1 Purpose

The purpose of this technical memorandum (TM) is to document the process for identifying disadvantaged community (DAC) areas in the Lahontan Basins Region and to compile and summarize the existing water quality, supply, and flooding information available for DACs[1]. The findings of this TM will be used to develop a conceptual monitoring plan for DAC areas in the region.

2 DAC Background

A DAC under the Integrated Regional Water Management (IRWM) Program is defined as a community with a median household income (MHI) less than 80% of the statewide average. An MHI of less than $48,706 is the IRWM DAC threshold from the 2012 Proposition 84 Guidelines.

Within the Lahontan Basins Region IRWM stakeholder group, a RWMG Outreach committee was formed to assist with data collection, outreach efforts, and project solicitation in DAC areas. The committee was composed of volunteer members representing a diverse cross section of the active stakeholders including DACs, the California Department of Water Resources (DWR), and mutual water companies. The members soon developed and implemented a multifaceted outreach campaign to support the IRWM Plan that would more actively address the needs of DACs. Overall, the two main goals of the committee were to:

- Encourage participation by DACs and solicit input (including potential projects) into the Lahontan Basins IRWM Plan
- Educate target audiences in DAC areas about the purpose and benefits of the Lahontan Basins
  IRWM Plan

3 Determination of DAC Areas

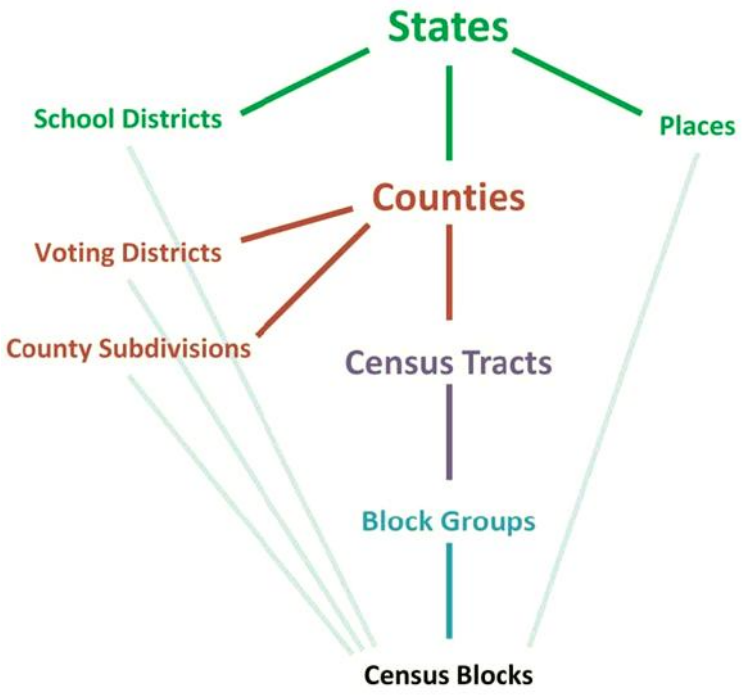
This section provides a short background on the types of census data that are available for determining DAC areas and it then discusses how two DAC maps were developed for the region. Finally, a description of DAC outreach efforts is provided.

[1] As recommended in the 2012 DWR IRWM Grant Program Guidelines, Appendix G.

3.1 Background of Census Data

United States Census data is organized in multiple ways. The most basic unit of measurement is the "block". Census blocks are used to make up larger areas of organization, such as block groups, tracts, and up to counties, states and nations. This sequence of organization is used by the Census Bureau for statistical analysis. Another unit of organization that is also built from Census blocks is called a Census "Place". Census places are areas that have a particular identity or meaning for local residents. For example, an unincorporated area that is a town could be a Census place. A Census place is simply another way to organize blocks. Figure 1 below illustrates multiple ways that are used to organize Census blocks.

Figure 1: Organization of Census Blocks



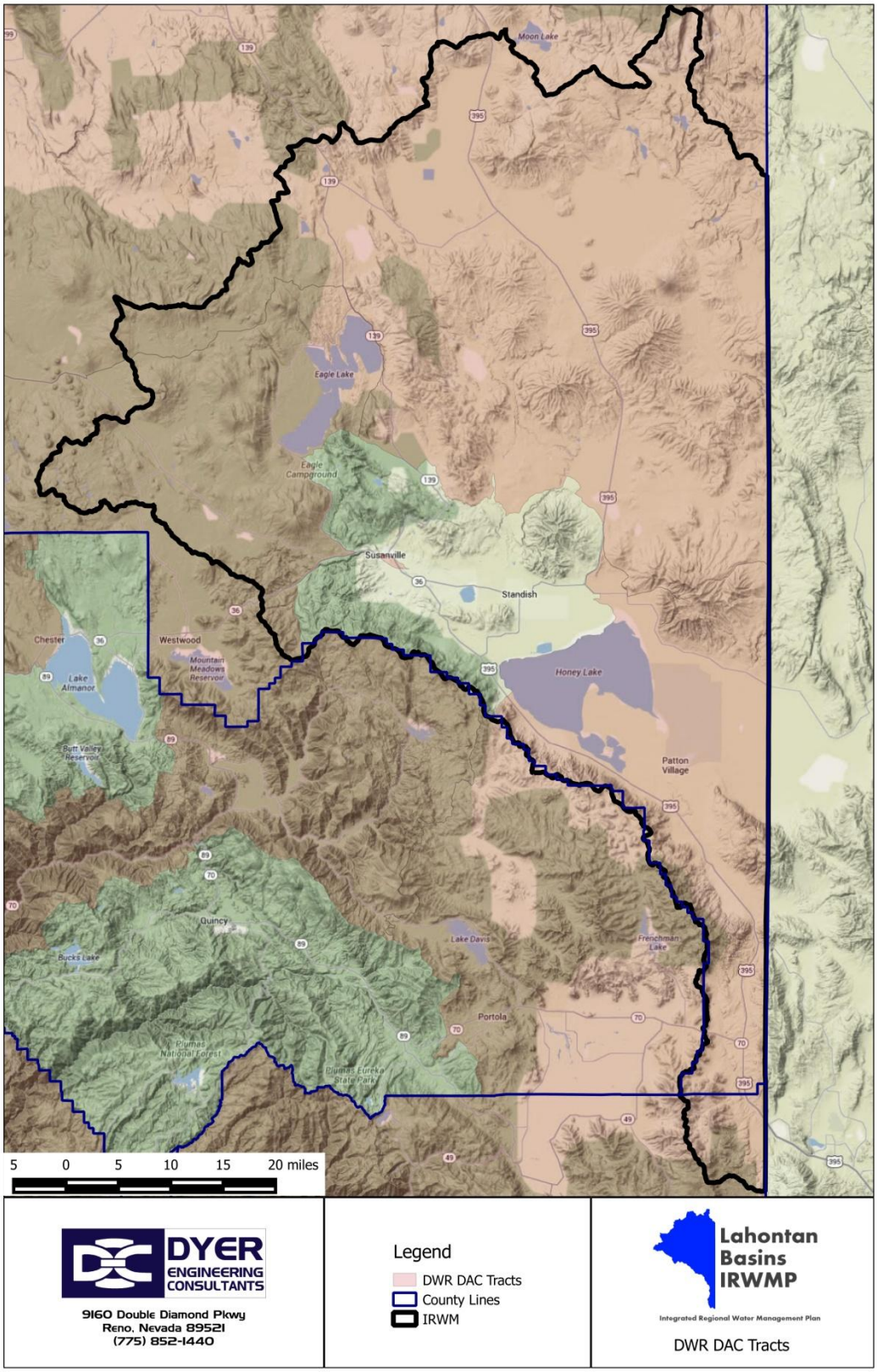
3.2 DAC Maps Developed for the Lahontan Basins Region

The Department of Water Resources (DWR) developed a mapping tool to help determine which communities within the IRWM region meet the DAC MHI definition.[2] The maps and GIS files were derived from the US Census Bureau's American Community Survey (ACS) for the five year period 2006-2010. The initial DAC map was drafted using Census Place GIS data from DWR, which provided a larger scale overview of the DAC areas within the Lahontan Basins IRWM Region. After an initial review of the Lahontan Basins IRWM DAC map that was

[2] As defined by the Department of Water on the Integrated Regional Water Management Site: http://www.water.ca.gov/irwm/grants/resourceslinks.cfm

subsequently shared with the RWMG committee and Stakeholder group, a second map was developed using Census Block GIS data from DWR. The Census Block GIS data provided DAC information at the smallest geographic unit available. The result was that more DAC areas within the Lahontan Basins IRWM Region were captured than had previously been captured using the Census Places GIS data. The Census Block GIS data was further defined to include the population density (people per square mile) within the Lahontan Basins IRWM Region (Figure 3). For the purposes of DAC outreach, it was decided that the Census Block information would be used since it provides a more inclusive accounting of DAC areas.

Figure 2 Lahontan Basins IRWM Disadvantaged Communities as defined by Census Blocks



3.3 DAC Outreach Efforts

After the various DAC areas were identified, a coordinated effort was initiated to provide outreach. Initial contact was made with representatives from City of Susanville, Lassen County, Sierra County, Honey Lake Valley RCD, Lassen Irrigation Company, Susanville Indian Rancheria, and others. Subsequent presentations at local community meetings were also arranged. In addition to PowerPoint presentations, handouts were provided at each meeting that included detailed schedules, project eligibility criteria, IRWM Plan goals, plan objectives, and technical assistance listings with contact information. At these meetings, data was requested on any water resource issues and DAC projects that could be eligible for Prop 84 grant funding. Calls were also conducted with representatives of several of the DAC areas.

4 DAC Issues

This section describes the methodology for identifying water supply, water quality, and flooding issues in the DAC areas discussed in Section 3.

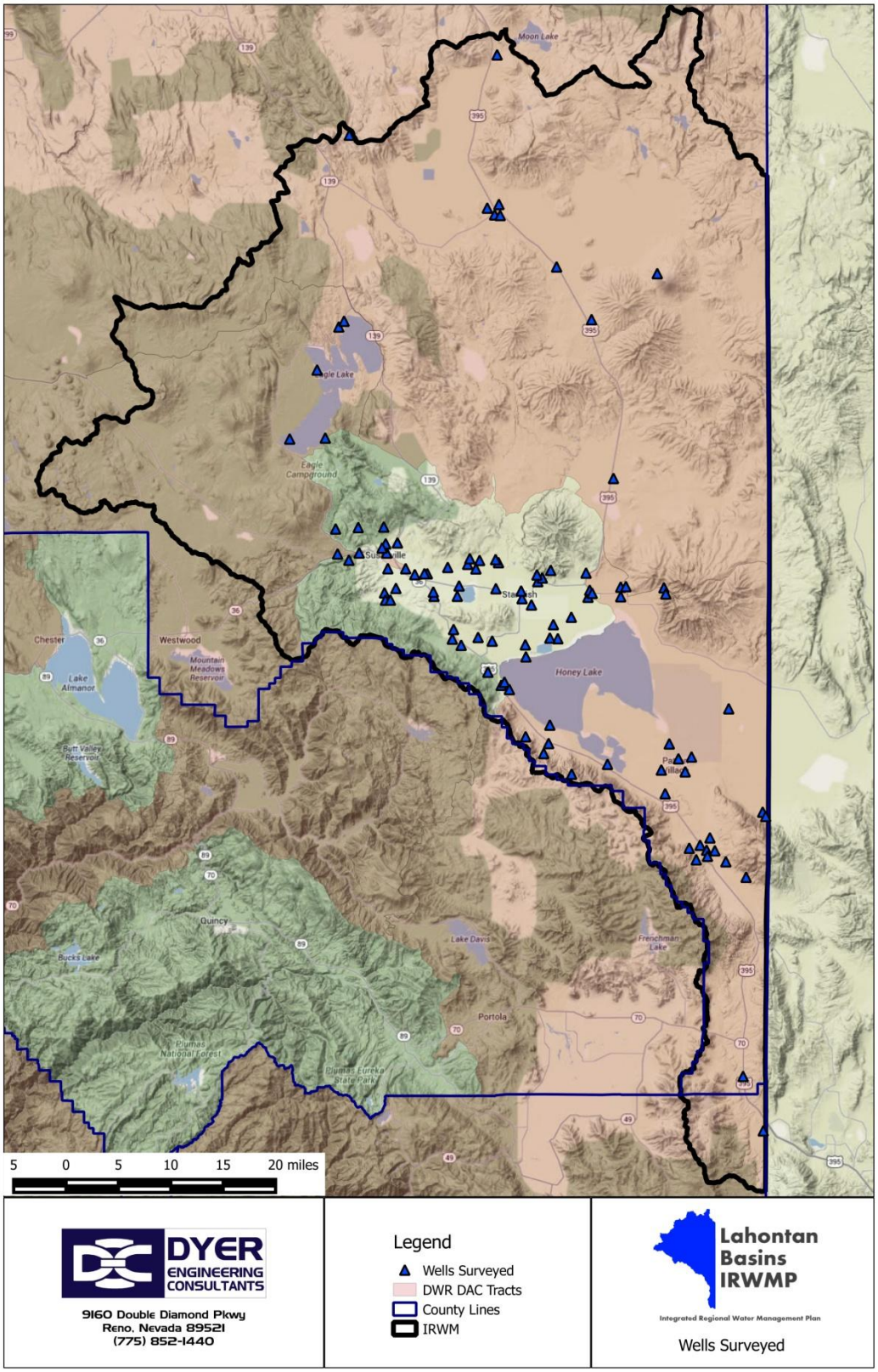
4.1 Water Supply

To identify water supply issues in each of the DAC areas, the consultant team contacted water agencies that served each area and verified the information with available Water Management Plans. In general, DAC areas rely on groundwater pumped from wells. Water supply issues in specific DAC areas will be documented in a subsequent DAC TM.

4.1.1 Groundwater Supply

Groundwater supplies for DAC areas are mainly impacted by water quality and aging well infrastructure. Specific arsenic water quality issues as well as general water quality concerns are described in Section 4.2. The region relies on groundwater to meet a significant portion of its water demand. Figure 4 shows the locations of groundwater wells throughout the region in relation to DAC areas.

Figure 3 - Wells in Relation to DAC Areas



4.2 Water Quality

To identify water quality issues in each of the DAC areas, the consultant team contacted water agencies that served each area and documented the information using the Geotracker Groundwater Ambient Monitoring Assessment (GAMA) and National Water Quality Monitoring Council (NWQMC) database. The GAMA program is California's comprehensive groundwater quality monitoring program. GAMA collects data by testing untreated, raw water in different types of wells for naturally-occurring and manmade chemicals (State Water Resources Control Board N.D.)[3]. The test results are complied with existing groundwater quality data from several agencies into a public accessible database (State Water Resources Control Board). The GAMA program was created by the State Water Board in 2000 and its main goals are to: 1) improve statewide groundwater monitoring and 2) increase the availability of groundwater quality information to the public. The NWQMC is a portal to access stored data in various large water quality databases (NWQMC N.D.). The available databases through this portal are the USGS NWIS and USEPA STORET. The USGS NWIS collects water resource data from approximately 1.5 million sites throughout the United States (NWQMC N.D.). These data are updated every 24 hours (NWQMC N.D.). USEPA STORET is a data warehouse for water quality, biological, and physical data used by state environmental agencies, the Environmental Protection Agency, other federal agencies, universities, private citizens, and others (NWQMC N.D.). STORET data is updated weekly (NWQMC N.D.).

The Lahontan Basins IRWM groundwater well water quality data from both the GAMA and NWQMC databases were downloaded into an excel format. The groundwater well water quality data were screened using the California maximum contaminant levels (MCL) for drinking water and national secondary drinking water standards (which match California's secondary maximum contaminant levels for the contaminants examined). Table 1 and Table 2 list all the drinking water contaminants screened for groundwater well water quality data (if information was available). All groundwater supply wells and the contaminants exceeding the MCL and/or national secondary drinking water regulations are shown in the tables below. In addition, groundwater wells exceeding selected California MCL and/or the national secondary drinking water regulations located in DAC areas within the Lahontan Basins IRWM are mapped in Figures 7 though 10.

[3] Source: http://www.waterboards.ca.gov/gama/

Table 1 California Primary MCLs

Contaminant	MCL(mg/L)	Effective Date
	Inorganic	
Aluminum	1 0.2[4]	2/25/1989 9/8/1994
Antimony	0.006	9/8/1994
Arsenic	0.05 0.010	1977 11/28/2008
Asbestos	7 MFL[5]	9/8/1994
Barium	1	1977
Beryllium	0.004	9/8/1994
Cadmium	0.010 0.005	1977 9/8/1994
Chromium	0.05	1977
Copper	1[6] 1.3[7]	1977 12/11/1995
Cyanide	0.2 0.15	9/8/1994 6/12/1903
Fluoride	2	4/1998
Lead	0.05[8] 0.015[9]	1977 12/11/1995
Mercury	0.002	1977
Nickel	0.1	9/8/1994
Nitrate as NO_3	45	1977
Nitrite (as N)	1	9/8/1994
Total Nitrate/Nitrite (as N)	10	9/8/1994
Percholrate	0.006	10/18/2007
Selenium	0.01 0.05	1977 9/8/1994
Thallium	0.002	9/8/1994
	VOCs	
Benzene	0.001	2/25/1989
Carbon Tetrachloride	0.0005	4/4/1989
1,2 - Dichlorobenzene	0.6	9/8/1994
1,4 - Dichlorobenzene	0.005	4/4/1989
1,1 - Dichloroethane	0.005	6/24/1990
1,2 - Dichloroethane	0.0005	4/4/1989
1,1 - Dichloroethylene	0.006	2/25/1989
Cis - 1,2 - Dichloroethylene	0.006	9/8/1994
Trans - 1,2 - Dichloroethylene	0.01	9/8/1994

[4] Secondary MCL
[5] MFL=million fibers per liter, with fiber 3enth>10 microns 9/8/94
[6] Secondary MCL
[7] Regulatory Action Level; if system exceeds, it must take certain actions such as additional monitoring, corrosion control studies and treatment, and for lead, a public education program, replaces MCL.
[8] The MCL for lead was rescinded with the adoption of the regulatory action level described in footnote 4.
[9] Secondary MCL

Dichloromethane	0.005	9/8/1994
1,3 - Dichloropropene	0.0005	2/25/1989
1,2 - Dichloropropane	0.005	6/24/1990
Ethylbenzene	0.68 0.7 0.3	2/25/1989 9/8/1994 6/12/2003
Methyl-tert-butyl ether (MTBE)	0.005[10] 0.013	1/7/1999 5/17/2000
Monochlorobenzene	0.03 0.07	2/25/1989 9/8/1994
Styrene	0.1	9/8/1994
1,1,2,2 - Tetrachloroethane	0.001	2/25/189
Tetrachloroethylene	0.005	5/1989
Toluene	0.15	9/8/1994
1,2,4 - Trichlorobenzene	0.07 0.005	9/8/1994 6/12/2003
1,1,1 - Trichloroethane	0.2	2/25/1989
1,1,2 - Trichloroethane	0.032 0.005	4/4/1989 9/8/1994
Trichloroethane	0.005	2/25/1989
Trichlorofluoromethane	0.15	6/24/1990
1,1,2 - trichloro - 1,2,2 - Trifluoroethane	1.2	6/24/1990
Vinyl Chloride	0.0005	4/4/1989
Xylenes	1.750	2/25/1989
	Disinfection Byproduct	
Total Trihalomethanes	0.1 0.080	3/14/1983 6/17/2006
Haloacetic acids (five)	0.060	6/17/2006
Bromate	0.010	6/17/2006
Chlorite	1.0	6/17/2006

Sources: California Department of Public Health – Maximum Contaminant Levels and Regulatory Dates for Drinking Water. November 2008. Available: http://www.cdph.ca.gov/certlic/drinkingwater/Documents/DWdocuments/EPAandCDPH-11-28-2008.pdf

Table 2 Secondary Drinking Water Regulations

Contaminant	Secondary Drinking Water Regulations
Chloride	250 mg/L
Color	15 Color units
Manganese	0.05 mg/L
Iron	0.3 mg/L
Sulfate	250 mg/L
TDS	500 mg/L
Turbidity	0.5 NTU (Nephelometric Turbidity Units)

[10] Secondary MCL

Source: United States Environmental Protection Agency. Drinking Water Contaminants – Secondary Drinking Water Regulations. Last updated June 5, 2012. Available: http://water.epa.gov/drink/contaminants/index.cfm

Table 3 NWQMC Groundwater Wells in DAC Areas with Water Quality Issues

Well ID	Water Quality Exceedances
1800534-001	Mn, Iron
1800599-001	Mn, Iron
22N17E23Q001M	As
22N17E26H002M	As
28N13E25L001M	Nitrate
28N14E08J001M	Iron
29N13E01N001M	As, Nitrate
29N13E16A003M	TDS, Sulfate
29N14E18R001M	As ,Iron, Nitrate
29N14E19A003M	As , Iron, Nitrate
29N14E20A003M	As
29N15E21N001M	Iron
29N15E30A003M	As, Mn, Iron
31N15E26N001M	Iron
CAMP-HL-06	Nitrate
CAMP-HL-07	Mn
CAMP-HL-09	Mn
CAMP-HL-10	Mn, Iron
CAMP-HL-11	As , Mn
CAMP-HL-15	As
SGMW-12D	Sulfate
SGMW-9S	Chromium, Sulfate
SL0603521701	As , Mn, Iron
T0603500032	As , Mn, Iron, TDS
T0603555508	Iron
W0601800503	Mn
W0601800524	Mn
W0601800531	Nitrate
W0601800573	As
W0601805004	As, Mn
W0601810004	Iron
W0601810700	Mn, Iron, Nitrate
WQ2	Sulfate

Figure 4 Wells Exceeding Arsenic MCL

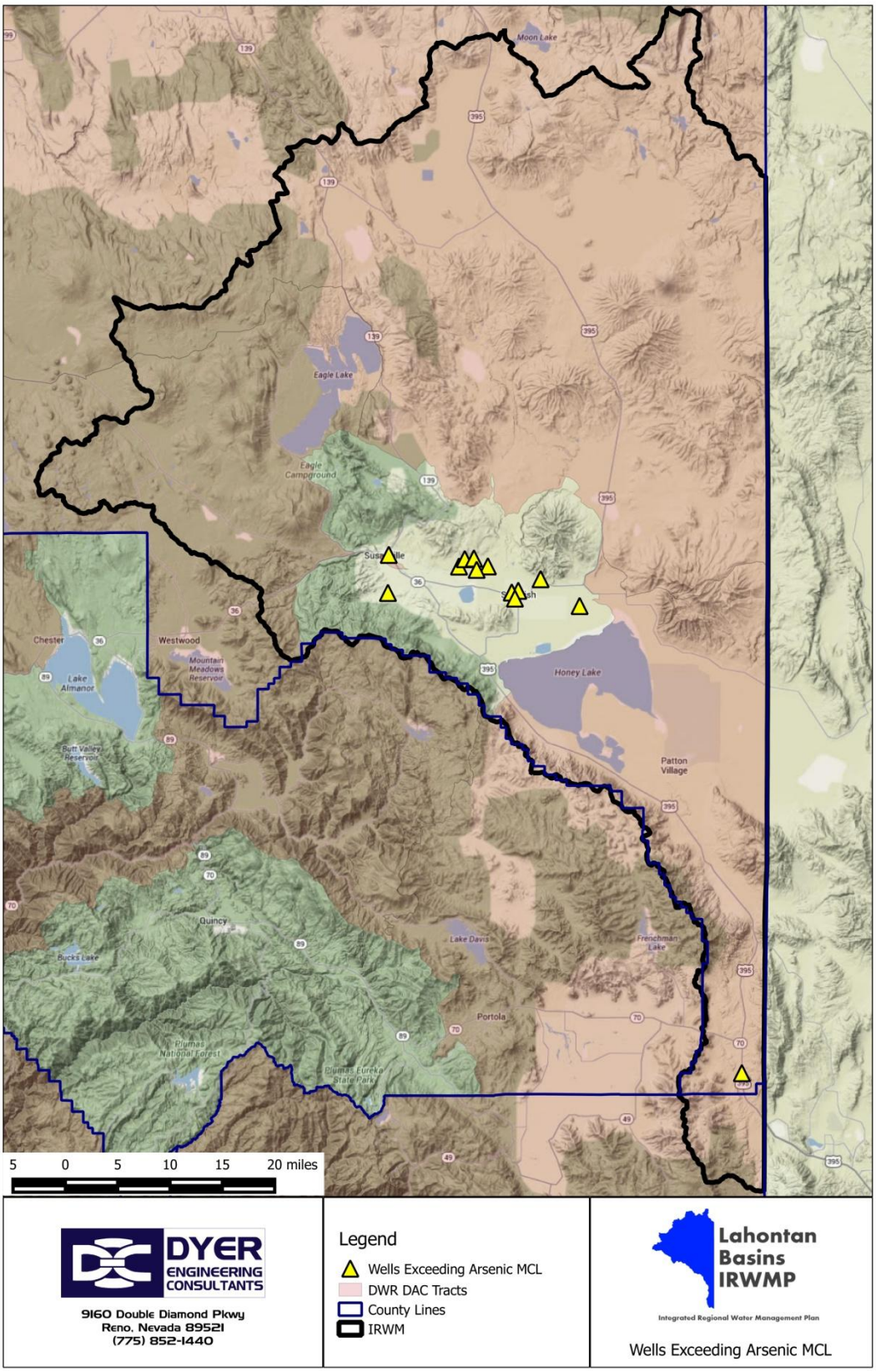


Figure 5 Well Metals Exceedance

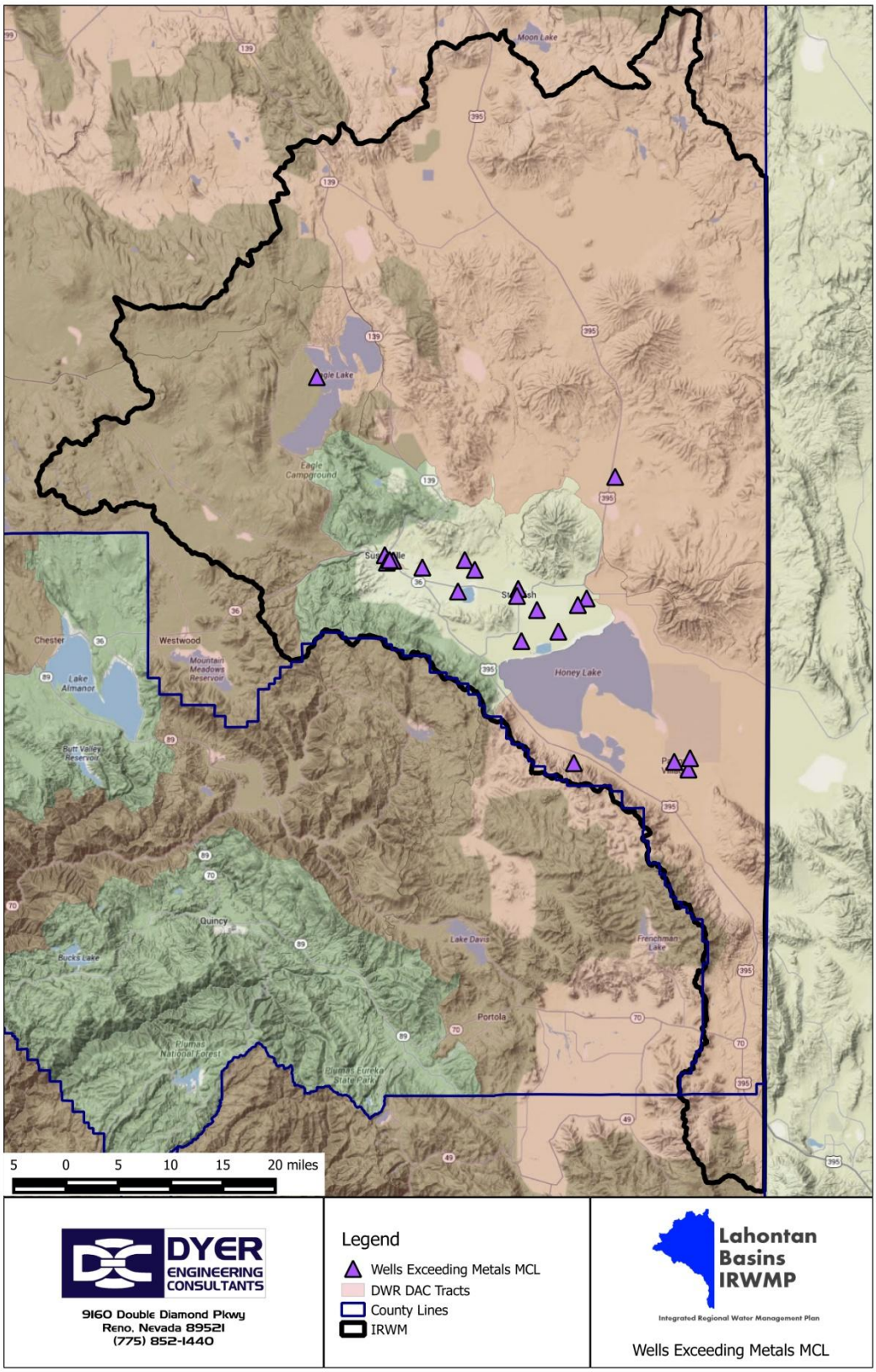


Figure 6 Well Nitrate/Nitrite Exceedance

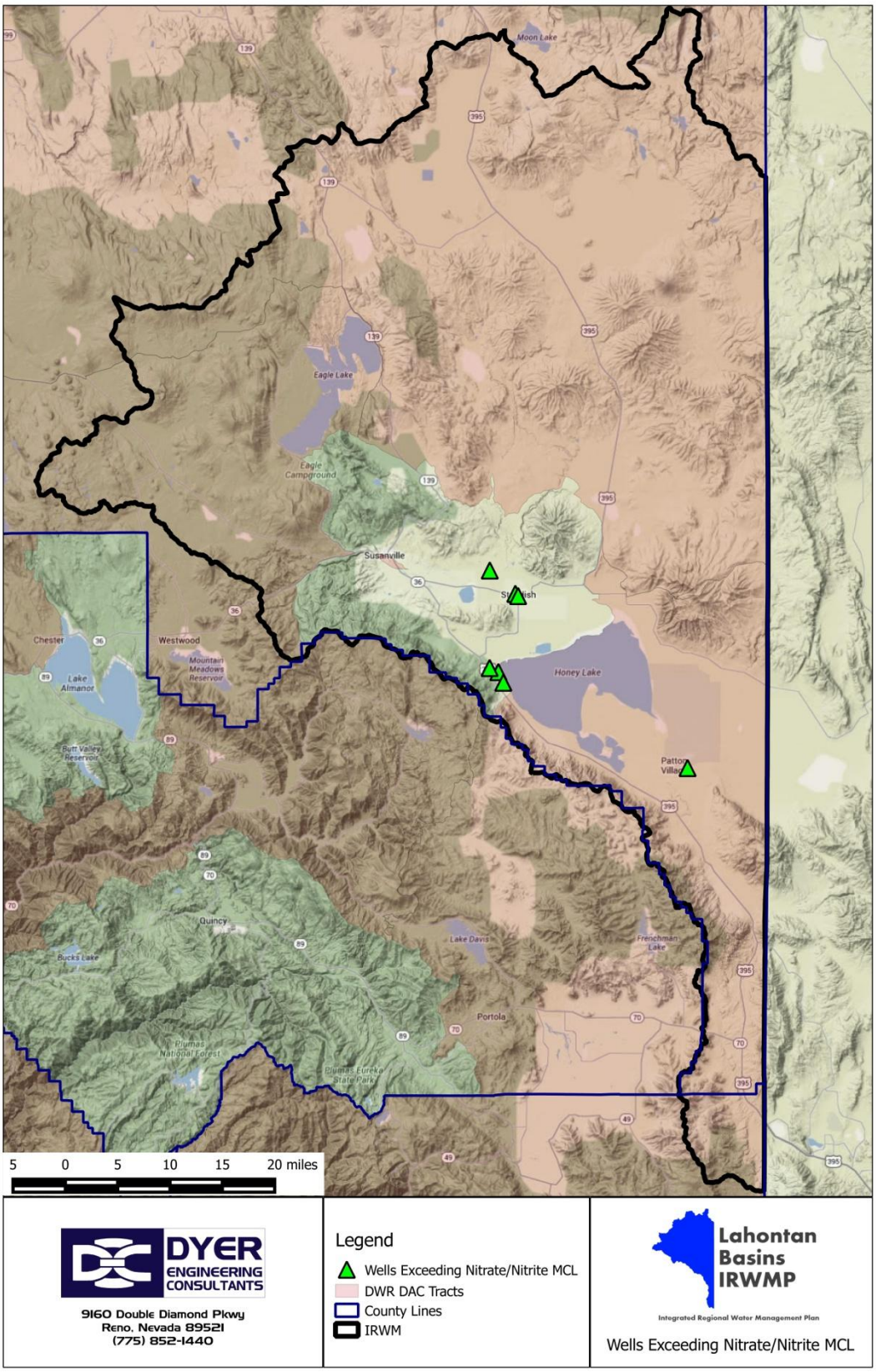
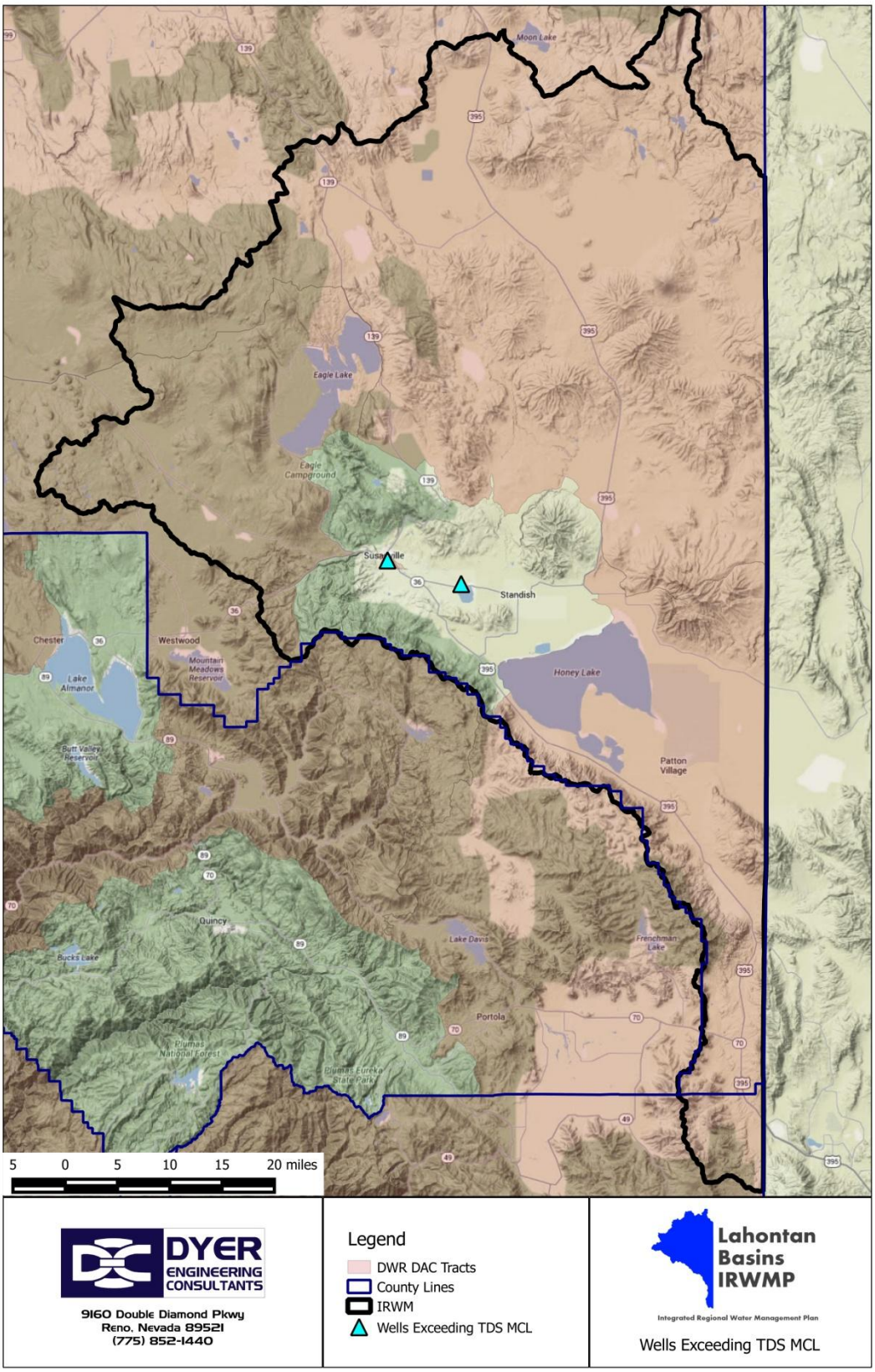


Figure 7 Well TDS Exceedance



A total of 14 groundwater wells located in DAC areas within the Lahontan Basins IRWM have documented exceedances of California MCLs and/or the national secondary drinking water standards.

One of the common water quality issues in DAC areas is high arsenic. The Environmental Protection Agency (EPA) replaced the previous standard for arsenic in drinking water of 50 parts per billion (ppb) with a 10 ppb limit (EPA, 2012).[11] This new rule became effective on February 22, 2002 (EPA, 2012). The California Department of Public Health revised the drinking water standard for arsenic (DPH-04-017) and adopted the amended the California Code of Regulations, Title 22, Chapter 15, Section 64431(a) on November 28, 2008 to comply with the new federal MCL of 10 ppb for arsenic (CDPH, 2008).[12] DAC areas in the Lahontan Basins IRWM have arsenic concentrations that exceed the maximum contaminant level (mcl) of 10 ppb in much of the groundwater supply and must be reduced by either blending or treatment. Facilities are needed to allow DACs to blend or treat high-arsenic groundwater.

4.3 Flooding

To identify flooding issues in each of the DAC areas, the consultant team contacted water agencies that served each area and substantiate the information with documentation from the State FloodSAFE database as described in the *Integrated Flood Management Plan* prepared for the Lahontan Basins IRWM Region in 2015. Flooding information was supplemented with localized flood information provided by the City of Susanville and the Lassen County Department of Public Works.

Currently flooding has occurred at Carroll Street during Susan River high water events at various times. The City has a temporary flood wall erected out of K-rail and sandbags. Construction of a permanent flood wall would provide permanent safety to residents from flooding.

5 Monitoring Studies Needed

This section describes additional monitoring studies that could be performed in DAC areas that would support the implementation of future projects. Studies related to DAC issues are eligible for grant funding under the Proposition 84 implementation program as well as subsequent grant programs.

[11] Source: http://water.epa.gov/lawsregs/rulesregs/sdwa/arsenic/regulations_factsheet.cfm
[12] Source: http://www.cdph.ca.gov/certlic/drinkingwater/Pages/Arsenic.aspx

5.1 Water Supply

Monitoring of water supply availability and reliability in DAC areas may be improved by tracking reported supply volumes in the various Urban Water Management Plans (UWMPs) or comparable plans developed for water suppliers that serve 3,000 AFY or more in the Lahontan Basins. Currently the only UWMP that exists in the Lahontan Basins is that of the City of Susanville. Water served to DAC areas may be approximated by proportioning the total AFY served inside the various service areas to the percentage of DAC area inside the service areas. For water suppliers that serve less than 3,000 AFY, a survey of supply records may be conducted to approximate the amount of supply provided to DAC areas.

In addition, condition assessments of aging wells, treatment systems, and pipelines may be conducted to determine the needs for new or improved infrastructure to maintain the supply capabilities for service to DAC areas.

5.2 Water Quality

Since the majority of water supplied to DAC areas comes from groundwater, monitoring of water quality issues in DAC areas may be improved by mapping data from the State Water Resources Control Board Groundwater Ambient Monitoring Assessment (GAMA) and National Water Quality Monitoring Council (NWQMC) databases over time to track changes. These data would provide information about the trends for various water quality parameters in local groundwater supplies.

Water quality data may also be compiled from large and small drinking water purveyors to track the trends in potable water served to DAC customers from both imported and groundwater supplies.

5.3 Flooding

Monitoring of flooding issues may be improved by developing a region-wide database of recorded flood incidents that are managed by municipal and county maintenance crews. This type of database could be used to correlate storm intensity to flood locations and flood depths in various parts of the region. Maintenance staff at Lassen County, and the city of Susanville would need to become partners in this effort. Regional Public Utility Districts (PUD) and Community Service Districts (CSD) would also need to be a partner in this effort as these entities already have collected flood data for storm events that impact activities around the region. Flood management may be improved in DAC areas by incorporating regional integrated flood management strategies, including adaptive management strategies for climate change, into the

2015 IRWMP. The Update may also include recommendations for a policy mechanism.

1 Purpose

The purpose of this technical memorandum (TM) is to provide an assessment of data gaps that exist in disadvantaged communities (DAC) with regard to water quality, water supply, and flood protection. The document builds upon the information presented in the DAC Water Supply, Quality, and Flooding Data TM. The water resource areas with the most urgent issues are included as a part of this monitoring plan.

2 Background

Historically, the Lahontan Basins DAC areas have experienced issues that are similar to other DAC areas throughout the state. Below is a summary of these issues which are described in more detail in the DAC Water Supply, Quality, and Flooding Data TM.

Water Supply

To identify water supply issues in each of the region's DAC areas, the consultant team contacted water agencies that served each are and verified the information with available 2010 Urban Water Management Plans (UWMPs) which only exists for the City of Susanville. In general, DAC areas rely on groundwater pumped from wells. The outreach and research conducted as part of the DAC Water Supply, Quality, and Flooding Data TM found that the region faces the following two issues in regards to water supply:

- Suppliers that serve 3,000 AFY or less do not have to submit UWMPs to the state. Therefore, data on supply volumes served to DACs is frequently not readily available.

- Little data is available on the conditions of aging wells, treatment systems, and pipelines, particularly for purveyors in DACs who don't have the staff time or funds to conduct such an assessment.

Water Quality

To identify water quality issues in each of the DAC areas, the consultant team contacted water agencies that served each area and documented the information using Geotracker Groundwater Ambient Monitoring Assessment (GAMA) and National Water Quality Monitoring Council (MWQMC) database. As part of the research conducted under the DAC Water Supply, Quality,

and Flooding Data TM, the Lahontan Basins IRWM groundwater well water quality data from both the GAMA and NWQMC databases were downloaded into an excel format. The groundwater well water quality data were screened using the California maximum contaminant levels (MCL) for drinking water and national secondary drinking water standards (which match California's secondary maximum containment levels for the containments examined). This research found that the region faces the following two issues in regards to water quality:

- Groundwater quality data is available from a number of monitoring efforts, but a mapping analysis of the groundwater quality issues affecting DACs has not been completed

- Analysis of local surface water and imported water quality issues as they relate to DACs has not been conducted

Flood Protection

To identify flooding issues in each of the DAC areas, the consultant team contacted water agencies that served each area and substantiated the information with documentation from the State FloodSAFE database. Flooding information was supplemented with localized flood information provided by the City of Susanville, the Lassen County Department of Public Works (LCDPW). This research found that large areas identified as a flood risk, either using FEMA high risk flood zones (areas within the 100-year flood zone) or through local confirmation by LCDPW, overlap with areas identified as DACs. In the central portion of the region, the city of Susanville has many areas identified where localized flooding occurs which may impact areas identified as DACs. In general, this research effort found the following issue in regards to flood protection:

- There is no centralized database of known flooding issues in the region. Instead, flooding is tracked by municipality

3 Water Supply Data Collection and Organization

The water supply issues described above have been used to develop two monitoring objectives:

- Track volume of supplies delivered to DACs by water source and supplier

- Assess conditions of aging facilities (wells, treatment systems and pipelines) to determine need for new or improved infrastructure

The data to be collected and analyses performed to achieve these objectives are described below.

3.1 Water Supply Volumes to DACs

Objective: Track Volume of supplies delivered to DACs by water source and supplier

Monitoring of water supply availability and reliability in DAC areas may be improved by tracking reported supply volumes in the various Urban Water Management Plans (UWMPs) and Agricultural Water Management Plans (AWMPs) developed for water suppliers that serve 3,000 AFY or more in the Lahontan Basins. Water served to DAC areas may be approximated by proportioning the total AFY served to the various service areas to the percentage of DAC area inside the service areas. For water suppliers that serve less than 3,000 AFY, a survey of supply records may be conducted to approximate the amount of supply provided to DAC areas.

Collection of this data will require tracking of UWMP completion for each water district in Lahontan Basins, as well as requests for annual reports submitted to the State Water Resources Control Board with the Division of Drinking Water which include the volume of water produced for consumption. The portion of supply delivered to DACs may be estimated by assuming that demand is equivalent to supply delivered, and applying the percentage of demand in DAC areas to total supply.

Water supply volumes delivered to DACs could be calculated on an annual basis based on annual CDPH reports, with a more detailed analysis completed every five years based on UWMPs/AWMPs. This data should be organized into a spreadsheet that tracks water supplies delivered to each water district for each year, if possible.

3.2 Water Supply Facility Conditions Assessment

Objective: Assess conditions of aging facilities (wells, treatment systems and pipelines) to determine need for new or improved infrastructure

Monitoring of supply facilities can be achieved by conducting condition assessments of aging wells, treatment systems, and pipelines to determine the needs for new or improved infrastructure to maintain the supply capabilities for service to DAC areas. Currently there is a Capital Improvements Plan that was conducted for the Honey Lake Valley, but this assessment is limited to agricultural water conveyance structures. Given that these facilities are managed by individual water suppliers, each supplier will need to complete condition assessments of its own facilities and provide the results to the region.

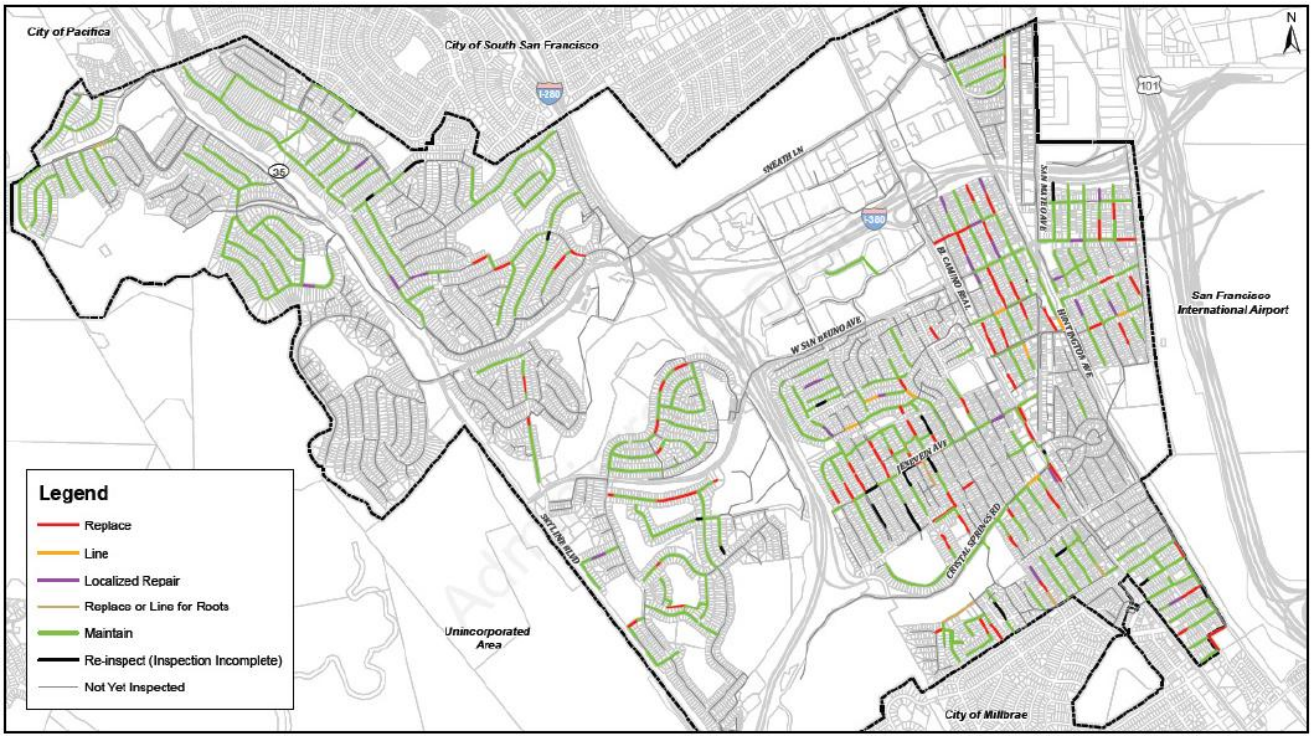
Wells and treatment systems can be assessed onsite for their physical condition and functionality.

Physical condition relates to the appearance (e.g. apparent wear and corrosion) and operating characteristics (e.g. noise, vibration and temperature) of the facility. Functionality relates to the ability of the piece of equipment to accomplish its purpose.

Pipeline assessment will require CCTV be performed, and the video observed at a later date by a professional trained in pipeline assessment. For example, the National Association of Sewer Service Companies (NASSCO) provides training and standardized methods for assessing sewer pipelines for various structural (e.g. cracks, holes or collapses) operational/maintenance issues (e.g. roots, deposits and infiltration). This same level of assessment can be completed for water supply pipelines.

Once the assessment is completed, the structural and operational/maintenance issues can be prioritized by severity to determine where there is greatest need for new or improved infrastructure. An example of this type of assessment for pipelines is shown in Figure 1. This prioritization can be based on a number of aspects, including: severity of structural issues, severity of operational/maintenance issues, size or flow through the facility, size of area served by the facility, remaining useful life of the facility, and cost to repair or replace.

Figure 8 Sample Pipeline Condition Assessment Map



4 Water Quality Data Collection and Organization

The water quality issues described above have been used to develop two monitoring objectives:

- Track the quality of drinking water delivered to DACs
- Map groundwater quality issues in DACs to determine areas of poor groundwater quality and need for treatment

The data to be collected and analyses performed to achieve these objectives are described below.

4.1 Water Quality Data Tracking

Objective: Track the quality of drinking water delivered to DACs

The quality of drinking water delivered to DACs may be monitored by compiling water quality reports from large and small drinking water purveyors submitted to CDPH on an annual basis. The specific data to be collected is shown in Table 1. The quality data to be collected is based on water supplies (typically groundwater wells) that have exceeded maximum containment levels (MCLs) and secondary drinking water standard within the past ten years.

The data should be compiled using a spreadsheet that tracks the quality of finished water delivered to customers, and if possible, the quality of each water supply.

Table 1: Drinking Water Quality Data to be Collected

Constituent concentration data to be collected	MCL or Secondary Standard
Antimony	0.006 mg/L (MCL)
Arsenic	0.010 mg/L (MCL)
Chloride	250 mg/L (secondary standard)
Chromium	0.05 mg/L (MCL)
Fluoride	2 mg/L (MCL)
Iron	0.3 mg/L (secondary standard)
Manganese	0.05 mg/L (secondary standard)
Nitrate	45 mg/L (MCL)
Nitrite	1 mg/L (MCL)
Sulfate	250 mg/L (secondary standard)
TDS	500 mg/L (secondary standard)
Turbidity	0.5 NTU (secondary standard)

4.2 Groundwater Quality Mapping

Objective: Map groundwater quality issues in DACs to determine areas of poor groundwater quality and need for treatment

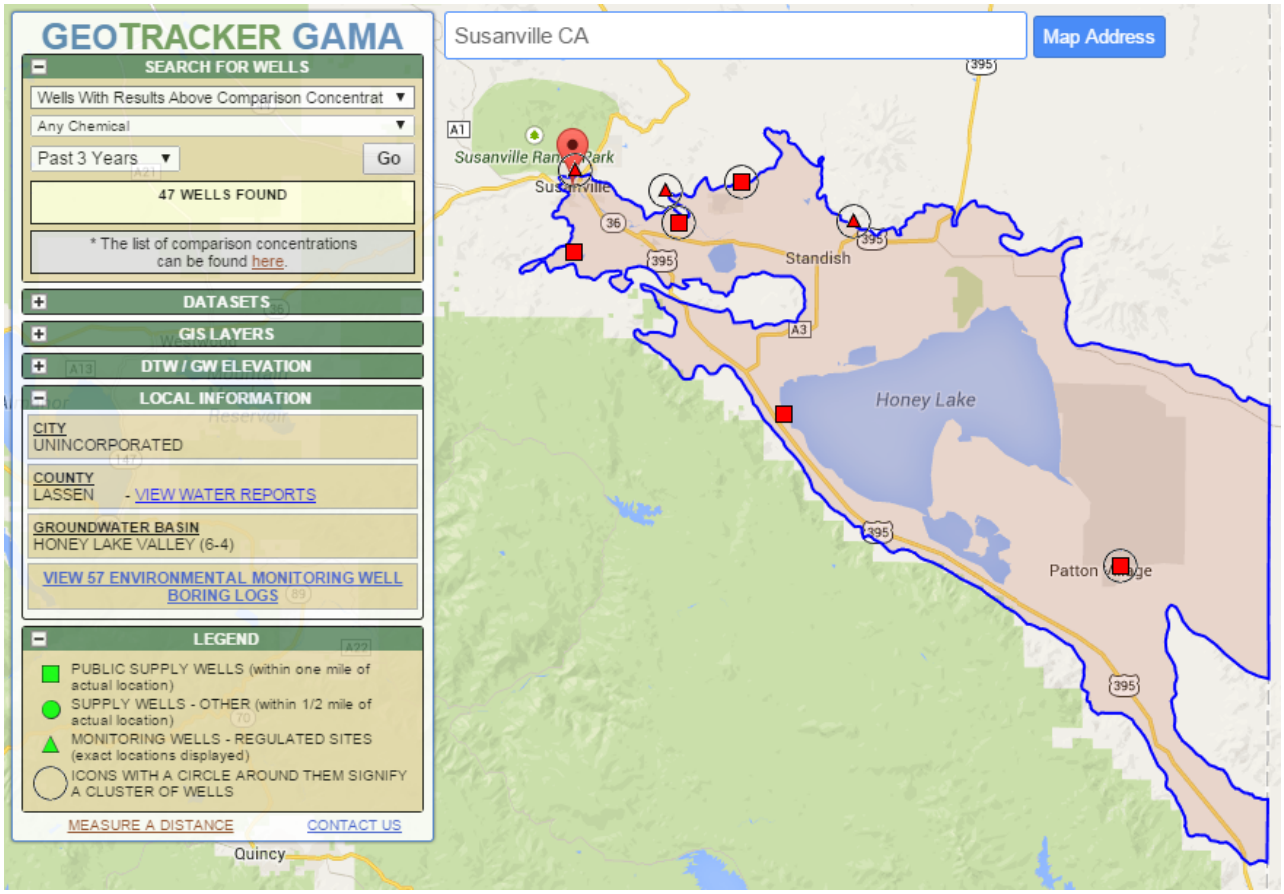
The data to be collected in order to accomplish the objective of mapping groundwater quality issues involves the collection of the water quality data listed in Table 1 by specific well. The State of California already collects water quality data by well through various databases, and compiles these databases on its GeoTracker GAMA(http://geotracker.waterboards.ca.gov/gama/) website. Detailed instructions for use of this online tool are available on the website, however, the following settings can be used to help narrow the results:

- GIS Layer: “Groundwater Basins”
- Groundwater Basin: " Honey Lake Valley (6-4)”
- Water quality data: “Wells With Results Above Comparison Concentration” OF “Any Chemical” IN THE PAST “10 YEARs”

The resulting data can then be exported to a .zip file containing a spreadsheet with water quality data available for each well that can then be sorted according to constituent, and mapped using well coordinates also provided in the spreadsheet. Once the well points are mapped, a GIS analysis can be completed using spatial analysis tools available in programs such as QGIS Spatial Analyst tool that can interpolate data between points to show water quality constituent concentrations across the region as well as changes in concentration.

This level of analysis should be done on an annual basis to track changes in the quality of groundwater. Tracking groundwater quality to this level of detail will allow the region to create maps of water quality over time throughout the Lahontan Basins.

Figure 9 GeoTracker GAMA Sample Query



5 Flood Monitoring Data Collection and Organization

The flooding issues described above have been used to develop the following objective:

Objective: Track flood incidents in DACs to determine need for flood infrastructure improvements

Monitoring of flooding issues may be improved by developing a region-wide database of recorded flood incidents that are managed by municipal and county maintenance crews. This type of database could be used to correlate storm intensity to flood locations and flood depths in various parts of the basin. Maintenance staff at Lassen County and the city of Susanville would need to become partners in this effort.

The data collected from each entity would need to include:

- Flood incident date and location
- Storm intensity

- Flood depth, if applicable

It should be noted that there is little data available for Lassen County, meaning that a part of the flood monitoring effort will involve implementation of a program to track flood issues in the Lassen County portion of the region.

The flood data that is collected can be compiled into a region-wide database to allow for tracking of incidents over time. Analysis of this data will involve mapping of the flood locations to better understand where the greatest needs are for flood infrastructure improvements.

6 Data Dissemination and Reporting

The overarching goals of monitoring the above described data is the development of projects to improve the water supply, water quality and flood conditions in DACs, and the incorporation of the analysis results into water resources management. Given these goals, it is important for the region to make the results of the data analyses available to stakeholders in the region. The dissemination and reporting of the collected data and associated analyses can be accomplished through the following mechanisms:

- Upload of data and analyses to the http://honeylakevalleyrcd.us/irwm/ (annually)
- Presentation of analysis results at regular stakeholder meetings (annually)
- Incorporation of data into future updates of the Lahontan Basins IRWM Plan (every five years)

By disseminating and reporting on the collected data and analyses on an annual basis, water resource management agencies can incorporate the latest regional data into their planning efforts.