENGHTS SHOWN ON PLANS ARE APPROXIMATE. ACTUAL RUN LENGTHS SHALL BE ALWAYS BE VERIFIED AT JOB SITE BY CONTRACTOR.

SPECIFIC NOTES:

1. PLUMBING EQUIPMENT AND INSTALLATION SHALL COMPLY WITH REQUIREMENTS OF UPC, RIVERSIDE COUNTY DEPARTMENT OF ENVIRONMENTAL HEALTH AND TITLE 25.ER WITH IID, THE SERVICE PROVIDER FOR NEW SYSTEM.
2. EACH DWELLING UNIT SPACE SHALL BE PROVIDED WITH A 3" DIAMETER SEWER DRAIN INLET.
3. SEWER CONNECTION AT EACH SPACE SHALL BE LOCATED WITHIN 18" OUTSIDE THE REAR HALF OF THE UNIT OR PROPOSED LOCATION OF BUILDING.
4. ALL MAIN LINE SEWER PIPE SHALL BE 4" ABS.
5. SEE DETAIL FOR SEWER RISER CONNECTION.
6. SEPTIC TANKS SHALL BE TYPICAL 3000 GAL. AS INDICATED
7. ANY CROSSINGS OF MAIN SEWER LINES WITH DOMESTIC WATER LINES OR DRAIN TILES LINES SHALL BE PROPERLY ENCASED.
8. BUILDINGS CONNECTING TO SERVICE RISER MUST BEAR THE CALIFORNIA INSIGNIA OF APPROVAL.

SEPTIC TANK CAPACITIES - BASED ON 40SQ.FT PER 100 GAL

MOBILE HOMES 1, 2, 3

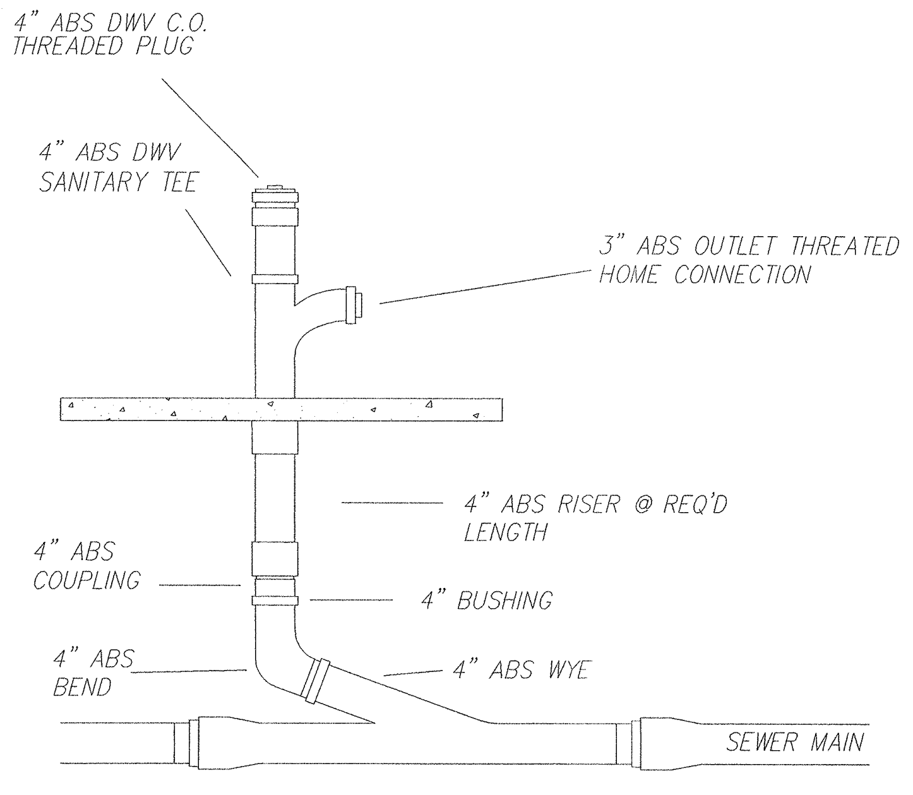
TANK CAPACITY: 3000gal
LENGTH: 350 LINEAR FEET
TYPE: STANDARD CAPACITY INFILTRATOR CHAMBERS

MOBILE HOME 4 AND 5

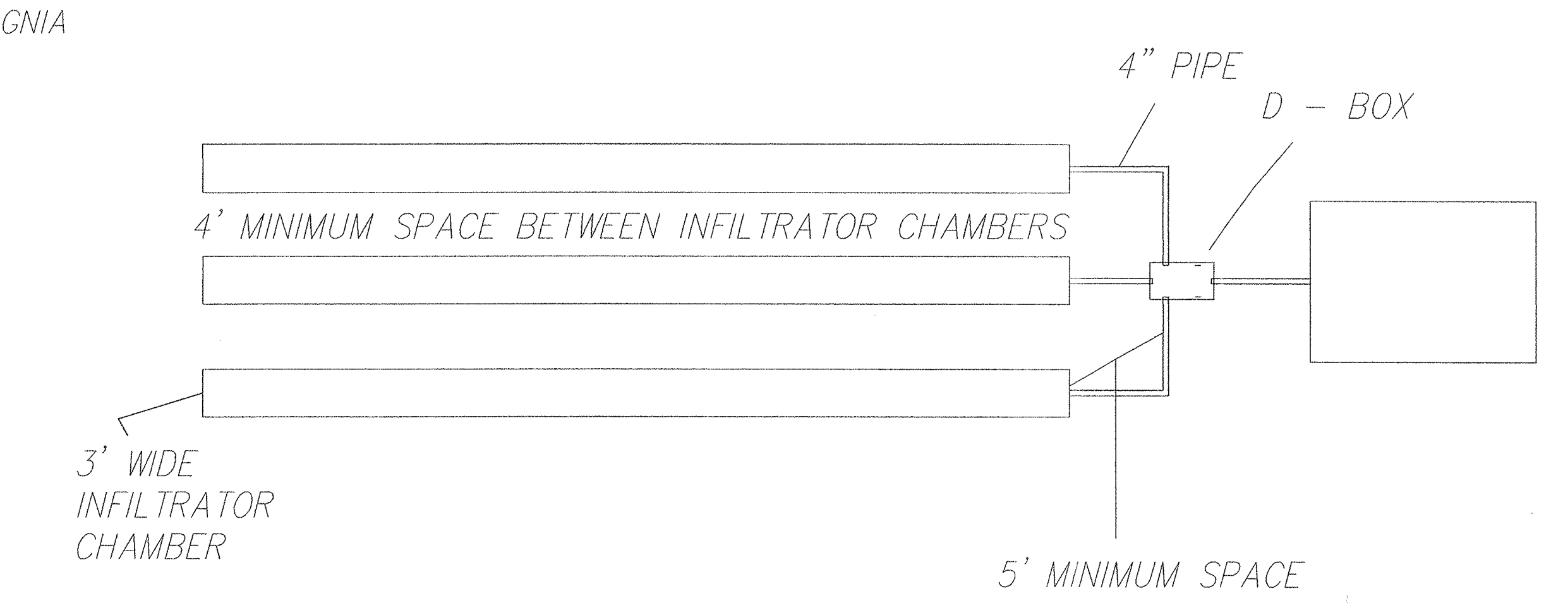
TANK CAPACITY: 2000 GAL
LENGTH: 262.5 LINEAR FEET
TYPE: STANDARD CAPACITY INFILTRATOR CHAMBERS

MOBILE HOME 6, 7 AND 8

TANK CAPACITY: 3000 GAL
LENGTH: 350 LINEAR FEET
TYPE:STANDARD CAPACITY INFILTRATOR CHAMBERS



SEWER SITE SERVICE DETAILS - NOT TO SCALE



LEACH FIELD DETAILS - NOT TO SCALE

* Reviewed for conformance to Earth Systems
Soil percolation report 07427-04, Doc# 13-10-705.
Septic sizing by others.

PUEBLO UNIDO CDC

AGRICULTURAL HOUSING REHABILITATION PROGRAM

53040 AVENIDA MENDOZA
LA QUINTA, CA 92253
PHONE (760) 427-0985 *FAX (760) 777-7550*

DATE	BY	MARK		APPR	DATE
ENGINEER				COUNTY	

SEAL COUNTY

SEAL ENGINEER

KEVIN L. PAUL
No. C 70084
No. GE 2930
Exp. 9/30/2014
1/14/14

Earth Systems Southwest

GEOTECHNICAL ENGINEERING

79-811B COUNTRY CLUB DRIVE
BERMUDA DUNES, CA 92201

PHONE (760) 345-1588 FAX (760) 345-7315

ASSESOR PARCEL NUMBER:
PROJECT ADDRESS:
81-550 HARRISON RD.
THERMAL, CA 92274

BMK#

SCALE
H 1" = 30' V N/A

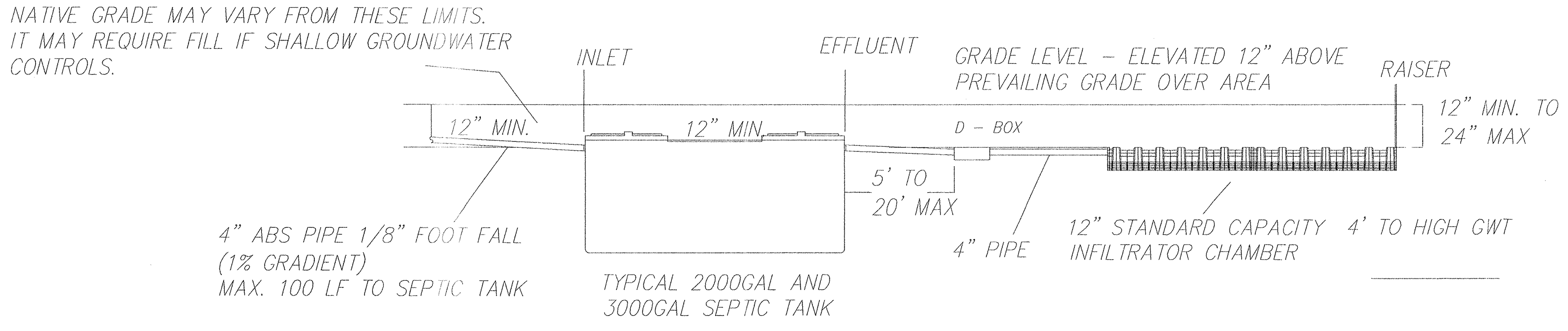
COUNTY OF RIVERSIDE
EMMA VALENZUELA MOBILE HOME PARK
SEPTIC SYSTEM PLANS

FOR:
W.O.
COUNTY FILE NO.

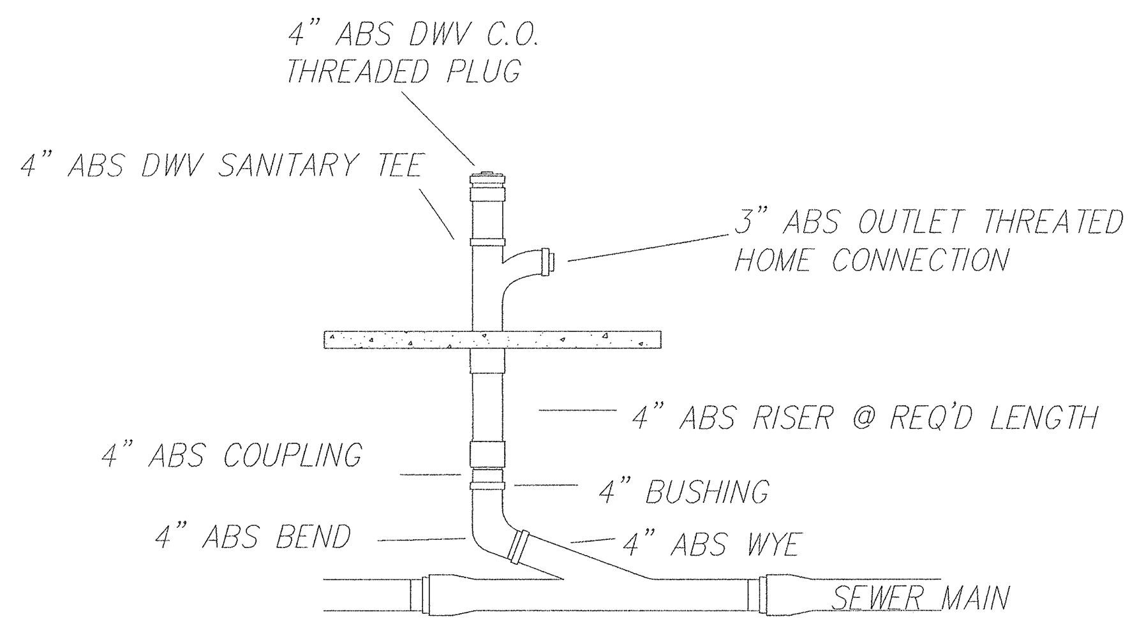
SHEET NO.
S

DATE: 10/28/13

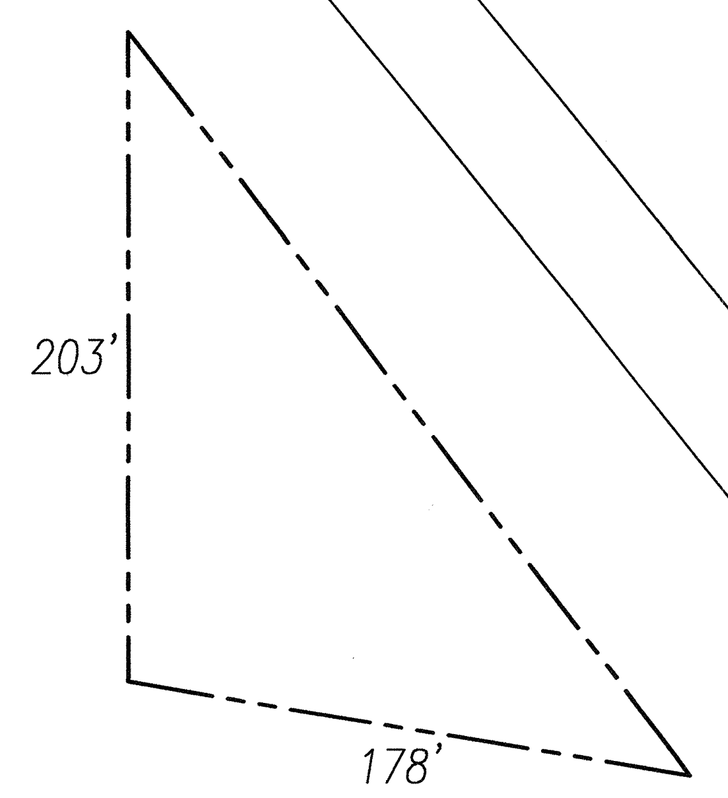
Appendix A4 – Gutierrez Mobile Home Park

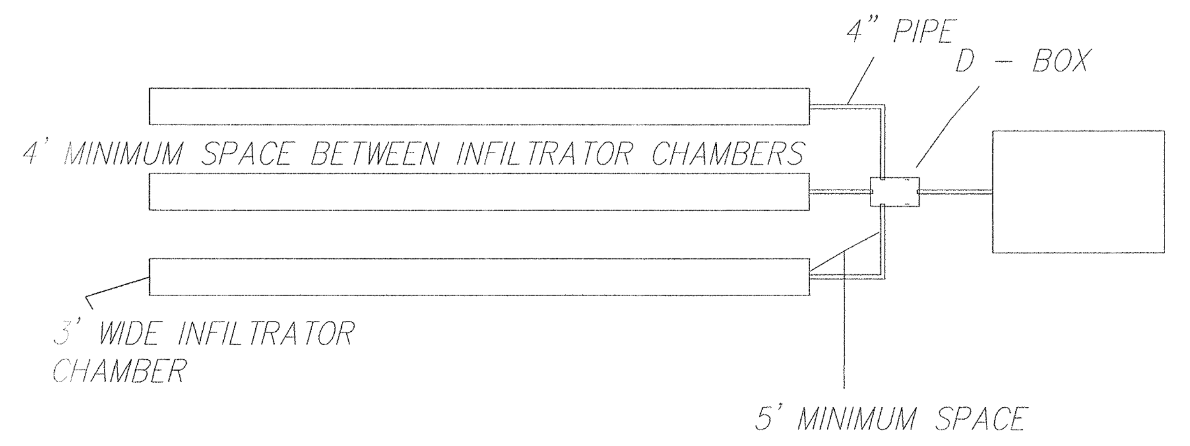


GRADE LEVEL DETAILS - NOT TO SCALE



SEWER SITE SERVICE DETAILS - NOT TO SCALE





LEACH FIELD DETAILS - NOT TO SCALE

GENERAL NOTES:

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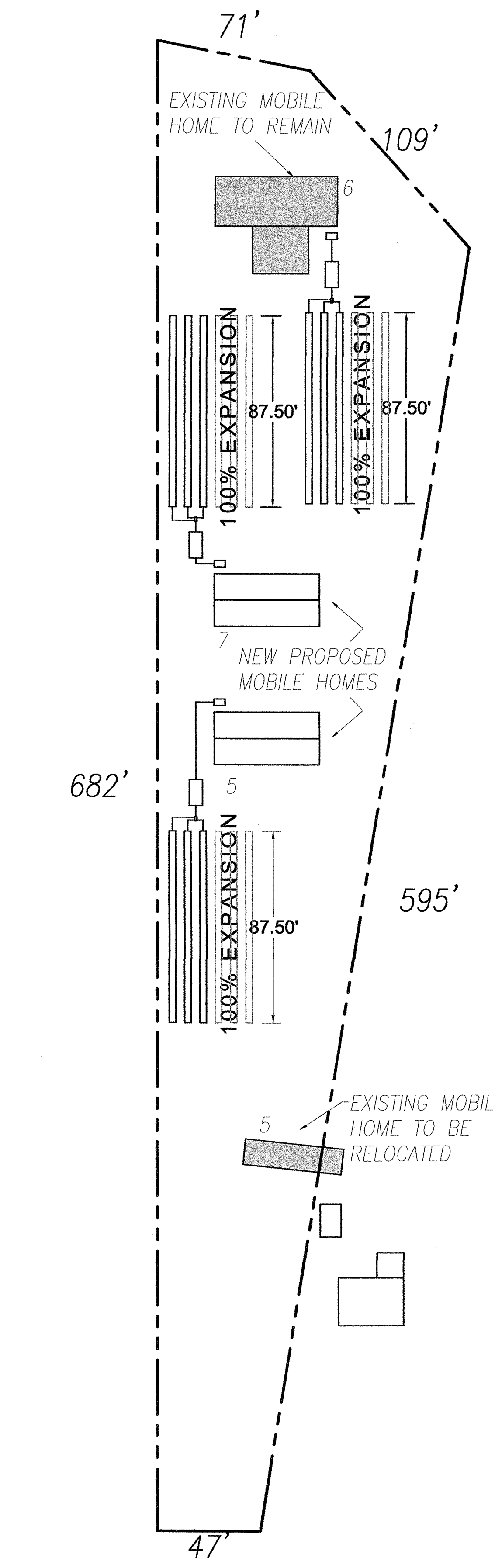

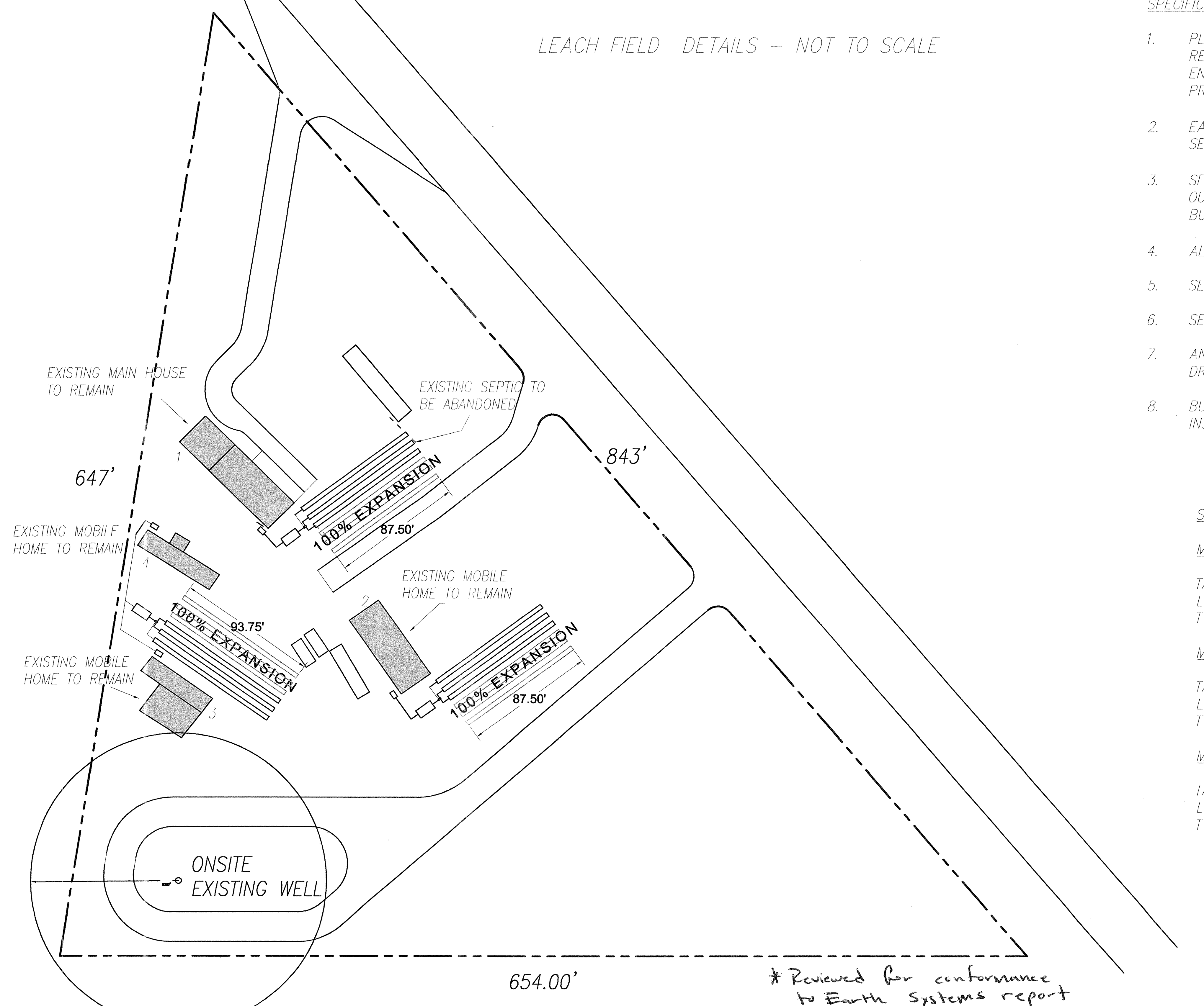

SEPTIC TANK CAPACITIES - BASED ON 40SQ.FT PER 100 GAL

MOBILE HOMES 1, 2

TANK CAPACITY: 1500 GAL
LENGTH: 262.50 LINEAR FEET
TYPE: STANDARD CAPACITY INFILTRATOR CHAMBERS

MOBILE HOME 3 AND 4

TANK CAPACITY: 2000 GAL
LENGTH: 281.25 LINEAR FEET
TYPE: STANDARD CAPACITY INFILTRATOR CHAMBERS

MOBILE HOME 6, 7 AND 8

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LENGTH: 262.5 LINEAR FEET
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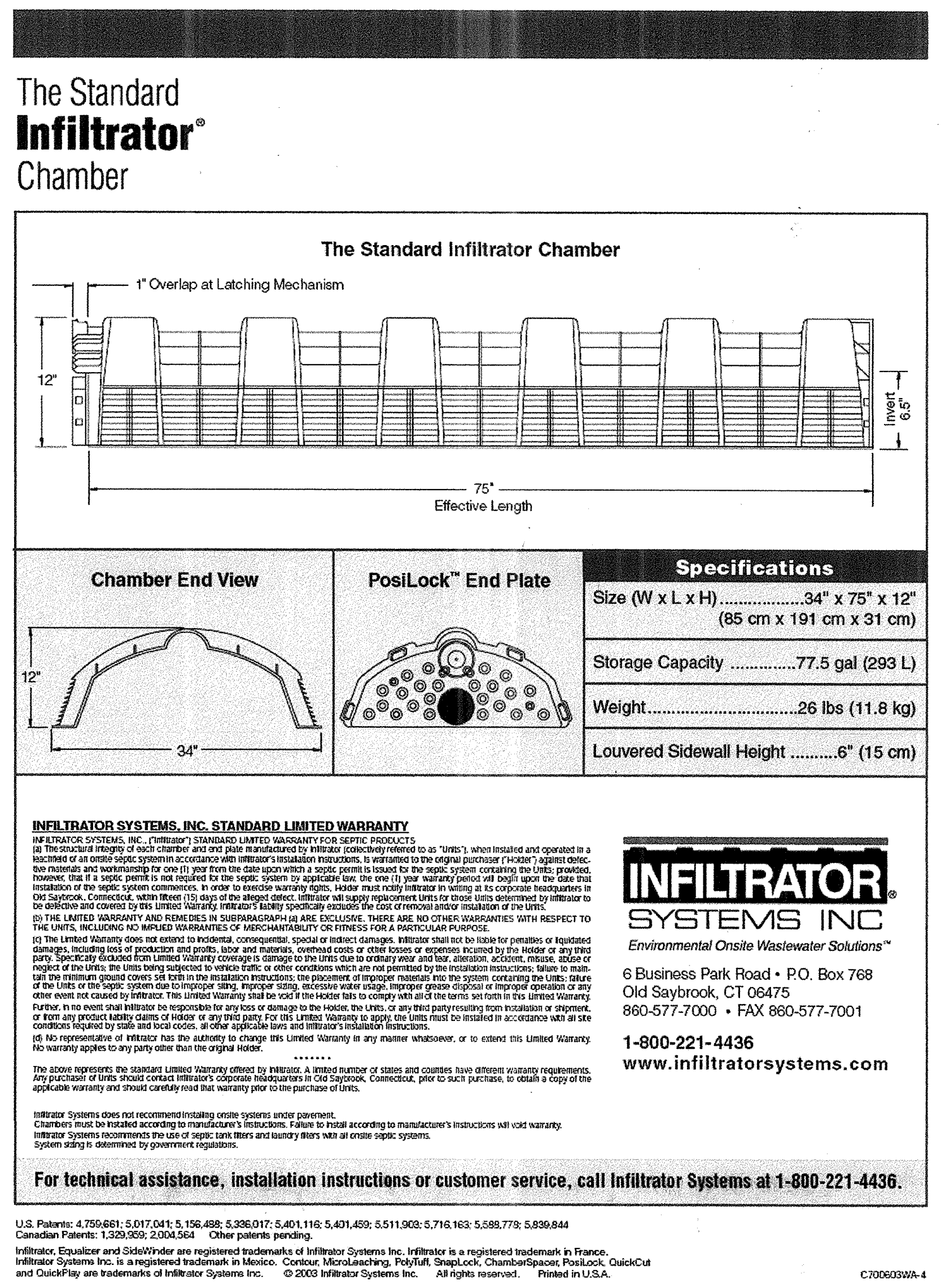

The Standard
Infiltrator®
Chamber

The Standard Infiltrator Chamber

Specifications

Size (W x L x H) ....34" x 75" x 12" (85 cm x 191 cm x 31 cm)
Storage Capacity ....77.5 gal (293 L)
Weight................................26 lbs (11.8 kg)
Louvered Sidewall Height ....6" (15 cm)

INFILTRATOR SYSTEMS, INC. STANDARD LIMITED WARRANTY

INFILTRATOR SYSTEMS, INC. ("Infiltrator") STANDARD LIMITED WARRANTY FOR SEPTIC PRODUCTS
(a) The structural integrity of each chamber and end plate manufactured by Infiltrator (collectively referred to as "Units"), when installed and operated in a leachfield of an onsite septic system in accordance with Infiltrator's installation instructions, is warranted to the original purchaser ("Holder") against defective materials and workmanship for one (1) year from the date upon which a septic permit is issued for the septic system containing the Units; provided, however, that if a septic permit is not required for the septic system by applicable law, the one (1) year warranty period will begin upon the date that installation of the septic system commences. In order to exercise warranty rights, Holder must notify Infiltrator in writing at its corporate headquarters in Old Saybrook, Connecticut, within fifteen (15) days of the alleged defect. Infiltrator will supply replacement Units for those Units determined by Infiltrator to be defective and covered by this Limited Warranty. Infiltrator's liability specifically excludes the cost of removal and/or installation of the Units.
(b) THE LIMITED WARRANTY AND REMEDIES IN SUBPARAGRAPH (a) ARE EXCLUSIVE. THERE ARE NO OTHER WARRANTIES WITH RESPECT TO THE UNITS, INCLUDING NO IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.
(c) The Limited Warranty does not extend to incidental, consequential, special or indirect damages. Infiltrator shall not be liable for penalties or liquidated damages, including loss of production and profits, labor and materials, overhead costs or other losses or expenses incurred by the Holder or any third party. Specifically excluded from Limited Warranty coverage is damage to the Units due to ordinary wear and tear, alteration, accident, misuse, abuse or neglect of the Units; the Units being subjected to vehicle traffic or other conditions which are not permitted by the installation instructions; failure to maintain the minimum ground covers set forth in the installation instructions; the placement of improper materials into the system containing the Units; failure of the Units or the septic system due to improper siting, improper sizing, excessive water usage, improper grease disposal or improper operation or any other event not caused by Infiltrator. This Limited Warranty shall be void if the Holder fails to comply with all of the terms set forth in this Limited Warranty. Further, in no event shall Infiltrator be responsible for any loss or damage to the Holder, the Units, or any third party resulting from installation or shipment, or from any product liability claims of Holder or any third party. For this Limited Warranty to apply, the Units must be installed in accordance with all site conditions required by state and local codes, all other applicable laws and Infiltrator's installation instructions.
(d) No representative of Infiltrator has the authority to change this Limited Warranty in any manner whatsoever, or to extend this Limited Warranty. No warranty applies to any party other than the original Holder.

....

The above represents the standard Limited Warranty offered by Infiltrator. A limited number of states and counties have different warranty requirements. Any purchaser of Units should contact Infiltrator's corporate headquarters in Old Saybrook, Connecticut, prior to such purchase, to obtain a copy of the applicable warranty and should carefully read that warranty prior to the purchase of Units.

Infiltrator Systems does not recommend installing onsite systems under pavement.
Chambers must be installed according to manufacturer's instructions. Failure to install according to manufacturer's instructions will void warranty.
Infiltrator Systems recommends the use of septic tank filters and laundry filters with all onsite septic systems.
System sizing is determined by government regulations.

INFILTRATOR® SYSTEMS INC
Environmental Onsite Wastewater Solutions™
6 Business Park Road • P.O. Box 768
Old Saybrook, CT 06475
860-577-7000 • FAX 860-577-7001
1-800-221-4436
www.infiltratorsystems.com

For technical assistance, installation instructions or customer service, call Infiltrator Systems at 1-800-221-4436.

U.S. Patents: 4,759,661; 5,017,041; 5,156,488; 5,336,017; 5,401,116; 5,401,459; 5,511,903; 5,716,163; 5,588,778; 5,839,844
Canadian Patents: 1,329,959; 2,004,564 Other patents pending.
Infiltrator, Equalizer and SideWinder are registered trademarks of Infiltrator Systems Inc. Infiltrator is a registered trademark in France. Infiltrator Systems Inc. is a registered trademark in Mexico. Contour, MicroLeaching, PolyTuff, SnapLock, ChamberSpacer, PosiLock, QuickCut and QuickPlay are trademarks of Infiltrator Systems Inc. © 2003 Infiltrator Systems Inc. All rights reserved. Printed in U.S.A.
C700603WA-4

* Reviewed for conformance
to Earth Systems report
12180-01, Doc# 13-10-704.
Septic system sizing & design by others.

PUEBLO UNIDO CDC

AGRICULTURAL HOUSING REHABILITATION PROGRAM

53040 AVENIDA MENDOZA
LA QUINTA, CA 92253
PHONE (760) 427-0985 FAX (760) 777-7550

DATE	BY	MARK		APPR	DATE
ENGINEER				COUNTY	

SEAL COUNTY

SEAL ENGINEER

*

KEVIN L. PAUL
No. C 70084
No. GE 2930
Exp. 9/30/2014
CIVIL
GEOTECHNICAL

1/6/14

Earth Systems Southwest

GEOTECHNICAL ENGINEERING

79-811B COUNTRY CLUB DRIVE
BERMUDA DUNES, CA 92201

PHONE (760) 345-1588 FAX (760) 345-7315

ASSESOR PARCEL NUMBER:
PROJECT ADDRESS:
82-200 HARRISON RD.
THERMAL, CA 92274

BMK#

SCALE
H 1" = 60' V N/A

COUNTY OF RIVERSIDE
GUTIERREZ RANCH
SEPTIC SYSTEM PLANS

FOR:

W.O.

COUNTY FILE NO.

SHEET NO.
S

DATE: 10/28/13

Appendix B – Soil Test Reports

Appendix B1 – Don Jose Agricultural Housing

RMC WATER AND ENVIRONMENT
515 SOUTH FLOWER STREET, 36TH FLOOR
LOS ANGELES, CALIFORNIA 90071

SEWAGE DISPOSAL FEASIBILITY AND SOIL PERCOLATION REPORT UPDATE
PROPOSED DON JOSE AGRICULTURAL HOUSING PROJECT
89-860 64TH AVENUE
THERMAL, RIVERSIDE COUNTY
CALIFORNIA

October 10, 2013

File No.: 08786-02
Doc. No.: 13-10-706

TABLE OF CONTENTS

Section 1
INTRODUCTION

1.1 Project Description

This sewage disposal feasibility and soil percolation report has been prepared for the proposed Don Jose Agricultural Housing Project located at 89-860 64th Avenue in Thermal, California. The Assessor's Parcel Number (APN) is 749-060-021. Twelve mobile homes may ultimately be situated on a portion of the site. Septic tanks and leach field waste disposal systems are proposed for this unsewered area. Domestic water comes from a well on the site. The site location is shown on Plate 1 in Appendix A. This report is being prepared to substantiate previous percolation testing evaluated by Earth Systems on February 2, 2007.

1.2 Site Description

The proposed Don Jose Agricultural Housing Project is to be developed on a portion of the rectangular-shaped parcel that consists of approximately 9 acres. The project is located at 82-860 64th Avenue in Thermal, Riverside County, California. The site location is shown on Plate 1 in Appendix A. The Don Jose Agricultural Housing Project site is situated on nearly level ground that drains by surface infiltration and gentle sheet flow toward the southeast. Based upon information provided to us, we have assumed 12 mobile homes (3 bedrooms), laid out as shown on Plate 2. The locations of the tests are within an open and undeveloped area on the property. The proposed Don Jose Agricultural Housing Project area is currently an existing mobile home park.

1.3 Purpose and Scope of Services

The purpose for our services was to evaluate and verify the site soil conditions and to provide professional opinions and recommendations regarding the feasibility for sewer waste disposal on the site and to provide updated recommendations if necessary. The scope of services included:

- A general reconnaissance of the site.
- Shallow subsurface exploration by drilling one exploratory boring to a depth of 30 feet below existing grades and to evaluate current groundwater levels and soil stratigraphy.
- Two percolation tests in the area of the proposed leach fields to verify previous percolation tests.
- An engineering evaluation of the acquired data from the exploration and testing and previous reports.
- A summary of our findings and recommendations in this written report, including:
  - Discussions on subsurface soil and groundwater conditions.
  - Discussions on soil percolation rate.
  - Recommendations regarding need for septic systems and leach field design criteria.

Not Contained In This Report: Although available through Earth Systems Southwest, the current scope of our services does not include:

- An environmental assessment.
- An investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

Section 2
METHODS OF EXPLORATION

2.1 Field Exploration

Previous field exploration was performed on October 3, 1997 to evaluate percolation characteristics of the subject site. For this current study, additional field exploration was performed to evaluate previous reports. Two percolation borings were drilled on September 23, 2013 with an 8-inch auger to a depth of approximately 3 feet. Additionally, one deep exploratory boring was drilled to a depth of approximately 30 feet below the existing ground surface to observe soil profiles. The deep exploratory boring was drilled on September 23, 2013 using an 8-inch outside diameter hollow stem auger powered by a Mobile B-61 drill rig. The boring locations are shown on the Boring and Test Location Map, Plate 2, in Appendix A. The locations shown are approximate, established using nearby landmarks. Soil samples were collected at various intervals and sealed for transport to Earth Systems laboratory. Samples were collected in a modified California sampler and contained in brass rings.

The final logs of the borings represent our interpretation of the contents of the field logs and review of the samples obtained during the subsurface exploration. The final logs of the percolation and deep borings are included in Table 1 and Appendix A of this report, respectively. The stratification lines represent the approximate boundaries between soil types, although transitions may be gradational.

2.2 Percolation Tests

Two percolation tests were performed on September 25, 2013 in the vicinity of the proposed leach fields as shown on Plate 2. The County was notified prior to conducting our onsite percolation testing (County notification number PR # 1718). The percolation tests were performed in substantial conformance to the County percolation test method for single lots, normal or sandy soil criteria (as applicable), as described in the *Onsite Waste Treatment Systems, Technical Guidance Manual, Version A.*

The tests were performed using 8-inch diameter boreholes made to a depth of about 3 feet below existing ground surface. Hole sidewalls were cleared of any smeared material. A 6 inch diameter perforated PVC pipe was installed in the excavated hole to reduce the potential for caving or disturbance from the addition of water. The boreholes had approximately 1 to 2 inches of gravel placed on the sides and bottom of the hole, respectively, to minimize sidewall disturbance and sedimentation. A gravel correction factor was applied to the volume of water percolated. Tests were performed in the typical silty sand and silt soils (Unified Soil Classification System, USCS, soil types SM and ML, respectively). The boreholes were filled with water on September 24, 2013 and presoaked overnight and for approximately ½ hour prior to testing. For testing, successive readings of the drop in water level were made over several 10- or 30-minute periods (depending on normal or sandy soil criteria) until a stabilized drop was recorded. Measurements were referenced from the top of the perforated pipe terminated at the ground surface. The field percolation test results are included in Appendix B and below.

Table 1

Onsite Seepage Pit Percolation Results

Test Hole	Test Description	Soil Condition	USCS Soil Description	Test Zone Below Existing Grades (feet)	Estimated Basic Percolation Rate (Minutes/Inch)
P-1	8" Drilled Hole	Native	0-2.5' Silt (ML)	2-3	Did Not Percolate
P-2	8" Drilled Hole	Native	0-2.5' Silty Sand (SM)	2-3	47

The test results indicate that the stabilized drop ranges from approximately no percolation to 47 minutes per inch (mpi). Previous results indicated infiltration rates of up to 24 minutes per inch (mpi) where percolation occurred. At various locations tested previously, various areas did not percolate. Please see attached previous report.

Section 3
DISCUSSION

3.1 Soil Conditions

The field exploration indicates that site soils consist primarily of interbedded silt and silty sand in the shallow leach area. The boring logs provided in Appendix A include detailed descriptions of the soils encountered.

3.2 Groundwater

Initial groundwater was determined to be at approximately 7½ feet below the ground surface based upon evaluation of the percent saturation of samples collected. Groundwater levels may fluctuate with precipitation, irrigation, drainage, and site grading. The shallow groundwater levels are generally a semi-perched layer and are strongly influenced by surrounding agricultural irrigation and drainage. This semi-perched zone is generally not used as a domestic water supply, nor is it suited for potable use because of its alkalinity, salinity, and dissolved solids content.

3.3 Geologic Setting

The site lies at an elevation of about 175 feet below mean sea level in the lower Coachella Valley, a part of the Colorado Desert geomorphic province. A significant feature within the Colorado Desert geomorphic province is the Salton Trough. The Salton Trough is a large northwest-trending structural depression that extends approximately 180 miles from San Gorgonio Pass to the Gulf of California. Much of this depression in the area of the Salton Sea is below sea level. In the prehistoric past, ancient Lake Cahuilla submerged the lower Coachella Valley.

The Coachella Valley forms the northerly portion of the Salton Trough. The lower Coachella Valley contains a thick sequence of Miocene to Holocene sedimentary deposits. The upper sediments within the lower valley consist of fine-grained sands with interbedded clays and silts that are of lacustrine (lakebed), aeolian (wind-blown), and alluvial (water-deposited) origin.

<u>Geohydrologic Setting</u>: The site lies within the Thermal subbasin of the Coachella Valley groundwater basin. The Thermal subbasin is subdivided into four generalized zones: a semi-perched zone with alternating clay layers to about 100 foot depth, underlain by an upper and lower aquifer, separated by an aquitard layer at least 100 feet thick. Domestic wells in the region derive their water form the lower portion of the upper aquifer and the lower aquifer, generally from about 400 to 1,200 feet deep. The upper semi-perched zone is generally not used as a domestic water supply, nor is it suited for potable use because of its alkalinity, salinity, and dissolved solids content.

Section 4
CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of our conclusions and professional opinions based on the data obtained from the site evaluation.

- The site is highly erratic for soil percolation and septic tank systems with infiltrators for waste disposal. Percolation tests results as well as soil and groundwater conditions indicate that a portion of the site may be feasible for soil percolation while other portions are not. The recommendations of Earth Systems previous report apply for areas which do not sufficiently percolate for sewage disposal. Each location chosen for percolation should be evaluated for the presence of silt soils which may inhibit percolation. The evaluation should be performed by a representative of the geotechnical engineer at the time of excavation. Leach fields may require moving to more acceptable areas if silt soils are observed.

- The soils encountered generally have more than 10% fines smaller than a #200 sieve.

- Results are consistent with previous report findings and recommendations from the previous report should be applied as amended and superseded within.

- The percolation test results as described in Section 2.2, presented in Appendix B indicate that the percolation may be set at 47 minutes per inch (mpi) in areas that were shown to percolate. Based upon a stabilized rate of 47 mpi, conventional leach lines for sanitary waste disposal may be sized using 100 square feet of leaching area per 100 gallons of septic tank capacity (based on design soil percolation rate of 44-48 mpi).

- Groundwater was at 7½ feet previously and currently at 7½ feet. Signs of groundwater higher than 7½ feet were not observed.

- The final design should delineate the area to be set aside and used for 100% expansion.

- Leach lines should be constructed to provide the required leaching area. Leach lines should have a maximum length of 100 feet and be separated at least 4 feet (edge-to-edge) from each other. The leach lines should have at least 12 inches of soil cover and have a bottom no more than 24 inches below existing prevailing grade. Due to the very moist upper soils encountered, the leach fields should consist of standard size chamber systems, such as the Infiltrator® or Cultec System. This system replaces leach lines with perforated drainage pipe and gravel with a sturdy plastic chamber that is 34 inches wide, 12 inches high, and completely open on the bottom. Although allowed by Code, due to the high moisture content of the upper soils, we do not recommend a 20% reduction in leaching area for this type of system.

- Rapid injection or high volume discharge of effluent may tax the ability of the soils to readily absorb effluent over the short term. System design should consider the effects of increased user use (additional residents per home), incorporate low flow discharge (low flow toilets, shower heads, etc.) and incorporate low flow septic systems which dose the leach field slower.

- Leach fields should be located at least 5 feet from property lines, 8 feet from buildings or covered areas, and 100 feet away from on-site or off property wells. Other separations detailed in *Onsite Waste Treatment Systems, Technical Guidance Manual, Version A* for Riverside County apply and should be referred to in design.

- Maintenance of onsite waste disposal systems can be the most critical element in determining the success of a design. Due to general accessibility limitations which typically exist with drainage systems and infiltration structures, they must be protected clogging of any filter medium, and the near structure soils. The potential for clogging can be reduced by pre-treating structure inflow through the installation of a proper septic tank. In addition, sediment, paper, and debris must be removed from the tank on a regular basis.

- Based on the data presented in this report and using the recommendations set forth, it is the judgment of this professional that there is sufficient area to support a primary and expansion OWTS that will meet the current standards of the Department of Environmental Health and the Regional Water Quality Control Board (RWQCB). Based on the data presented in this report and the testing information accumulated, it is the judgment of this professional that the groundwater table will not encroach within the current allowable limit set forth by County and State requirements (5 feet below the base of the leach field set at no deeper than 2 feet below existing grade).

- This report should be submitted to the Riverside County Department of Environmental Health (RCDEH) for their review and comment. Earth Systems should have the opportunity to review the plan of the septic system and details.

Section 5
LIMITATIONS

Our findings and recommendations in this report are based on selected points of field exploration, percolation testing, and our understanding of the Don Jose Agricultural Housing Project. Furthermore, our findings and recommendations are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil or groundwater conditions could exist between and beyond the exploration points.

Findings of this report are valid as of the issued date of the report. However, changes in conditions of a property can occur with passage of time, whether they are from natural processes or works of man, on this or adjoining properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one year.

This report is issued with the understanding that the owner or the owner's representative has the responsibility to bring the information and recommendations contained herein to the attention of the designer for the septic systems and are incorporated into the plans and specifications. The owner or the owner's representative also has the responsibility to take the necessary steps to see that the contractor carry out such recommendations in the field. It is further understood that the owner or the owner's representative is responsible for submittal of this report to the appropriate governing agencies.

Earth Systems has striven to provide our services in accordance with generally accepted geotechnical engineering practices in this locality at this time. No warranty or guarantee, express or implied, is made. This report was prepared for the exclusive use of the Client and the client's authorized agents.

Earth Systems should be provided the opportunity for a general review of the septic tank and leach field plan in order that our recommendations may be properly interpreted and implemented in the design. If Earth Systems is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

Although available through Earth Systems Southwest, the current scope of our services does not include an environmental assessment or an investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

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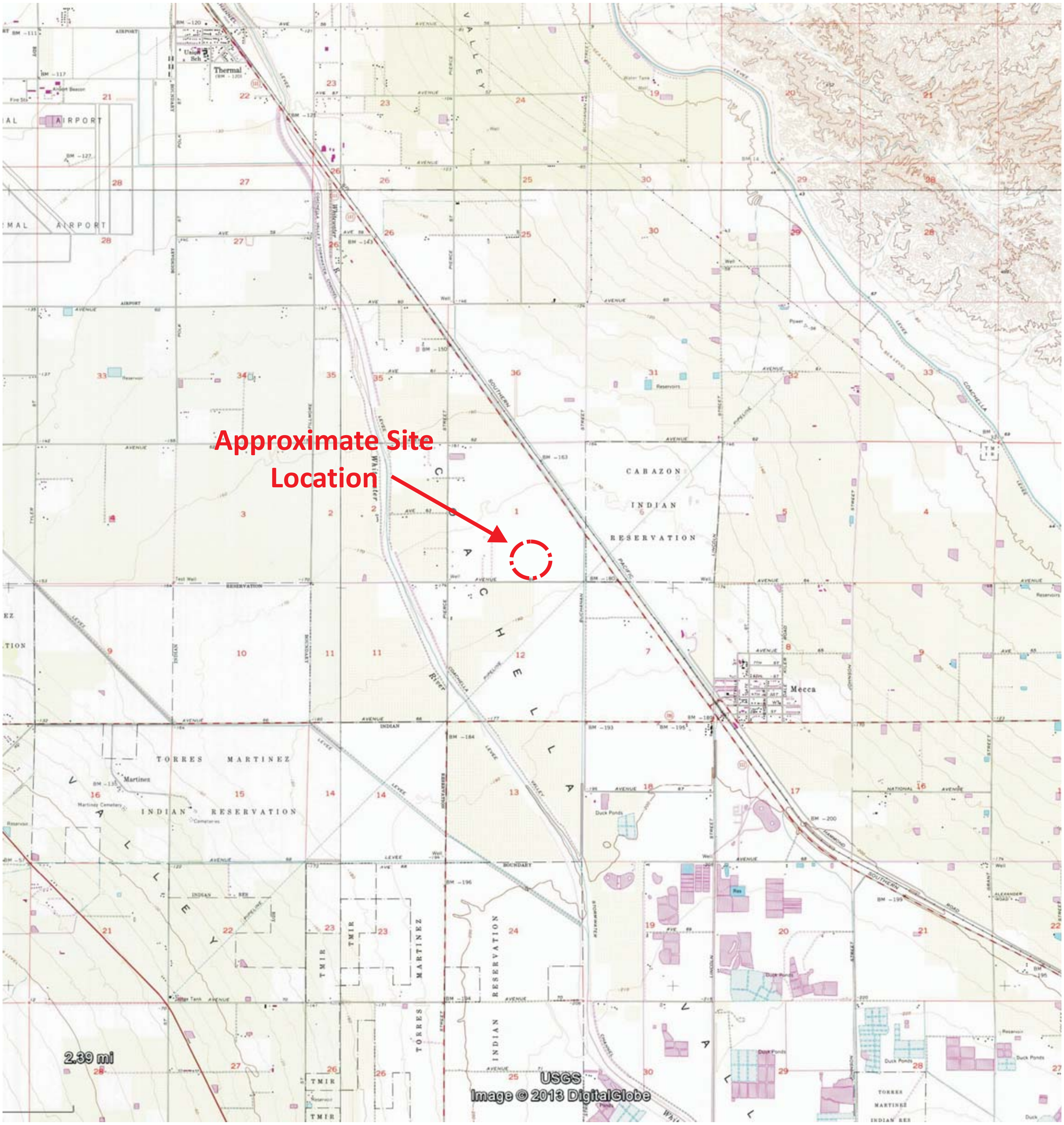
Appendices as cited are attached and complete this report.

APPENDIX A

Plate 1 – Site Location Map
Plate 2 – Boring & Percolation Test Location Map
Terms and Symbols Used on Boring Logs
Soil Classification System
Log of Boring
Laboratory Test Results



Reference: Good Earth Satellite Image with Historical Topographic Map Overlay, dated 2011.

LEGEND

○ Approximate Site Location

Approximate Scale: 1" = 1 Mile

0 1 Mile 2 Miles

N

Plate 1
Site Location Map

Proposed Don Jose Agricultural Housing Project
89-860 64th Avenue
Thermal, Riverside County, California

Earth Systems
Southwest

10/10/2013	File No.: 08786-02

Reference: Google Earth Satellite Image dated 3/22/2013.

LEGEND

- **B-2** ◐ Approximate Boring Locations
- **P-2** ● Approximate Percolation Test Location

Approximate Scale: 1" = 175'

0 175' 350'

N

Plate 2
Boring & Percolation Test Location Map

Proposed Don Jose Agricultural Housing Project
89-860 64th Avenue
Thermal, Riverside County, California

Earth Systems
Southwest

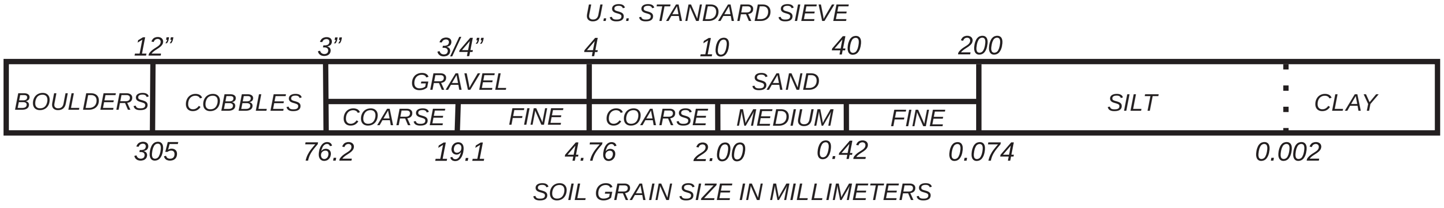
10/10/2013

File No.: 08786-02

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE



RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	**N=0-4*	*RD=0-30*	*Easily push a 1/2-inch reinforcing rod by hand*
Loose	*N=5-10*	*RD=30-50*	*Push a 1/2-inch reinforcing rod by hand*
Medium Dense	*N=11-30*	*RD=50-70*	*Easily drive a 1/2-inch reinforcing rod with hammer*
Dense	*N=31-50*	*RD=70-90*	*Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer*
Very Dense	*N>50*	*RD=90-100*	*Drive a 1/2-inch reinforcing rod a few inches with hammer*

**N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler,140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).*

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	**N=0-1*	**C=0-250 psf*	*Squeezes between fingers*
Soft	*N=2-4*	*C=250-500 psf*	*Easily molded by finger pressure*
Medium Stiff	*N=5-8*	*C=500-1000 psf*	*Molded by strong finger pressure*
Stiff	*N=9-15*	*C=1000-2000 psf*	*Dented by strong finger pressure*
Very Stiff	*N=16-30*	*C=2000-4000 psf*	*Dented slightly by finger pressure*
Hard	*N>30*	*C>4000*	*Dented slightly by a pencil point or thumbnail*

MOISTURE DENSITY

Moisture Condition:	*An observational term; dry, damp, moist, wet, saturated.*
Moisture Content:	*The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.*
Dry Density:	*The pounds of dry soil in a cubic foot.*

MOISTURE CONDITION

Dry.....................Absence of moisture, dusty, dry to the touch
Damp................Slight indication of moisture
Moist.................Color change with short period of air exposure (granular soil)
Below optimum moisture content (cohesive soil)
Wet....................High degree of saturation by visual and touch (granular soil)
Above optimum moisture content (cohesive soil)
Saturated..........Free surface water

RELATIVE PROPORTIONS

Trace............minor amount (<5%)
with/some......significant amount
modifier/and...sufficient amount to influence material behavior (Typically >30%)

PLASTICITY

DESCRIPTION	*FIELD TEST*
Nonplastic	*A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.*
Low	*The thread can barely be rolled.*
Medium	*The thread is easy to roll and not much time is required to reach the plastic limit.*
High	*The thread can be rerolled several times after reaching the plastic limit.*

LOG KEY SYMBOLS

▮	*Bulk, Bag or Grab Sample*
◧	*Standard Penetration Split Spoon Sampler (2" outside diameter)*
▮	*Modified California Sampler (3" outside diameter)*
◩	*No Recovery*

GROUNDWATER LEVEL

▼	*Water Level (measured or after drilling)*
▽	*Water Level (during drilling)*

Terms and Symbols Used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS *More than 50% of material is larger than No. 200 sieve size*	**GRAVEL AND GRAVELLY SOILS** *More than 50% of coarse fraction retained on No. 4 sieve*	**CLEAN GRAVELS**	░	**GW**	*Well-graded gravels, gravel-sand mixtures, little or no fines*
			▒	**GP**	*Poorly-graded gravels, gravel-sand mixtures. Little or no fines*
		GRAVELS WITH FINES	▦	**GM**	*Silty gravels, gravel-sand-silt mixtures*
			▓	**GC**	*Clayey gravels, gravel-sand-clay mixtures*
	SAND AND SANDY SOILS *More than 50% of coarse fraction passing No. 4 sieve*	**CLEAN SAND (Little or no fines)**	░	**SW**	*Well-graded sands, gravelly sands little or no fines*
			░	**SP**	*Poorly-graded sands, gravelly sands, little or no fines*
		SAND WITH FINES (appreciable amount of fines)	▥	**SM**	*Silty sands, sand-silt mixtures*
			▨	**SC**	*Clayey sands, sand-clay mixtures*
FINE-GRAINED SOILS *More than 50% of material is smaller than No. 200 sieve size*	**SILTS AND CLAYS**	**LIQUID LIMIT LESS THAN 50**	▥	**ML**	*Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity*
			▨	**CL**	*Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays*
			▥	**OL**	*Organic silts and organic silty clays of low plasticity*
		LIQUID LIMIT GREATER THAN 50	▥	**MH**	*Inorganic silty, micaceous, or diatomaceous fine sand or silty soils*
			▨	**CH**	*Inorganic clays of high plasticity, fat clays*
			▨	**OH**	*Organic clays of medium to high plasticity, organic silts*
HIGHLY ORGANIC SOILS			▒	**PT**	*Peat, humus, swamp soils with high organic contents*
VARIOUS SOILS AND MAN MADE MATERIALS			▦		*Fill Materials*
MAN MADE MATERIALS			■		*Asphalt and concrete*

Soil Classification System

Earth Systems
Southwest

Boring No. B-1

Project Name: Don Jose Agricultural Housing
Project Number: 08786-02
Boring Location: See Plate 2

Drilling Date: September 23, 2013
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobile B61 HDX w/Autohammer
Logged By: Randy Reed

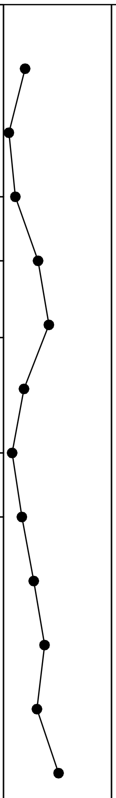
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Sample Type: Bulk	SPT	MOD Calif.	Penetration Resistance (Blows/6")	USCS/Bedrock	Dry Density (pcf)	Moisture Content (%)	Description of Units
				SM			SILTY SAND: yellowish brown, medium dense, damp, fine grained sand
		■	5, 9, 11				
		■	2, 2, 3				loose, moist
		■	3, 4, 7	ML			CLAYEY SILT: brown, firm, wet, cohesive, plastic
		■	13, 16, 16	SP-SM			POORLY GRADED SAND WITH SILT: brown, medium dense, wet, fine to medium grained sand
		■	11, 20, 22				
				SM			SILTY SAND: brown, medium dense, wet, fine to medium grained sand
		■	8, 9, 10				
		■	3, 4, 4	ML			CLAYEY SILT: brown, firm, wet, cohesive, plastic
		■	6, 7, 10	SM			SILTY SAND: brown, medium dense, wet, fine to medium grained sand
		■	7, 13, 15				
		■	13, 19, 19				
		■	10, 14, 17				
		■	12, 23, 28				dense

Graphic Trend
Blow Count Dry Density



Total Depth 31 1/2 feet
Groundwater Encountered at 7 1/2 feet
No Refusal, Backfilled w/cuttings and bentonite

File No.: 08786-02 October 10, 2013

Lab No.: 13-295

UNIT DENSITIES AND MOISTURE CONTENT ASTM D2937-04 & D2216-05

Job Name: Proposed Don Jose Agriculture Housing Project

Sample Location	Depth (feet)	Unit Dry Density (pcf)	Moisture Content (%)	USCS Group Symbol
B1	2.5	97	7	SM
B1	5	91	11	SM
B1	7.5	91	31	ML
B1	10	118	14	SP-SM
B1	12.5	120	14	SM
B1	15	96	27	SM
B1	17.5	95	29	ML
B1	20	95	29	SM
B1	22.5	97	27	SM
B1	25	96	28	SM
B1	27.5	93	30	SM
B1	30	102	23	SM

File No.: 08786-02 10/10/2013

Lab No.: 13-295

SIEVE ANALYSIS

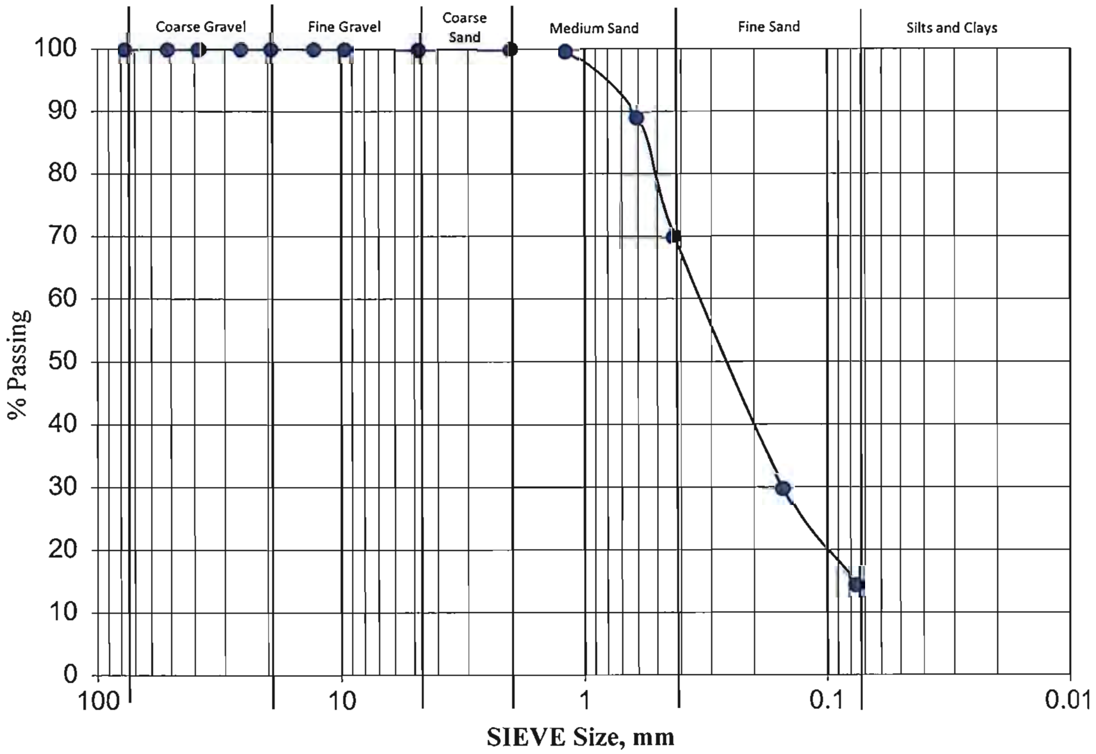
ASTM D6913-09

Job Name: Proposed Don Jose Agriculture Housing Project

Sample ID: B1 @ 12 1/2 feet

Description: Silty Sand (SM)

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	100
#16	100
#30	89
#40	70
#100	30
#200	14.7



% Coarse Gravel:	0	% Coarse Sand:	0				
% Fine Gravel:	0	% Medium Sand:	30	Cu:	NA		
		% Fine Sand:	55	Cc:	NA	Gradation	
% Total Gravel	0	% Total Sand	85	% Fines:	15	NA	

APPENDIX B

Percolation Test Results

Leachline Percolation Data Sheet

Project: Don Jose Ag Housing Job No.: 08786-02

Test Hole No.: P-1 Date Excavated: 9/23/2013

Depth of Test Hole: 2.5 feet below grade Soil Classification: Silt (ML)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/24/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/25/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.50

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	15:45 16:15	30	4.6	1.2	3.4
B					

Gravel Factor 0.73

Use [✓ Normal] or Sandy (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	10:10	10:40	30	30	7.0	7.0	0.0	No Perc
2	10:40	11:10	30	60	7.0	7.0	0.0	No Perc
3	11:10	11:40	30	90	7.0	6.5	0.5	82.2
4	11:40	12:10	30	120	6.5	6.5	0.0	No Perc
5	12:10	12:40	30	150	6.5	6.5	0.0	No Perc
6	12:40	13:10	30	180	6.5	6.5	0.0	No Perc
7	13:10	13:40	30	210	6.5	6.5	0.0	No Perc
8	13:40	14:10	30	240	6.5	6.5	0.0	No Perc
9	14:10	14:40	30	270	6.5	6.5	0.0	No Perc
10	14:40	15:10	30	300	6.5	6.5	0.0	No Perc
11	15:10	15:40	30	330	6.5	6.0	0.5	82.2
12	15:40	16:10	30	360	6.0	6.0	0.0	No Perc

Leachline Percolation Data Sheet

Project: Don Jose Ag Housing
Job No.: 08786-02
Test Hole No.: P-2
Date Excavated: 9/23/2013
Depth of Test Hole: 2.5 feet below grade
Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Reed
Date: 9/24/2013
Presoak: Yes
Actual Percolation Tested by: R. Reed
Date: 9/25/2013
Pipe Stick Up (ft): 0.00
Length of Pipe (ft): 2.50

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	15:50 16:20	30	7.0	1.5	5.5
B					

Gravel Factor 0.73

Use [✓ Normal] or Sandy (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	10:00	10:30	30	30	6.0	3.0	3.0	13.7
2	10:30	11:00	30	60	6.0	4.0	2.0	20.5
3	11:00	11:30	30	90	7.3	6.0	1.3	32.9
4	11:30	12:00	30	120	6.0	4.5	1.5	27.4
5	12:00	12:30	30	150	7.0	5.3	1.8	23.5
6	12:30	13:00	30	180	6.3	4.5	1.8	23.5
7	13:00	13:30	30	210	7.0	6.3	0.8	54.8
8	13:30	14:00	30	240	6.3	5.5	0.8	54.8
9	14:00	15:00	60	300	5.5	2.0	3.5	23.5
10	15:00	16:00	60	360	7.8	6.0	1.8	47.0

APPENDIX C

Earth Systems Southwest Previous Percolation Report for the Site dated February 2, 2007.

Earth Systems
Southwest

79-811B Country Club Drive
Bermuda Dunes, CA 92203
(760) 345-1588
(800) 924-7015
FAX (760) 345-7315

February 2, 2007

File No.: 08786-01
07-02-707

Mr. Jose Cervera
89-860 Avenue 64
Thermal, California 92274

Project: **Cervera Mobile Home Park**
APN 749-060-021
89-860 Avenue 64
Thermal, California

Subject: **Update to Soil Percolation Feasibility Report**

Reference: Southland Geotechnical, Soil Percolation Feasibility Report, APN 749-060-021, Avenue 64 East of Pierce Street, Mecca, California, File No.: P97116, dated October 3, 1997.

As requested, we have reviewed the referenced document for purposes of updating the report. The undersigned engineer had prepared this report in 1997. As stated in the report, additional testing is required for trailer spaces 4, 7, and 9, or alternatively routing to leach field within proven areas of acceptable percolation. It is our opinion that the referenced document remains applicable to the Polanco mobile home park. The report is attached for reference and convenience.

Should you have any questions concerning this letter or attached report, please give us a call and we will be pleased to assist you.

Respectfully submitted,
EARTH SYSTEMS SOUTHWEST

Shelton L. Stringer

Shelton L. Stringer
GE 2266

REGISTERED PROFESSIONAL ENGINEER
SHELTON L. STRINGER
2/2/07
No. 2266
Exp. 6-30-08
GEOTECHNICAL
STATE OF CALIFORNIA

Letter/sls/ajf

Distribution: 3/Mr. Jose Cervera
1/RC File
2/BD File

Attachments: Soil Percolation Feasibility Report

SOUTHLAND GEOTECHNICAL

FOUNDATION ENGINEERS AND MATERIALS L

October 3, 1997

JRC & Associates
P.O. Box 3024
Indio, CA 92202

Attn: John Castillo

Soil Percolation Feasibility Report
Mobile Home Park
Avenue 64 East of Pierce Street
APN 749-060-021
Mecca, California
Report No. P97116

Dear John:

This report presents the findings of our soil percolation feasibility study for the proposed mobile home park near Mecca, California. The project site is located at the northeast corner of Avenue 64 east of Pierce Street. (See Vicinity Map, Plate 1). The proposed development will consist of a 10-lot mobile home park for migrant farm laborers. Ten, 1500 gallon septic tanks and leachfield disposal fields are planned.

Field Exploration

We conducted a subsurface exploration on August 28, 1997 by observing two backhoe test pits previously dug and made to an approximate depth of 8 feet below the existing ground surface. The test pit locations are shown on the Site and Exploration Plan on Plate 2. The test pits were located by paced measurements and should be considered approximate. A staff geologist developed logs of the test pits from observation of the exposed soils within the pit. The test pit logs are presented on Plates 3 and 4 attached to this report.

242 NORTH 8TH STREET • EL CENTRO, CALIFORNIA 92243 • (760) 352-1242
79-607 COUNTRY CLUB DRIVE, SUITE 5 • BERMUDA DUNES, CALIFORNIA 92201 • (760) 360-0665
2211 EAST PALO VERDE STREET • YUMA, ARIZONA 85365 • (520) 344-8844
7975 RAYTHEON ROAD, SUITE 210 • SAN DIEGO, CALIFORNIA 92123 • (619) 467-4900

Percolation Tests

Twelve percolation tests were made on September 3, 1997 in the vicinity of the proposed systems as shown on Plate 2. The percolation tests were made in conformance to Riverside County percolation report standards, as described in "Waste Disposal for Individual Homes, Commercial and Industrial", published by the Riverside County Division of Environmental Health.

The tests were performed using a basket inside a 10-inch diameter, hand auger boreholes made to depths of 3.0 feet below existing ground surface. The boreholes were filled with water and normal soil criteria was determined to be applicable, so the boreholes were presoaked with water overnight. Successive readings of drop in water level were made over several periods of about 30 minutes until a stabilized drop was recorded.

The field percolation test results are summarized below with calculations included in the Appendix of this report. The test results indicate that the stabilized percolation rate in the soil are highly erratic and range from 5 to over 120 minutes per inch (mpi). Areas having over 60 mpi percolation rate are unacceptable for leach field systems.

Site Conditions

The 9.9 acre project site consists of agricultural field. The site is relatively flat and drains through surface infiltration and sheet flow to the southeast. The area is bounded by vacant land to the east, west and north, and Avenue 64 to the south. The project site lies at an elevation of approximately 180 feet below mean sea level.

Subsurface Soils

The field exploration conducted on August 28, 1997 indicates that the soils consist generally of silt and sandy silt (ML). According to the USDA Soil Conservation Soils Survey Map, the surficial soils classifies as Indio silt, wet. Groundwater was encountered in the exposed test pits made to a depth of 7.5 feet.

Soil Percolation Rate and Leachfield Design

The percolation test results as well as soil and groundwater conditions indicate that a portion of the site may be feasible for soil percolation. A tentative design soil percolation rate for use in areas of proven acceptable percolation may be set at 24 minutes per inch (mpi). Accordingly, the leachfields designed to this rate using 60 square feet of leaching area per 100 gallons of septic tank capacity. This will require 300 LF of 3-ft. wide leachlines for a 1500 gallon septic tank.

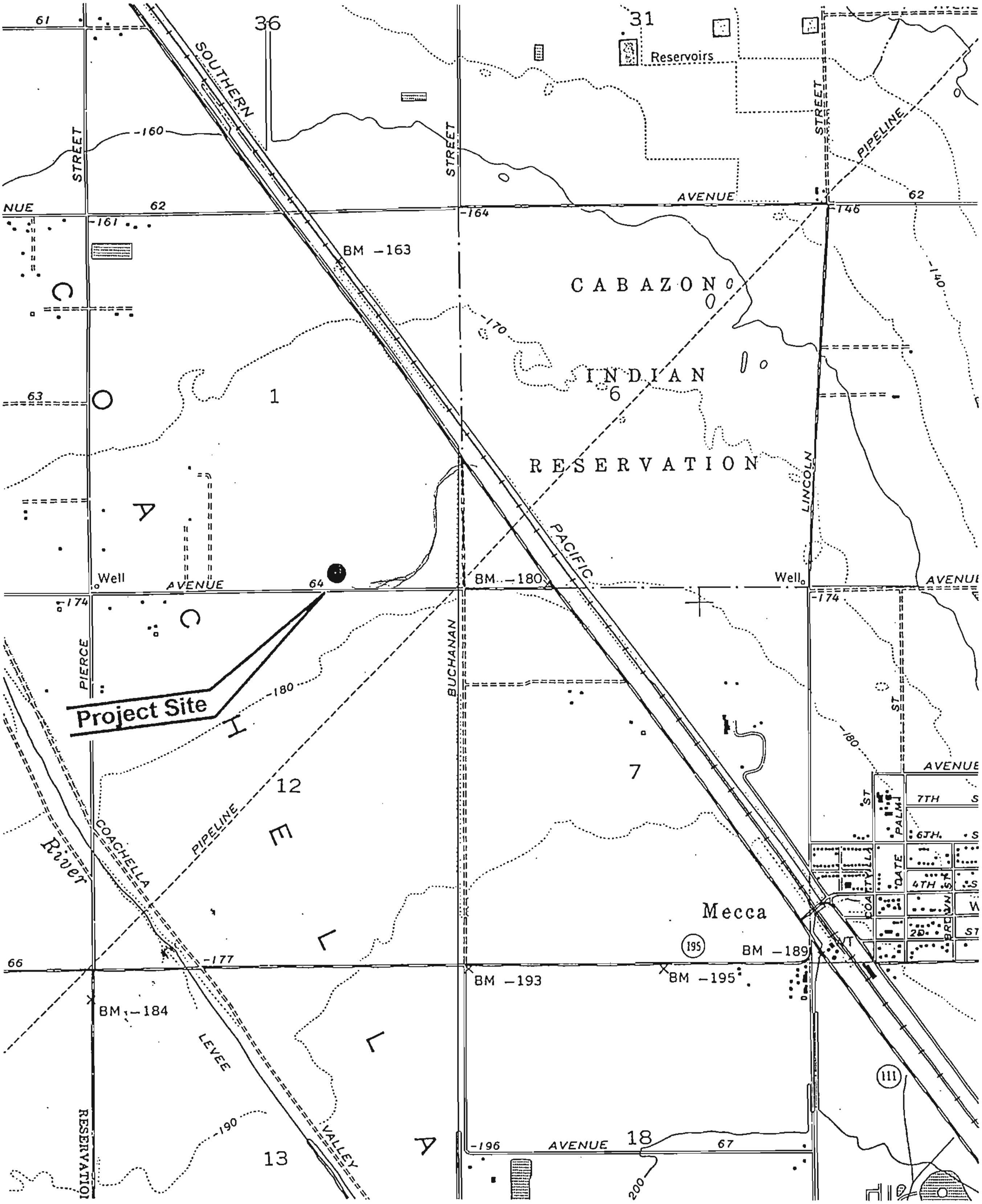
Based on the data presented in this report, it is the judgement of the engineer that prepared and signed this report that further testing may be required to evaluate whether there is sufficient area in the lot in question to support individual sewage disposal systems that will meet the current codes and standards of the Riverside County Health Department. Additional tests are required in particular at trailer spaces 4, 7 and 9 to evaluate whether the exceptionally low percolation is representative of those areas or whether additional tests will indicate acceptable percolation rate (<60mpi). Alternately, the trailers for these spaces may be relocated such that the leachfields could be installed in areas of proven percolation in adjacent trailer spaces. This report should be submitted to the Riverside County Health Department for their review and comment. Based on the subsurface data presented in the report, it is the judgement of the same engineer that the groundwater table is marginally within the current allowable limit set forth by county and state requirements.

We appreciate the opportunity to provide our professional services. If you have any questions or comments regarding our findings, please call our office at 360-0665.

Sincerely,
SOUTHLAND GEOTECHNICAL INC.
Shelton L Stringer
Shelton L. Stringer, PE, GE
Senior Geotechnical Engineer

REGISTERED PROFESSIONAL ENGINEER
SHELTON L. STRINGER
No. 2266
Exp. 6-30-00
GEOTECHNICAL
STATE OF CALIFORNIA

attachments:
- Plate 1 - Vicinity Map
- Plate 2 - Site and Exploration Map
- Plate 3-4 - Log of Borings
- Appendix - Soil Percolation Test Results



SOUTHLAND GEOTECHNICAL

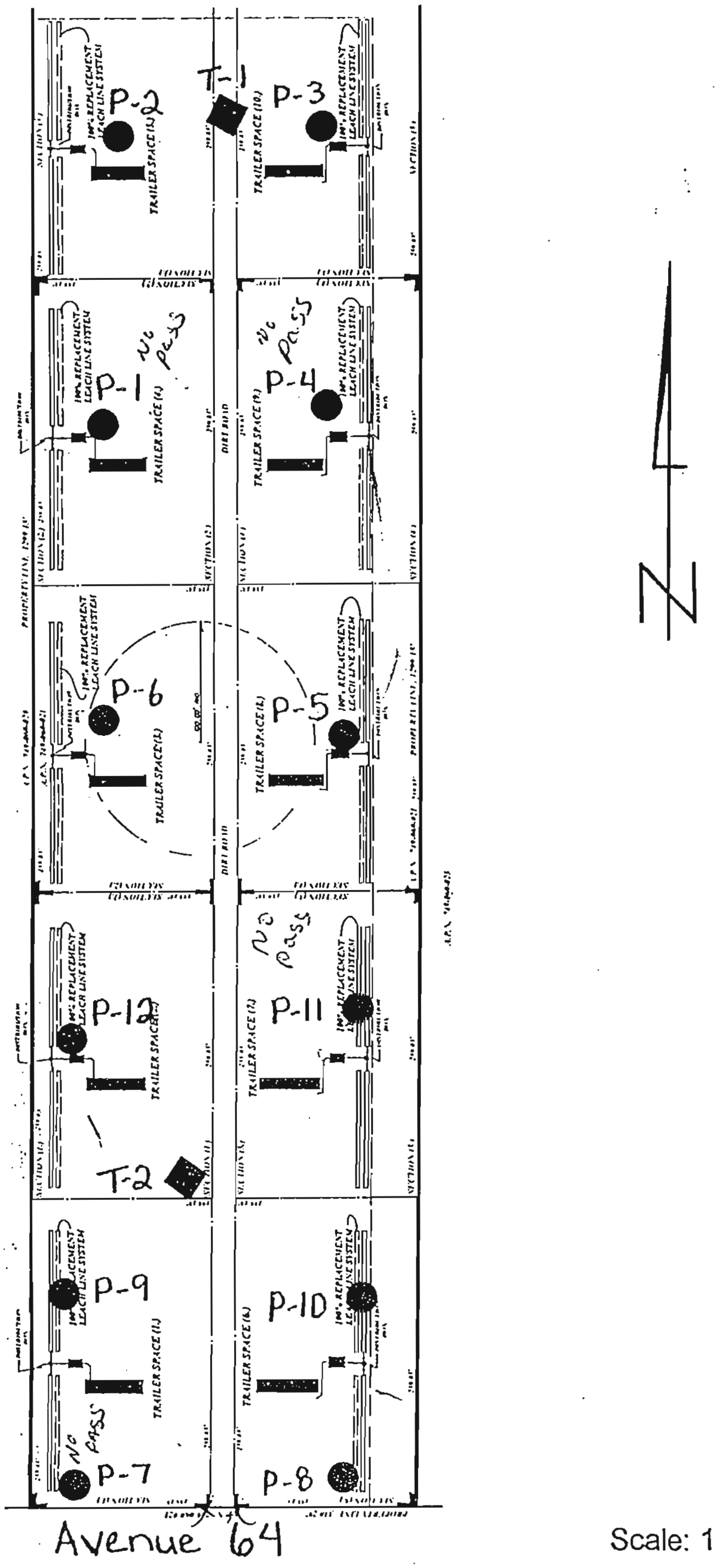
Project No: P97116

Vicinity Map

Plate 1

◆ Approximate Test Pit Location (typ)

● Approximate Perc Test Location (typ)



Scale: 1"=~155'

SOUTHLAND GEOTECHNICAL

Project No: P97116

Site and Exploration Plan

Plate 2

CLIENT: JRC & Associates
METHOD OF EXCAVATION: Backhoe
PROJECT: Pec Testing, Ave 62 East of Pierce
DATE OBSERVED:08/28/97
LOCATION:See Site & Exploration Plan
LOGGED BY: K. Harmon

LOG OF TEST PIT T-1

SHEET 1 OF 1

DESCRIPTION OF MATERIAL

SURFACE ELEV. +/-

DEPTH (FEET)	CLASSIFICATION	SAMPLE TYPE	BLOWS/ FOOT	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	RELATIVE COMPACTION (%)	LIQUID LIMIT	PLASTICITY INDEX	PASSING # 200
1	▥				SILT (ML): Gray, medium dense, dry to humid, some very fine sand						
2	▥										
3	▥										
4	▥										
5	░				SILTY SAND (SM): Gray, medium dense, humid to moist, fine grained						
6	▥										
7	▥				SANDY SILT (ML): Gray, moist to saturated						
8	▥				▼ GWT @ 7.5 ft.						
9					Bottom of Excavation @ 8 ft.						
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											

Project No:
P97116

SOUTHLAND GEOTECHNICAL

Plate
3

CLIENT: JRC & Associates
METHOD OF EXCAVATION: Backhoe
PROJECT: Pec Testing, Ave 62 East of Pierce
DATE OBSERVED: 08/28/97
LOCATION: See Site & Exploration Plan
LOGGED BY: K. Harmon

LOG OF TEST PIT T-2

SHEET 1 OF 1

DEPTH (FEET)	CLASSIFICATION	SAMPLE TYPE	BLOWS/ FOOT	POCKET PEN. (TSF)	DESCRIPTION OF MATERIAL SURFACE ELEV. +/-	MOISTURE CONTENT (%)	DRY UNIT WT. (PCF)	RELATIVE COMPACTION (%)	LIQUID LIMIT	PLASTICITY INDEX	PASSING # 200
1					SANDY SILT (ML): Gray, medium dense, dry to humid						
2											
3											
4					-Moist						
5											
6											
7					-Wet to saturated ▼ GWT @ 7.5 ft.						
8											
9					Bottom of Excavation @ 8 ft.						
10											
11											
12											
13											
14											
15											
16											
17											
18											
19											
20											
21											
22											

Project No:
P97116

SOUTHLAND GEOTECHNICAL

Plate
4

P97116

LEACH LINE PERC DATA SHEET

Project: Perc Tests, Ave 64 East of Pierce Job No: ~~P97115~~
Test Hole No. P1 Date Excavated: 8-28-97
Depth of Test Hole: 3 ft. Soil Classification: ML
Check for Sandy Soil Criteria Tested By: KH Date: 8-29-97 Presoak: 24hr
Actual Percolation Tested by: Karl A. Hanson Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1	6:00 6:25	25	9 1/4	4	5 1/4
2	6:26 6:51	25	9 5/8	6 1/2	3 1/8

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:05 7:35	30	30	10	9 1/8	0.88	34.1
7:36 8:06	30	61	9 1/4	8 5/8	0.63	47.6
8:07 8:37	30	92	8 5/8	8 1/4	0.38	78.9
8:38 9:08	30	123	9 1/8	8 3/4	0.38	78.9
9:09 9:39	30	154	9 7/8	9 3/8	0.50	60.0
9:40 10:10	30	185	9 7/8	9 3/8	0.50	60.0
10:11 10:41	30	216	10 1/8	9 3/4	0.38	78.9
10:42 11:12	30	247	10 1/8	9 3/4	0.38	78.9
11:13 11:43	30	278	10	9 5/8	0.38	78.9
11:44 12:14	30	309	9 3/4	9 3/8	0.38	78.9
12:15 12:45	30	340	9 3/4	9 3/8	0.38	78.9
12:46 1:16	30	371	9 3/4	9 1/2	0.25	120.0

Say 80

LEACH LINE PERC DATA SHEET

Project: Perc Tests, Ave 64 East of Pierce Job No: P97116
Test Hole No. P2 Date Excavated: 8-28-97
Depth of Test Hole: 3 ft. Soil Classification: ML
Check for Sandy Soil Criteria Tested By: KH Date: 8-29-97 Presoak: 24 hr
Actual Percolation Tested by: Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1	6:05 6:30	25	9 1/4	1/2	8 3/4
2	6:31 6:56	25	9 5/8	5 1/8	4 1/2

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:09 7:39	30	30	8 7/8	5	3.88	7.7
7:40 8:10	30	61	9	6 1/4	2.75	10.9
8:11 8:41	30	92	9 1/4	7 1/8	2.13	14.1
8:42 9:12	30	123	9 1/8	7 1/8	2.00	15.0
9:13 9:43	30	154	9 1/2	7 5/8	1.88	16.0
9:44 10:14	30	185	9 1/4	7 1/2	1.75	17.1
10:15 10:45	30	216	9 1/4	7 1/2	1.75	17.1
10:46 11:16	30	247	9 5/8	8 1/8	1.50	20.0
11:17 11:47	30	278	9 5/8	8 1/8	1.50	20.0
11:48 12:18	30	309	9 1/4	7 3/4	1.50	20.0
12:19 12:49	30	340	9 1/4	7 7/8	1.38	21.7
12:50 1:20	30	371	9 1/2	8 1/8	1.38	21.7

say 2

LEACH LINE PERC DATA SHEET

Project: Perc Tests, Ave 64 East of Pierce Job No: P97116
Test Hole No. P3 Date Excavated: 8-28-97
Depth of Test Hole: 3 ft. Soil Classification: ML
Check for Sandy Soil Criteria Tested By: KH Date: 8-29-97 Presoak: 24 ho
Actual Percolation Tested by: Karl A. Hanson Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1	6:10 6:35	25	9 3/8	1 3/4	7 5/8
2	6:36 7:01	25	9 5/8	5 1/2	4 1/8

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:13 7:43	30	30	8 7/8	5 1/4	3.63	8.3
7:44 8:14	30	61	8 7/8	6 3/4	2.13	14.1
8:15 8:45	30	92	9 1/2	7 3/4	1.75	17.1
8:46 9:16	30	123	9 3/4	8 1/8	1.63	18.4
9:17 9:47	30	154	9 3/4	8 1/8	1.63	18.4
9:48 10:18	30	185	9 7/8	8 3/8	1.50	20.0
10:19 10:49	30	216	9 1/8	7 3/4	1.38	21.7
10:50 11:20	30	247	9 5/8	8 1/4	1.38	21.7
11:21 11:51	30	278	9 7/8	8 1/2	1.38	21.7
11:52 12:22	30	309	9 3/4	8 3/8	1.38	21.7
12:23 12:53	30	340	9 3/8	8	1.38	21.7
9:54 1:24	30	371	9 3/8	8	1.38	21.7

say 22

LEACH LINE PERC DATA SHEET

Project: Perc Testing, Ave 64 East of Pierce Job No: P97116
Test Hole No. P4 Date Excavated: 8-28-97
Depth of Test Hole: 3 ft Soil Classification: ML
Check for Sandy Soil Criteria Tested By: KH Date: 8-29-97 Presoak: 24 hou
Actual Percolation Tested by: Karl A. Hamm Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1	6:15 6:40	25	9 1/4	0	9 1/4
2	6:41 7:06	25	10 3/8	6 1/2	3.875

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:01 7:31	30	30	10 1/4	9 1/2	0.75	40.0
7:32 8:02	30	61	9 3/4	9 3/8	0.38	78.9
8:03 8:33	30	92	9 3/8	9	0.38	78.9
8:34 9:04	30	123	9	8 5/8	0.38	78.9
9:05 9:35	30	154	9 1/8	8 3/4	0.38	78.9
9:36 10:06.5	30.5	185.5	9 3/4	9 3/8	0.38	80.3
10:07 10:37	30	216.5	9 3/8	9	0.38	78.9
10:38 11:08	30	247.5	9	8 3/4	0.25	120.0
11:09 11:39	30	278.5	9 3/8	9 1/8	0.25	120.0
11:40 12:10	30	309.5	9 1/2	9 1/8	0.38	78.9
12:11 12:41	30	340.5	9 5/8	9 3/8	0.25	120.0
12:42 1:12	30	371.5	9 3/4	9 1/2	0.25	120.0

say 120

LEACH LINE PERC DATA SHEET

Project: Perc Testing, Ave 64 East of Pierce Job No: P97116
Test Hole No. P5 Date Excavated: 8-28-97
Depth of Test Hole: 3 ft. Soil Classification: ML
Check for Sandy Soil Criteria Tested By: KH Date: 8-29-97 Presoak: 24 ho
Actual Percolation Tested by: Karl A Hamm Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:18 7:48	30	30	9 1/8	2 3/4	6.38	4.7
7:49 8:19	30	61	8 3/4	1 3/4	7.0	4.3
8:20 8:50	30	92	8 7/8	2 1/8	6.75	4.4
8:51 9:21	30	123	8 5/8	2 5/8	6.00	5.0
9:22 9:52	30	154	8 1/2	2 3/4	5.75	5.2
9:53 10:23	30	185	8 3/8	2 7/8	5.50	5.5
10:24 10:54	30	216	8 1/4	3	5.25	5.7
10:55 11:25	30	247	8 3/8	3	5.38	5.6
11:26 11:56	30	278	7 7/8	3	4.88	6.1
11:57 12:27	30	309	9 3/4	3	6.75	4.4
12:28 12:58	30	340	9 1/2	3	6.50	4.6
12:59 1:29	30	371	9 1/8	3	6.13	4.9

say 5 m

LEACH LINE PERC DATA SHEET

Project: Perc Testing, Ave 64 East of Pierce Job No: P97116
Test Hole No. P6 Date Excavated: 8-28-97
Depth of Test Hole: 3 ft. Soil Classification: ML
Check for Sandy Soil Criteria Tested By: KH Date: — Presoak: 24 h
Actual Percolation Tested by: Karl A. Hanna Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
6:57 7:27	30	30	9 1/8	1 5/8	7.5	4.0
7:28 7:58	30	61	9 3/8	3 7/8	5.5	5.5
7:59 8:29	30	92	9 1/2	5 1/4	4.25	7.1
8:30 9:00	30	123	9 1/2	6 1/4	3.25	9.2
9:01 9:31	30	154	9 3/4	6 7/8	2.88	10.4
9:32 10:05	33	188	9 1/4	6 5/8	2.63	11.4
10:05.5 10:35.5	29.5 ~~30~~	218	9 3/4	7 3/8	2.38	12.6
10:35.5 11:05	29.5 ~~30~~	248	9 3/8	7 3/8	2.0	15.0
11:06 11:36	30	279	9 3/8	7 1/2	1.88	16.0
11:37 12:07	30	310	9 3/4	7 7/8	1.88	16.0
12:08 12:38	30	341	9 5/8	7 3/4	1.88	16.0
12:39 1:09	30	372	9 3/8	7 1/2	1.88	16.0

say 16

LEACH LINE PERC DATA SHEET

Project: Perc Testing, Ave 64 East of Pierce Job No: P97116
Test Hole No. P7 Date Excavated: 9-2-97
Depth of Test Hole: 2'6" Soil Classification: ML
Check for Sandy Soil Criteria Tested By: KH Date: 9-2-97 Presoak: 24 ho
Actual Percolation Tested by: C. Barnes Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
6:48 7:18	30	30	9 2/8	8 6/8	0.5	60
7:19 7:49	30	61	11	10 7/8	0.13	230.8
7:50 8:20	30	92	10 7/8	10 7/16	0.44	68.2
8:21 8:51	30	123	10 7/16	10 5/16	0.13	230.8
8:52 9:22	30	154	10 5/16	10 1/8	0.19	157.9
9:23 9:53	30	185	10 1/8	9 7/8	0.25	120.0
9:54 10:24	30	216	11 6/8	11 4/8	0.25	120.0
10:25 10:55	30	247	11 4/8	11 2/8	0.25	120.0
10:56 11:26	30	278	11 2/8	10 7/8	0.38	78.9
11:27 11:57	30	309	10 7/8	10 6/8	0.13	230.8
11:58 12:28	30	340	10 6/8	10 5/8	0.13	230.8
12:29 12:59	30	371	10 5/8	10 4/8	0.13	230.8

Say >12

LEACH LINE PERC DATA SHEET

Project: Perc Testing, Ave 64 East of Pierce Job No: P97116
Test Hole No. P8 Date Excavated: 9-2-97
Depth of Test Hole: 2.5' Soil Classification: ML
Check for Sandy Soil Criteria Tested By: ______ Date: ______ Presoak: 24 ho
Actual Percolation Tested by: Karl A. Ham Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
6:52 7:22	30	30	8 2/8	1 1/8	7.13	4.21
7:23 7:53	30	61	9 5/8	1 1/2	8.13	3.7
7:54 8:24	30	92	10 3/4	2 1/16	8.69	3.5
8:25 8:55	30	123	11 7/8	3 7/8	8.0	3.8
8:56 9:26	30	154	10 1/4	3 7/8	6.38	4.7
9:27 9:57	30	185	8 3/8	3 5/8	4.75	6.3
9:58 10:28	30	216	11 4/8	4 5/8	7.13	4.2
10:29 10:59	30	247	11 5/8	4 7/8	6.75	4.4
11:00 11:30	30	278	12	5 1/8	6.88	4.4
11:31 12:01	30	309	10 2/8	4 7/8	5.38	5.6
12:02 12:32	30	340	9 1/2	4 5/8	4.88	6.1
12:33 1:03	30	371	11 7/8	5 3/8	6.5	4.6

say 5mi

LEACH LINE PERC DATA SHEET

Project: Avenue 64, East of Pierce St Job No: P97116
Test Hole No. P9 Date Excavated: 8-28-97
Depth of Test Hole: 3ft Soil Classification: ML
Check for Sandy Soil Criteria Tested By: — Date: — Presoak: 24 hour
Actual Percolation Tested by: C. Barnes Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
6:56 7:26	30	30	8 1/2	0	8.5	3.5
7:27 7:57	30	61	9 1/8	1 3/16	~~8.31~~ 7.94	3.8
7:58 7:28	30	92	10 3/8	5	5.38	5.6
8:29 8:59	30	123	9 15/16	5 13/16	4.13	7.3
9:00 9:30	30	154	10	6 1/4	3.75	8.0
9:31 10:01	30	185	9 11/16	6 5/8	3.06	9.8
10:02 10:32	30	216	10 7/8	7 7/8	3.00	10
10:33 11:03	30	247	9 1/8	6 5/8	2.50	12
11:04 11:34	30	278	10 5/8	8 2/8	2.38	13
11:35 12:05	30	309	8	5 5/8	2.38	13
12:06 12:36	30	340	8 7/8	6 6/8	2.13	14
12:37 1:07	30	371	10 1/2	8 1/2	2.0	15

say 15.

LEACH LINE PERC DATA SHEET

Project: Avenue 64, East of Pierce St Job No: P97116
Test Hole No. P10 Date Excavated: 8-28-97
Depth of Test Hole: 3ft Soil Classification: ML
Check for Sandy Soil Criteria Tested By: — Date: — Presoak: 24 hour
Actual Percolation Tested by: C. Barnes Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:00 7:30	30	30	8 6/8	0	8.75	3.4
7:31 8:01	30	61	9	5/16	8.69	3.5
8:02 8:32	30	92	10 1/8	2 15/16	7.19	4.2
8:33 9:03	30	123	9 3/4	3 3/8	6.38	4.7
9:04 9:35	30	154	9 5/8	4 7/8	4.75	6.3
9:36 10:06	30	185	9 2/8	3 6/8	5.50	5.5
10:07 10:37	30	216	8 7/8	3	5.75	5.2
10:38 11:08	30	247	9 2/8	1 1/2	7.75	3.9
11:09 11:39	30	278	9 1/2	4 5/8	4.88	6.2
11:40 12:10	30	309	9 5/8	5 1/8	4.50	6.7
12:11 12:41	30	340	8 6/8	4 6/8	4.00	7.5
12:42 1:12	30	371	9 3/8	5 3/8	4.00	7.5

Say 7

LEACH LINE PERC DATA SHEET

Project: Avenue 64, East of Pierce St Job No: P97116

Test Hole No. P11 Date Excavated: 8-28-97

Depth of Test Hole: 3ft Soil Classification: ML

Check for Sandy Soil Criteria Tested By: ______ Date: ______ Presoak: 24hour

Actual Percolation Tested by: C. Barnes Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:04 7:34	30	30	9 1/2	9 1/8	0.38	80
7:35 8:05	30	61	9 1/8	8 3/4	0.38	80
8:06 8:36	30	92	9 1/2	9 5/16	0.19	160
9:37 9:07	30	123	9 5/16	9 1/16	0.25	120
9:08 9:38	30	154	10 1/4	9 7/8	0.38	80
9:39 10:09	30	185	9 7/8	9 5/8	0.25	120
10:10 10:40	30	216	9 5/8	9 4/8	0.13	240
10:41 11:11	30	247	9 4/8	9 2/8	0.25	120
11:12 11:42	30	278	9 2/8	9	0.25	120
11:43 12:13	30	309	9	8 6/8	0.25	120
12:14 12:44	30	340	8 6/8	8 5/8	0.13	240
12:45 1:15	30	371	8 5/8	8 1/2	0.13	240

LEACH LINE PERC DATA SHEET

Project: Avenue 64, East of Pierce St Job No: P97116

Test Hole No. P12 Date Excavated: 8-29-97

Depth of Test Hole: 3ft Soil Classification: ML

Check for Sandy Soil Criteria Tested By: Date: Presoak: 24hour

Actual Percolation Tested by: C. Barnes Date: 9-3-97

SANDY SOIL CRITERIA TEST

Trial No.	Time	Time Interval (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)
1					
2					

Use [✓ Normal] Sandy (Circle One) Soil Criteria

Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (inches)	Final Water Level (inches)	Δ in Water Level (inches)	Percolation Rate (min/inch)
7:08 7:38	30	30	9	3 3/8	5.63	5.3
7:39 8:09	30	61	9 5/8	6	3.63	8.3
8:10 8:40	30	92	10 1/16	7 5/16	2.75	11
8:41 9:11	30	123	10 1/16	7 7/8	2.19	14
9:12 9:42	30	154	10	8 1/8	1.88	16
9:43 10:13	30	185	8 5/8	6 3/8	1.75	17
10:14 10:44	30	216	10 3/8	8 7/8	1.50	20
10:45 11:15	30	247	8 7/8	7 4/8	1.38	22
11:16 11:46	30	278	10	8 6/8	1.25	24
11:47 12:17	30	309	8 6/8	7 2/8	1.50	20
12:18 12:48	30	340	10 6/8	9 2/8	1.50	20
12:49 1:19	30	371	9 2/8	8 2/8	1.00	30

say 24mp

Appendix B2 – Cisneros Mobile Home Park

Sladden Engineering

45090 Golf Center Parkway, Suite F, Indio, CA. 92201 (760) 863-0713 Fax (760) 863-0847
450 Egan Avenue, Beaumont, CA 92223 (951) 845-7743 Fax (951) 845-8863
800 E. Florida Avenue, Hemet, CA 92543 (951) 766-8777 Fax (951) 766-8778

February 4, 2013

Project No. 544-8107
13-02-045

Mr. Carlos Cisneros
88410 Avenue 77
Thermal, California 92274

Project: Cisneros Mobile Home Park
88410 Avenue77
Oasis Area
Riverside County, California

Subject: Sewage Disposal Feasibility Report Update

Ref: Percolation Testing for Sewage Disposal Feasibility prepared by Sladden Engineering dated March 8, 1999; Project No. 544-8107

As requested, we have reviewed the above referenced Sewage Disposal Feasibility report as it relates to the design and installation of the new on-site sewage disposal systems proposed for the subject site. The project site is located at 88410 Avenue 77 in the Oasis area of Riverside County, California.

The referenced report includes information and recommendations pertaining to the design of the on-site sewage disposal systems. It is our opinion that the information provided within the referenced report remains applicable for the design and installation of the new on-site sewage disposal systems proposed for the existing mobile home park. The application rates and related leach line design information indicated in the referenced report remains applicable.

If you have questions regarding this letter or the above referenced report, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

Brett L. Anderson
Principal Engineer

BRETT L. ANDERSON
No. C45389
Exp. 9/30/14
CIVIL ENGINEERING

Letter/gvm

Copies: 4/ Mr. Carlos Cisneros

Sladden Engineering

6782 Stanton Ave., Suite E, Buena Park, CA 90621 (562) 864-4121 (714) 523-0952 Fax (714) 523-1369
39-725 Garand Ln., Suite G, Palm Desert, CA 92211 (760) 772-3893 Fax (760) 772-3895

March 8, 1999

544-8107

Carlos S. Cisneros & Ana D. Cisneros
88-410 Avenue 77
Thermal, California 92274

Project : Proposed Mobile Home Park
A.P.N. 755-161-007
88-410 Avenue 77
Oasis Area
Riverside County, California

Subject: Percolation Testing for Sewage Disposal Feasibility

As requested, we have performed field exploration and percolation testing for sewage disposal feasibility on the above referenced project site. It is our understanding that a 10 to 12 unit mobile home park is proposed for the site. The site is located on the north side of Avenue 77, approximately one quarter mile west of Highway 86, in the Oasis area of Riverside County, California. There is an existing well located on the west side of the site. The majority of the proposed mobile homes are to be located within the eastern portion of the site so that a minimum of 100 feet of separation is maintained between the well and the leachlines.

Due to the relatively shallow depth to groundwater, septic tank and leachline disposal systems are recommended. Six new sewage disposal systems are currently proposed with each system serving two mobile homes. One existing system including a 1500 gallon septic tank and an 80 foot long by 3 foot wide leachline is located approximately 120 feet northeast of the existing well. The approximate system locations are indicated on a site plan provided by JRC & Associates.

Two exploratory trenches and ten test holes were excavated on the property on November 21, 1998. The exploratory trench and test holes were excavated by the owner with a rubber-tired backhole. The exploratory trenches were excavated to a depth of approximately twelve feet below existing grade. The test holes were excavated to depths of approximately two to three feet below existing grade. The approximate exploratory trench and percolation test hole locations are indicated on the attached plan. The locations of the test holes were determined by pacing and sighting from existing prominent features and should only be considered accurate to the degree implied.

The soils encountered within the exploratory trenches consisted primarily of silty fine grained sands and sandy silts. The site soils appeared fairly consistent in composition and stratigraphy throughout the site. The surface soils were dry on the surface but typically moist at a depth below five feet. No groundwater was encountered in the exploratory trenches and capillary moisture was not observed at the 12 foot depth. Based upon our observations we expect that groundwater will be in excess of 15 feet in this area.

Percolation tests were performed on November 21, 1998. Two inches of ½ inch gravel was placed on the bottom of the holes to prevent scouring when water was added. Tests were performed by filling the test holes with approximately eight to ten inches of water and recording the drop in the water surface at regular intervals. The water percolated out at rates such that the "sandy" soil criteria was used on each of the test holes. Tests results are summarized below:

Test Hole No.	**Rate (min/inch)**	**Minimum Square Feet Per 100 Gallons of Septic Tank Capacity**
A	7	20
B	4	20
C	4	20
D	5	20
E	4	20
F	2	20
G	3	20
H	2	20
I	5	20
J	5	20

Leachlines may be designed using a minimum of 20 square feet per 100 gallons of septic tank capacity which is the maximum allowable application rate as determined by Riverside County guidelines. The leachlines should be located in the area of the tests except that the minimum setbacks as contained in the County Ordinance should be maintained. All systems should operate by gravity flow. No grading should be necessary in the area of the leach lines which should be bottomed no more than 6 feet below the existing ground surface. It appears that there will be sufficient area for the sewage disposal systems and the required expansion area.

Based on the data presented in the report and using the recommendations set forth, it is the judgment of the engineer that there is sufficient area of the property in question to support individual sewage disposal systems that will meet the current codes and standards of the health department.

Based on the data presented in the report and the test information accumulated, it is the judgment of the engineer that the groundwater table should not encroach within the current allowable limit set forth by County and State requirements when the recommendations of this report are followed.

The analysis and recommendations submitted in this report are based in part upon the data obtained from the exploratory trenches and ten percolation test holes excavated on the property. The nature and extent of variations within the field may not become evident until construction. If variations then appear evident, it may be necessary to reevaluate the recommendations of this report.

Findings of this report are valid as of this date. However, changes in conditions of a property can occur with passage of time whether they be due to natural processes or works of man. In addition, changes in applicable or appropriate standards can occur whether they result from legislation or the broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one (l) year.

In the event that any changes in the nature, design or location of the development are planned, the conclusions and recommendations contained in this report shall not be considered valid unless the changes are reviewed and conclusions of this report modified or verified in writing.

This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to insure that the information and recommendations contained herein are called to the attention of the architect and engineers for the project and are incorporated into the plans and specifications.

It is also the owners responsibility, or his representative, to insure that the necessary steps are taken to see that the general contractor and all subcontractors carry out such recommendations in the field. It is further understood that the owner or his representative is responsible for submittal of this report to the appropriate governing agencies.

This report has been prepared for the exclusive use of the client and authorized agents. This report has been prepared in accordance with generally accepted soil and foundation engineering practices. No other warranties, either expressed or implied, are made as the professional advice provided under the terms of this agreement, and included in the report.

It is recommended that Sladden Engineering be provided the opportunity for a general review of final design and specifications in order that percolation rates and designated areas for the sewage disposal system will be properly interpreted and implemented in the design and specifications. If Sladden Engineering is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

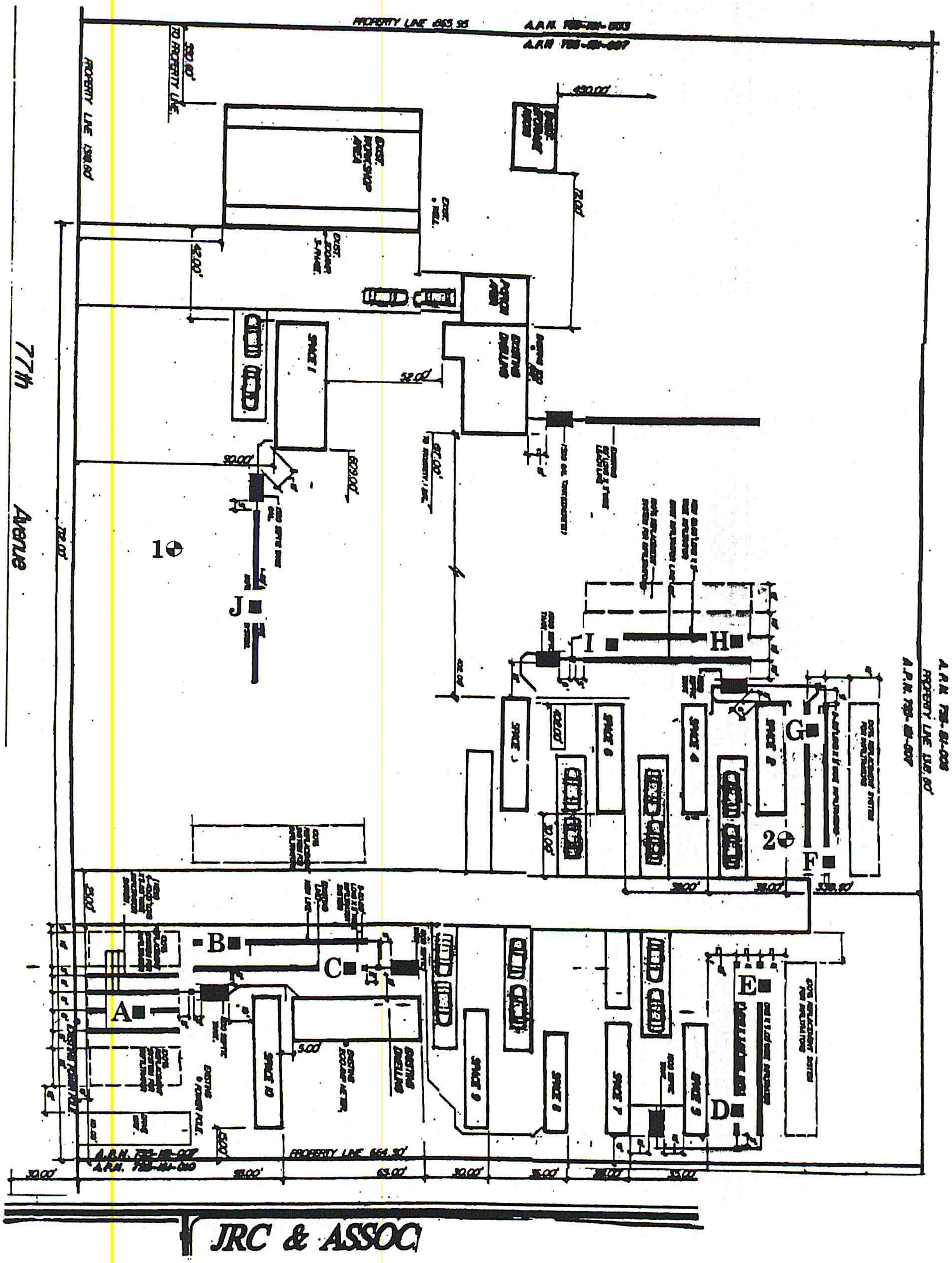
If there are any questions regarding this report, please contact the undersigned.

Respectfully submitted,
SLADDEN ENGINEERING

Hogan R. Wright
Project Engineer

Brett L. Anderson
Principal Engineer

Copies - 4 - Carlos S. Cisneros & Ana D. Cisneros



● Approximate Exploratory Trench Locations

■ Approximate Percolation Test Locations

Percolation Test Location Map

A.P.N. 755-161-007
88-410 Avenue 77
Oasis Area
Riverside County, California

Sladden Engineering

DATE: 3-4-99	JOB NO.: 544-8107

A.P.N. 755-161-007 / 88-410 Avenue 77

Date: 9-23-98
Trench No.: 1
Job No.: 544-8107

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0									
1				Silty Sand: Brown, fine grained	SM		Dry		
2							Dry		
3				" "	"				
4									
5				Sandy Silt: Brown, slightly clayey	ML		Moist		
6									Interbedded silty sand layers, moist
7				" "	"				
8							Moist		
9				Silty Sand: Brown, fine grained	SM				Thin interbedded clay layers, moist
10									
11				" "	"		Moist		
12									
13									Total Depth = 12' No Groundwater No Bedrock
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									Note: The statification lines represent the approximate boundaries between the soil types; the transitions may be gradual.
28									

A.P.N. 755-161-007 / 88-410 Avenue 77

Date: 9-23-98

Trench No.: 2

Job No.: 544-8107

Depth (in feet)	Symbol	Core	Blows/ft.	DESCRIPTION	Soil Type	Unit Dry Wt. (pcf)	% Moisture	% Relative Compaction	REMARKS
0							Dry		
1				Silty Sand: Brown, fine grained	SM				
2							Dry		
3				" "	"				
4							Damp		
5				" "	"				
6									
7				Sandy Silt: Brown, slightly clayey	ML		Moist		Interbedded silty sand layers, moist
8				Silty Sand: Brown, fine grained	SM				
9									
10									
11									
12				" "	"		Moist		
13									Total Depth = 12' No Groundwater No Bedrock
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									Note: The statification lines represent the approximate boundaries between the soil types; the transitions may be gradual.
28									

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77

Project No.: 544-8107

Test Hole: A

Date Excavated: 11-21-98

Depth of Test Hole: 24"

Soil Classification: SM

Check for Sandy Soil Criteria Tested by: Ryan

Date: 11-21-98 Presoak: ---

Actual Percolation Tested by: Ryan

Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	9:30 9:55	25	11.2	0.0	11.2
B	10:00 10:25	25	10.4	0.0	10.4

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	10:30 - 10:41	10	10	11.0	9.5	1.5	6.7
2	10:49 - 10:59	10	20	9.9	6.3	3.6	2.8
3	11:00 - 11:10	10	30	9.6	5.8	3.8	2.6
4	11:12 - 11:22	10	40	9.8	5.5	4.3	2.3
5	11:22 - 11:32	10	50	10.2	7.4	2.8	3.6
6	11:32 - 11:42	10	60	9.2	6.2	3.0	3.3

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77
Test Hole: B
Depth of Test Hole: 24"
Check for Sandy Soil Criteria Tested by: Ryan
Actual Percolation Tested by: Ryan

Project No.: 544-8107
Date Excavated: 11-21-98
Soil Classification: SM
Date: 11-21-98 Presoak: ---
Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	9:31 9:56	25	11.0	0.0	11.0
B	10:01 10:26	25	10.0	0.0	10.0

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	10:33 - 10:43	10	10	8.3	4.7	3.6	2.8
2	10:46 - 10:56	10	20	11.1	7.0	4.1	2.4
3	10:58 - 11:08	10	30	9.9	6.1	3.8	2.6
4	11:11 - 11:21	10	40	9.0	5.9	3.1	3.2
5	11:21 - 11:31	10	50	10.8	8.1	2.7	3.7
6	11:33 - 11:43	10	60	9.8	6.6	3.2	3.1

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77
Project No.: 544-8107
Test Hole: C
Date Excavated: 11-21-98
Depth of Test Hole: 24"
Soil Classification: SM
Check for Sandy Soil Criteria Tested by: Ryan
Date: 11-21-98 Presoak: ---
Actual Percolation Tested by: Ryan
Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	9:47 10:12	25	11.0	0.0	11.0
B	10:17 10:42	25	10.0	0.0	10.0

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	10:42 - 10:52	10	10	9.3	4.7	4.6	2.2
2	10:54 - 11:04	10	20	8.0	4.3	3.7	2.7
3	11:05 - 11:15	10	30	8.6	4.9	3.7	2.7
4	11:16 - 11:26	10	40	8.8	5.5	3.3	3.0
5	11:26 - 11:36	10	50	9.4	6.8	2.6	3.8
6	11:36 - 11:46	10	60	9.5	6.6	2.9	3.4

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77

Project No.: 544-8107

Test Hole: D

Date Excavated: 11-21-98

Depth of Test Hole: 24"

Soil Classification: SM

Check for Sandy Soil Criteria Tested by: Scott

Date: 11-21-98 Presoak: ---

Actual Percolation Tested by: Scott

Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	11:27 11:52	25	11.2	0.0	11.2
B	11:52 12:17	25	10.1	0.0	10.1

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:27 - 12:37	10	10	10.6	4.7	5.9	1.7
2	12:44 - 12:54	10	20	8.2	4.3	3.9	2.6
3	12:59 - 1:09	10	30	9.1	4.9	4.2	2.4
4	1:10 - 1:20	10	40	9.1	5.5	3.6	2.8
5	1:21 - 1:31	10	50	9.3	6.8	2.5	4.0
6	1:32 - 1:42	10	60	9.0	6.6	2.4	4.2

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77
Project No.: 544-8107
Test Hole: E
Date Excavated: 11-21-98
Depth of Test Hole: 30"
Soil Classification: SM
Check for Sandy Soil Criteria Tested by: Scott
Date: 11-21-98 Presoak: ---
Actual Percolation Tested by: Scott
Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	11:35 12:00	25	11.5	0.0	11.5
B	12:00 12:25	25	12.1	0.0	12.1

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:25 - 12:35	10	10	10.6	4.0	6.6	1.5
2	12:37 - 12:47	10	20	10.3	6.1	4.2	2.4
3	12:51 - 1:01	10	30	10.8	5.9	4.9	2.0
4	1:04 - 1:14	10	40	8.8	5.0	3.8	2.6
5	1:15 - 1:25	10	50	8.7	5.8	2.9	3.4
6	1:26 - 1:36	10	60	9.0	5.6	3.4	2.9

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77
Project No.: 544-8107
Test Hole: F
Date Excavated: 11-21-98
Depth of Test Hole: 24"
Soil Classification: SM
Check for Sandy Soil Criteria Tested by: Scott
Date:11-21-98 Presoak: ---
Actual Percolation Tested by: Scott
Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	11:40 12:05	25	11.2	0.0	11.2
B	12:05 12:30	25	11.5	0.0	11.5

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:33 - 12:43	10	10	10.7	3.0	7.7	1.3
2	12:47 - 12:57	10	20	10.8	2.9	7.9	1.3
3	12:58 - 1:08	10	30	10.8	2.9	7.9	1.3
4	1:08 - 1:18	10	40	10.0	3.5	6.5	1.5
5	1:20 - 1:30	10	50	10.0	3.8	6.2	1.6
6	1:30 - 1:40	10	60	9.6	3.2	6.4	1.6

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77
Project No.: 544-8107
Test Hole: G
Date Excavated: 11-21-98
Depth of Test Hole: 30"
Soil Classification: SM
Check for Sandy Soil Criteria Tested by: Ryan Reid
Date: 11-21-98 Presoak: ---
Actual Percolation Tested by: Ryan Reid
Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	11:23 11:48	25	11.0	0.0	11.0
B	11:48 12:13	25	10.3	0.0	10.3

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:14 - 12:24	10	10	8.3	2.0	6.3	1.6
2	12:26 - 12:36	10	20	9.1	3.8	5.3	1.9
3	12:38 - 12:48	10	30	9.0	3.8	5.2	1.9
4	12:49 - 12:59	10	40	8.0	3.9	4.1	2.4
5	1:00 - 1:10	10	50	9.0	5.0	4.0	2.5
6	1:11 - 1:21	10	60	9.2	5.2	4.0	2.5

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77
Test Hole: H
Depth of Test Hole: 30"
Check for Sandy Soil Criteria Tested by: Ryan Reid
Actual Percolation Tested by: Ryan Reid

Project No.: 544-8107
Date Excavated: 11-21-98
Soil Classification: SM
Date:11-21-98 Presoak: ---
Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	11:23 11:48	25	10.8	0.0	10.8
B	10:23 10:48	25	10.0	0.0	10.0

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	10:48 - 10:58	10	10	8.0	0.0	8.0	1.3
2	10:58 - 11:08	10	20	8.0	0.0	8.0	1.3
3	11:08 - 11:18	10	30	8.1	0.0	8.1	1.2
4	11:19 - 11:29	10	40	8.0	0.0	8.0	1.3
5	11:29 - 11:39	10	50	8.3	0.0	8.3	1.2
6	11:39 - 11:49	10	60	8.2	0.0	8.2	1.2

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77

Project No.: 544-8107

Test Hole: I

Date Excavated: 11-21-98

Depth of Test Hole: 24"

Soil Classification: SM

Check for Sandy Soil Criteria Tested by: Ryan Reid

Date: 11-21-98 Presoak: ---

Actual Percolation Tested by: Ryan Reid

Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	11:51 12:16	25	10.6	0.0	10.6
B	12:18 12:43	25	10.0	0.0	10.0

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:45 - 12:55	10	10	8.3	5.5	2.8	3.6
2	12:56 - 1:06	10	20	10.5	7.0	3.5	2.9
3	1:08 - 1:18	10	30	10.0	7.2	2.8	3.6
4	1:20 - 1:30	10	40	9.3	7.1	2.2	4.5
5	1:33 - 1:43	10	50	10.3	7.5	2.8	3.6
6	1:44 - 1:54	10	60	9.8	7.2	2.6	3.8

Stormwater Percolation Data Sheet

Project: A.P.N. 755-161-007 / 88-410 Avenue 77
Project No.: 544-8107
Test Hole: J
Date Excavated: 11-21-98
Depth of Test Hole: 30"
Soil Classification: SM
Check for Sandy Soil Criteria Tested by: Ryan Reid
Date: 11-21-98 Presoak: ---
Actual Percolation Tested by: Ryan Reid
Date: 11-21-98

Trial No.	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	11:56 12:21	25	10.2	0.0	10.2
B	12:23 12:48	25	10.9	3.2	7.7

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)	Percolation Rate (min./in.)
1	12:50 - 1:00	10	10	8.3	5.5	2.8	3.6
2	1:01 - 1:11	10	21	10.5	7.0	3.5	2.9
3	1:13 - 1:23	10	33	10.0	7.2	2.8	3.6
4	1:25 - 1:35	10	45	9.3	7.1	2.2	4.5
5	1:36 - 1:46	10	56	10.3	7.5	2.8	3.6
6	1:48 - 1:58	10	68	9.8	7.2	2.6	3.8

Appendix B3 – Emma Valenzuela Mobile Home Park

RMC WATER AND ENVIRONMENT
515 SOUTH FLOWER STREET, 36TH FLOOR
LOS ANGELES, CALIFORNIA 90071

SEWAGE DISPOSAL FEASIBILITY AND SOIL PERCOLATION REPORT UPDATE
EMMA VALENZUELA MOBILE HOME PARK
81-550 HARRISON STREET
THERMAL, RIVERSIDE COUNTY
CALIFORNIA

October 10, 2013

File No.: 07427-04
Doc. No.: 13-10-705

Earth Systems
Southwest

79-811B Country Club Drive
Bermuda Dunes, CA 92203
(760) 345-1588
(800) 924-7015
FAX (760) 345-7315

October 10, 2013

File No.: 07427-04
Doc. No.: 13-10-705

RMC Water and Environment
515 South Flower Street, 36th Floor
Los Angeles, California 90071

Subject: **Sewage Disposal Feasibility and Soil Percolation Report Update**

Project: **Emma Valenzuela Mobile Home Park**
81-550 Harrison Street
Thermal, California

Reference: Earth Systems Consultants, Sewage Disposal Feasibility and Soil Percolation Report, Fransisco Valenzuela Polanco Mobile Home Park, 81-550 Highway 86, Oasis, California, File No.: 07427-01, Doc. No.: 99-11-718, dated November 9, 1999.

Dear Mr. Bichette:

Earth Systems Southwest (Earth Systems) presents this sewage disposal feasibility and soil percolation report for the Emma Valenzuela Mobile Home Park to be located at 81-550 Harrison Street in Thermal, Riverside County, California. This report presents our findings and recommendations for leach field waste disposal. This report should stand as a whole and no part of the report should be excerpted or used to exclusion of any other part.

This report completes our scope of services in accordance with our agreement (SWP-13-154), dated September 9, 2013. Other services that may be required, such as plan review, are additional services and will be billed according to the Fee Schedule in effect at the time services are provided. Unless requested in writing, the client is responsible for distributing this report to the appropriate governing agency.

We appreciate the opportunity to provide our professional services. Please contact our office if there are any questions or comments concerning this report or its recommendations.

Respectfully submitted,
EARTH SYSTEMS SOUTHWEST

Kevin L. Paul, PE, GE
Senior Engineer

REGISTERED PROFESSIONAL ENGINEER
KEVIN L. PAUL
No. C 70084
No. GE 2930
Exp. 9/30/2014
CIVIL
GEOTECHNICAL
STATE OF CALIFORNIA

Perc/rcr/klp/cgj/mr

Distribution: 4/RMC Water and Environment
1/BD File

TABLE OF CONTENTS

Section 1
INTRODUCTION

1.1 Project Description

This sewage disposal feasibility and soil percolation report has been prepared for the Emma Valenzuela Mobile Home Park located at 81-550 Harrison Street in Thermal, California. The Assessor's Parcel Number (APN) is 737-110-002. The property currently has one permanent residence and 9 mobile homes for employee housing on it. Eight mobile homes may ultimately be re-situated on the site. Septic tanks and leach field waste disposal systems are proposed for this unsewered area. Domestic water comes from a well on the site. The site location is shown on Plate 1 in Appendix A. This report is being prepared to substantiate previous percolation testing performed onsite by Earth Systems on November 9, 1999.

1.2 Site Description

The Emma Valenzuela Mobile Home Park is to be developed on a portion of the triangular-shaped parcel that consists of approximately 3 acres. The project is located at 81-550 Harrison Street in Thermal, Riverside County, California. The site location is shown on Plate 1 in Appendix A. The mobile home park site is situated on nearly level ground that drains by gentle sheet flow towards the northeast. An open drainage channel lies to the north of the property. Based upon information provided to us, we have assumed 9 mobile homes (3 bedrooms), laid out as shown on Plate 2. The location of the test is within the existing mobile home property.

1.3 Purpose and Scope of Services

The purpose for our services was to evaluate and verify the site soil conditions and to provide professional opinions and recommendations regarding the feasibility for sewer waste disposal on the site and to provide updated recommendations if necessary. The scope of services included:

- A general reconnaissance of the site.
- Shallow subsurface exploration by drilling one exploratory boring to a depth of 30 feet below existing grades to evaluate current groundwater levels and soil stratigraphy.
- One percolation test in the area of the proposed leach fields.
- An engineering evaluation of the acquired data from the exploration and testing and previous reports.
- A summary of our findings and recommendations in this written report, including:
  - Discussions on subsurface soil and groundwater conditions.
  - Discussions on soil percolation rate.
  - Recommendations regarding need for septic systems and leach field design criteria.

Not Contained In This Report: Although available through Earth Systems Southwest, the current scope of our services does not include:

- An environmental assessment.
- An investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

Section 2
METHODS OF EXPLORATION

2.1 Field Exploration

Previous field exploration was performed on October 22, 1999, to evaluate percolation characteristics of the subject site. Additional field exploration was performed that include one percolation boring drilled on September 23, 2013 with an 8-inch auger to a depth of approximately 2.5 feet. Additionally, one deep exploratory boring was drilled to a depth of approximately 30 feet below the existing ground surface to observe current ground water levels and soil profiles. The deep exploratory boring was drilled on September 23, 2013 using an 8-inch outside diameter hollow stem auger powered by a Mobile B-61 drill rig. The boring locations are shown on the Boring Location Map, Plate 2, in Appendix A. The locations shown are approximate, established using nearby landmarks. Soil samples were collected at various intervals and sealed for transport to Earth Systems laboratory. Samples were collected in a Modified California Sampler and contained in brass rings.

The final logs of the borings represent our interpretation of the contents of the field logs and review of the samples obtained during the subsurface exploration. The final logs of the percolation and deep borings are included in Table 1 and Appendix A of this report, respectively. The stratification lines represent the approximate boundaries between soil types, although transitions may be gradational.

2.2 Percolation Tests

One percolation test was performed on September 24 and 25, 2013 in the vicinity of the proposed leach fields as shown on Plate 2. This test was performed to substantiate previous testing. The County was notified prior to conducting our onsite percolation testing (County notification number PR # 1717). The percolation tests were performed in substantial conformance to the County percolation test method for single lots, normal or sandy soil criteria (as applicable), as described in the *Onsite Waste Treatment Systems, Technical Guidance Manual, Version A.*

The test was performed using 8-inch diameter boreholes made to a depth of about 2.5 feet below existing ground surface. Hole sidewalls were cleared of any smeared material. A 6 inch diameter perforated PVC pipe was installed in the excavated hole to reduce the potential for caving or disturbance from the addition of water. The boreholes had approximately 1 to 2 inches of gravel placed on the sides and bottom of the hole, respectively, to minimize sidewall disturbance and sedimentation. A gravel correction factor was applied to the volume of water percolated. Tests were performed in the typical sand with silt soils (Unified Soil Classification System, USCS, soil type SP-SM). The boreholes were filled with water on September 23, 2013 and presoaked overnight and for approximately ½ hour prior to testing. For testing, successive readings of the drop in water level were made over several 10-minute periods (for sandy soil criteria). Measurements were referenced from the top of the perforated pipe. The field percolation test results are included in Appendix B and below.

Table 1

Onsite Seepage Pit Percolation Results

Test Hole	Test Description	Soil Condition	USCS Soil Description	Test Zone Below Existing Grades (feet)	Estimated Basic Percolation Rate (Minutes/Inch)
P-1	8" Drilled Hole	Native	0-2.5' Sand with Silt (SP-SM)	2-2.5	2.5

The test results indicate that the stabilized drop ranges from approximately 2.5 minutes per inch (mpi). Previous results indicated infiltration rates of 0.4 to 4.6 minutes per inch (mpi). Please see attached previous report dated November 9, 1999.

Section 3
DISCUSSION

3.1 Soil Conditions

The field exploration indicates that site soils consist primarily of interbedded sands in the shallow leach area. The boring logs provided in Appendix A include detailed descriptions of the soils encountered.

3.2 Groundwater

Initial groundwater was determined to be at approximately 18 feet below the ground surface based upon evaluation of the percent saturation of samples collected. Previous groundwater levels in 1999 were greater than 15 feet. Historic high groundwater level is likely to exist at a depth of about 12 feet. As such, we estimate that high groundwater levels at the site may be on the order of 12 feet below existing grades. Groundwater levels may fluctuate with precipitation, irrigation, drainage, and site grading. The absence of groundwater may not represent an accurate or permanent condition. The shallow groundwater levels are generally a semi-perched layer and are strongly influenced by surrounding agricultural irrigation and drainage. This zone is generally not used as a domestic water supply, nor is it suited for potable use because of its alkalinity, salinity, and dissolved solids content.

3.3 Geologic Setting

The site lies at an elevation of about 152 feet below mean sea level in the lower Coachella Valley, a part of the Colorado Desert geomorphic province. A significant feature within the Colorado Desert geomorphic province is the Salton Trough. The Salton Trough is a large northwest-trending structural depression that extends approximately 180 miles from San Gorgonio Pass to the Gulf of California. Much of this depression in the area of the Salton Sea is below sea level. In the prehistoric past, ancient Lake Cahuilla submerged the lower Coachella Valley.

The Coachella Valley forms the northerly portion of the Salton Trough. The lower Coachella Valley contains a thick sequence of Miocene to Holocene sedimentary deposits. The upper sediments within the lower valley consist of fine-grained sands with interbedded clays and silts that are of lacustrine (lakebed), aeolian (wind-blown), and alluvial (water-deposited) origin.

<u>Geohydrologic Setting</u>: The site lies within the Thermal subbasin of the Coachella Valley groundwater basin. The Thermal subbasin is subdivided into four generalized zones: a semi-perched zone with alternating clay layers to about 100 foot depth, underlain by an upper and lower aquifer, separated by an aquitard layer at least 100 feet thick. Domestic wells in the region derive their water form the lower portion of the upper aquifer and the lower aquifer, generally from about 400 to 1,200 feet deep. The upper semi-perched zone is generally not used as a domestic water supply, nor is it suited for potable use because of its alkalinity, salinity, and dissolved solids content.

Section 4
CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of our conclusions and professional opinions based on the data obtained from the site evaluation.

- The site is feasible for soil percolation and will support leach field and septic tank systems with infiltrators for waste disposal.
- Historic high groundwater is anticipated to be on the order of 12 feet below the ground surface based upon soil mottling observed and iron staining.
- Based upon the low moisture content in the upper 15 feet, there does not appear to be impermeable strata precluding the downward migration of water.
- The soils encountered generally have greater than 10% fines smaller than a #200 sieve in a zone at least 5 feet in thickness above the historic water table.
- Results are consistent with previous report findings and recommendations from previous report should be applied except as modified and superseded below.
- The designed system shall be located in natural undisturbed soil at the depth the tests were performed. Proposed system depths (see attached) correspond to the tested elevations. Leach beds should not be founded deeper than approximately 3 feet below existing grades.
- Based on testing, and the similarity of soil types, the natural occurring body of minerals and organic matter at the proposed wastewater disposal area contains earthen materials having more than 50% of its volume composed of particles smaller than 0.08 inches (2mm) in size.
- There is at least 5 feet of undisturbed soil between the bottom of the tested leach field bottom and anticipated historic high groundwater.
- The percolation test results as described in Section 2.2 and presented in Appendix B indicate that the stabilized drop range is from 0.4 to 4.6 minutes per inch (mpi). Based upon a stabilized rate of 5 mpi, conventional leach lines for sanitary waste disposal may be sized using 20 square feet of leaching area per 100 gallons of septic tank capacity (based on design soil percolation rate of 0 to 9 mpi).
- The final design should delineate the area to be set aside and used for 100% expansion.
- Leach lines should be constructed to provide the required leaching area. Leach lines should have a maximum length of 100 feet and be separated at least 4 feet (edge-to-edge) from each other. The leach lines should have at least 12 inches of soil cover and have a bottom no more than 24 to 36 inches below existing prevailing grade. The leach fields should consist of standard size chamber systems, such as the Infiltrator® or Cultec System. This

system replaces leach lines with perforated drainage pipe and gravel with a sturdy plastic chamber that is 34 inches wide, 12 inches high, and completely open on the bottom.

- Leach lines should be bottomed in natural undisturbed soil. If during leach live excavations soils previously used for leach fields are encountered, they should be removed and replaced with sandy soils similar to the sieve gradation presented within and approved by the geotechnical engineer.
- Leach line bottom soils should be observed prior to backfilling by the geotechnical engineer or his representative to confirm the soils are sandy as anticipated, or to modify the recommendations if siltier or clay soils are encountered.
- Rapid injection or high volume discharge of effluent may tax the ability of the soils to readily absorb effluent over the short term. System design should consider the effects of increased user use (additional residents per home), incorporate low flow discharge (low flow toilets, shower heads, etc.) and incorporate low flow septic systems which dose the leach field slower.
- Leach fields should be located at least 5 feet from property lines, 8 feet from buildings or covered areas, and 100 feet away from on-site or off property wells. Other separations detailed in *Onsite Waste Treatment Systems, Technical Guidance Manual, Version A* for Riverside County apply and should be referred to in design.
- Maintenance of onsite waste disposal systems can be the most critical element in determining the success of a design. Due to general accessibility limitations which typically exist with drainage systems and infiltration structures, they must be protected clogging of any filter medium, and the near structure soils. The potential for clogging can be reduced by pre-treating structure inflow through the installation of a proper septic tank. In addition, sediment, paper, and debris must be removed from the tank on a regular basis.
- Based on the data presented in this report and using the recommendations set forth, it is the judgment of this professional that there is sufficient area to support a primary and expansion OWTS that will meet the current standards of the Department of Environmental Health and the Regional Water Quality Control Board (RWQCB). Based on the data presented in this report and the testing information accumulated, it is the judgment of this professional that the groundwater table will not encroach within the current allowable limit set forth by County and State requirements (5 feet below the base of the leach field set at no deeper than 3 feet below existing grade).
- This report should be submitted to the Riverside County Department of Environmental Health (RCDEH) for their review and comment. Earth Systems should have the opportunity to review the plan of the septic system and details.

Section 5
LIMITATIONS

Our findings and recommendations in this report are based on selected points of field exploration, percolation testing, and our understanding of the mobile home park. Furthermore, our findings and recommendations are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil or groundwater conditions could exist between and beyond the exploration points.

Findings of this report are valid as of the issued date of the report. However, changes in conditions of a property can occur with passage of time, whether they are from natural processes or works of man, on this or adjoining properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one year.

This report is issued with the understanding that the owner or the owner's representative has the responsibility to bring the information and recommendations contained herein to the attention of the designer for the septic systems and are incorporated into the plans and specifications. The owner or the owner's representative also has the responsibility to take the necessary steps to see that the contractor carry out such recommendations in the field. It is further understood that the owner or the owner's representative is responsible for submittal of this report to the appropriate governing agencies.

Earth Systems has striven to provide our services in accordance with generally accepted geotechnical engineering practices in this locality at this time. No warranty or guarantee, express or implied, is made. This report was prepared for the exclusive use of the Client and the client's authorized agents.

Earth Systems should be provided the opportunity for a general review of the septic tank and leach field plan in order that our recommendations may be properly interpreted and implemented in the design. If Earth Systems is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

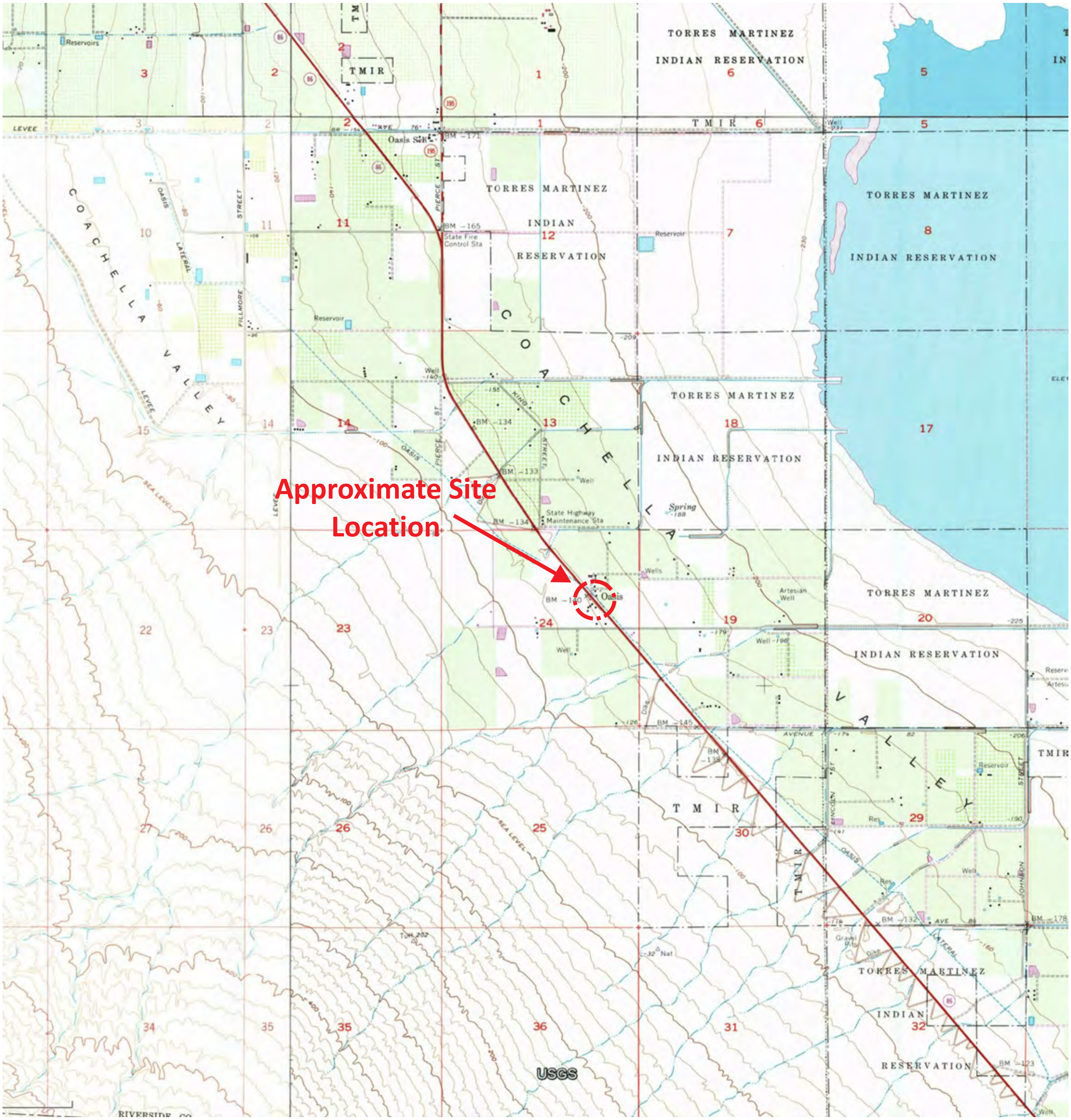
Although available through Earth Systems Southwest, the current scope of our services does not include an environmental assessment or an investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

-o0o-

Appendices as cited are attached and complete this report.

APPENDIX A

Plate 1 – Site Location Map
Plate 2 – Boring Location Map
Terms and Symbols Used on Boring Logs
Soil Classification System
Logs of Borings
Laboratory Test Results



Reference: Good Earth Satellite Image with Historical Topographic Map Overlay, dated 2011.

LEGEND

🔴 Approximate Site Location

Approximate Scale: 1" = 4,000’

0 4,000’ 8,000’

N

Plate 1
Site Location Map

Emma Valenzuela Mobile Home Park
81-550 Harrison Road
Thermal, Riverside County, California

Earth Systems
Southwest

10/10/2013

File No.: 07427-04

Reference: Google Earth Satellite Image dated 5/27/2012 &Pueblo Unido CDC Septic System Plans Sheet S, dated 2/11/13.

LEGEND

B-1 ◑	Approximate Boring Location
P-1 ●	Approximate Infiltration Test Location

Approximate Scale: 1" = 100’

0 100’ 200’

N

Plate 2
Boring Location Map

Emma Valenzuela Mobile Home Park
81-550 Harrison Road
Thermal, Riverside County, California

Earth Systems
Southwest

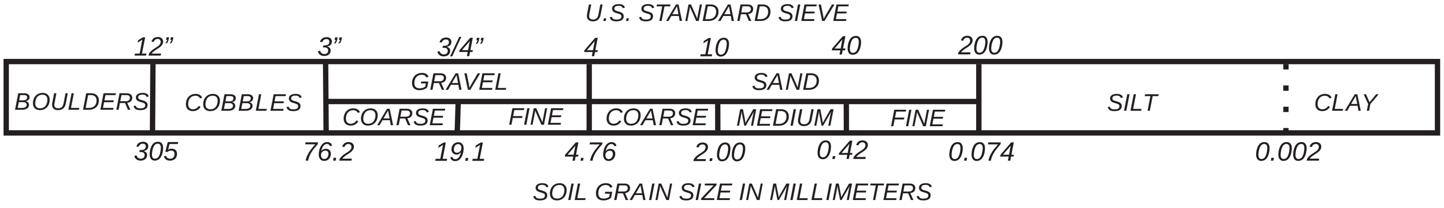
10/10/2013

File No.: 07427-04

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE



RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	**N=0-4*	*RD=0-30*	*Easily push a 1/2-inch reinforcing rod by hand*
Loose	*N=5-10*	*RD=30-50*	*Push a 1/2-inch reinforcing rod by hand*
Medium Dense	*N=11-30*	*RD=50-70*	*Easily drive a 1/2-inch reinforcing rod with hammer*
Dense	*N=31-50*	*RD=70-90*	*Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer*
Very Dense	*N>50*	*RD=90-100*	*Drive a 1/2-inch reinforcing rod a few inches with hammer*

**N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler,140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).*

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	**N=0-1*	**C=0-250 psf*	*Squeezes between fingers*
Soft	*N=2-4*	*C=250-500 psf*	*Easily molded by finger pressure*
Medium Stiff	*N=5-8*	*C=500-1000 psf*	*Molded by strong finger pressure*
Stiff	*N=9-15*	*C=1000-2000 psf*	*Dented by strong finger pressure*
Very Stiff	*N=16-30*	*C=2000-4000 psf*	*Dented slightly by finger pressure*
Hard	*N>30*	*C>4000*	*Dented slightly by a pencil point or thumbnail*

MOISTURE DENSITY

Moisture Condition: *An observational term; dry, damp, moist, wet, saturated.*

Moisture Content: *The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.*

Dry Density: *The pounds of dry soil in a cubic foot.*

MOISTURE CONDITION

Dry.....................Absence of moisture, dusty, dry to the touch
Damp................Slight indication of moisture
Moist.................Color change with short period of air exposure (granular soil)
Below optimum moisture content (cohesive soil)
Wet....................High degree of saturation by visual and touch (granular soil)
Above optimum moisture content (cohesive soil)
Saturated..........Free surface water

RELATIVE PROPORTIONS

Trace............minor amount (<5%)
with/some......significant amount
modifier/and...sufficient amount to influence material behavior (Typically >30%)

PLASTICITY

DESCRIPTION	*FIELD TEST*
Nonplastic	*A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.*
Low	*The thread can barely be rolled.*
Medium	*The thread is easy to roll and not much time is required to reach the plastic limit.*
High	*The thread can be rerolled several times after reaching the plastic limit.*

LOG KEY SYMBOLS

▮	*Bulk, Bag or Grab Sample*
◧	*Standard Penetration Split Spoon Sampler (2” outside diameter)*
▮	*Modified California Sampler (3” outside diameter)*
◩	*No Recovery*

GROUNDWATER LEVEL

▼	*Water Level (measured or after drilling)*
▽	*Water Level (during drilling)*

Terms and Symbols Used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS *More than 50% of material is larger than No. 200 sieve size*	GRAVEL AND GRAVELLY SOILS *More than 50% of coarse fraction retained on No. 4 sieve*	CLEAN GRAVELS	░	GW	*Well-graded gravels, gravel-sand mixtures, little or no fines*
			▒	GP	*Poorly-graded gravels, gravel-sand mixtures. Little or no fines*
		GRAVELS WITH FINES	▦	GM	*Silty gravels, gravel-sand-silt mixtures*
			▩	GC	*Clayey gravels, gravel-sand-clay mixtures*
	SAND AND SANDY SOILS *More than 50% of coarse fraction passing No. 4 sieve*	CLEAN SAND (Little or no fines)	░	SW	*Well-graded sands, gravelly sands little or no fines*
			░	SP	*Poorly-graded sands, gravelly sands, little or no fines*
		SAND WITH FINES (appreciable amount of fines)	▥	SM	*Silty sands, sand-silt mixtures*
			▨	SC	*Clayey sands, sand-clay mixtures*
FINE-GRAINED SOILS *More than 50% of material is smaller than No. 200 sieve size*	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	ML	*Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity*
			▨	CL	*Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays*
			▥	OL	*Organic silts and organic silty clays of low plasticity*
		LIQUID LIMIT GREATER THAN 50	▥	MH	*Inorganic silty, micaceous, or diatomaceous fine sand or silty soils*
			▨	CH	*Inorganic clays of high plasticity, fat clays*
			▨	OH	*Organic clays of medium to high plasticity, organic silts*
HIGHLY ORGANIC SOILS			░	PT	*Peat, humus, swamp soils with high organic contents*
VARIOUS SOILS AND MAN MADE MATERIALS			▦		*Fill Materials*
MAN MADE MATERIALS			■		*Asphalt and concrete*

Soil Classification System

Earth Systems
Southwest

Earth Systems
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92201
Phone (760) 345-1588 Fax (760) 345-7315

Boring No. B-1
Project Name: Emma Valenzuela Mobile Home Park
Project Number: 07427-04
Boring Location: See Plate 2

Drilling Date: September 23, 2013
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobile B61 HDX w/Autohammer
Logged By: Randy Reed

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type Bulk	Sample Type SPT	Sample Type MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS/Bedrock	Dry Density (pcf)	Moisture Content (%)	Description of Units
0						SP-SM			POORLY GRADED SAND WITH SILT: gray brown, medium dense, damp, fine to coarse grained sand, no mottling
			■	6, 11, 13					
5			■	8, 13, 15					no mottling
			■	13, 17, 22		SM			SILTY SAND: brown, medium dense, moist, fine to coarse grained sand cobble in upper part of sampler, no mottling
10			■	8, 13, 11					cobble in sampler tip, no mottling
			■	7, 11, 11		SM			SILTY SAND: brown, medium dense, moist, fine to coarse grained sand, some mottling
15			■	7, 11, 14		ML			SILT WITH CLAY: brown, very stiff, moist, cohesive, some plasticity, some iron staining
▼			■	6, 8, 11		SM/ML			SILTY SAND/SANDY SILT: brown, medium dense/very stiff, wet, fine grained sand
20			■	8, 9, 13		SM			SILTY SAND: brown, medium dense, wet, fine to medium grained sand
			■	11, 13, 15					
25			■	6, 11, 8		ML			SILT WITH CLAY: brown, very stiff, wet, cohesive, slight plasticity
			■	4, 7, 8					saturated
30			■	8, 10, 13		SM			SILTY SAND: brown, medium dense, wet, fine grained sand
35									
40									
45									
50									
55									
60									

Graphic Trend
Blow Count Dry Density

Total Depth 31 1/2 feet
Groundwater Encountered at 18 feet
No Refusal, Backfilled w/cuttings

File No.: 07427-04 October 10, 2013

Lab No.: 13-294

UNIT DENSITIES AND MOISTURE CONTENT ASTM D2937-04 & D2216-05

Job Name: Emma Valenzuela Mobile Home Park

Sample Location	Depth (feet)	Unit Dry Density (pcf)	Moisture Content (%)	USCS Group Symbol
B1	2.5	111	2	SP-SM
B1	5	115	2	SP-SM
B1	7.5	112	2	SM
B1	10	113	3	SM
B1	12.5	108	5	SM
B1	15	106	19	ML
B1	17.5	104	16	SM/ML
B1	20	112	17	SM
B1	22.5	98	25	SM
B1	25	100	24	ML
B1	27.5	94	29	ML
B1	30	104	23	SM

File No.: 07427-04 10/10/2013

Lab No.: 13-294

SIEVE ANALYSIS

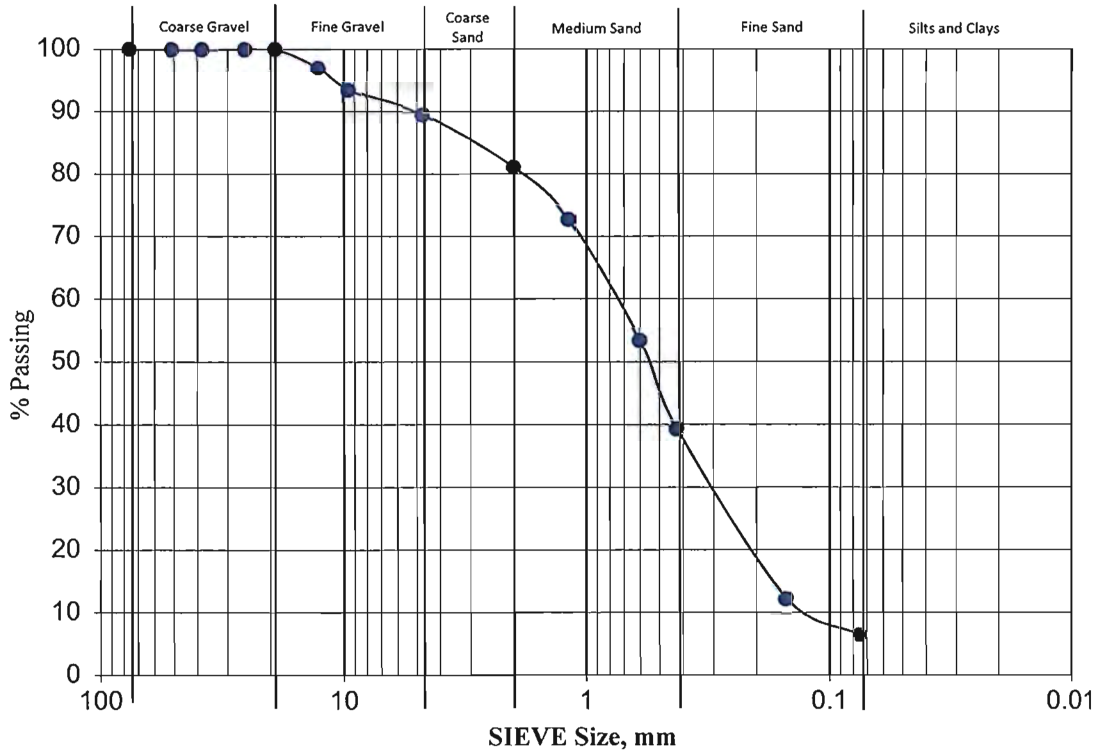
ASTM D6913-09

Job Name: Emma Valenzuela Mobile Home Park

Sample ID: B1 @ 5 feet

Description: Poorly Graded Sand with silt w/Gravel (SP)

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	97
3/8"	94
#4	90
#10	81
#16	73
#30	54
#40	40
#100	12
#200	6.5



% Coarse Gravel:	0	% Coarse Sand:	9			
% Fine Gravel:	10	% Medium Sand:	42	Cu:	0.58	
		% Fine Sand:	33	Cc:	0.09	Gradation
% Total Gravel	10	% Total Sand	83	% Fines:	6	Poorly Graded

EARTH SYSTEMS SOUTHWEST

APPENDIX B

Percolation Test Results

Leachline Percolation Data Sheet

Project: Emma Valenzuela Mobile Home Park Job No.: 07427-04
Test Hole No.: P-1 Date Excavated: 9/23/2013
Depth of Test Hole: 2.5 feet below grade Soil Classification: Sand with Silt (SP-SM)
Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/24/2013 Presoak: Yes
Actual Percolation Tested by: R. Reed Date: 9/25/2013
Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.50

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	08:15 08:40	25	8.0	0.0	8.0
B	08:45 09:10	25	10.0	0.0	10.0

Gravel Factor 0.73

Use Normal or Sandy (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	08:20	08:30	10	10	17.0	12.0	5.0	2.7
2	08:30	08:40	10	20	12.0	7.0	5.0	2.7
3	08:40	08:50	10	30	7.0	2.0	5.0	2.7
4	08:50	09:00	10	40	9.0	4.0	5.0	2.7
5	09:00	09:10	10	50	7.0	2.0	5.0	2.7
6	09:10	09:20	10	60	6.0	0.5	5.5	2.5

APPENDIX C

Earth Systems Southwest Previous Percolation Report for the Site dated November 9, 1999.

COACHELLA VALLEY HOUSING COALITION
47-501 MONROE STREET
SUITE G, PLAZA I
INDIO, CALIFORNIA 92201

SEWAGE DISPOSAL FEASIBILITY AND SOIL PERCOLATION REPORT

FRANSISCO VALENZEULA
POLANCO MOBILE HOME PARK
81-550 HIGHWAY 86
OASIS, CALIFORNIA

File No. 07427-01
99-11-718

Earth Systems Consultants
Southwest

79-811B Country Club Drive
Bermuda Dunes, CA 92201
(760) 345-1588
(800) 924-7015
FAX (760) 345-7315

November 9, 1999

File No. 07427-01
99-11-718

Coachella Valley Housing Coalition
45-701 Monroe Street, Suite G, Plaza I
Indio, California 92201

Attention: Ms. Debra Arauz

Subject: **Sewage Disposal Feasibility and Soil Percolation Report**

Project: **Fransisco Valenzuela**
Polanco Mobile Home Park
81-550 Highway 86
Oasis, California

We take pleasure to present this Sewage Disposal and Soil Percolation Report prepared for the existing Polanco Mobile Home Park located at 81-550 Highway 86 near Oasis Riverside County, California. This report presents our findings and recommendations for leachfield waste disposal. This report should stand as a whole, and no part of the report should be excerpted or used to exclusion of any other part.

This report completes our scope of services in accordance with our agreement, dated October 1, 1999. Other services that may be required, such as plan review are additional services and will be billed according to the Fee Schedule in effect at the time services are provided. Unless requested in writing, the client is responsible to distribute this report to the appropriate governing agency.

We appreciate the opportunity to provide our professional services. Please contact our office if there are any questions or comments concerning this report or its recommendations.

Respectfully submitted,
EARTH SYSTEMS CONSULTANTS
Southwest
Shelton L. Stringer
Shelton L. Stringer
GE 2266

REGISTERED PROFESSIONAL ENGINEER
SHELTON L. STRINGER
No. 2266
Exp. 6-30-00
GEOTECHNICAL
STATE OF CALIFORNIA

SER/sls

Distribution: 4/Coachella Valley Housing Coalition
1/VTA File, 1/BD File

TABLE OF CONTENTS

Section 1
INTRODUCTION

1.1 Project Description

This Sewage Disposal Feasibility and Soil Percolation Report has been prepared for the existing Polanco Mobile Home Park owned by Fransisco Valenzuela and located at 81-550 Highway 86 near Oasis Riverside County, California. The property currently has one permanent residence and 12 mobile homes for employee housing on it. Twelve mobile homes are contemplated to remain. Existing septic tanks and leachfield waste disposal systems exist for this unsewered area. Domestic water comes from a well on the site.

1.2 Site Description

The mobile home park is located on the east side of Highway 86. The site location is shown on Figure 1 in Appendix A. The property is located within the SW1/4 of the SW1/4 Section 19, T8S, R9E of the San Bernardino Baseline Meridian.

The mobile home park site is situated on gently sloping ground by sheet flow to the northeast. Agricultural lands surround most of the property. Additional mobile homes lie on the property to the north. There are no known agricultural tile drain lines on or near the property. A open drainage channel lies to the north of the property. Construction of new Highway 86 is to the east of the site.

1.3 Purpose and Scope of Work

The purpose for our services was to evaluate the site soil conditions and to provide professional opinions and recommendations regarding the feasibility for sewer waste disposal on the site. The scope of work included the following:

- A general reconnaissance of the site.
- shallow subsurface exploration by drilling one exploratory boring to a depth of about 15 feet.
- 10 percolation tests in the area of the leach fields.
- Evaluation of existing septic tanks and leach lines.
- Engineering evaluation of the acquired data from the exploration and testing.
- A summary of our findings and recommendations in this written report, including:
  - Discussions on subsurface soil and groundwater conditions.
  - Discussions on soil percolation rate.
  - Discussions on the adequacy of existing septic tanks and leach lines.
  - Recommendations regarding need for additional septic systems and leach field design criteria.

Not Contained In This Report: Although available through Earth Systems Consultants Southwest, the current scope of our services does not include:

- An environmental assessment.
- Investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.
- Geotechnical and geologic studies, such as soil liquefaction hazard.

Section 2
METHODS OF INVESTIGATION

2.1 Field Exploration

One exploratory boring was drilled to a depth of about 15 feet below the existing ground surface to observe the soil profile. The boring was drilled on October 22, 1999 using 8-inch outside diameter hollow-stem augers, and powered by a CME 45 truck-mounted drilling rig. The location of the boring is approximate, established by sighting from existing topographic features. The approximate boring location is shown on the site and percolation test location plan, Figure 2, in Appendix A.

The final log of the boring represents our interpretation of the contents of the field log and review of bulk samples obtained during the subsurface investigation. The final log is included in Appendix A of this report.

2.2 Percolation Tests

Ten (10) percolation tests were made on October 27, 1999, in the vicinity of the proposed leachfields as shown on Figure 2. The percolation tests were made in conformance to Riverside County percolation test method, as described in “Waste Disposal for Individual Homes, Commercial and Industrial”, published by the Riverside County Division of Environmental Health (RCDEH).

The tests were performed using 8-inch diameter; boreholes made to depths of 3 feet below existing ground surface. The boreholes were filled with water and the sandy soil criteria test conducted. Successive readings of drop in water level were made over several, 10-minute periods until a stabilized drop was recorded. Measurements were referenced from the top of a 6-inch diameter Coex pipe set in the borehole to reduce caving and perforated at the bottom. The field percolation test results are included in Appendix B. The test results indicate that the stabilized drop range from 0.4 to 5 minutes per inch (mpi).

2.3 Evaluation of Existing Septic Systems

As part of our sewage disposal evaluation, we subcontracted with Terra Geosciences of Loma Linda, California to conduct geophysical surveys of the existing septic tanks/pits and any connecting leachlines. This survey was conducted by ground penetrating radar. The investigation consisted of the following:

- Locating and uncovering the existing septic tanks/pits to determine their type, condition, and estimate their capacities by indirect measurement.
- Locating some of the existing leachlines uncovering them at a few locations to evaluate their construction.

Section 3
DISCUSSION

3.1 Soil Conditions

The field exploration indicates that site soils consist primarily of Silty Sand (SM). The boring logs provided in Appendix A include detailed descriptions of the soils encountered. The USDA Soil Conservation Service maps the upper 60 inches of soil as Myoma fine sand with expected slight conditions for soil percolation.

3.2 Groundwater

Free groundwater was not encountered in the 15-foot boring during exploration. The depth to groundwater in the area may be 15 to 30 feet. The first groundwater zone is a semi-perched zone above deeper clay layers. This semi-perched zone is generally not used as a domestic water supply nor is suited for potable use because of its alkalinity, salinity, and dissolved solids content.

3.3 Geologic Setting

The site lies at an elevation of about 150 feet below mean sea level in the lower Coachella Valley, a part of the Colorado Desert geomorphic province. A significant feature within the Colorado Desert geomorphic province is the Salton Trough. The Salton Trough is a large northwest-trending structural depression that extends from San Gorgonio Pass, approximately 180 miles to the Gulf of California. Much of this depression in the area of the Salton Sea is below sea level. In the prehistoric past, ancient Lake Cahuilla submerged the lower Coachella Valley.

The Coachella Valley forms the northerly portion of the Salton Trough. The lower Coachella Valley contains a thick sequence of sedimentary deposits that are Miocene to recent in age. The upper sediments within the lower valley consist of fine-grained sands with interbedded clays and silts that are of lacustrine (lakebed), aeolian (wind-blown), and alluvial (water-deposited) origin.

Geohydologic Setting: The site lies within the Thermal subbasin of the Coachella Valley groundwater basin. The Thermal subbasin is subdivided into four generalized zones: a semi-perched zone with alternating clay layers to about 100 foot depth, underlain by a upper and lower aquifer, separated by an aquitard layer at least 100 feet thick. Domestic wells in the region derive their water form the lower portion of the upper aquifer and the lower aquifer generally from about 400 to 1200 feet deep.

3.4 Existing Septic Systems

The following table is a summary of information regarding existing septic tanks discovered on site. The locations of the septic tanks are shown on Figure 2 in Appendix A.

Septic Tank Number	Number of Units Served	Dimensions LxWxD (feet)	Estimated Capacity (gallons)	Sanitary Tee Inlets	Construction Type
S-1	1 + residence	8x5x5	1500	baffles	Concrete
S-2*	N/A	N/A*	N/A*	N/A*	N/A*
S-3*	N/A	N/A*	N/A*	N/A*	N/A*
S-4	N/A	7.5x4x4 cylindrical	750	Baffles, septic level flowing over	Steel, moderately rusted, completely full with thick scum layer.
S-5	N/A	N/A	N/A	no	Homemade, rotted wood (with metal siding?)
Total	12				

* These tanks were not examined in that they lie in close proximity to the well and should be abandoned.

The following table provides a summary of information regarding existing leach lines discovered on site. The locations of the leach lines are shown on Figure 2 in Appendix A.

Connected Septic Tank Number	Number of Units Served	Number @ Length x Width (feet)	Leaching Area (sf)	Remarks
S-1	1 + residence	1 @ 50x3	150	Detected by GPR
S-4	N/A	1 @ 50x3	150	Detected by GPR
S-5	N/A	1 @12x3, 1 @16x3	80	Detected by GPR

Section 4
CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of our conclusions and professional opinions based on the data obtained from the site evaluation.

- The site is feasible for soil percolation and will support leachfield and septic tank systems for waste disposal.

- Most of the existing septic tanks for the mobile homes are unacceptable in their present condition (except Septic Tank S-1). These tanks should be abandoned. Septic Tank S-4 could be pumped out and used for only one mobile home. The septic systems may present a potential health hazard by contaminating the on-site domestic well. *We recommend testing these wells for possible septic contamination.*

- There should be the following septic tank capacities, depending on the number of units :

Units Served by Septic Tanks	Septic Tank Capacity (gallons)
2	1500
3	2250
4	2630
5	3000
6	3380

- The percolation test results as described in Section 2.2 and presented in Appendix B indicate that the stabilized drop range from 0.4 to 5 minutes per inch (mpi). Therefore, leach lines for sanitary waste disposal may be sized using 20 square feet of leaching area per 100 gallons of septic tank capacity. As an example, based on the design soil percolation rate given above, 100 LF of 3-foot wide leach lines should be provided for a 1500-gallon septic tank.

- Additional leachlines should be constructed to supplement existing leach lines to provide the required leaching area. The site is limited for possible leachfields. Possible areas include the northeast corner of site (dependent on location of any off-site wells to the north), northwest corner of the site, and along the frontage road.

- Leach lines should have a maximum length of 100 feet and be separated at least 4 feet (edge-to edge) from each other. The leach lines should have at least 12 (preferably 18) inches of soil cover and have a bottom at least 30 inches but no more than 48 inches deep. The width of the leach lines should range from 18 to 36 inches wide. Drain rock consisting of 3/4 to 2-1/2 inch size gravel should be used. The perforated drainage pipe should be laid level and have a minimum 2 inches of gravel cover. Untreated building paper should be laid over the gravel cover to reduce soil infiltration, yet allow evapotranspiration. They should be located at least 5 feet from property lines, 8 feet from buildings or covered areas, and 100 feet away from onsite or off property wells. A typical leach line construction detail is provided on Figure 3 in Appendix A.

- Based on the data presented in this report, it is the judgement of the engineer who prepared and signed this report that there may be sufficient area within the park to support an individual sewage disposal system that can meet the current codes and standards of the Riverside County Department of Environmental Health. Based on the subsurface data presented in the report, it is the judgement of the same engineer that neither the groundwater table or bedrock will encroach within the current allowable limit set forth by county and state requirements. This report should be submitted to the Riverside County Department of Environmental Health for their review and comment. ESCSW should have the opportunity to review the plan of the leachfield layout and details.

Section 5
LIMITATIONS

Our findings and recommendations in this report are based on selected points of field exploration, percolation testing, and our understanding of the mobile home park. Furthermore, our findings and recommendations are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil or groundwater conditions could exist between and beyond the exploration points.

Findings of this report are valid as of the issued date of the report. However, changes in conditions of a property can occur with passage of time whether they are from natural processes or works of man on this or adjoining properties. In addition, changes in applicable or appropriate standards occur whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one year.

This report is issued with the understanding that the owner, or the owner's representative, has the responsibility that the information and recommendations contained herein are brought to the attention of the designer for the septic systems and are incorporated into the plans and specifications. The owner, or his representative, also has the responsibility to take the necessary steps to see that the contractor carry out such recommendations in the field. It is further understood that the owner or the owner's representative is responsible for submittal of this report to the appropriate governing agencies.

ESCSW has striven to provide our services in accordance with generally accepted geotechnical engineering practices in this locality at this time. No warranty or guarantee is express or implied. This report was prepared for the exclusive use of the Client and their authorized agents

ESCSW should be provided the opportunity for a general review of the septic tank and leachfield plan in order that our recommendations may be properly interpreted and implemented in the design. If ESCSW is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

Although available through Earth Systems Consultants Southwest, the current scope of our services does not include an environmental assessment; or investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater or air on, below, or adjacent to the subject property.

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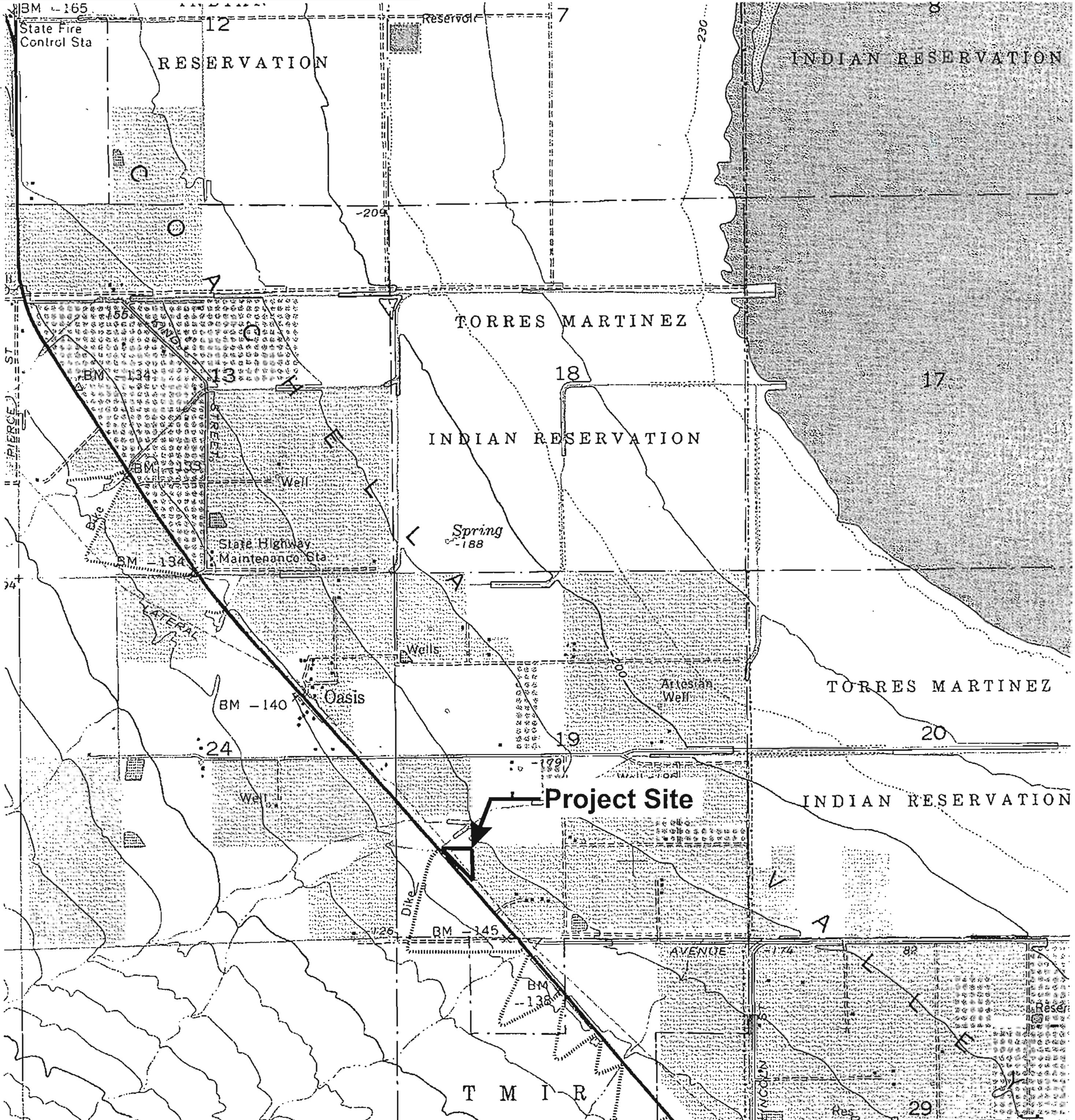
Appendices as cited are attached and complete this report.

APPENDIX A

Figure 1 - Site Location
Figure 2- Site and Test Location Plan

Logs of Borings



Reference: Oasis 7.5 min. USGS Quadrangle (photorevised 1974)

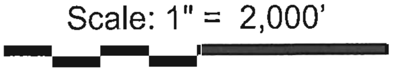
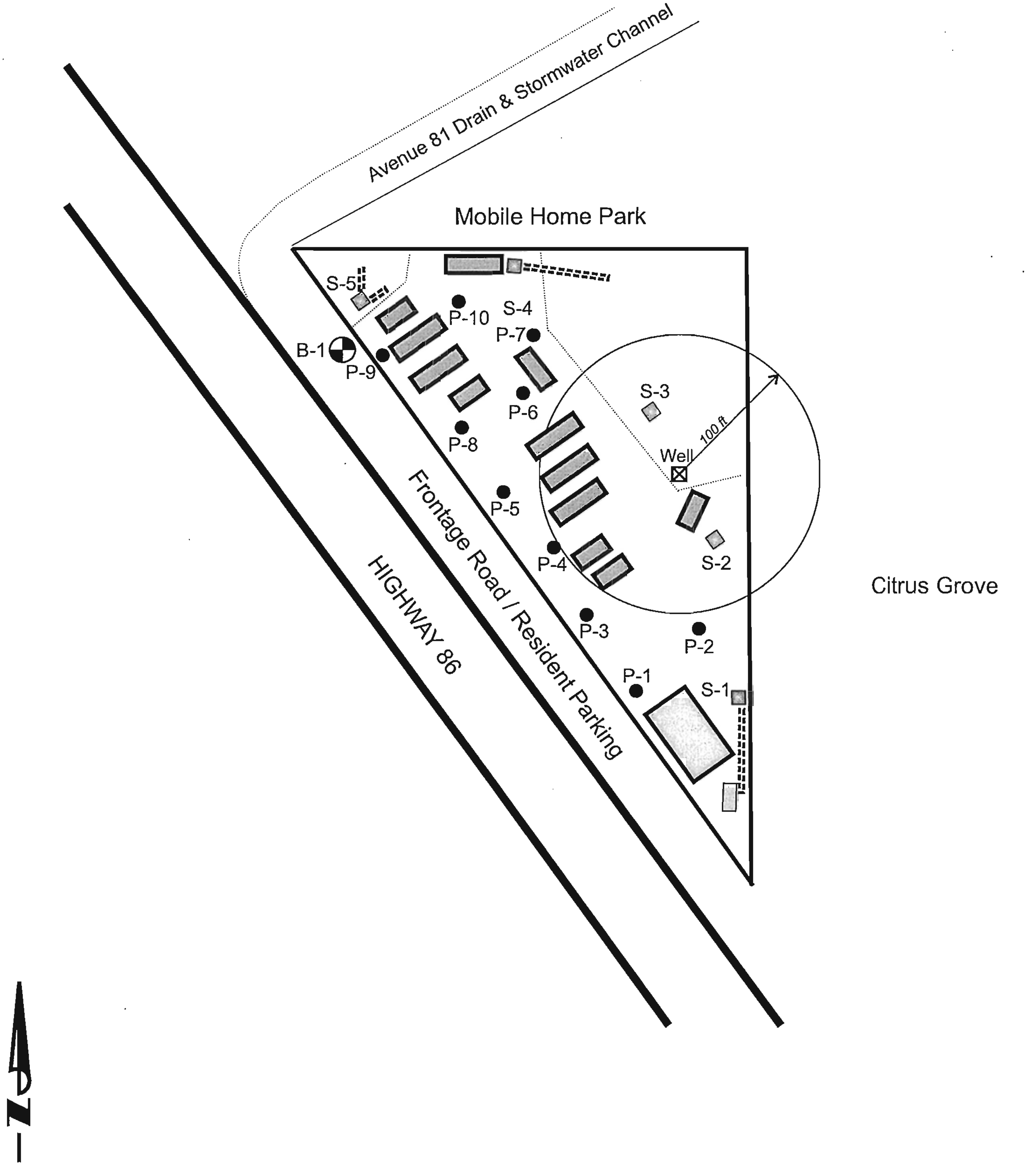


Figure 1 - Site Location

Project Name: Valenzuela Moblie Home Park
Project No.: 07427-01

Earth Systems Consultants
Southwest



LEGEND

◐ Approximate Boring Location
● Approximate PercTest Location
▨ Existing Septic Tank & number
╍╍╍ Existing Leach Line
▭ Existing Mobile Home

Scale: 1" = 100'
0 100 200

Figure 2 - Site and Test Location Plan

Valenzuela Mobile Home Park
81-550 Highway 86
Job Number 07427-01

Earth Systems Consultants
Southwest

Earth Systems Consultants
Southwest
79-811B Country Club Drive, Bermuda Dunes, CA 92201
Phone (760) 345-1588 FAX (760) 345-7315

Boring No: B-1
Project Name: 81-550 Highway 86
Project Number: 07427-01
Boring Location: See Site and Test Location Plan

Drilling Date: October 22, 1999
Drilling Method: 8-in. Hollow Stem Auger
Drill Type: CME 45
Logged By: Clifford Batten

Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type			Penetration Resistance (Blows/6")	Symbol	USCS	Dry Density (pcf)	Moisture Content (%)	Description of Units	Graphic Trend	
	Bulk	SPT	MOD Calif.							Blow Count	Dry Density
0					∴	SM			SILTY SAND: Brown; damp to moist; fine to coarse grained, with some clay.		
5	■				∴						
10	■				∴						
15	■								Total Depth: 15 feet No groundwater or bedrock encountered.		
20											
25											
30											

APPENDIX B

Percolation Test Results

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86** Job No.: 07427-01
Test Hole No.: **P-1** Date Excavated: 10/26/99
Depth of Test Hole: 3.5 feet below grade Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes
Actual Percolation Tested by: R. Howe Date: 10/27/99
Pipe Stick Up (ft): 0.38 Length of Pipe (ft): 3.85

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:37 10:02	25	10.3	1.8	8.5
B	10:32 10:57	25	13.3	6.6	6.7

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	14:44	14:54	10	10	12.5	8.5	4.0	2.5
2	14:55	15:05	10	21	12.1	9.6	2.5	4.0
3	15:06	15:16	10	32	12.2	10.0	2.3	4.4
4	15:17	15:27	10	43	16.1	12.5	3.6	2.8
5	15:28	15:38	10	54	12.2	9.6	2.6	3.8
6	15:39	15:49	10	65	13.8	11.5	2.3	4.4

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86**
Job No.: 07427-01
Test Hole No.: **P-2**
Date Excavated: 10/26/99
Depth of Test Hole: 3.3 feet below grade
Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Howe
Date: 10/27/99
Presoak: Yes
Actual Percolation Tested by: R. Howe
Date: 10/27/99
Pipe Stick Up (ft): 0.55
Length of Pipe (ft): 3.88

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:39 10:04	25	9.6	0.0	9.6
B	10:34 10:59	25	11.3	0.0	11.3

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	14:47	14:57	10	10	11.2	0.0	11.2	0.9
2	14:58	15:08	10	21	13.1	0.0	13.1	0.8
3	15:09	15:19	10	32	18.7	1.4	17.3	0.6
4	15:20	15:30	10	43	20.2	1.4	18.7	0.5
5	15:31	15:41	10	54	24.0	1.8	22.2	0.5
6	15:42	15:52	10	65	27.4	3.0	24.4	0.4

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86** Job No.: 07427-01

Test Hole No.: **P-3** Date Excavated: 10/26/99

Depth of Test Hole: 3.2 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes

Actual Percolation Tested by: R. Howe Date: 10/27/99

Pipe Stick Up (ft): 0.60 Length of Pipe (ft): 3.77

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:41 10:06	25	10.4	0.0	10.4
B	10:36 11:01	25	10.2	0.0	10.2

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time Start of Reading	 End of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
1	14:50	15:00	10	10	12.5	0.0	12.5	0.8
2	15:01	15:11	10	21	14.4	2.8	11.6	0.9
3	15:12	15:22	10	32	18.2	4.0	14.3	0.7
4	15:23	15:33	10	43	19.4	4.7	14.8	0.7
5	15:34	15:44	10	54	19.3	5.5	13.8	0.7
6	15:45	15:55	10	65	18.5	5.6	12.8	0.8

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86** Job No.: 07427-01

Test Hole No.: **P-4** Date Excavated: 10/26/99

Depth of Test Hole: 3.4 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes

Actual Percolation Tested by: R. Howe Date: 10/27/99

Pipe Stick Up (ft): 0.50 Length of Pipe (ft): 3.9

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:43 10:08	25	9.6	0.0	9.6
B	10:38 11:03	25	14.0	0.0	14.0

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	16:07	16:17	10	10	12.0	1.9	10.1	1.0
2	16:18	16:28	10	21	15.4	5.0	10.3	1.0
3	16:29	16:39	10	32	15.1	5.9	9.2	1.1
4	16:40	16:50	10	43	15.2	6.4	8.9	1.1
5	16:51	17:01	10	54	14.9	6.5	8.4	1.2
6	17:02	17:12	10	65	16.1	7.4	8.6	1.2

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86** Job No.: 07427-01

Test Hole No.: **P-5** Date Excavated: 10/26/99

Depth of Test Hole: 3.2 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes

Actual Percolation Tested by: R. Howe Date: 10/27/99

Pipe Stick Up (ft): 0.71 Length of Pipe (ft): 3.88

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:45 10:10	25	10.6	0.0	10.6
B	10:40 11:05	25	12.1	0.0	12.1

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	13:15	13:25	10	10	11.5	3.8	7.7	1.3
2	13:26	13:36	10	21	11.5	5.9	5.6	1.8
3	13:37	13:47	10	32	11.2	6.4	4.8	2.1
4	13:48	13:58	10	43	12.1	7.7	4.4	2.3
5	13:59	14:09	10	54	8.4	4.2	4.2	2.4
6	14:10	14:20	10	65	13.0	9.1	3.8	2.6

Earth Systems Consultants Southwest

Leachline Percolation Data Sheet

Project: Valenzuela MHP - 81-550 Hwy 86 Job No.: 07427-01

Test Hole No.: P-6 Date Excavated: 10/26/99

Depth of Test Hole: 3.3 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes

Actual Percolation Tested by: R. Howe Date: 10/27/99

Pipe Stick Up (ft): 0.55 Length of Pipe (ft): 3.86

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:47 10:12	25	12.6	0.0	12.6
B	10:42 11:07	25	13.3	0.0	13.3

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	11:35	11:45	10	10	9.8	0.0	9.8	1.0
2	11:46	11:56	10	21	11.3	-0.1	11.4	0.9
3	11:57	12:07	10	32	12.4	2.4	10.0	1.0
4	12:08	12:18	10	43	11.4	3.0	8.4	1.2
5	12:19	12:29	10	54	12.1	2.5	9.6	1.0
6	12:30	12:40	10	65	12.6	3.1	9.5	1.1

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86** Job No.: 07427-01
Test Hole No.: **P-7** Date Excavated: 10/26/99
Depth of Test Hole: 3.2 feet below grade Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes
Actual Percolation Tested by: R. Howe Date: 10/27/99
Pipe Stick Up (ft): 0.67 Length of Pipe (ft): 3.9

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:49 10:14	25	11.4	1.2	10.2
B	10:44 11:09	25	15.6	5.2	10.4

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	11:38	11:48	10	10	11.9	8.9	3.0	3.3
2	11:49	11:59	10	21	12.7	10.0	2.8	3.6
3	12:00	12:10	10	32	12.6	10.2	2.4	4.2
4	12:11	12:21	10	43	12.1	9.8	2.3	4.4
5	12:22	12:32	10	54	11.9	9.8	2.0	4.9
6	12:33	12:43	10	65	11.9	9.7	2.2	4.6

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86**
Job No.: 07427-01
Test Hole No.: **P-8**
Date Excavated: 10/26/99
Depth of Test Hole: 3.0 feet below grade
Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Howe
Date: 10/27/99
Presoak: Yes
Actual Percolation Tested by: R. Howe
Date: 10/27/99
Pipe Stick Up (ft): 0.80
Length of Pipe (ft): 3.76

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:51 10:16	25	10.4	0.0	10.4
B	10:46 11:11	25	13.7	0.0	13.7

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	13:12	13:22	10	10	11.8	4.8	7.0	1.4
2	13:23	13:33	10	21	14.5	7.3	7.2	1.4
3	13:34	13:44	10	32	12.2	7.0	5.3	1.9
4	13:45	13:55	10	43	12.4	7.3	5.0	2.0
5	13:56	14:06	10	54	11.5	6.8	4.7	2.1
6	14:07	14:17	10	65	11.4	6.8	4.6	2.2

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86** Job No.: 07427-01

Test Hole No.: **P-9** Pipe Length: 4 ft Date Excavated: 10/26/99

Depth of Test Hole: 3.4 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes

Actual Percolation Tested by: R. Howe Date: 10/27/99

Pipe Stick Up (ft): 0.55 Length of Pipe (ft): 3.95

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:53 10:18	25	10.9	0.0	10.9
B	10:48 11:13	25	12.8	0.0	12.8

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	13:09	13:19	10	10	14.4	3.6	10.8	0.9
2	13:20	13:30	10	21	15.5	4.7	10.8	0.9
3	13:31	13:41	10	32	16.2	6.0	10.2	1.0
4	13:42	13:52	10	43	15.1	6.1	9.0	1.1
5	13:53	14:03	10	54	16.3	7.2	9.1	1.1
6	14:04	14:14	10	65	15.4	6.8	8.5	1.2

Leachline Percolation Data Sheet

Project: **Valenzuela MHP - 81-550 Hwy 86** Job No.: 07427-01

Test Hole No.: **P-10** Date Excavated: 10/26/99

Depth of Test Hole: 3.3 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Howe Date: 10/27/99 Presoak: Yes

Actual Percolation Tested by: R. Howe Date: 10/27/99

Pipe Stick Up (ft): 0.61 Length of Pipe (ft): 3.92

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	09:55 10:20	25	13.1	0.0	13.1
B	10:50 11:15	25	9.6	0.0	9.6

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	11:41	11:51	10	10	11.4	0.0	11.4	0.9
2	11:52	12:02	10	21	11.0	1.6	9.5	1.1
3	12:03	12:13	10	32	14.0	2.4	11.6	0.9
4	12:14	12:24	10	43	14.3	3.8	10.4	1.0
5	12:25	12:35	10	54	13.7	4.0	9.7	1.0
6	12:36	12:46	10	65	13.6	3.8	9.7	1.0

Appendix B4 – Gutierrez Mobile Home Park

RMC WATER AND ENVIRONMENT
515 SOUTH FLOWER STREET, 36TH FLOOR
LOS ANGELES, CALIFORNIA 90071

SEWAGE DISPOSAL FEASIBILITY AND SOIL PERCOLATION REPORT
PROPOSED MOBILE HOME PARK
80-200 HARRISON STREET
THERMAL, CALIFORNIA

October 14, 2013

File No.: 12180-01
Doc. No.: 13-10-704

Earth Systems
Southwest

79-811B Country Club Drive
Bermuda Dunes, CA 92203
(760) 345-1588
(800) 924-7015
FAX (760) 345-7315

October 14, 2013

File No.: 12180-01
Doc. No. 13-10-704

RMC Water and Environment
515 South Flower Street, 36th Floor
Los Angeles, California 90071

Subject: **Sewage Disposal Feasibility and Soil Percolation Report**

Project: **Proposed Mobile Home Park**
80-200 Harrison Street
Thermal, California

Dear Mr. Bichette:

Earth Systems Southwest (Earth Systems) presents this sewage disposal feasibility and soil percolation report for the proposed Mobile Home Park to be located at 80-200 Harrison Street in Thermal, Riverside County, California. This report presents our findings and recommendations for leach field waste disposal. This report should stand as a whole and no part of the report should be excerpted or used to exclusion of any other part.

This report completes our scope of services in accordance with our agreement (SWP-13-161), dated September 11, 2013. Other services that may be required, such as plan review, are additional services and will be billed according to the Fee Schedule in effect at the time services are provided. Unless requested in writing, the client is responsible for distributing this report to the appropriate governing agency.

We appreciate the opportunity to provide our professional services. Please contact our office if there are any questions or comments concerning this report or its recommendations.

Respectfully submitted,
EARTH SYSTEMS SOUTHWEST

Kevin L. Paul
No. C 70084
No. GE 2930
Exp. 9/30/2014

Kevin L. Paul, PE, GE
Senior Engineer

Perc/rcr/klp/cgj

Distribution: 4/RMC Water and Environment
1/BD File

TABLE OF CONTENTS

Section 1
INTRODUCTION

1.1 Project Description

This sewage disposal feasibility and soil percolation report has been prepared for the proposed Mobile Home Park located at 80-200 Harrison Street in Thermal, California. The Assessor's Parcel Number (APN) is 755-251-010. Nine mobile homes may ultimately be situated on a portion of the site. Septic tanks and leach field waste disposal systems are proposed for this unsewered area. Domestic water comes from a well on the site. The site location is shown on Plate 1 in Appendix A.

1.2 Site Description

The proposed mobile home park is to be developed on a portion of the triangular-shaped parcel that consists of approximately 11 acres. The project is located at 82-200 Harrison Street in Thermal, Riverside County, California. The site location is shown on Plate 1 in Appendix A. The mobile home park site is situated on nearly level ground that drains by onsite infiltration and gentle sheet flow towards a natural drainage course that runs from north to south through the center of the mobile home park. Based upon information provided to us, we have assumed 9 mobile homes (3 bedrooms), laid out as shown on Plate 2. The location of the tests is within the existing mobile home property. The proposed mobile home park area is currently an existing mobile home park.

1.3 Purpose and Scope of Services

The purpose for our services was to evaluate the site soil conditions and to provide professional opinions and recommendations regarding the feasibility for sewer waste disposal on the site. The scope of services included:

- A general reconnaissance of the site.
- Shallow subsurface exploration by drilling two exploratory borings to a depth of 30 feet below existing grades.
- Sixteen percolation tests in the general area of the proposed leach fields.
- An engineering evaluation of the acquired data from the exploration and testing.
- A summary of our findings and recommendations in this written report, including:
    - Discussions on subsurface soil and groundwater conditions.
    - Discussions on soil percolation rate.
    - Recommendations regarding need for septic systems and leach field design criteria.

Not Contained In This Report: Although available through Earth Systems Southwest, the current scope of our services does not include:

- An environmental assessment.
- An investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

Section 2
METHODS OF EXPLORATION

2.1 Field Exploration

Sixteen percolation borings were drilled on September 24, 2013 with an 8-inch hand auger to a depth of approximately 2.5 to 3 feet. Additionally, two deep exploratory borings were drilled to a depth of approximately 30 feet below the existing ground surface to observe soil profiles. The deep exploratory borings were drilled on September 23, 2013 using an 8-inch outside diameter hollow stem auger powered by a Mobile B-61 drill rig. The boring locations are shown on the Boring and Test Location Map, Plate 2, in Appendix A. The locations shown are approximate, established using nearby landmarks. Samples from the borings were collected in a modified California sampler, sealed, and transported to our laboratory.

The final logs of the borings represent our interpretation of the contents of the field logs and review of the samples obtained during the subsurface exploration. The final logs of the percolation and deep borings are included in Table 1 and Appendix A of this report, respectively. The stratification lines represent the approximate boundaries between soil types, although transitions may be gradational.

2.2 Percolation Tests

Sixteen percolation tests were performed on September 26, 2013 in the vicinity of the proposed leach fields as shown on Plate 2. The County was notified prior to conducting our onsite percolation testing (County notification number PR # 1719). The percolation tests were performed in substantial conformance to the County percolation test method for single lots, normal or sandy soil criteria (as applicable), as described in the *Onsite Waste Treatment Systems, Technical Guidance Manual, Version A.* Tests were made across the site in order to evaluate the general percolation rate across the site.

The tests were performed using 8-inch diameter boreholes made to a depth of about 2.5 to 3 feet below existing ground surface. Hole sidewalls were cleared of any smeared material. A 6 inch diameter perforated PVC pipe was installed in the excavated hole to reduce the potential for caving or disturbance from the addition of water. The boreholes had approximately 1 to 2 inches of gravel placed on the sides and bottom of the hole, respectively, to minimize sidewall disturbance and sedimentation. A gravel correction factor was applied to the volume of water percolated. Tests were performed in the typical silty sand and sand soils (Unified Soil Classification System, USCS, soil types SM and SP, respectively). The boreholes were filled with water on September 25, 2013 and presoaked overnight and for approximately ½ hour prior to testing. For testing, successive readings of the drop in water level were made over several 10-minute periods (sandy soil criteria) until a stabilized drop was recorded. Measurements were referenced from demarcations in perforated pipe. The field percolation test results are included in Appendix B and below. Laboratory test results are included in Appendix A.

Table 1

Onsite Seepage Pit Percolation Results

Test Hole	Test Description	Soil Condition	USCS Soil Description	Test Zone Below Existing Grades (feet)	Estimated Basic Percolation Rate (Minutes/Inch)
P-1	8” Drilled Hole	Native	0-2.5’ Silty Sand (SM)	2.5	2.8
P-2	8” Drilled Hole	Native	0-2.5’ Silty Sand (SM)	2.5	3.2
P-3	8” Drilled Hole	Native	0-3’ Poorly Graded Sand (SP)	2-3	0.7
P-4	8” Drilled Hole	Native	0-3’ Poorly Graded Sand (SP)	2-3	0.9
P-5	8” Drilled Hole	Native	0-3’ Poorly Graded Sand (SP)	2-3	0.9
P-6	8” Drilled Hole	Native	0-3’ Poorly Graded Sand (SP)	2-3	0.8
P-7	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0
P-8	8” Drilled Hole	Native	0-3’ Poorly Graded Sand (SP)	2-3	0.7
P-9	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0
P-10	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0
P-11	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0
P-12	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	3.2
P-13	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0
P-14	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0
P-15	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0
P-16	8” Drilled Hole	Native	0-3’ Silty Sand (SM)	2-3	2.0

The test results indicate that the stabilized drop ranges from approximately 0.7 to 3.2 minutes per inch (mpi).

Section 3
DISCUSSION

3.1 Soil Conditions

The field exploration indicates that site soils consist primarily of interbedded sand and silty sand in the shallow leach area. The boring logs provided in Appendix A include detailed descriptions of the soils encountered.

3.2 Groundwater

Groundwater was encountered as perched layers at approximately 22½ to 30 feet. Historic high groundwater level is likely to exist at a depth of about 35 feet below existing grades based upon groundwater level contours (DWR Bulletin 108, 1961). Further historic review estimates groundwater at approximately 20 feet (DWR Bulletin 108, 1949 contours). As such, we estimate that high groundwater levels at the site may be on the order of 20 feet below existing grades based upon the encountered perched conditions. Groundwater levels may fluctuate with precipitation, irrigation, drainage, and site grading. The absence of groundwater may not represent an accurate or permanent condition. The shallow groundwater levels are strongly influenced by surrounding agricultural irrigation and drainage. This semi-perched zone is generally not used as a domestic water supply, nor is it suited for potable use because of its alkalinity, salinity, and dissolved solids content.

3.3 Geologic Setting

The site lies at an elevation of about 130 feet below mean sea level in the lower Coachella Valley, a part of the Colorado Desert geomorphic province. A significant feature within the Colorado Desert geomorphic province is the Salton Trough. The Salton Trough is a large northwest-trending structural depression that extends approximately 180 miles from San Gorgonio Pass to the Gulf of California. Much of this depression in the area of the Salton Sea is below sea level. In the prehistoric past, ancient Lake Cahuilla submerged the lower Coachella Valley.

The Coachella Valley forms the northerly portion of the Salton Trough. The lower Coachella Valley contains a thick sequence of Miocene to Holocene sedimentary deposits. The upper sediments within the lower valley consist of fine-grained sands with interbedded clays and silts that are of lacustrine (lakebed), aeolian (wind-blown), and alluvial (water-deposited) origin.

Geohydrologic Setting: The site lies within the Thermal subbasin of the Coachella Valley groundwater basin. The Thermal subbasin is subdivided into four generalized zones: a semi-perched zone with alternating clay layers to about 100 foot depth, underlain by an upper and lower aquifer, separated by an aquitard layer at least 100 feet thick. Domestic wells in the region derive their water form the lower portion of the upper aquifer and the lower aquifer, generally from about 400 to 1,200 feet deep. The upper semi-perched zone is generally not used as a domestic water supply, nor is it suited for potable use because of its alkalinity, salinity, and dissolved solids content.

Section 4
CONCLUSIONS AND RECOMMENDATIONS

The following is a summary of our conclusions and professional opinions based on the data obtained from the site evaluation.

- The site is feasible for soil percolation and will support leach field and septic tank systems for waste disposal.

- Perched groundwater level was encountered at a depth of 22½ feet.

- Historic high groundwater is anticipated to be on the order of 20 feet below the ground surface.

- The soils encountered have greater than 10% fines smaller than a #200 sieve in a zone at least 5 feet thick above the groundwater table.

- The designed system shall be located in natural undisturbed soil at the depth the tests were performed. Proposed system depths (see attached) correspond to the tested elevations. Leach beds should not be founded deeper than approximately 4 feet below existing grades.

- Based on testing, and the similarity of soil types, the natural occurring body of minerals and organic matter at the proposed wastewater disposal area contains earthen materials having more than 50% of its volume composed of particles smaller than 0.08 inches (2mm) in size.

- There is at least 5 feet of undisturbed soil between the bottom of the tested leach field bottom and anticipated historic high groundwater.

- The percolation test results as described in Section 2.2 and presented in Appendix B indicate that the stabilized drop range is from 0.7 to 3.2 minutes per inch (mpi). Based upon a stabilized rate of 3.2 mpi, conventional leach lines for sanitary waste disposal may be sized using 20 square feet of leaching area per 100 gallons of septic tank capacity (based on design soil percolation rate of 0 to 9 mpi).

- The final design should delineate the area to be set aside and used for 100% expansion.

- Leach lines should be constructed to provide the required leaching trench area. Leach lines should have a maximum length of 100 feet and be separated at least 4 feet (edge-to-edge) from each other. The leach lines should have at least 18 inches of soil cover and have a bottom no more than 36 to 48 inches below existing prevailing grade. All leach field design should follow the Riverside County Onsite Waste Water Treatment Systems Technical Guidance Manual (current version).

- Rapid injection or high volume discharge of effluent may tax the ability of the soils to readily absorb effluent over the short term. System design should consider the effects of increased user use (additional residents per home), incorporate low flow discharge (low flow toilets, shower heads, etc.) and incorporate low flow septic systems which dose the leach field slower.

- Leach fields should be located at least 5 feet from property lines, 8 feet from buildings or covered areas, and 100 feet away from on-site or off property wells. Other separations detailed in *Onsite Waste Treatment Systems, Technical Guidance Manual, Version A* for Riverside County apply and should be referred to in design.

- Maintenance of onsite waste disposal systems can be the most critical element in determining the success of a design. Due to general accessibility limitations which typically exist with drainage systems and infiltration structures, they must be protected clogging of any filter medium, and the near structure soils. The potential for clogging can be reduced by pre-treating structure inflow through the installation of a proper septic tank. In addition, sediment, paper, and debris must be removed from the tank on a regular basis.

- A minimum 15-foot setback should be provided from the stormwater drainage course for septic tanks, leach lines, and leach beds.

- Based on the data presented in this report and using the recommendations set forth, it is the judgment of this professional that there is sufficient area to support a primary and expansion OWTS that will meet the current standards of the Department of Environmental Health and the Regional Water Quality Control Board (RWQCB). Based on the data presented in this report and the testing information accumulated, it is the judgment of this professional that the groundwater table will not encroach within the current allowable limit set forth by County and State requirements (5 feet below the base of the leach field set at no deeper than 3 feet below existing grade).

- This report should be submitted to the Riverside County Department of Environmental Health (RCDEH) for their review and comment. Earth Systems should have the opportunity to review the plan of the septic system and details.

Section 5
LIMITATIONS

Our findings and recommendations in this report are based on selected points of field exploration, percolation testing, and our understanding of the mobile home park. Furthermore, our findings and recommendations are based on the assumption that soil conditions do not vary significantly from those found at specific exploratory locations. Variations in soil or groundwater conditions could exist between and beyond the exploration points.

Findings of this report are valid as of the issued date of the report. However, changes in conditions of a property can occur with passage of time, whether they are from natural processes or works of man, on this or adjoining properties. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or broadening of knowledge. Accordingly, findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of one year.

This report is issued with the understanding that the owner or the owner’s representative has the responsibility to bring the information and recommendations contained herein to the attention of the designer for the septic systems and are incorporated into the plans and specifications. The owner or the owner’s representative also has the responsibility to take the necessary steps to see that the contractor carry out such recommendations in the field. It is further understood that the owner or the owner’s representative is responsible for submittal of this report to the appropriate governing agencies.

Earth Systems has striven to provide our services in accordance with generally accepted geotechnical engineering practices in this locality at this time. No warranty or guarantee, express or implied, is made. This report was prepared for the exclusive use of the Client and the client’s authorized agents.

Earth Systems should be provided the opportunity for a general review of the septic tank and leach field plan in order that our recommendations may be properly interpreted and implemented in the design. If Earth Systems is not accorded the privilege of making this recommended review, we can assume no responsibility for misinterpretation of our recommendations.

Although available through Earth Systems Southwest, the current scope of our services does not include an environmental assessment or an investigation for the presence or absence of wetlands, hazardous or toxic materials in the soil, surface water, groundwater, or air on, below, or adjacent to the subject property.

-o0o-

Appendices as cited are attached and complete this report.

APPENDIX A

Plate 1 – Site Location Map
Plate 2 – Boring & Percolation Test Location Map
Terms and Symbols Used on Boring Logs
Soil Classification System
Logs of Borings
Laboratory Test Results

Reference: Good Earth Satellite Image with Historical Topographic Map Overlay, dated 2011.

LEGEND

Approximate Site Location

Approximate Scale: 1" = 4,000'

0 4,000' 8,000'

N

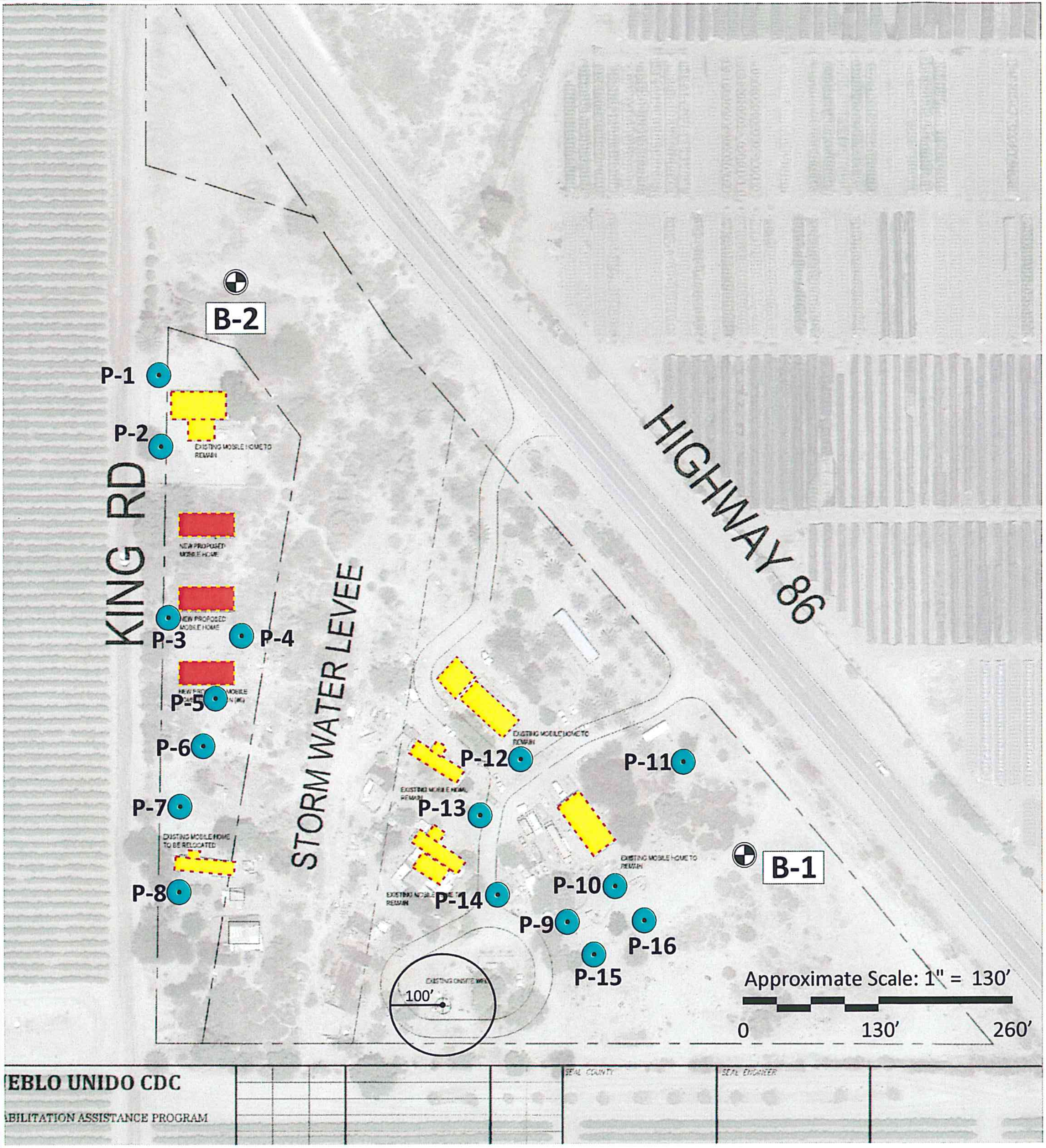
Plate 1
Site Location Map

Proposed Gutierrez Mobile Home Park
80-200 Highway 86
Thermal, Riverside County, California

Earth Systems
Southwest

10/14/2013

File No.: 12180-01



Reference: Google Earth Satellite Image dated 5/27/2012 & Pueblo Unido CDC Index Sheet, dated 9/18/2013.

LEGEND

B-2 ⊕ Approximate Boring Locations

P-16 ● Approximate Percolation Test Locations

🟨 Existing Mobile Home

🟥 Proposed New Mobile Home

N

Plate 2
Boring Location Map

Proposed Gutierrez Mobile Home Park
80-200 Highway 86
Thermal, Riverside County, California

Earth Systems
Southwest

10/14/2013 File No.: 12180-01

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on ASTM Designations D 2487 and D 2488 (Unified Soil Classification System). Information on each boring log is a compilation of subsurface conditions obtained from the field as well as from laboratory testing of selected samples. The indicated boundaries between strata on the boring logs are approximate only and may be transitional.

SOIL GRAIN SIZE

U.S. STANDARD SIEVE

12” 3” 3/4” 4 10 40 200

BOULDERS	COBBLES	GRAVEL		SAND			SILT	CLAY
		COARSE	FINE	COARSE	MEDIUM	FINE		

305 76.2 19.1 4.76 2.00 0.42 0.074 0.002

SOIL GRAIN SIZE IN MILLIMETERS

RELATIVE DENSITY OF GRANULAR SOILS (GRAVELS, SANDS, AND NON-PLASTIC SILTS)

Very Loose	*N=0-4	RD=0-30	Easily push a 1/2-inch reinforcing rod by hand
Loose	N=5-10	RD=30-50	Push a 1/2-inch reinforcing rod by hand
Medium Dense	N=11-30	RD=50-70	Easily drive a 1/2-inch reinforcing rod with hammer
Dense	N=31-50	RD=70-90	Drive a 1/2-inch reinforcing rod 1 foot with difficulty by a hammer
Very Dense	N>50	RD=90-100	Drive a 1/2-inch reinforcing rod a few inches with hammer

*N=Blows per foot in the Standard Penetration Test at 60% theoretical energy. For the 3-inch diameter Modified California sampler, 140-pound weight, multiply the blow count by 0.63 (about 2/3) to estimate N. If automatic hammer is used, multiply a factor of 1.3 to 1.5 to estimate N. RD=Relative Density (%). C=Undrained shear strength (cohesion).

CONSISTENCY OF COHESIVE SOILS (CLAY OR CLAYEY SOILS)

Very Soft	*N=0-1	*C=0-250 psf	Squeezes between fingers
Soft	N=2-4	C=250-500 psf	Easily molded by finger pressure
Medium Stiff	N=5-8	C=500-1000 psf	Molded by strong finger pressure
Stiff	N=9-15	C=1000-2000 psf	Dented by strong finger pressure
Very Stiff	N=16-30	C=2000-4000 psf	Dented slightly by finger pressure
Hard	N>30	C>4000	Dented slightly by a pencil point or thumbnail

MOISTURE DENSITY

Moisture Condition:	An observational term; dry, damp, moist, wet, saturated.
Moisture Content:	The weight of water in a sample divided by the weight of dry soil in the soil sample expressed as a percentage.
Dry Density:	The pounds of dry soil in a cubic foot of soil.

MOISTURE CONDITION

Dry......................Absence of moisture, dusty, dry to the touch
Damp.................Slight indication of moisture
Moist.................Color change with short period of air exposure (granular soil)
Below optimum moisture content (cohesive soil)
Wet....................High degree of saturation by visual and touch (granular soil)
Above optimum moisture content (cohesive soil)
Saturated..........Free surface water

PLASTICITY

DESCRIPTION	FIELD TEST
Nonplastic	A 1/8 in. (3-mm) thread cannot be rolled at any moisture content.
Low	The thread can barely be rolled.
Medium	The thread is easy to roll and not much time is required to reach the plastic limit.
High	The thread can be rerolled several times after reaching the plastic limit.

GROUNDWATER LEVEL

▼	Water Level (measured or after drilling)
▽	Water Level (during drilling)

RELATIVE PROPORTIONS

Trace.............minor amount (<5%)
with/some......significant amount
modifier/and...sufficient amount to influence material behavior (Typically >30%)

LOG KEY SYMBOLS

▮	Bulk, Bag or Grab Sample
▯	Standard Penetration Split Spoon Sampler (2” outside diameter)
▮	Modified California Sample (3” outside diameter)
◩	No Recovery

Terms and Symbols used on Boring Logs

Earth Systems
Southwest

MAJOR DIVISIONS			GRAPHIC SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS More than 50% of material is larger than No. 200 sieve size	GRAVEL AND GRAVELLY SOILS More than 50% of coarse fraction retained on No. 4 sieve	CLEAN GRAVELS	⁘	GW	Well-graded gravels, grand-sand mixtures, little or no fine
			▩	GP	Poorly-graded gravels, gravel-sand mixtures. Little or no fines
		GRAVELS WITH FINES	▥	GM	Silty gravels, gravel-sand-silt mixtures
			▩	GC	Clayey gravels, gravel-sand-clay mixtures
	SAND AND SANDY SOILS More than 50% of coarse fraction passing No. 4 sieve	CLEAN SAND (Little or no fines)	⁘	SW	Well-graded sands, gravelly sands, little or no fines
			░	SP	Poorly-graded sands, gravelly sands, little or no fines
		SAND WITH FINES (appreciable amount of fines)	▦	SM	Silty sands, sand-silt mixtures
			▨	SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS More than 50% of material is smaller than No. 200 sieve size	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	▥	ML	Inorganic silts and very fine sands, rock flour, silty low clayey fine sands or clayey silts with slight plasticity
			▨	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
			▥	OL	Organic silts and organic silty clays of low plasticity
		LIQUID LIMIT GREATER THAN 50	▥	MH	Inorganic silty, micaceous, or diatomaceous fine sand or silty soils
			▧	CH	Inorganic clays of high plasticity, fat clays
			▨	OH	Organic clays of medium to high plasticity, organic silts
HIGHLY ORGANIC SOILS			▩	PT	Peat, humus, swamp soils with high organic contents
VARIOUS SOILS AND MAN MADE MATERIALS			▦		Fill Materials
MAN MADE MATERIALS			■		Asphalt and concrete

Soil Classification System

Earth Systems
Southwest

Earth Systems
Southwest

79-811B Country Club Drive, Bermuda Dunes, CA 92201
Phone (760) 345-1588 Fax (760) 345-7315

Boring No. B-1
Project Name: Gutierrez Mobile Home Park
Project Number: 12180-01
Boring Location: See Plate 2

Drilling Date: September 23, 2013
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobile B61 HDX w/Autohammer
Logged By: Randy Reed

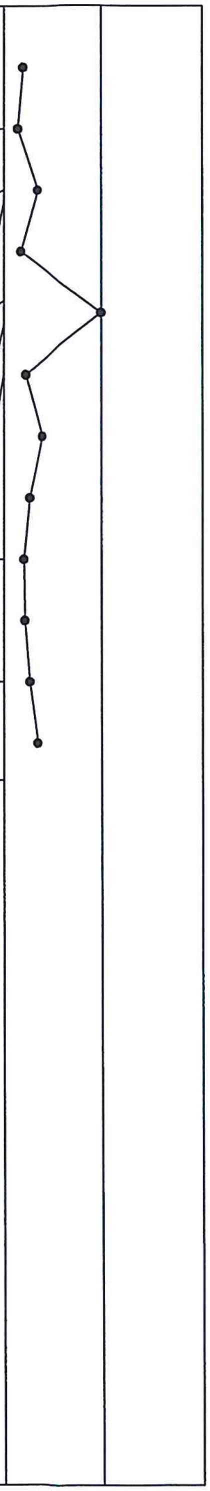
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type: Bulk	Sample Type: SPT	Sample Type: MOD Calif.	Penetration Resistance (Blows/6")	Symbol	USCS/Bedrock	Dry Density (pcf)	Moisture Content (%)	Description of Units
0						SP			POORLY GRADED SAND: gray, medium dense, dry, fine to coarse grained sand
			■	6, 8, 11			114	1	
5			■	5, 6, 8		SP-SM	110	2	POORLY GRADED SAND WITH SILT: gray, medium dense, damp, fine to medium grained sand
			■	6, 17, 17		SP	111	5	POORLY GRADED SAND: gray, medium dense, damp, fine to coarse grained sand, cobbles
10			■	6, 8, 9		ML	108	3	SANDY SILT: brown, stiff, damp, fine to medium grained sand
			■	50/6"		SP	98	3	POORLY GRADED SAND: gray, very dense, damp, fine to coarse grained sand, gravel, cobbles
15			■	8, 11, 11		SP-SM	98	1	POORLY GRADED SAND WITH SILT: brown, very dense, damp, fine to medium grained sand
						SP			POORLY GRADED SAND: gray, medium dense, moist, fine to coarse grained sand
			■	13, 19, 20			113	2	
20			■	10, 13, 13			114	5	
▼			■	6, 7, 13		ML	107	18	SANDY SILT WITH CLAY: brown, stiff, wet, fine grained sand, cohesive
25			■	6, 10, 11			107	19	
									gravel
			■	9, 12, 14		SM	86	22	SILTY SAND: brown, medium dense, wet, fine to medium grained sand
30			■	12, 17, 17			110	19	
35									
40									
45									
50									
55									
60									

Graphic Trend
Blow Count Dry Density



Total Depth 31 1/2 feet
Groundwater Encountered at 22 1/2 feet
No Refusal, Backfilled w/cuttings

Boring No. B-2

Project Name: Gutierrez Mobile Home Park
Project Number: 12180-01
Boring Location: See Plate 2

Drilling Date: September 23, 2013
Drilling Method: 8" Hollow Stem Auger
Drill Type: Mobile B61 HDX w/Autohammer
Logged By: Randy Reed

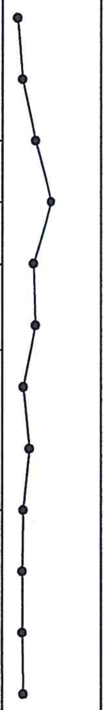
Page 1 of 1

Description of Units

Note: The stratification lines shown represent the approximate boundary between soil and/or rock types and the transition may be gradational.

Depth (Ft.)	Sample Type (Bulk / SPT / MOD Calif.)	Penetration Resistance (Blows/6")	USCS/Bedrock	Dry Density (pcf)	Moisture Content (%)	Description of Units
0			SM			SILTY SAND: gray, medium dense, damp, fine grained sand
	■	4, 6, 9		89	2	
5	⧄	7, 9, 11				No Recovery
	■	6, 15, 18	ML	102	4	SANDY SILT: gray, medium dense, damp, fine grained sand
10	■	13, 50/6"	SP	126	1	POORLY GRADED SAND: gray, medium dense, damp, fine to coarse grained sand
	■	9, 12, 19	ML	103	6	SANDY SILT: gray, stiff, damp, fine grained sand
15	■	9, 13, 20		101	2	
			SP			POORLY GRADED SAND: gray, medium dense, damp, fine to medium grained sand
	■	8, 7, 14		104	2	
20	■	8, 11, 16		110	3	
	■	6, 10, 11	SM	107	18	SILTY SAND: brown, medium dense, wet, fine grained sand
25	■	7, 10, 10		112	14	
	■	8, 10, 10		107	20	
30	■	9, 10, 11		108	16	

Graphic Trend
Blow Count Dry Density



Total Depth 31 1/2 feet
Groundwater Encountered at 22 1/2 feet
No Refusal, Backfilled w/cuttings

File No.: 12180-01 October 14, 2013

Lab No.: 13-296

UNIT DENSITIES AND MOISTURE CONTENT ASTM D2937-04 & D2216-05

Job Name: Proposed Gutierrez Mobile Home Park

Sample Location	Depth (feet)	Unit Dry Density (pcf)	Moisture Content (%)	USCS Group Symbol
B1	2.5	114	1	SP
B1	5	110	2	SP-SM
B1	7.5	111	5	SP/ML
B1	10	108	3	ML
B1	12.5	98	3	SP-SM
B1	15	98	1	SP
B1	17.5	113	2	SP
B1	20	114	5	SP
B1	22.5	107	18	ML
B1	25	107	19	ML
B1	27.5	86	22	SM
B1	30	110	19	SM
B2	2.5	89	2	SM
B2	7.5	102	4	ML
B2	10	126	1	SP
B2	12.5	103	6	ML
B2	15	101	2	SP
B2	17.5	104	2	SP
B2	20	110	3	SP
B2	22.5	107	18	SM
B2	25	112	14	SM
B2	27.5	107	20	SM
B2	30	108	16	SM

File No.: 12180-01 10/14/2013

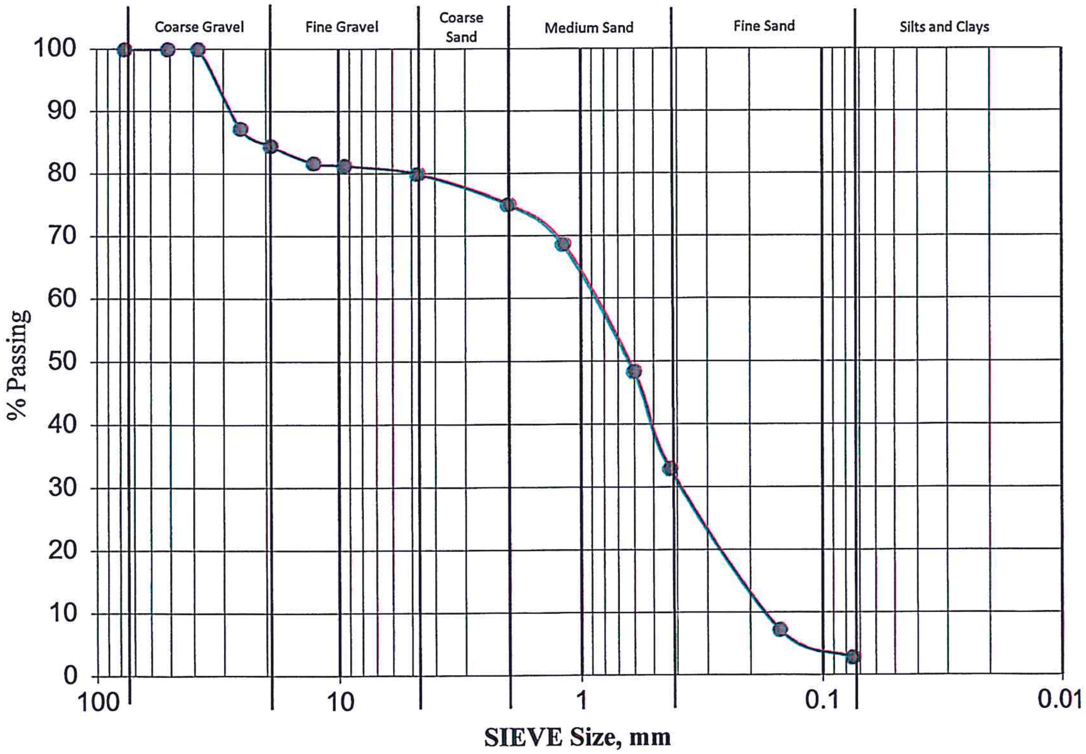
Lab No.: 13-296

SIEVE ANALYSIS

ASTM D6913-09

Job Name: Proposed Gutierrez Mobile Home Park
Sample ID: B1 @ 15 feet
Description: Poorly Graded Sand w/Gravel (SP)

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	87
3/4"	84
1/2"	82
3/8"	81
#4	80
#10	75
#16	69
#30	48
#40	33
#100	7
#200	2.9



% Coarse Gravel:	16	% Coarse Sand:	5				
% Fine Gravel:	5	% Medium Sand:	42	Cu:	0.6		
		% Fine Sand:	30	Cc:	0.11	Gradation	
% Total Gravel	20	% Total Sand	77	% Fines:	3	Poorly Graded	

File No.: 12180-01 10/14/2013

Lab No.: 13-296

SIEVE ANALYSIS

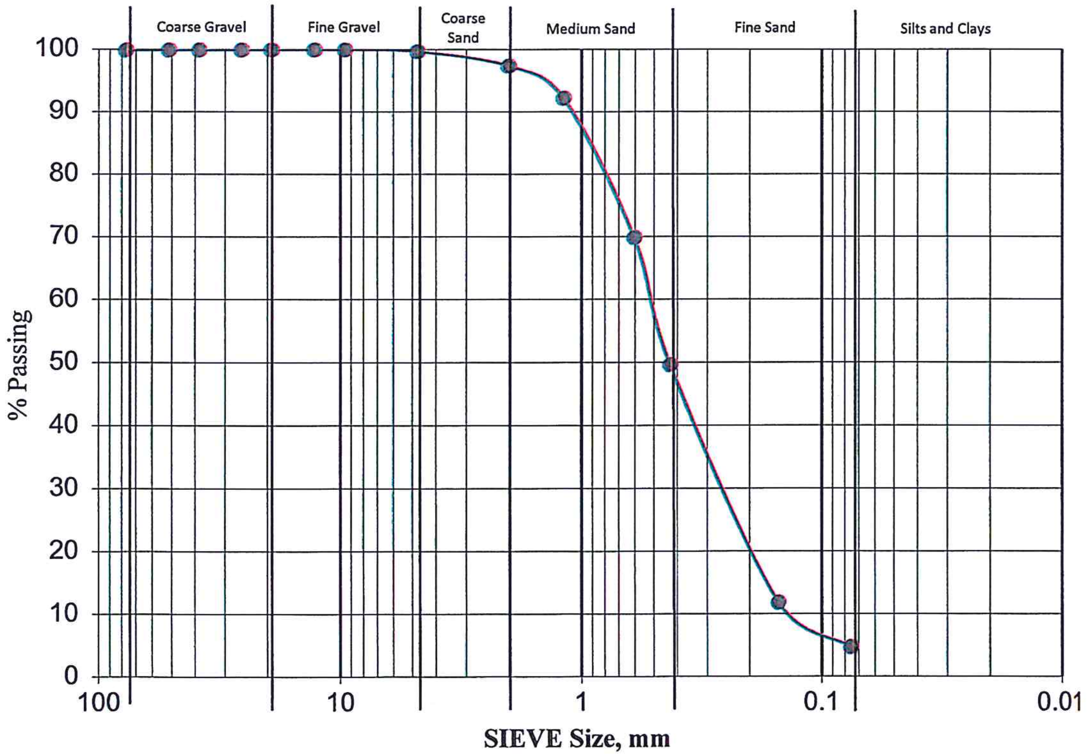
ASTM D6913-09

Job Name: Proposed Gutierrez Mobile Home Park

Sample ID: B2 @ 17 1/2 feet

Description: Poorly Graded Sand (SP)

Sieve Size	% Passing
3"	100
2"	100
1-1/2"	100
1"	100
3/4"	100
1/2"	100
3/8"	100
#4	100
#10	97
#16	92
#30	70
#40	50
#100	12
#200	4.9



% Coarse Gravel:	0	% Coarse Sand:	2				
% Fine Gravel:	0	% Medium Sand:	48	Cu:	0.38		
		% Fine Sand:	45	Cc:	0.09	Gradation	
% Total Gravel	0	% Total Sand	95	% Fines:	5	Poorly Graded	

APPENDIX B

Percolation Test Results

Leachline Percolation Data Sheet

Project: **Guitierrez**
Job No.: 12180-01
Test Hole No.: **P-1**
Date Excavated: 9/24/2013
Depth of Test Hole: 2.5 feet below grade
Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Reed
Date: 9/25/2013
Presoak: Yes
Actual Percolation Tested by: R. Reed
Date: 9/26/2013
Pipe Stick Up (ft): 0.00
Length of Pipe (ft): 2.50

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:00 07:25	25	7.0	0.0	7.0
B	07:25 07:50	25	7.0	0.0	7.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	08:20	08:30	10	10	21.0	12.5	8.5	1.6
2	08:30	08:40	10	20	12.5	6.8	5.8	2.4
3	08:40	08:50	10	30	12.8	8.3	4.5	3.0
4	08:50	09:00	10	40	21.0	13.0	8.0	1.7
5	09:00	09:10	10	50	13.0	9.0	4.0	3.4
6	09:10	09:20	10	60	9.0	6.3	2.8	5.0

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01
Test Hole No.: **P-2** Date Excavated: 9/24/2013
Depth of Test Hole: 2.5 feet below grade Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes
Actual Percolation Tested by: R. Reed Date: 9/26/2013
Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.50

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:01 07:26	25	7.0	0.0	7.0
B	07:27 07:52	25	7.0	0.0	7.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	08:25	08:35	10	10	22.5	12.3	10.3	1.3
2	08:35	08:45	10	20	12.3	7.0	5.3	2.6
3	08:45	08:55	10	30	24.5	14.0	10.5	1.3
4	08:55	09:05	10	40	14.0	10.0	4.0	3.4
5	09:05	09:15	10	50	16.0	11.5	4.5	3.0
6	09:15	09:25	10	60	11.5	7.3	4.3	3.2

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01
Test Hole No.: **P-3** Date Excavated: 9/24/2013
Depth of Test Hole: 3.0 feet below grade Soil Classification: Sand (SP)
Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes
Actual Percolation Tested by: R. Reed Date: 9/26/2013
Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:20 07:45	25	6.0	0.0	6.0
B	07:45 08:10	25	7.5	0.0	7.5

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	09:40	09:50	10	10	18.5	0.0	18.5	0.7
2	09:50	10:00	10	20	20.0	0.0	20.0	0.7
3	10:00	10:10	10	30	20.0	0.0	20.0	0.7
4	10:10	10:20	10	40	21.0	0.0	21.0	0.7
5	10:20	10:30	10	50	21.0	0.0	21.0	0.7
6	10:30	10:40	10	60	21.0	0.0	21.0	0.7

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01
Test Hole No.: **P-4** Date Excavated: 9/24/2013
Depth of Test Hole: 3.0 feet below grade Soil Classification: Sand (SP)
Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes
Actual Percolation Tested by: R. Reed Date: 9/26/2013
Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:23 07:48	25	7.0	0.0	7.0
B	07:48 08:13	25	7.0	0.0	7.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	11:01	11:11	10	10	16.0	0.0	16.0	0.9
2	11:11	11:21	10	20	16.0	0.0	16.0	0.9
3	11:21	11:31	10	30	16.0	0.0	16.0	0.9
4	11:31	11:41	10	40	16.0	0.0	16.0	0.9
5	11:41	11:51	10	50	16.0	0.0	16.0	0.9
6	11:51	12:01	10	60	16.0	0.0	16.0	0.9

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-5** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Sand (SP)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:31 07:56	25	6.3	0.0	6.3
B	07:56 08:21	25	7.0	0.0	7.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	11:02	11:12	10	10	15.0	0.0	15.0	0.9
2	11:12	11:22	10	20	17.0	0.0	17.0	0.8
3	11:22	11:32	10	30	16.0	0.0	16.0	0.9
4	11:32	11:42	10	40	16.0	0.0	16.0	0.9
5	11:42	11:52	10	50	16.0	0.0	16.0	0.9
6	11:52	12:02	10	60	16.0	0.0	16.0	0.9

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-6** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Sand (SP)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:34 07:59	25	7.0	0.0	7.0
B	07:59 08:24	25	7.0	0.0	7.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	11:04	11:14	10	10	16.0	0.0	16.0	0.9
2	11:14	11:24	10	20	18.0	0.0	18.0	0.8
3	11:24	11:34	10	30	18.0	0.0	18.0	0.8
4	11:34	11:44	10	40	18.0	0.0	18.0	0.8
5	11:44	11:54	10	50	18.0	0.0	18.0	0.8
6	11:54	12:04	10	60	18.0	0.0	18.0	0.8

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01
Test Hole No.: **P-7** Date Excavated: 9/24/2013
Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes
Actual Percolation Tested by: R. Reed Date: 9/26/2013
Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:36 08:01	25	6.5	0.0	6.5
B	08:01 08:26	25	7.0	0.0	7.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time Start of Reading	Time End of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
1	11:55	12:05	10	10	18.0	4.3	13.8	1.0
2	12:05	12:15	10	20	20.0	8.0	12.0	1.1
3	12:15	12:25	10	30	19.0	8.5	10.5	1.3
4	12:25	12:35	10	40	13.0	6.0	7.0	2.0
5	12:35	12:45	10	50	17.0	7.5	9.5	1.4
6	12:45	12:55	10	60	19.0	12.0	7.0	2.0

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01
Test Hole No.: **P-8** Date Excavated: 9/24/2013
Depth of Test Hole: 3.0 feet below grade Soil Classification: Sand (SP)
Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes
Actual Percolation Tested by: R. Reed Date: 9/26/2013
Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	07:40 08:05	25	6.5	0.0	6.5
B	08:05 08:30	25	7.0	0.0	7.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	12:00	12:10	10	10	14.0	0.0	14.0	1.0
2	12:10	12:20	10	20	19.0	0.0	19.0	0.7
3	12:20	12:30	10	30	19.0	0.0	19.0	0.7
4	12:30	12:40	10	40	19.0	0.0	19.0	0.7
5	12:40	12:50	10	50	19.0	0.0	19.0	0.7
6	12:50	13:00	10	60	19.0	0.0	19.0	0.7

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01
Test Hole No.: **P-9** Date Excavated: 9/24/2013
Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)
Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes
Actual Percolation Tested by: R. Reed Date: 9/26/2013
Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	12:57 13:22	25	10.0	0.0	10.0
B	13:23 13:48	25	10.0	0.0	10.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	14:05	14:15	10	10	7.0	0.0	7.0	2.0
2	14:15	14:25	10	20	7.0	0.0	7.0	2.0
3	14:25	14:35	10	30	7.0	0.0	7.0	2.0
4	14:35	14:45	10	40	7.0	0.0	7.0	2.0
5	14:45	14:55	10	50	7.0	0.0	7.0	2.0
6	14:55	15:05	10	60	7.0	0.0	7.0	2.0

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-10** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	13:00 13:25	25	21.0	0.0	21.0
B	13:25 13:50	25	21.0	0.0	21.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	14:05	14:15	10	10	14.0	0.0	14.0	1.0
2	14:15	14:25	10	20	7.0	0.0	7.0	2.0
3	14:25	14:35	10	30	7.0	0.0	7.0	2.0
4	14:35	14:45	10	40	7.0	0.0	7.0	2.0
5	14:45	14:55	10	50	7.0	0.0	7.0	2.0
6	14:55	15:05	10	60	7.0	0.0	7.0	2.0

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-11** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	13:01 13:26	25	21.0	0.0	21.0
B	13:27 13:52	25	21.0	0.0	21.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	15:13	15:23	10	10	7.0	0.0	7.0	2.0
2	15:23	15:33	10	20	7.0	0.0	7.0	2.0
3	15:33	15:43	10	30	7.0	0.0	7.0	2.0
4	15:43	15:53	10	40	7.0	0.0	7.0	2.0
5	15:53	16:03	10	50	7.0	0.0	7.0	2.0
6	16:03	16:13	10	60	7.0	0.0	7.0	2.0

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-12** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	13:03 13:28	25	21.0	0.0	21.0
B	13:29 13:54	25	21.0	0.0	21.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	15:20	15:30	10	10	7.0	0.0	7.0	2.0
2	15:30	15:40	10	20	7.0	0.0	7.0	2.0
3	15:40	15:50	10	30	7.0	0.0	7.0	2.0
4	15:50	16:00	10	40	7.0	0.0	7.0	2.0
5	16:00	16:10	10	50	7.0	0.0	7.0	2.0
6	16:10	16:20	10	60	7.0	2.8	4.3	3.2

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-13** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	13:05 13:23	18	21.0	0.0	21.0
B	13:31 13:56	25	21.0	0.0	21.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	15:22	15:32	10	10	7.0	0.0	7.0	2.0
2	15:32	15:42	10	20	7.0	0.0	7.0	2.0
3	15:42	15:52	10	30	7.0	0.0	7.0	2.0
4	15:52	16:02	10	40	7.0	0.0	7.0	2.0
5	16:02	16:12	10	50	7.0	0.0	7.0	2.0
6	16:12	16:22	10	60	7.0	0.0	7.0	2.0

Earth Systems Southwest

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-14** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	13:07 13:32	25	21.0	0.0	21.0
B	13:33 13:58	25	21.0	0.0	21.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time Start of Reading	Time End of Reading	Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
1	15:24	15:34	10	10	7.0	0.0	7.0	2.0
2	15:34	15:44	10	20	7.0	0.0	7.0	2.0
3	15:44	15:54	10	30	7.0	0.0	7.0	2.0
4	15:54	16:04	10	40	7.0	0.0	7.0	2.0
5	16:04	16:14	10	50	7.0	0.0	7.0	2.0
6	16:14	16:24	10	60	7.0	0.0	7.0	2.0

Leachline Percolation Data Sheet

Project: **Guitierrez**

Job No.: 12180-01

Test Hole No.: **P-15**

Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade

Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Reed

Date: 9/25/2013

Presoak: Yes

Actual Percolation Tested by: R. Reed

Date: 9/26/2013

Pipe Stick Up (ft): 0.00

Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	13:11 13:33	22	9.0	0.0	9.0
B	13:34 13:59	25	9.0	0.0	9.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	14:09	14:19	10	10	7.0	0.0	7.0	2.0
2	14:19	14:29	10	20	7.0	0.0	7.0	2.0
3	14:29	14:39	10	30	7.0	0.0	7.0	2.0
4	14:39	14:49	10	40	7.0	0.0	7.0	2.0
5	14:49	14:59	10	50	7.0	0.0	7.0	2.0
6	14:59	15:09	10	60	7.0	0.0	7.0	2.0

Leachline Percolation Data Sheet

Project: **Guitierrez** Job No.: 12180-01

Test Hole No.: **P-16** Date Excavated: 9/24/2013

Depth of Test Hole: 3.0 feet below grade Soil Classification: Silty Sand (SM)

Check for Sandy Soil Criteria Tested by: R. Reed Date: 9/25/2013 Presoak: Yes

Actual Percolation Tested by: R. Reed Date: 9/26/2013

Pipe Stick Up (ft): 0.00 Length of Pipe (ft): 2.00

SANDY SOIL CRITERIA TEST

Trial No	Time of Reading	Time Interval (min.)	Initial Water Level (in.)	Final Water Level (in.)	Change in Water Level (in.)
A	13:22 13:47	25	17.0	0.0	17.0
B	13:48 14:00	12	17.0	0.0	17.0

Gravel Factor 0.73

Use Normal or [✓ Sandy] (Circle One) Soil Criteria

Reading No.	Time		Time Interval (min.)	Total Elapsed Time (min.)	Initial Water Level (inches)	Final Water Level (inches)	Change in Water Level (inches)	Corrected Percolation Rate (min./inch)
	Start of Reading	End of Reading						
1	14:11	14:21	10	10	10.0	0.0	10.0	1.4
2	14:21	14:31	10	20	7.0	0.0	7.0	2.0
3	14:31	14:41	10	30	7.0	0.0	7.0	2.0
4	14:41	14:51	10	40	7.0	0.0	7.0	2.0
5	14:51	15:01	10	50	7.0	0.0	7.0	2.0
6	15:01	15:11	10	60	7.0	0.0	7.0	2.0

Appendix C – Work Plan for the Coachella Valley Septic Rehabilitation Program

Coachella Valley Integrated Regional Water Management Program

Disadvantaged Community Outreach Demonstration Project

Regional Program for Septic Rehabilitation Work Plan

Prepared by:

RMC
Water and Environment

February 2014

1 Introduction

The Coachella Valley Regional Water Management Group (CVRWMG) – comprising Coachella Valley Water District (CVWD), Coachella Water Authority (CWA), Desert Water Agency (DWA), Indio Water Authority (IWA), and Mission Springs Water District (MSWD) – are updating the 2010 Coachella Valley Integrated Regional Water Management (IRWM) Plan. As part of this update, a concerted effort was made to improve the region's understanding of the issues and needs of disadvantaged communities (DACs) in the Coachella Valley IRWM Region. Through a grant from the California Department of Water Resources (DWR), the CVRWMG developed a Disadvantaged Community Outreach Demonstration Program (DAC Outreach Program), the goal of which is to develop and implement methods to improve DAC participation in the Coachella Valley IRWM planning process. Through this process, and with the input of local non-profit organizations with existing relationships with local DACs, the DAC Outreach Program identified potential projects that could be implemented to directly benefit DACs and address high priority water-related issues in DACs. Some of these projects were selected as example projects to be further developed, and to serve as an example for how similar projects might work. Templates and sample documents were created for many of the deliverables, and the DAC Outreach Program report contains a summary of the lessons learned and analysis of which strategies were effective and which strategies may not be as effective in moving DAC projects forward.

One of these projects that was identified and expanded was onsite wastewater treatment system (OWTS) rehabilitation or replacement. Aging or failing OWTSs in the shallow aquifer (particularly in the eastern Coachella Valley) have been cited as a serious public health concern and a potential source of local water contamination from bacteria and nitrates. This Work Plan is included in the *Regional Program for Septic System Rehabilitation Report* as Appendix C.

1.1 Project Purpose

The purpose of the Regional Program for Septic System Rehabilitation is to address a critical water quality issue facing Coachella Valley DACs. Stakeholders in the Region have noted that failing OWTSs may not be properly designed and therefore fail because they are not able to handle the volume of wastewater produced by residents. Stakeholders also noted that regular and proper maintenance may not occur due to various financial and technical capacity reasons. Many areas with suspected or identified failing OWTSs are located in remote areas, far from existing sewer service connections. These communities may also be outside the service area of local wastewater agencies. To address these issues, a local non-profit organization with extensive experience with DACs in the Coachella Valley, Pueblo Unido Community Development Corporation (PUCDC), supported development of this program. All decisions related to this program were vetted through PUCDC for technical and financial feasibility within the constraints of a typical Coachella Valley DAC.

1.2 Background

OWTSs can be a reliable and sanitary method for treating and disposing of wastewater, provided that systems are appropriately designed and maintained. Due to the large number of OWTSs throughout the Coachella Valley, it is possible that OWTS rehabilitation or replacement projects could provide a significant positive impact to the community by:

1. Assessing current issues with failing OWTS (determine why they are failing), and
2. Implementing actions necessary to resolve OWTS issues – replacing, rehabilitating, or performing maintenance on the systems, based on identified issues.

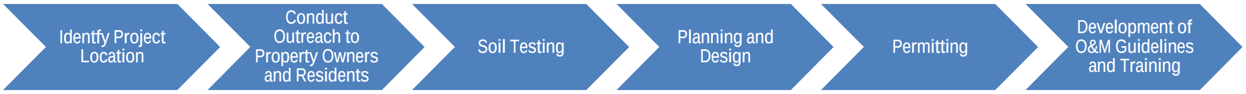
OWTS rehabilitation and replacement projects are optimal in areas that are located at far distances from municipal sewer systems, and in communities where connecting to the municipal sewer system may be too costly due to collection system expansion into remote areas. As a result of feedback from the non-profit partners hired to work on the DAC Outreach Program, it was recommended that a rehabilitation program for OWTSs should target small mobile home parks in the eastern Coachella Valley.

1.3 Work Plan for the Coachella Valley Septic Rehabilitation Program

This work plan is intended to provide a framework for local agencies and non-governmental organizations (NGOs) who are interested in implementing onsite wastewater treatment system (OWTS) improvement projects similar to the Septic Rehabilitation Program (these implementing groups are collectively referred to as project proponents). This work plan is a supporting document to the Septic Rehabilitation Program; background information about OWTS and issues associated with OWTS should be obtained from the larger Septic Rehabilitation Program document.

OWTS improvement projects will help protect disadvantaged communities from potential public health concerns by improving OWTS performance and potentially protecting surface and groundwater quality. The following sections (tasks) of the work plan provide a step-by-step outline for projects that are similar to the Septic System Rehabilitation Project. A flow chart of the activities required for OWTS rehabilitation project implementation is shown in **Figure 1** and explained in the following sections.

Figure 1: Flow Chart for OWTS Rehabilitation Implementation



1.4 Using the Work Plan

This work plan was developed in support of the *Regional Program for Septic System Rehabilitation*. It provides a template that can be used to apply for IRWM funding opportunities by laying out the different tasks necessary to identify potential project areas, gain stakeholder support, determine the most appropriate type of OWTS for each site, develop training materials designed to enable residents to properly operate and maintain their system, as well as provides information on how to design projects, what permitting requirements may need to be considered. This work plan has been included as Appendix C of the *Regional Program for Septic System Rehabilitation* report. While the work plan is written specific to the Coachella Valley's septic system rehabilitation project, it is also designed to act as guidance and a template for other regions considering similar projects, and written for a program that is regional in nature. Text in **[bold brackets]** indicates text that should be changed to fit the individual project or that provides guidance on what sort of information may be required. It is anticipated that this template can be used for future IRWM funding opportunities, and with this is mind, was written to meet the requirements of DWR's 2012 Proposition 84 Implementation Grant – Round 2 Guidelines, with the expectation that requirements will either remain similar in future rounds or that the information contained herein will be easily translated into new funding opportunity applications. The content of this work plan should be modified to fit the criteria of the targeted grant opportunity.

2 Work Plan for the *Regional Program for Septic System Rehabilitation* project

2.1 Introduction

2.1.1 Project Sponsor

The Regional Program for Septic System Rehabilitation is sponsored by **[Project Sponsor]**.

2.1.2 Project Need

The Coachella Valley IRWM Region **[Region or Project Area]** is located within the Region 7 (Colorado River Basin) of the California Regional Water Quality Control Board (RWQCB). The RWQCB's *Water Quality Control Plan for the Colorado River Basin* (Basin Plan) set water quality objectives for the region and laid out strategies for achieving those objectives. The Basin Plan notes Septic System Impacts to Groundwater Basins as a critical issue in the region, and that improperly designed, maintaining, or otherwise damaged or failing septic systems have the potential to negatively impact groundwater.

Groundwater is the primary source of water in the Coachella Valley IRWM Region, and provides potable water, agricultural irrigation water, and in parts of the valley hot water that fuels the spa and tourism industry. Most of the development in the Valley is concentrated along the Whitewater River (and associated stormwater channel), along the floor of the Valley. For communities outside the established cities, it can be challenging to connect to existing municipal systems. These communities often rely on groundwater they pump themselves, and septic systems for wastewater disposal. They are often relatively remote communities that lack the monetary and technical capacity to ensure that these septic systems are adequate for their needs and remain protective of the groundwater on which they and the rest of the Region are dependent.

Adequate wastewater disposal was identified as a critical issue in disadvantaged communities (DACs) in the Region. Disadvantaged communities are those earning 80% or less of the statewide Median Household Income (MHI). In **[year]**, DACs were those communities with an MHI of **[DAC MHI]** or less. The DACs targeted by this project are considered Polanco Mobile Home Parks. These are small mobile home parks of up to 14 units, and approximately 200 such communities exist in the eastern Coachella Valley. Of these 200 communities, only about 50 are considered permitted Polanco Parks, having received a Conditional Use Permit (CUP) from the County of Riverside. Clearances from Environmental Health, Fire, and Building and Safety departments are required prior to the issue of a CUP, which can be hindered by existing OWTSs, which are often not constructed in accordance with regulatory ordinances. Most unpermitted Polanco Parks do not have the engineering and economic resources to bring their existing OWTSs into compliance, and are therefore unable to become permitted.

2.1.3 Project Purpose

The purpose of the *Regional Program for Septic System Rehabilitation* **[Project title]** project is to address the critical wastewater and public health issues of DACs unable to connect to municipal sewer systems by replacing faulty or inadequate on-site wastewater treatment systems (OWTSs). It will also serve to protect groundwater and local surface water from contamination from poorly designed, sited, or maintained OWTSs.

2.1.4 Project Objectives

The *Regional Program for Septic System Rehabilitation* **[Project title]** includes the following project objectives:

- Identify areas with OWTS failure

- Assess current issues with failing OWTSs and determine why they are failing
- Replace, rehabilitate, or perform maintenance on failing OWTSs to address the identified issues
- Reduce public health threat from inadequate or failing OWTSs
- Create a sustainable use of OWTSs by empowering residents and property owners through training to maintain and operate their OWTSs to ensure proper continued use of their systems

The project is consistent with the 2014 Coachella Valley IRWM Plan Volume I**[appropriate plan]**, and will contribute towards achieving six **[number]** objectives of the 2014 Coachella Valley IRWM Plan Volume I **[appropriate plan]**. **[Table X]** provides an overview of the 2014 Coachella Valley IRWM Plan Volume I objectives that are expected to be indirectly (○) or directly (●) achieved through implementation of the *Regional Program for Septic System Rehabilitation* **[project title]**.

Table X: Contribution to 2014 Coachella Valley IRWM Plan Volume I Objectives

Proposal Projects	Contribution to 2014 Coachella Valley IRWM Plan Volume I Objectives												
	A	B	C	D	E	F	G	H	I	J	K	L	M
Regional Program for Septic System Rehabilitation **[Project title]**	○				●	○				●	○	●	

● = directly related; ○ = indirectly related

This project contributes to the 2014 Coachella Valley IRWM Plan Volume I objectives in the following ways:

Objective A – Provide reliable water supply. The program will help to provide a reliable water supply by reducing contamination risks to groundwater, the primary water supply source throughout the Region.

Objective E – Protect groundwater quality and improve where feasible. The project targets failing or damaged OWTSs that have the potential to negatively impact groundwater quality. By replacing these with properly designed, sited, and providing training on proper maintenance and operation, the risks to groundwater from septic systems are minimized to become negligible.

Objective F – Preserve and improve surface water quality. Some damaged or failing OWTSs that will be replaced as part of the project may be at risk of failure during storm events, or otherwise have wastewater conveyed by runoff to surface waters. Properly sited and designed septic systems do not allow wastewater to contaminate surface water, and conversion to these systems will protect surface water from contamination from OWTSs.

Objective J – Maximize stakeholder involvement. This project will involve training residents receiving new or rehabilitated septic systems on proper operation and maintenance of the system. This empowers residents to understand and address their wastewater needs, and engages them in the project, helping to ensure long-term success.

Objective K – Address water-related needs of local Native American culture. The project has the potential to address water-related needs of local Native American peoples if a tribal DAC chooses to participate in the program. It also will serve to protect groundwater quality, a documented concern of local tribes.

Objective L – Address water and sanitation needs of DACs. This project directly addresses water and sanitation needs of DACs by removing failing OWTSs that pose risks of potential unsanitary conditions. Potential nitrate and pathogen contaminations of the shallow aquifer will be eliminated via replacement and rehabilitation of septic systems in DACs.

2.1.5 Project Partners

The **[Project sponsor]** is the primary project sponsor for the *Regional Program for Septic System Rehabilitation* **[Project title]** project. **[Project sponsor]** has partnered with **[list project proponents]** to implement the project. **[add information on why project proponents are appropriate for the project – their interest in its success, etc.]**.

2.1.6 Project Abstract

[use project abstract from throughout grant application] The *Regional Program for Septic System Rehabilitation* **[Project title]** project will replace **[rehabilitate, or perform maintenance on]** failing on-site wastewater treatment systems (OWTSs) in disadvantaged communities (DACs) in the Coachella Valley **[Project area/Region]**. The DACs identified as having failing systems fall outside the current service areas of the Region's wastewater agencies, or are located too far from existing sewer systems to make connection to sewers feasible. Known issues with OWTSs in the Region include **[list known issues – could include systems too close together, inadequately sized, not maintained or cleaned out, faulty pipelines, too shallow of leach field, open ponding or other unsafe wastewater treatment systems]**. Failing systems pose a public health risk to those communities, and have the potential to contaminate groundwater. The Coachella Valley is dependent on groundwater, with many communities and industries using untreated water from the aquifer. The targeted DACs of this project use untreated well water as their source of tap water, as they are too far from existing municipal potable water supply systems to be connected. This puts these communities at greater risk of coming in contact with water contaminated by failing OWTSs **[delete this information if DACs are not on wells]**. Failing systems may also pose a risk to surface waters, as surface contamination may be conveyed into local surface waters via runoff or storm events, or if shallow underground flow reaches surface waters rather than percolating down.

This project will replace failing OWTSs in four **[target number]** DACs in the Coachella Valley **[Region]**, and is expected to serve **[number]** people. The four DACs directly benefitting from the *Regional Program for Septic System Rehabilitation* project are Don Jose Agricultural Housing, Cisneros Mobile Home Park, Valenzuela Mobile Home Park, and Gutierrez Mobile Home Park. These communities have or plan to have between 4 and 13 units, and none are permitted.

2.1.7 Linkages and Synergies between Projects

[Describe any other projects in the area that complement, support, or are otherwise related and linked to the project] This program will replace failing and damaged septic systems with properly designed and sited septic systems in DACs that are unable to connect to existing sewer systems due to feasibility issues. This project serves to address a critical water and public health issue in DACs in the Region, and protect groundwater supplies from contamination. These efforts complement and continue similar efforts of previously funded IRWM Projects, such as the *Groundwater Quality Protection Program – Subarea D2*, and the *San Antonio del Desierto DAC Sewer Extension Project*, both funded through Proposition 84 Implementation Grant – Round 2, and the *Groundwater Quality Protection Program – Desert Hot Springs*, funded through Proposition 84 Implementation Grant – Round 1, which convert DACs from failing septic and other on-site wastewater treatment systems to sewer. For those previously funded projects, communities with failing OWTSs have been able to connect to existing municipal sewer systems, primarily due to their location within a wastewater agency service area or near existing sewer systems and planned expansions. The purpose of those projects is consistent with those of the *Regional Program for Septic System Rehabilitation Program*, that is, to address wastewater disposal and groundwater quality issues and protect public health in DACs. For DACs outside of a wastewater agency service area or located far from existing sewer systems and planned expansions, it is unfeasible to connect to sewer systems, leaving OWTS as the only option. When designed and sited properly, OWTSs can be a reliable and sanitary method for treating and disposing of wastewater, and in conjunction with other septic rehabilitation and sewer connection projects, serves to protect public health and groundwater quality.

2.1.8 Completed Work

[add information on completed] The following work has been completed prior to the grant award date:

- Coachella Valley IRWM DAC Project – Regional Program for Septic System Rehabilitation was completed in 2013, and provided background on failing OWTSs in the Region, as well as identification of target areas, soils testing, and preliminary OWTS design
- **[if any of the Work Plan tasks have been completed already, or will be completed prior to grant start, move that to here]**
- **[add any other completed work]**

2.1.9 Existing Studies and Data

The following includes a list of studies that have been conducted and data that has been collected in support of the *Regional Program for Septic System Rehabilitation* project, and provide justification for the activities and decisions inherent in the project. These documents are also included as **[Appendix X]**. Where noted, only the relevant pages have been included in the appendix.

- **[List existing studies and data used for project site choice, feasibility, technical methods. Provide page numbers that support claims made]**

2.1.10 Project map

[Figure X] provides a map showing project area for the *Regional Program for Septic System Rehabilitation*, including which areas in the Region are DACs, areas with suspected failing septic systems, proximity to nearest sewer systems, and wastewater agency service areas. **[Describe map elements as appropriate.]**

2.1.11 Project Timing and Phasing

The *Regional Program for Septic System Rehabilitation* **[Project tile]** is intended to be the start of a region-wide program to address issues with OWTSs in DACs and rural communities. **[If permitting does not require septic improvements to be part of a larger design plan:]** However, because it will identify failing OWTSs, implement solutions to these failing systems, and provide training to residents to properly maintain and operate their systems, it is also able to function as an independent project and will be able to achieve the project objectives without implementation of any other projects or phases. **[If permitting requires septic improvements to be included as part of a larger design plan, describe that larger plan:]** However, within the County of Riverside, OWTS improvements within mobile home parts are typically reviewed as part of a complete design plan along with other improvements in order to obtain a Conditional Use Permit. As such, this project is part of a larger design package, but is the only element of the design package eligible and applying for funding under the IRWM Grant Program **[grant opportunity]**. This larger permitting package includes **[describe other elements in the greater design package]**.

2.1.12 Project Work

<u>Direct Project Administration Costs</u>

Task 1: Project Administration – Ongoing project administration for this project will involve coordinating with **[grant administrator]** on DWR-related **[funding agency]** contracting efforts and coordinating with **[project consultant, other parties, other project sponsors]**.

Task 1 deliverables:

- **[Add appropriate deliverables here as necessary]**

Task 2: Labor Compliance Program – **[Project sponsor]** will contract with a consultant to develop a Labor Compliance Program to verify that construction will be completed in accordance with current applicable wage laws. This program will be completed and submitted to the California Department of Industrial Relations **[appropriate agency]**. Implementation of the Labor Compliance Program will begin prior to and throughout project construction, and will end with construction.

Task 2 deliverables:

- Final Labor Compliance Program report and submittal to the California Department of Industrial Relations **[appropriate agency]**

Task 3: Reporting – Reporting will be completed by **[project sponsor]** for the *Regional Program for Septic System Rehabilitation* **[Project title]** and submitted to **[grant administrator]** for inclusion in regional reporting to DWR **[Funding agency]**. Reporting activities include those required for quarterly progress reports and invoices, a project assessment, and a project completion report. It will also include any data collection and analysis reporting to appropriate databases, as required.

Task 3 deliverables:

- Quarterly invoices and progress reports, including required deliverables
- Project Assessment and Evaluation Plan (PAEP)
- Project Completion Report

Table X: Direct Project Administration

Activity or Deliverable	Schedule	Status	Completion of Task	
			Before Sept 2013	After Sept 2013
Task 1: Project Administration				
Project Coordination	**[Start of grant – end of grant]**	Not yet begun		X
Task 2: Labor Compliance Program				
Labor Compliance Program, including field interviews, reviewing contractor payroll, preparing deficiency notifications, and preparing final report	**[Start of grant – end of Task 9 + 1 month]**	Not yet begun		X
Task 3: Reporting				
Compile PAEP, Invoices, and Progress Reports	**[Start of grant – end of grant]**	Not yet begun		X
Prepare Quarterly Reports	**[End of first quarter after start of grant – end of grant]**	Not yet begun		X
Prepare Final Report	**[6 months prior to end of grant – end of grant]**	End of work		X

Land Purchase/Easement

A land purchase easement is not required for implementation of this project. As such, there are no deliverables related to land purchase easement. **[Describe any land purchases or easements required for projects, if applicable. Describe any deliverables or tasks, include summary table]**

Planning/Design/Engineering/Environmental Documentation

Task 4: Assessment and Evaluation – There are three subtasks for Task 4, described here:

Subtask 4.1: Identify Project Location **[This task may be conducted during project development, prior to grant application. If so, incorporate results into project background, purpose, need, completed work, and existing data and studies, as appropriate]**

[Project sponsor] must identify locations where existing OWTSs are failing or where new OWTSs need to be installed. Some target communities may not have OWTS yet installed, while some communities may have existing OWTSs that may be unpermitted, poorly designed, or not properly maintained. Communities with unpermitted systems may be difficult for agencies or **[project sponsor]** to identify. **[Project sponsor]** will consult with **[local environmental health departments]** and **[appropriate NGOs]**, who work on septic rehabilitation projects. These local groups are able to identify a number of disadvantaged communities without proper OWTSs through their work in the communities, observations, and testing. The **[local environmental health department]** should be able to provide records of identified failing OWTS, and **[local NGOs]** may be able to help verify the issues or identify communities with OWTS issues that the health department has not yet discovered.

After the project site is selected it will be mapped in an interactive mapping program such as ArcGIS. The map of the project site will be compared against the *Water Quality Control Plan for the Colorado River Basin* (Basin Plan) adopted by Colorado River Basin Regional Water Quality Control Board (RWQCB) **[appropriate reference plan and agency]**. This step is necessary to ensure that the project site is not located in an area within which the Basin Plan limits the use of OWTS; direct coordination with the RWQCB will ensure that the site is eligible for potential OWTS rehabilitation. The project site will also be mapped to determine the applicable land use agency (City or County) for the project, and allow for direct coordination with the applicable land use agency to ensure that the project site does not conflict with applicable municipal codes.

After the project site has been deemed feasible in terms of the Basin Plan and the applicable land use agency, backup documentation to describe the existing conditions and the need for OWTS upgrades will be gathered. While not all sites will have such materials, backup documentation includes photographs of OWTS overflows or spills, water quality records, citations from the RWQCB, the County Department of Environmental Health, or other relevant agencies. **[These materials help to define the need for the project with respect to other similar projects and are important if the project proponents are seeking competitive grant funds to help pay for project implementation. If documentation collected prior to application, include in Project Need, Purpose, Objective, etc.]**

Subtask 4.1 deliverables:

- Formal map of the selected project site,**[preferably in ArcGIS format]**. The map will show, at a minimum the: potential project site, applicable land use agency, and major roadways.
- A brief write-up that explains consistency with the Basin Plan and applicable municipal codes, including the applicable land use agency.
- Information about the selected project site, including but not limited to: number of residents, condition of the existing OWTS, documentation of OWTS issues or failures, water quality tests (if applicable).

Subtask 4.2: Conduct Outreach to Property Owners and Residents

After identifying potential sites for OWTS improvements, **[project sponsors]** will initiate meetings and conversations with the property owners and residents living in those communities that require OWTS rehabilitation. During this subtask, the assistance of **[a local NGO]**, which is active and trusted in the community can provide significant benefits. Experience from the *Coachella Valley DAC Outreach Program* found that working with local NGOs can reduce language and cultural barriers, and an active local community organizer can help to convey the importance of the project and create a positive atmosphere from the onset of the project. At some sites, the assistance of NGOs in this step may be essential to project success **[if known, name project sites that require NGO assistance to be most successful]**.

This subtask provides **[project sponsors]** the opportunity to explain the importance of properly designed and constructed OWTSs to owners and residents and helps to gain owner and resident support of the project, which is critical to project implementation. **[Project sponsors]**will use this subtask to confirm that owners and members of the candidate communities are willing to participate in an OWTS improvement project before moving forward. Formal willingness to participate in the OWTS improvement project (via a letter or other signed document) on behalf of the property owner is required prior to initiating Task 2.

Subtask 4.2 deliverables:

- Documentation of outreach to local community (property owner and residents) through meeting summaries.
- Formal willingness to participate in the OWTS improvement project on behalf of the property owner.

Subtask 4.3: Soil Testing

Because each individual site's sub-surface (soil) conditions are the key parameters of OWTS performance, soil testing provides crucial information for OWTS planning and design. A preliminary layout of the existing OWTS will be prepared prior to soils testing in order to identify the location and number of soils tests to be performed. System layout will be finalized under Task 5 (see below), after soils testing is complete. Soil engineers will follow **[local agency's]** guidelines for soil tests. The soil evaluation consists of two different tests: a deep boring and a shallow percolation test **[these are generally what is involved in soil evaluation, adjust as appropriate]**. The deep boring will identify groundwater levels and the presence, if any, of impermeable soil layers and bedrock; the percolation test will evaluate the percolation rate of the site on a parcel or subdivision level, depending on the site. Soil testing will ensure that subsurface conditions are suitable for OWTS installation. Soil testing will also help the engineer determine the types and sizes of OWTS that are most appropriate for a particular site during Task 5 Final Design.

Subtask 4.3 deliverables:

- Copy of **[applicable local agency's**] guidelines for soil tests.
- Preliminary layout of the existing OWTS.
- Deep boring test results (documentation of groundwater level and presence of any impermeable soil layers and bedrock).
- Shallow percolation test results (documentation of onsite percolation rates).

Task 5: Final Design - After review of the soils testing results, the [**project engineer]**will identify a viable OWTS alternative based on the soil test report, size and layout the system **[refer to Section 3 of the *Coachella Valley Septic Rehabilitation Program Report* for more information on system types]**.

A number of site parameters are considered in the course of selecting the type of OWTS for a specific site, including the number of existing and near-term planned units, the onsite percolation rate, groundwater level, the community layout, and the locations and depth of existing utilities. In addition, other site conditions such as the formal location and permitting status will be evaluated as part of this task. **[Table X]** shows the types of onsite parameters that will be considered in this task. **[modify table as appropriate to individual project. Table below can be used as an example]**

Table X: Onsite Parameters

Items	Description
Status	Permitted or Unpermitted
Address	Formal address for permitting documents
APN	xxx-xxx-xxx
Owner	Name(s)
Existing Units	Number
Planned Units	Number (within next five years)

The design process will be implemented in compliance with local and state regulations. In Riverside County **[appropriate location]**, the soil engineer who performed the soils testing must sign off on the design before the final design of the OWTS is submitted to **[applicable regulating agency]** for permit application. **[Table 2]** shows the type of information that will be synthesized from the soils tests and considered in the design criteria. **[Modify table as appropriate to individual project. Table below is an example]**

Table X: OWTS Design Criteria

Item	Criteria	Unit X	Unit Y	Unit Z
Septic Tank	Units per Tank (#)	1	1	1
	Minimum Tank Size (gal)	1,000	1,000	1,000
Leach fields	Minimum Area (sq.ft)	400	400	400
	Parallel Chambers (#)	2	2	2
	Minimum Length (ft)	67	67	67

**Unit X, Y, Z indicates that an individual site or mobile home park likely has multiple units that would need to connect to a septic system, and that these units may have different capacities and leach field requirements.*

Task 5 deliverables:

- Final layout of the existing OWTS.
- Summary of onsite parameters
- Summary of OWTS design criteria
- Preliminary design plans.
- Final design plans.
- Soil engineer's sign-off on final design plans **[if applicable]**.

Task 6: Environmental Documentation – The project does not trigger CEQA, NEPA, or other environmental regulations and therefore does not require environmental documentation. **[If project will trigger CEQA/NEPA/etc., describe here]**

Task 6 deliverables:

As no environmental documentation is required, there are no deliverables associated with Task 6. **[If project triggers CEQA/NEPA or other environmental documentation, add appropriate deliverables here (EIR/EIS, MND, NegDec, FONSI, etc.)]**

Task 7: Permitting – There are two subtasks for permitting: determining the required permits, and obtaining the permits. These are described as Subtask 7.1 and Subtask 7.2, respectively.

Subtask 7.1: Determining Required Permit Type

[This subtask is unlikely to be included in a grant application – the amount of on-site subsurface discharge will likely be determined during the final design phase (Task 5), which will determine what type of permit is required. The work described in this subtask explains how to determine the permit type]

[Project sponsor] will coordinate with regulatory agencies to obtain information regarding permitting requirements for OWTS projects; please note that while permitting is formally discussed in Task 7, coordination with the applicable agencies is recommended during initiation of the project (see Task 4). According to the RWQCB's Order 97-500 for on-site subsurface discharge, projects generating flows greater than 5,000 gallons per day (gpd) per parcel are required to apply for a general discharge permit from the RWQCB. In contrast, parcels generating less than 5,000 gpd of sewer flow are usually issued a conditional use permit (CUP) by the Riverside County Planning Department. Therefore, the first step in permitting is to determine the amount of on-site subsurface discharge. **[The information presented herein is related to those projects that require a CUP and is not applicable if a general discharge permit is required.]** Unless otherwise determined during Subtask 7.1, **[Project sponsor]** will apply for a Conditional Use Permit. **[modify as appropriate]**.

Subtask 7.1 deliverables:

- Record of on-site subsurface discharge.

Subtask 7.2: Obtaining a Conditional Use Permit

[This subtask described how to obtain a CUP in Riverside County. The process likely varies depending on project location/region. Text included here provides guidance on the steps required to obtain permit, and notes that OWTS design must be permitted as part of a larger package, not as an individual project. This means that the project should already have a permit (as part of a larger project) or should acknowledge this, and state when/how project is expected to receive permit (as part of what other improvements?). Should be modified to reflect actual steps that will be taken to obtain permits.]

OWTS improvements within Polanco Parks, such as those evaluated in the *Coachella Valley Septic Rehabilitation Program*, are typically reviewed as part of a complete design plan along with other necessary improvements for the Polanco Park, which receives a CUP from the County of Riverside **[appropriate agency]**. Although this project focuses on improvements to OWTSs, a CUP requires multiple onsite improvements, including: water system improvements, street/access improvements, and fire suppression. A CUP from the County of Riverside requires review and approval of the proposed design plan for onsite improvements from the following departments:

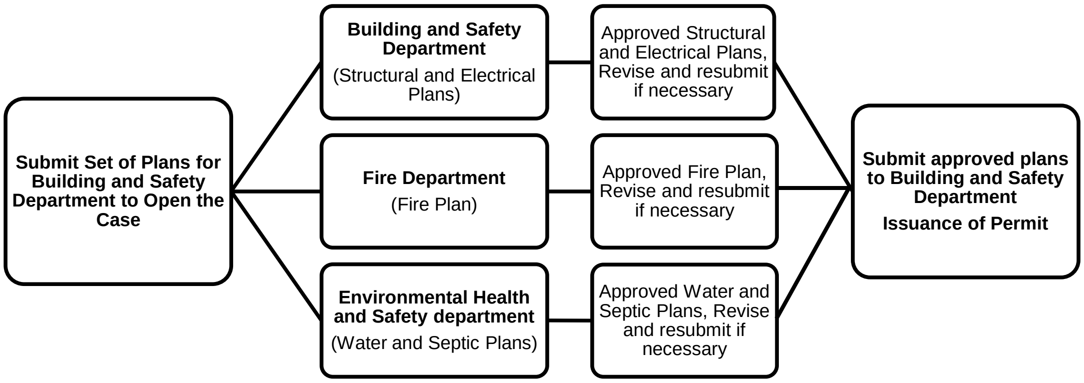
- Environmental Health Department
- Fire Department
- Building and Safety Department

Comments from the above departments will be addressed in a revised design plan that will be resubmitted for approval by each department. Once all the comments are properly addressed and the plan has been approved, a permit to implement the proposed project will be issued. The project must be implemented in accordance with stipulations in the approved design plan, which will include conditions for the OWTS. **[Most counties have similar permitting requirements to those described above, which are specific to the Coachella Valley (portions of Riverside County located within the Colorado River Basin).]** Prior to approval, and during development of the OWTS design plan, **[local health department]** will be asked to provide informal review or input on the design.

[**That OWTS design must be permitted as part of a larger package of other community improvements, rather than as an independent project, presents additional challenges to obtaining**

proper permitting for small communities with failing OWTSs. Packaging improvements together means that in addition to the specific design work explained in Task 5 for the OWTS, project proponents must also complete planning and design work for other community improvements in order to obtain a CUP and implement the OWTS portion of the project. Figure 2 below provides an overview of the CUP process as it applies specifically to Riverside County.]

Figure 2: Conditional Use Permit Application Overview [modify as appropriate]



Adapted based on information from: *Redevelopment Agency for the County of Riverside. 2010. Mobile Home Park Development Standards & Design Criteria. Available:* http://www.rivcoeda.org/LinkClick.aspx?fileticket=qcYkeHL%2BZTA%3D&tabid=57&mid=2389

Subtask 7.2 deliverables:

- Compilation of other design plans (structural and engineering plans, fire plan, and water plan).
- Submittal of final design plans for all aspects of the project to the applicable agencies and departments.
- Comments on final design plans from the applicable agencies and departments **[if applicable]**.
- Revised design plans with approval from the applicable agencies and departments **[if applicable]**.
- Formal CUP issued by the applicable agency **[if applicable]**.
- **[Other permits as required]**

Table X: Planning/Design/Engineering/Environmental Documentation

Activity or Deliverable	**Schedule**	**Status**	**Completion of Task**	
			Before Sept 2013	**After Sept 2013**
Task 4: Assessment and Evaluation				
Subtask 4.1: Identify Project Location				
Identify organizations to assist in locating DACs with failing OWTS	**[Start of grant - +2 months]**	Not yet begun		X
Identify location of failing OWTS	**[End of ID organizations to assist in locating DACs - +4 months]**	Not yet begun		X
Develop map of project site	**[End of ID location of failing OWTS - + 2 months]**	Not yet begun		X
Write site report	**[End of develop map - +3 months]**	Not yet begun		X
Subtask 4.2: Conduct Outreach to Property Owners and Residents				
Meet with Property Owners **[specific # of meetings or property owners if known]**	**[End of Subtask 4.1 - +2 months]**	Not yet begun		X
Subtask 4.3: Soil Testing				
Develop preliminary OWTS layout	**[End of Subtask 4.2 - +1 month per site]**	Not yet begun		X
Deep boring soil testing **[appropriate soil test name]**	**[End of preliminary OWTS layout – +1 month per site]**	Not yet begun		X
Shallow percolation soil testing **[appropriate soil test name]**	**[End of preliminary OWTS layout – +1 month per site]**	Not yet begun		X
Task 5: Final Design				
Final layout of OWTS	**[End of Task 4 - +2 months]**	Not yet begun		X
Determine onsite parameters	**[End of Task 4 - +2 months]**	Not yet begun		X
Determine OWTS design criteria	**[End of Task 4 - +2 months]**	Not yet begun		X
Preliminary design plans **[% design phase]**	**[End of Task 4 - +4 months]**	Not yet begun		X
Final design plans **[100% design]**	**[End of preliminary design - +4 months]**	Not yet begun		X
Final design approval from soil engineer **[if applicable]**	**[End of final design - +1 month]**	Not yet begun		X
Task 7: Permitting				
Subtask 7.1: Determining Required Permit Type				
Coordinate with regulatory agencies to	**[End of Task 4 – End of Task 5 + 1**	Not yet begun		X

determine permitting requirements	**month]**			
Determine on-site subsurface discharge for proposed system	**[End of Task 4 – End of Task 5]**	Not yet begun		X
Subtask 7.2: Obtain Conditional Use Permit **[appropriate permit name, if multiple permit types required, change to Obtain Permits, and list individual permits as deliverables]**				
Compile other design plans	**[End of Subtask 7.1 - +4 months]**	Not yet begun		X
Submit final compiled design plans for all aspects of project for agency review	**[End of compile other design plans]**	Not yet begun		X
Incorporate agency comments into revised design plan	**[Submit final compiled design plans + 1 month - +4 months]**	Not yet begun		X
Submit revised design plan to agencies for approval	**[End of incorporate agency comments]**	Not yet begun		X
Obtain Conditional Use Permit	**[End of submit revised plan - +3 months]**	Not yet begun		X
[other permits, as required]	**[timeframe appropriate for permit]**			

Construction/Implementation

Task 8: Construction Contracting – **[If applicable (adjust as needed):]**Solicitation for a construction contractor will involve advertisement for bids, holding a preconstruction meetings, bid opening, bid evaluation, **[Project sponsor]** staff recommendations, **[Project sponsor]** board approval, and awarding the construction contract. The contracting process will also include confirming the contractor's insurance requirements and bonds. For each contract **[Project sponsor]** staff must issue a Request for Proposals, evaluate submitted proposals, and issue recommendations.

Task 8 deliverables:

- Final executed construction contract

Task 9: Construction – Construction tasks will include mobilization and site preparation, construction and installation of new OWTS, removal or abandonment of existing failing OWTS, and clean-up **[adjust as appropriate]**.

Subtask 9.1: Mobilization and Site Preparation – Mobilization and site preparation will entail **[number]** of steps, including development of O&M guidelines, training, and OWTS site preparation (equipment delivery, clearing, **[other site preparations]**).

Subtask 9.1.1: Development of O&M Guidelines and Training

Proper maintenance of OWTS after the initial installation or rehabilitation is essential to ensure its proper performance. **[Project sponsor]** will set forth operation and maintenance (O&M) guidelines and provide adequate training to community members to ensure that the capital improvements made to the OWTS are not wasted due to improper O&M. While system layout for various OWTSs may differ, the general guidelines for maintaining these systems are essentially the same, and will be developed in a manner that is usable to residents and property owners. O&M guidelines will include regular (annual) inspection of onsite septic tanks and leach lines as well as regular (every 3-5 years) pumping and disposal of waste byproducts from the OWTS to nearby wastewater treatment facilities or landfills **[adjust as necessary]**. **[Project sponsor]** will confer with the engineering team that completed design work as well as the applicable regulatory agencies to ensure that the O&M guidelines are appropriate for the designed system and are in compliance with any applicable regulations. **[Project sponsor]** will conduct **[number]** workshops to train residents and property owners in appropriate operation and maintenance of the new systems **[if installing systems at multiple sites, include number of workshops per site]**.

Subtask 9.1.2: Site preparation

Prior to construction of new OWTS, sites will be prepared as appropriate. This task will involve equipment delivery, site clearing, **[other]**.

Subtask 9.2: Project Construction – Project construction includes the activities necessary to install the new OWTS. These activities include installation of **[number]** OWTS **[specify type]**, **[linear feet]** of **[size]** pipe to connect residences to the new OWTS, **[steps to OWTS construction – could include digging activities, filling activities, any paving activities, and more]**.

Subtask 9.3: Performance Testing and Demobilization – This subtask will involve system inspection and testing **[add specific testing activities as appropriate]**. It will also include **[removal/abandonment]** of the **[number]** existing failing OWTS. **[Add activities that will either remove existing systems (excavation of system, capping pipes, etc.) or safely abandon systems (sealing pipes, pumping tanks, etc.)].**

Task 9 deliverables:

- O&M guidelines usable to residents and property owners.
- Documentation of initial and regular O&M trainings to local community (property owner and residents) through meeting summaries.
- Performance testing on **[number]** new OWTS.
- Certification of appropriate existing system **[removal/abandonment]**

Table X: Construction/Implementation

Activity or Deliverable	Schedule	Status	Completion of Task	
			Before Sept 2013	After Sept 2013
Task 8: Construction Contracting				
Bidding	**[End of Task 5 – +1 month]**	Not yet begun		X
Bid Evaluation	**[End of bidding - +3 months]**	Not yet begun		X
Contract Award	**[End of bid evaluation - +1 month]**	Not yet begun		X
Contract Execution	**[End of contract award – end of construction]**	Not yet begun		X
Task 9: Construction				
Subtask 9.1 Mobilization and Site Preparation				
Development of O&M Guidelines	**[End of Task 5 - +6 months]**	Not yet begun		X
[number] O&M training workshops	**[End of Development of O&M Guidelines - +1 month]**	Not yet begun		X
[site preparation activities (Subtask 9.1.2)]				
Subtask 9.2 Project Construction				
Installation of **[number]** OWTS	**[Completion of Task 7, Task 8, and subtask 9.1 - +2 months per site]**	Not yet begun		X
Installation of **[lineal feet]** pipelines	**[Completion of Task 7, Task 8, and subtask 9.1 - +2 months per site]**	Not yet begun		X
[other construction activities]				
Subtask 9.3 Performance Testing and Demobilization				
[Removal/Abandonment] of **[number]** failing OWTSs **[breakdown activities if known into separate rows in table]**	**[End of Subtask 9.2 - +1 month per site]**	Not yet begun		X

Environmental Compliance/Mitigation/Enhancement

Task 10: Environmental Compliance/Mitigation/Enhancement – As noted in Task 6, this project will not trigger CEQA, NEPA, or other environmental regulations. Therefore no environmental compliance/mitigation/enhancement is required. **[If CEQA/NEPA/etc. is triggered (as noted in Task 6), describe any compliance/mitigation/enhancement that will be required. Could include compliance with mitigation monitoring and reporting plan (MMRP), existing monitoring efforts, any plans for mitigation, or if any enhancement activities will be part of the project]**

Construction Administration

Task 11: Construction Administration – Construction administration includes all activities necessary to oversee and manage the construction contract. These activities will include **[construction management activities – may include general construction management, materials testing, inspection, and construction staking]**.

Task 11 deliverables:

- Construction management contract

Table X: Construction Administration

Activity or Deliverable	Schedule	Status	Completion of Task	
			Before Sept 2013	After Sept 2013
Task 11 Construction Administration				
Management of construction contract	**[Start of Task 8 – End of Task 9]**	Not yet begun		X
[other activities as described above (e.g., materials testing, etc.)]				

2.1.13 Budget

The **[Project title]** will involve tasks that will allow **[Project sponsor]** to select, design, and construct OWTSs appropriate to meet the needs and conditions of each **[the]** project site. These new OWTSs will replace existing failing or inadequate OWTSs in DACs in the region **[project area]**. Failing OWTSs pose a risk to groundwater in the Coachella Valley **[region]**, which forms the sole **[primary]** source of water in the region. The communities served by the project are unable to connect to existing sewer services due to distance, cost, and restrictions on spending outside agency service areas. This project will address a critical wastewater need of a DAC, as well as address serious public health concerns in these communities. Funding for this project involves **[list categories for funding]**.

The total cost of the *Regional Program for Septic System Rehabilitation* **[Project title]** is **[total project cost]**. Of these total costs, **[grant request]** is being requested for grant funding through the IRWM Grant Program **[name of grant program/opportunity]**. The remaining **[remaining costs]** will be met by **[Project sponsor]**, **[partner agencies]**, and **[other grants]**. In total, the non-State share of the total project (funding match) is **[funding match %]** for this project. The funding match will be provided by the **[source of funding match]** of the operating funds of the **[project sponsor and partner agencies]**.

[Table X], below, provides a more detailed break-down of the total project budget.

Table X: Project Budget

Proposal Title: [Proposal Title]

Project Title: Regional Program for Septic System Rehabilitation [Project title]

Project serves a need of a DAC?: ☒ Yes ☐ No

Funding Match Waiver request?: ☐ Yes ☒ No

		(a)	**(b)**	**(c)**	**(d)**
Category		**Requested Grant Amount**	**Cost Share: Non-State Fund Source* (Funding Match)**	**Cost Share: Other State Fund Sources***	**Total**
(a)	Direct Project Administration				
(b)	Land Purchase/ Easement				
(c)	Planning/ Design/ Engineering/ Environmental Documentation				
(d)	Construction/ Implementation				
(e)	Environmental Compliance/ Mitigation/ Enhancement				
(f)	Construction Administration				
(g)	Other Costs				
(h)	Construction/ Implementation Contingency				
(i)	**Grand Total**				

** Sources of funding: The non-state funding match will be provided by the* ***[funding source]****.*

This proposal is requesting funding for **[number]** project tasks identified within the *Regional Program for Septic System Rehabilitation* **[Project title]** work plan (refer to **[add reference]**). The sections below provide detailed description of each row and task budget (where applicable), as well as a description of how these costs were calculated.

Table X: Cost Breakdown by Work Plan Task and Subtask

Row/Task	Category	Total
GA	Grant Administration	
Row (a)	Direct Project Administration Costs	
Task 1	*Project Administration*	
Task 2	*Labor Compliance*	
Task 3	*Reporting*	
Row (c)	Planning/Design/Engineering/Environmental Documentation	
Task 4	*Assessment and Evaluation*	
Task 5	*Final Design*	
	[If applicable: Task 6 Environmental Documentation]	
Task 7	*Permitting*	
Row (d)	Construction/Implementation	
Task 8	*Construction Contracting*	
Task 9	*Construction*	
	[If applicable: Row (e) Environmental Compliance/Mitigation/Enhancement]	
	[If applicable: Task 10 Environmental Compliance/Mitigation/Enhancement]	
Row (f)	Construction Administration	
Task 11	*Construction Contracting*	
Row (g)	Other Costs	
Row (h)	Construction/Implementation Contingency	
Row (i)	**Grand Total**	

Grant Administration

[Describe how grant administration will be handled] Local project sponsors shall dedicate a portion of their grant funds to CVWD **[agency responsible for grant administration]** for administration and processing of the Implementation Grant **[grant name]**. The *Regional Program for Septic System Rehabilitation* **[Project title]** will contribute **[amount for grant administration]** to this administration cost. **[Describe who will be doing what for this task:]** Costs for grant administration include labor costs for a planning manager to coordinate receipt of quarterly progress reports and an analyst who will receive and reconcile invoices for grant reimbursables and funding match from project sponsors to create a grant invoice for DWR. The costs are based on hourly rates for these positions, and effort based on **[justification]**. **[Note: in the past, Coachella Projects have allocated between 2% and 3% of project cost for Grant Administration]**

Table X: Grant Administration

Activity	Discipline	Hourly Wage ($/hr)	Number of Hours	Total	Funding Match	Grant Request
Grant Administration						
Grant administration	Planning Manager	$85				
	Analyst	$60				
Grant Administration Total						

Direct Project Administration Costs

The total direct project administration costs for the project are **[total direct project administration costs]** and will be spent by **[responsible party]** for administration and processing of the IRWM Implementation Grant **[grant name]**.

Task 1: Project Administration – **[Project sponsor]** will assume all direct project administration costs for this project. This task involved administration of the *Regional Program for Septic System Rehabilitation* **[Project title]**, and included costs for a Project Manager and supplies to conduct project administration activities, including coordination with **[grant administrator]** on DWR-related **[funding agency]** contracting efforts and coordination with **[project consultant, other parties, other project sponsors]**. Project administration costs are estimated to be **[costs]**. Costs estimates are based on hourly wage of a Project Manager, effort is estimated based on **[justification]**, and costs adjusted for efficiencies based on experience from **[justification]**. Equipment and supply costs have been estimated based on experience with **[justification – typically a similar project]**. **[Provide appropriate justification for cost estimates]**

Task 2: Labor Compliance Program – **[Project sponsor]** will hire a consultant to implement a Labor Compliance Program to verify that construction will be completed in accordance with current applicable wage laws. The consultant will conduct all Labor Compliance Program activities. Costs for this task are estimated to be **[costs]**. These costs are based on hourly rates for the consultant, as well as hourly rates for a Project Manager to oversee consultant work. Effort required to complete this task has been estimated using experience from **[justification]**.

Task 3: Reporting – **[If not already included under Task 1:]** Costs for Task 3 will be incurred by all activities required to produce the PAEP, quarterly progress reports and invoices, and the project completion report. These costs are estimated as **[costs]**, calculated using the hourly rate for the **[job title]** responsible for producing Task 3 deliverables, and the estimated amount of time required to produce deliverables, based on **[justification]**

Table X: Direct Project Administration Budget

Activity	Discipline	Hourly Wage ($/hr)	Number of Hours	Total	Funding Match	Grant Request
Task 1: Project Administration						
Project Coordination	Project Manager	$100	240			
			Task 1 Total			
Task 2: Labor Compliance Program						
Field Interview Project Labor Force	Consultant	$120	72			
Review Contractor Certified Payroll	Consultant	$120	48			
Prepare Deficiency Notification	Consultant	$120	48			
Prepare Final Report Summarizing Labor Compliance	Consultant	$120	24			
			Task 2 Total			
Task 3: Reporting						
PAEP	**[job title]**					
Compile invoices and progress report	Consultant	$120	40			
Prepare Quarterly Reports	Consultant	$120	120			
Prepare Final Report	Consultant	$120	80			
			Task 3 Total			
			Row (a) Total [Sum of this table]			

Land Purchase/Easement

A land purchase or easement is not required for implementation of this project. As such, there are no costs related to land purchase easement. **[If applicable, describe estimated costs, who will do what, and provide justification for costs. Add cost table.]**

Planning/Design/Engineering/Environmental Documentation

The total Planning/Design/Engineer/Environmental Documentation costs for the project are **[costs]**. **[Table X]** provides a detailed listing of all applicable costs. The cost totals are based on the following for the three **[number]** applicable Planning/Design/Engineering/Environmental Documentation tasks:

Task 4: Assessment and Evaluation – Costs for Task 4 are those incurred by the three subtasks described in the project Work Plan (see **[add reference]**). Task 4 costs are estimated to be **[costs]**.

Subtask 4.1: Identify Project Location

Costs for this task include costs for identifying project sites, coordinating with local agencies and non-profits to identify highest risk areas, mapping these areas, and determining regulatory compliance requirements. It is anticipated that completion of Subtask 4.1 will require a Project Manager to coordinate with different organizations and manage the site identification process. Workshops will be held with **[appropriate NGOs and agencies]**, incurring staff costs and meeting costs (location, equipment, and materials). A GIS Analyst **[staff member]** will create maps of potential project sites. Costs for this task are based on hourly wages of each required staff member, standard rates for meeting spaces, **[number]** workshops, and a level of effort estimated based on **[justification for hours spent]**. Subtask 4.1 costs are estimated to total **[costs]**.

Subtask 4.2: Conduct Outreach to Property Owners and Residents

Costs for Subtask 4.2 are estimated as **[costs]**, and will cover expenses incurred by outreach activities to property owners and residents. **[Project sponsor]** will hold **[number]** outreach meetings. Each outreach meeting will require **[number]** hours for a Project Manager, **[number]** hours for a **[staff job title or consultant]**. Each meeting will also involve **[number]** hours from **[local partner NGO]** to assist in reaching target property owners and residents. **[Number]** hours are anticipated to be required to complete translation of outreach materials from English to Spanish to accommodate anticipated language and cultural barriers. The Project Manager will spend an additional **[number]** hours coordinating with staff and **[partner NGOs and agencies]**, and processing formal documentation of willingness to participate from property owners and residents. These estimates of the level of effort required are based on experience with past projects, namely **[provide example project]**. Costs are based on the level of effort, hourly wages of staff members involved, and the typical costs for materials and meeting spaces. **[Adjust cost justification as necessary]**

Subtask 4.3: Soil Testing

To complete Subtask 4.3, a Project Manager will coordinate between design engineers and soil engineers. This effort is estimated to require **[number]** hours per testing site. A Soil Engineer **[appropriate job title for soil testing engineer]** will conduct two soil tests: deep boring and shallow percolation **[adjust as appropriate]**. The deep boring test is estimated to require **[number]** hours, and **[list equipment]**. Shallow percolation testing requires **[number]** hours and **[list equipment]**. A **[Design Engineer]** will produce a preliminary layout of existing OWTS, which is anticipated to require an average of **[number]** hours per site. Costs for soil testing is based on hourly wage for a Project Manager, Soil Engineer, and **[Design Engineer]**, and standard equipment costs. Estimates of level of effort are based on **[justification]**.

Task 5: Final Design - This task includes the costs for final layout of the existing OWTSs, determination of onsite parameters and OWTS design criteria, and preliminary and final design. A Project Manager will oversee all project activities, a Project Engineer will complete layout and design activities, while the Soil Engineer who completed Subtask 4.3 will sign off on the final design. The level of effort for each of these activities has been estimated using past experience from **[add justification]**. Costs were calculated using hourly wage of each staff member. Total Task 5 costs are estimated to be **[costs]**, and broken down in detail in **[Table X]**, below.

Task 6: Environmental Documentation – As the project will not require environmental documentation beyond those already included in other tasks, no environmental documentation costs will be incurred.

Task 7: Permitting – **[Adjust this budget as appropriate. As written, this budget will address the costs for the subtasks described in the example Work Plan]** Costs for this task include the cost to determine which permits are required, and the costs to obtain these permits. Total costs for Task 7 is estimated at **[costs]**. These costs are estimated on hourly wages for staff, level of effort (based on past experience **[add justification]**), and permit fees.

Subtask 7.1: Determining Required Permit Type

A Project Manager will coordinate with regulatory agencies to determine appropriate permitting for the *Regional Program for Septic System Rehabilitation* **[Project title]**. This is anticipated to require **[number]** hours. Costs for this subtask is based on level of effort and hourly wage of the Project Manager.

Subtask 7.2: Obtaining a Conditional Use Permit

Costs to obtain a CUP include the cost for **[staff]** to compile a design plan package, estimated to require **[number]** hours of staff effort. Revision of design plans is anticipated to require **[number]** hours of **[project sponsor]** staff time. Costs for this subtask are estimated from hourly wages of staff and the required effort to compile and complete the permit application process. Effort is estimated based on past experience in obtaining CUPs.

Table X: Planning/Design/Engineering/Environmental Documentation

Activity	Discipline/Materials	Hourly Wage ($/hr)/Unit Cost ($)	Number of Hours/Units	Total	Funding Match	Grant Request
Task 4: Assessment and Evaluation						
Subtask 4.1: Identify Project Location						
[number] project site identification workshop(s)	Project manager					
	[Project sponsor staff]					
	[NGO staff]					
	[If appropriate]Translator					
	Meeting space, materials and equipment					
Project site mapping	GIS Analyst					
Subtask 4.2: Conduct Outreach to Property Owners and Residents						
[number] outreach meetings	Project Manager					
	[Project sponsor staff]					
	[NGO staff]					
	Translator					
Formal willingness to participate	Project Manager					
Subtask 4.3: Soil Testing						
Coordination	Project Manager					
Deep boring testing	Soil Engineer					
Shallow percolation testing	Soil Engineer					
Preliminary layout of existing OWTS	**[Design Engineer]**					
			Task 4 Total			
Task 5: Final Design						
Final existing OWTS layout	**[Design Engineer]**					
Determination of onsite parameters	**[Design Engineer]**					
Determination of OWTS design criteria	**[Design Engineer]**					
Preliminary design **[% design]**	**[Design Engineer]**					
Final design **[100%**	**[Design Engineer]**					

design]						
Design coordination	Project Manager					
Task 5 Total						
[If applicable:] Task 6: Environmental Documentation						
[NEPA/CEQA/etc.]						
Task 6 Total						
Task 7: Permitting						
Subtask 7.1: Determine Required Permit Type						
Coordination with regulatory agencies	Project Manager					
Subtask 7.2: Obtaining a Conditional Use Permit **[adjust as appropriate, see work plan]**						
Compile and submit design plan package	**[Project sponsor staff]**					
Revise and resubmit design plan package	**[Project sponsor staff]**					
Task 7 Total						
Row (c) Total [Sum of this table]						

Construction/Implementation

Task 8: Construction Contracting – Costs for construction contracting include the costs for **[Project sponsor staff]** to request bids, assess proposals, and award construction contracts. Based on **[Project sponsor]**'s typical construction contracting process, this is estimated to require **[number]** hours. Costs for Task 8 are estimated at **[costs]**, based on hourly wage for **[Project sponsor]** staff.

Task 9: Construction – Costs for construction and implementation are estimated to be **[Task 9 costs]**. These costs are incurred by all activities necessary to complete subtasks 9.1 thought 9.3, as described in the Work Plan (see **[reference Work Plan]**). The costs for Task 9 were estimated based on **[cost justification]**, and divided into three categories: Materials, Equipment, and Labor **[appropriate categories]**.

- Materials: Materials that will be required for construction/implementation of this project include training materials (handouts, manuals, **[other training materials]**), materials for the O&M Guidelines, and **[construction materials]**. Estimated cost for materials is **[cost]**.
- Equipment: Anticipated equipment costs for the project include costs for the new OWTSs, **[other equipment]**, and space and equipment for trainings. Total equipment cost is anticipated to be **[cost]**.
- Labor: Labor costs for this project include costs for a trainer, general contractor, masonry, an electrician, and a plumber **[use appropriate labor based on Work Plan]**. Total labor costs are estimated at **[cost]**.

Table X: Construction/Implementation

Activity	Discipline	Hourly Wage ($/hr)	Number of Hours	Total	Funding Match	Grant Request
Task 8: Construction Contracting						
Bidding and pre-construction meeting	**[Project sponsor staff]**					
Bid evaluations	**[Project sponsor staff]**					
Contract award	**[Project sponsor staff]**					
Contract execution	**[Project sponsor staff]**					
Task 8 Total						
Task 9: Construction/Implementation						
Materials						
Activity	**Materials**	**Unit Costs ($)**	**Number of Units**	**Total ($)**	**Funding Match**	**Grant Request**
[number] **t**rainings	Training materials					
	Handouts					
	[other training materials]					
Development of O&M guidelines	O&M Guidelines					
OWTS installation	**[Construction materials]**					
Subtotal						
Equipment						
[number] trainings	Training Space		**[# of meetings]**			
	[other equipment for training – projectors, etc. if not included in space]					
OWTS installation	1-Unit System (LS)	$10,000	7	$70,000		
	2-Unit System (LS)	$15,000	8	$120,000		
	3-Unit System	$15,000	2	$30,000		
	[other construction equipment]					
Subtotal						
Labor						
Activity	**Discipline**	**Hourly Wage ($/hr)**	**Number of Hours**	**Total**	**Funding Match**	**Grant Request**
[number] trainings	**[Job title for trainer]**					

	[NGO partner staff]					
	Translator					
	[other persons necessary to conduct training]					
Development of O&M guidelines	**[Project sponsor staff]**					
OWTS installation	General Contractor					
	Masonry					
	Electrician					
	Plumber					
	General Labor					
	[Other labor]					
Subtotal						
Row (d) Total [Sum of this table]						

Environmental Compliance/Mitigation/Enhancement

Task 10: Environmental Compliance/Mitigation/Enhancement – As described in the Work Plan (see **[reference Work Plan]**), no environmental compliance/mitigation/enhancement will be required by the *Regional Program for Septic System Rehabilitation* **[Project title]**. Therefore, no costs are anticipated for Task 10.

Construction Administration

Construction administration costs for the project are estimated to be **[costs]**.

Task 11: Construction Administration – Costs for this task include work anticipated for construction management, materials testing, inspection, and construction staking **[use appropriate construction administration activities/costs]**. It is estimated the construction will take **[number]** months (from mobilization through performance testing). Labor hours were calculated with an estimate of **[number]** hours per month for the construction management team, including inspection. Staking labor is based on **[justification]**. A Project Manager will oversee all Construction Administration activities, and a Consultant will conduct all testing, inspection, and staking activities.

Table X: Construction Administration

Activity	**Discipline**	**Hourly Wage ($/hr)**	**Number of Hours**	**Total**	**Funding Match**	**Grant Request**
Task 11: Construction Administration						
Training administration	Project Manager					
Construction/installation administration	Project Manager					
Materials testing	Consultant					
Inspection	Consultant					
Construction staking	Consultant					
Row (f) Total						

Other Costs

No other costs are expected for this project.

	Qtr 1				Qtr 2				Qtr 3				Qtr 4				Qtr 5				Qtr 6				Qtr 7				Qtr 8				Qtr 9				Qtr 10				Qtr 11				Qtr 12			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
Grant Administration	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Task 1: Project Administration	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
Task 2: Labor Compliance	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓						
Task 3: Reporting	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓
PAEP	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
Quarterly Grant Reporting and Invoices				▒				▒				▒				▒				▒				▒				▒				▒				▒				▒				▒				▒
Final Report																																											▒	▒	▒	▒	▒	▒
Task 4: Assessment and Evaluation	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓																																
Subtask 4.1	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒																																					
Identify organizations to assist in locating DACs with failing OWTS	░	░																																														
Identify location of failing OWTS			░	░	░	░																																										
Develop map of project site							░	░																																								
Write site report									░	░	░																																					
Subtask 4.2												▒	▒																																			
Meet with property owners												░	░																																			
Subtask 4.3														▒	▒	▒																																
Develop preliminary OWTS layout														░	░																																	
Deep boring soil testing																░																																
Shallow percoloation soil testin																░																																
Task 5: Final Design																	▓	▓	▓	▓	▓	▓	▓	▓	▓																							
Final layout of OWTS																	▒	▒																														
Determine onsite parameters																	▒	▒																														
Determine OWTS design criteria																	▒	▒																														
Preliminary design plans																	▒	▒	▒	▒																												
Final design plans																					▒	▒	▒	▒																								
Final design plan approval from Soil Engineer																									▒																							
[If applicable:] Task 6: Environmental Documentation	Potentially start before grant	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒																														
Task 7: Permitting																	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓										
Subtask 7.1																	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒																						
Coordinate with regulatory agencies to determine permitting requirements																	░	░	░	░	░	░	░	░	░	░																						
Determine on-site subsurface discharge																	░	░	░	░	░	░	░	░	░																							
Subtask 7.2																											▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒										
Compile other design plans																											░	░	░	░																		
Submit final compiled design plans																														░																		
Incorporate agency comments into revised design plan																																░	░	░	░													
Submit revised design plan																																			░													
Obtain CUP																																				░	░	░										
Task 8: Construction Contracting																										▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓							
Bidding																										▒																						
Bid evaluation																											▒	▒	▒																			
Contract award																														▒																		
Contract execution																															▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒							
Task 9: Construction/Implementation																										▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓							
Subtask 9.1																										▒	▒	▒	▒	▒	▒	▒																
Development of O&M Guidelines																										░	░	░	░	░	░																	
O&M training workshops																																░																
Subtask 9.2																																							▒	▒								
Installation of OWTS																																							░	░								
Installation of pipelines																																							░	░								
Subtask 9.3																																									▒							
Removal/Abandonmnet of failing OWTS																																									░							
[If applicable:] Task 10: Environmental Compliance/Mitigation/Enhancement	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒	▒
Task 11: Construction Administration																										▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓	▓							

▓	Task
▒	Task-level activity
▒	*Subtask*
░	Subtask-level activity

Construction/Implementation Contingency

The Construction/Implementation Contingency costs for the *Regional Program for Septic System Rehabilitation* **[Project title]** are estimated to be **[costs]**. This was estimated to be approximately 10% of the total project budget. This value was based on **[Project sponsor]** experience and standard industry practice.

Table X: Construction/Implementation Contingency

Category	Contingency Percentage	Total ($)	Funding Match	Grant Request
Construction/Implementation Contingency	10%			
	Row (h) Total			

Grand Total

The Grand Total for the *Regional Program for Septic System Rehabilitation* **[Project title]** project is **[total project costs]**, calculated as the sum of rows (a) through (h).

Table X: Grand Total Costs

Row	Budget Category	Total Costs
GA	Grant Administration	
(a)	Direct Project Administration Costs	
(b)	Land Purchase/Easement	
(c)	Planning/Design/Engineering/ Environmental Documentation	
(d)	Construction/Implementation	
(e)	Environmental Compliance/ Mitigation/Enhancement	
(f)	Construction Administration	
(g)	Other Costs (Including Legal Costs, Permitting and Licenses)	
(h)	Construction/Implementation Contingency	
(i)	**Grand Total**	

2.1.14 Schedule

The project schedule for the *Regional Program for Septic System Rehabilitation* **[Project title]** was developed from the Work Plan (**[reference Work Plan location]**), and includes anticipated start and end dates, as well as milestones for each work plan task. **[Note: grant application may require actual dates, not just lengths of time from grant start date, schedule included here is to provide the minimum time required to complete each task. Timing will vary depending on specific tasks, site characteristics, number of sites, and project sponsor's ability to front the funding to complete each task. Project sponsor may choose to add time to tasks to provide for unexpected delays]**