Attachment 4: Project Description

The following attachment provides a complete, detailed description of the proposed project consistent with the *Guidelines and Proposal Solicitation Package Local Groundwater Assistance Grant Program May 2012* (California Department of Water Resources, May 2012).

4.1 Background

Over the past decade, groundwater management and the quantity and quality of hydrogeologic data in the South Westside Groundwater Basin has increased substantially with the development of the *South Westside Basin Groundwater Management Plan* and local investments in dedicated monitoring wells and routine hydraulic and water quality data collection efforts. The quantitative analysis of these data includes a regional groundwater-flow model constructed from MODFLOW, which has also been routinely updated and revised to improve basin understanding and management activities. Management activities that rely and a robust understanding of basin conditions include operational decisions on the quantity and location of groundwater production; efforts to replace irrigation uses of potable water with tertiary-treated recycled water; and efforts to formulate plans to utilize the basin conjunctively with the imported surface water supply, providing a new dry-year water supply benefit to the San Francisco Bay Area region.

Considerable uncertainty remains regarding the quantity, distribution, and quality of natural recharge, the character and quality of groundwater in the shallowest water-bearing zone (the water table aquifer), and the hydraulic interaction between the water table aquifer and deeper water-bearing zones tapped by water supply wells. Of particular concern are shallow groundwater conditions near the southern basin boundary adjacent to and beneath South San Francisco Bay (the Bay Plain area) and San Bruno area. The hydraulic interaction between San Francisco Bay, adjacent water table, and deeper inland aquifers in the Bay Plain area is not well understood, and groundwater model results indicate storage has been increasing beneath San Bruno as a result of a rising water table yet no data has yet been compiled and analyzed for the shallowest water-bearing zone. Lastly, some supply wells have shown sudden increases and upward trends in nitrate concentrations, pointing to the need

to identify nitrogen sources and determine how the region can keep nitrate concentrations within acceptable levels[1].

Data compilation and analyses that focus on shallow conditions is therefore needed to improve recharge estimates, increase the reliability of the basin's estimated volumetric water budget, investigate relationships between observed groundwater quality and past and present land uses, and project potential future changes in groundwater storage and quality under conjunctive use operations.

4.2 Project Summary

The proposed South Westside Basin Shallow Groundwater Study improves the overall technical understanding of the shallow groundwater system in the South Westside Groundwater Basin. This includes improvements in the understanding of recharge to the water table, deeper aquifer system, and improved understanding of the nitrate sources in the shallow and deep aquifer system. The project includes the following six major technical areas:

- Defining lithology of the upper subsurface
- Collecting, analyzing, and mapping groundwater elevation data
- Assessing groundwater quality using existing and supplemental data collected as part of this study
- Collecting, sampling, and analyzing stable isotope data
- Performing age dating
- Estimating groundwater recharge and modeling groundwater transport

Together, these technical analyses will lead to an improved understanding of water table conditions, the shallow groundwater system, and the relationships between recharge and deep water supply aquifer quantity and quality. With this information, San Bruno will be better able to develop recharge projects, including low impact development techniques; guide future land use and water use decisions; more reliably model and analyze groundwater conditions; and address nitrate and other water quality concerns in the basin.

Lithology of the upper subsurface will be defined primarily by analyzing available boring logs from the State Water Resources Control Board's GeoTracker database. The boring log data will be standardized into "coarse grained" or "fine grained" materials and the percent coarse will be defined in 10-foot intervals, or in intervals defined by the nature of the materials or screen intervals. This information will be displayed in maps of the 10-foot intervals from the ground surface to below the water table elevations, or in intervals defined by the nature of the materials or screen intervals. Five cross sections will also be developed. These maps and cross sections will show where fine-grained materials are more prevalent and more likely impede percolating recharge resulting in potential perched aquifers or the loss of recharged water as discharge to adjacent surface water bodies.

Groundwater elevation data will be obtained primarily though available data from the GeoTracker database. The screened interval and groundwater elevation at the wells will be mapped to show the nature and extent of the water table and shallow groundwater system. Elevations of groundwater in wells screened at deeper intervals will also be analyzed to determine the hydraulic connectivitiy between shallow and deeper aquifer zones as assess the potential for perched groundwater .

Groundwater quality data will focus on major anions and cations to distinguish between different water types and on nitrates to define nitrate distribution in the shallow and deep zones. The analysis

[1] City of San Bruno, 2012. South Westside Basin Groundwater Management Plan. July.

will include development of piper diagrams, maps and cross-sections of nitrate concentrations, stiff diagrams, and geochemical analysis to assess quality differences and the evolution of observed water types. The results will provide information on where nitrate concentrations are highest, where groundwaters are connected, and where they show distinct waters. Data will come from the GeoTracker database, City of San Bruno and SFPUC records, basin annual monitoring reports, and water quality databases of the California Department of Public Health.

Limited existing stable isotope data will be supplemented with samples collected as part of the project to distinguish water sources and nitrate sources in groundwater. Samples will be collected from the South Westside Basin's nested multilevel monitoring well sites, which provide depth-discrete samples from short-screened wells at multiple depths. The well nests include seven sites maintained by the SFPUC, two sites maintained by San Bruno, and one site maintained by Daly City (10 sites having a total of 34 individual wells that can be sampled). The oxygen-18 and deuterium results can distinguish between the relative proportions of local low-elevation rainfall and the municipal water supply water comprised of high-elevation imported Hetch Hetchy water and deep groundwater extracted by supply wells. Using our understanding of the areas served with Hetch Hetchy water and irrigated with groundwater we can utilize the isotopic data to calculate the relative proportions of recharge source waters represented by shallow groundwater samples and improve basin recharge estimates.

Nitrogen-15 and oxygen-18 in nitrate will be utilized to estimate nitrogen sources and the extent of denitrification in the basin. Potential major nitrogen sources in the South Westside Basin include historical cattle and dairy operations, natural peat soils, landscape fertilization, and leaking sewer lines. The nitrate and stable nitrogen isotopes data will be integrated with simulated groundwater pathlines and well capture zone analyses provided by the existing Westside Basin Groundwater Flow Model. Reverse-particle tracking shall be employed to identify likely recharge locations for the water extracted by different wells, and comparisons between simulated well capture zones, observed nitrate concentrations (e.g., Daly City's A Street Well), and identified nitrogen sources used to assess historical and present-day land uses that are impacting groundwater quality.

Age dating will be used to identify recently recharged groundwater in the basin and confirm groundwater velocities simulated by the groundwater flow model. Focused sampling for tritium, helium-3, and noble gases for high-precision age-dating will provide the apparent age of groundwater at variable depths (the apparent age is the length of time since the recharge water was intercepted at the water table). Younger or more modern groundwater indicates more recent recharge and higher percolation velocities to the sampling depths. The depth distribution of apparent age provides insight into apparent recharge rates. Furthermore, comparisons between observed groundwater ages and velocities with simulated pathlines and travel times will be utilized to confirm modeled hydraulic conductivities, effective porosities, and simulated well capture zones.

All work will be supported by a public outreach task that includes informing the Groundwater Task Force, a stakeholder group developed through the South Westside Basin Groundwater Management Plan.

Additional details on the goals; needed facilities; area covered; relationship to the GWMP; quality and usefulness of the information; technical feasibility; data, technical methods, and analysis; collaboration; and funding for ongoing use are provided below.

4.3 Project Goals

The South Westside Groundwater Basin faces three primary challenges: groundwater production near the yield of the basin, upward trends in nitrate concentrations and current levels in some wells that exceed maximum contaminant levels (MCLs), and the documented potential seawater intrusion. The proposed South Westside Basin Shallow Groundwater Study will help San Bruno address these challenges by providing improved data and information to better manage the basin. There are two goals for the proposed project:

- To improve the understanding of recharge to support improved water budget estimates, increase the reliability of the existing basin model, and improve decision making with regards to land use decisions, basin operations, and recharge projects.
- To improve the understanding of nitrogen sources impacting water-supply wells, and develop management activities to control the quality of groundwater pumped, manage nitrogen loads, or remove nitrogen impacted groundwater from the aquifer for non-potable use.

The first goal of the proposed project is to improve the understanding of recharge to support improved water budget estimates, increase the reliability of the existing basin model, and improve decision making with regards to land use decisions, basin operations, and recharge projects. The depositional environment of the South Westside Basin was of a lower energy in the southeast and higher energy in the northwest. This difference influences the distribution of basin recharge because the upper subsurface in the southeast is comprised of finer grained materials relative to coarser grained materials found in the northwest. Both conditions present unique issues for groundwater management. In the southeastern portion of the basin, near San Bruno, finer grained materials slow the recharge of water from the surface to the deeper aquifer. However, it is not well understood how much of the water is recharged from the surface compared to water that is recharged in the foothills and then enters the basin from the southwest. Also, the nature of the fine grained sediments that have inhibited seawater intrusion into the basin are not well understood. In contrast, northern portions of the basin are characterized by large turf areas for golf courses, cemeteries, and country clubs. These areas have greater percolation rates, but are also more susceptible to high nitrogen loads in percolating irrigation water. This study will better quantify these spatial variations and improve recharge estimates and factors affecting water quality in the basin.

The second goal of the proposed project is to improve the understanding of nitrogen sources impacting water-supply wells, and develop management activities to control the quality of groundwater pumped, manage nitrogen loads, or remove nitrogen impacted groundwater from the aquifer for non-potable use. Some wells in the northwestern portion of the basin, in the Daly City and South San Francisco areas, have measured nitrate concentrations above MCLs. The source of the nitrogen is not well understood. It is speculated that present-day nitrate concentrations are legacy effects from historical cattle and dairy operations that occurred during the 1880s and early 1900s. Other likely contributors are the natural peat deposits in the aquifer materials, on-going landscape fertilization for cemeteries, golf courses, and open spaces, or historical septic systems and leaking sewer pipes. The data collection, compilation, and analysis provided by this study will help delineate between these potential sources, help project future water quality impacts, and direct activities designed to manage and control future nitrogen concentrations in the aquifer.

Agencies in the South Westside Basin are working to improve recharge in the basin to improve groundwater supply sustainability. For example, basin stakeholders are investigating options for an in-lieu recharge project that utilizes imported surface water to increase basin storage during wet years and places greater reliance on groundwater during dry years. During dry periods, this conjunctive use operation can make available reduced surface water supplies for other out-of-basin water customers

in the South San Francisco Bay Area. The information on the water table, shallow groundwater conditions, and hydraulic interaction between the water table and deeper water supply aquifer provided by this project will help quantify the expected efficiency of an in-lieu recharge approach. Additionally, the City of San Bruno includes the San Mateo Countywide Sustainable Buildings Checklist as part of its application to the Planning Commission. This checklist includes maximizing onsite storm water management through landscaping and permeable pavement as well as rainwater harvesting. Making an informed choice on the benefit to the aquifer of onsite storm water management versus rainwater harvesting will depend on understanding the ability for water to recharge the aquifer as opposed to flowing horizontally to drainage canals and surface water bodies. The proposed project is designed to provide the information needed for decision makers to apply technically sound decisions on where recharge activities can provide benefits to the groundwater system.

The South Westside Basin has significant opportunities for non-potable water use that could be options for high-nitrate groundwater. Most of the basin's numerous cemeteries and golf courses have large turf areas and use groundwater for their irrigation needs. A better understanding of the sources and nature of nitrate in the subsurface can help in the decision process when dealing with high nitrate levels in municipal wells. For example, Daly City's A Street Well has nitrate concentrations exceeding the MCL. Daly City is considering work on the well to blank off the upper screened intervals in an attempt to improve water quality from the well. However, a better understanding of nitrates in the basin could lead to a different tact of piping the high nitrate water to cemeteries within ½ mile of the well for non-potable use, thereby reducing the nitrate load to the aquifer from fertilizer use while continuing to provide the necessary nutrients to irrigated turf. Such a pipeline could eventually become part of a non-potable pipeline for a regional recycled water project that provides tertiary-treated water for irrigation.

4.4 Needed Facilities

The proposed South Westside Basin Shallow Groundwater Study is a planning effort and requires no new facilities. Existing well facilities owned and maintained by San Bruno, SFPUC, and Daly City will be used to collect groundwater samples. The well owners have indicated that these wells are available for sampling as part of this proposed project.

Additionally, the proposed project will use the existing Westside Basin Groundwater Flow Model to estimate capture zones for wells with high nitrate concentrations, which is available in-house at the City of San Bruno.

4.5 Area Covered

The project covers the full area of the South Westside Basin, which is shaded in light green in Figure 4-1.

4.6 Project Support for GWMP Goals and Objectives / Project Relevance to GWMP

The goals of the proposed South Westside Basin Shallow Groundwater Study are consistent with and support the goals and objectives of the South Westside Basin Groundwater Management Plan (SWBGMP). The goal of the SWBGMP is:

To ensure a sustainable, high-quality, reliable water supply at a fair price for beneficial uses achieved through local groundwater management.

This goal is supported by five Basin Management Objectives (BMOs):

1) Maintain Acceptable Groundwater Levels
2) Maintain or Improve Groundwater Quality
3) Limit the Impact of Point Source Contamination
4) Explore Need for Land Subsidence Monitoring
5) Manage the Interaction of Surface Water and Groundwater for the Benefit of Groundwater and Surface Water Quantity and Quality

The improved understanding of shallow groundwater obtained through this proposed project will address BMOs 1, 2, 3, and 5, which in turn will help address the overall goal of the SWBGMP.

Meeting BMO 1, Maintain Acceptable Groundwater Levels, is largely dependent on the balance of recharge and groundwater production. By improving the understanding of recharge conditions, management efforts can focus on recharge projects providing the highest benefit to the basin, thereby increasing the volume of water that can be sustainably used for beneficial uses. Land use and basin operation decisions also will be improved through the understanding of recharge conditions.

The proposed project will address BMO 2, Maintain or Improve Groundwater Quality, through an improved understanding of nitrate sources. By better defining the source of nitrates, management efforts can focus on sources (if sources are modern) and/or on managing nitrates already in the basin.

Characterizing the shallow groundwater system and assessing the extent of shallow clays and potential existence of perched water will assist in meeting BMO 2 and 3. The proposed project will provide refined information on the

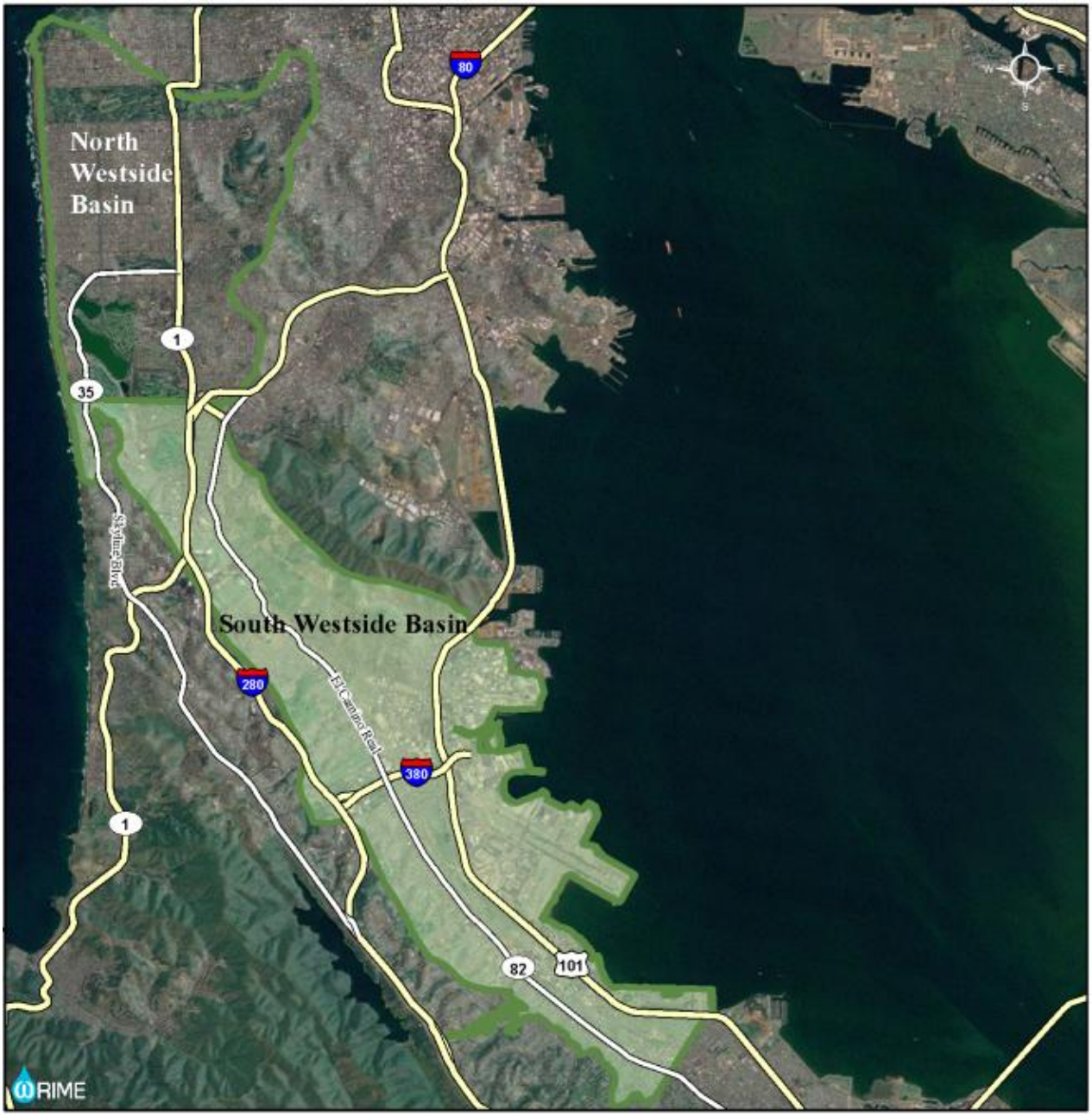

Figure 4-1. Location of Area Covered – South Westside Basin

clays that act as a partial barrier to seawater intrusion, protecting water quality. More regionally, the improved understanding of the clays will be beneficial for the analysis of point source contamination sites that may be relying on natural clays to prevent downward migration of contaminants to the drinking water aquifer.

The understanding of the shallow groundwater will also assist in meeting BMO 5. Surface water courses in the South Westside Basin are typically small. The largest is Colma Creek, which is concrete lined for most of the lower reaches. Results from this project can be used to determine if removing some of the lining would allow for recharge and thus benefit the groundwater basin, or if the clays would greatly inhibit any additional recharge. Also, the study results can be used to identify areas where recharge basins could be built to enhance recharge. Typically, these would be basins needed to meet flood control needs to justify land costs in the area.

4.7 Quality and Usefulness of the Information

Robust analysis and proper quality assurance and quality control will ensure that the information gained through the proposed South Westside Basin Shallow Groundwater Study will be of high quality and usefulness. The analysis will include the latest data and industry standard techniques.

A California Professional Geologist will perform the analysis of groundwater levels, lithology, and groundwater quality to ensure high quality results. The analysis will maintain the ability to reference back to the original boring log data for quality control (QC) purposes and for future reference. Intermediary steps in developing the percent-coarse estimates will be maintained in the spreadsheets for QC purposes and to provide additional details on the lithology.

The study will use accepted analytical methods including isotopic techniques as well as anions and cations to provide new information on the sources of recharge in the basin. The quality of the information will be driven by the standard methods for sampling and laboratory analysis. Additionally, the lab results will be analyzed by professional geologists and engineers with experience in isotopic analysis. Analysis of the isotopes will include analysis of oxygen-18 and deuterium to estimate the recharge source through an isotopic balance equation.

Furthermore, for nitrates, oxygen-18 and nitrogen-15 will be used to estimate the nitrogen source and to identify the extent of denitrification. The nitrogen analysis will be supported by particle tracking through the Westside Basin Groundwater Flow Model, which will help verify conclusions and will provide useful information to assist managers in understanding potential changes in groundwater quality as a result of time and changes in groundwater management.

Age dating analysis will provide important new information from the new multi-level monitoring wells in the basin. Age data will help identify recently recharged groundwater recharge sources and rates. Quality of the information will be maintained through the use of standard sampling and analytical techniques, as well as through analysis by experienced staff. Quality results will also be obtained through the usage of the Hydrotrace laboratory, a high-quality laboratory also used by Lawrence Livermore National Laboratory for their extensive age dating work.

Improved understanding of recharge in the South Westside Basin is critical for sound water management decisions and accurate groundwater modeling of the basin. The improved conceptual understanding of groundwater recharge is an important step towards implementing structural and non-structural projects that will assist the region in managing a sustainable groundwater resource and meeting the goals and objectives of the SWBGMP.

4.8 Technically Feasible Methods

The proposed South Westside Basin Shallow Groundwater Study depends on the sharing of a variety of data and resources. This is feasible through extensive ongoing relationships and work within the basin to advance groundwater management and through the large body of knowledge on stable isotope and age dating methods.

Refining the understanding of recharge conditions builds upon the groundwater management efforts already in place in the South Westside Basin. The Groundwater Task Force provides a forum for communication with stakeholders in the basin, including the general public, to gather input on the methodology and results for this Project. This proposed project relies on the extensive tools developed by San Bruno and other basin stakeholders. This network of tools is developed and ready for implementation to support the recharge analysis. These tools include the following:

- SWBGMP, which defines the Groundwater Task Force and sets goals and objectives for the basin
- The Westside Basin Groundwater Flow Model, the regional groundwater model that supports the nitrate analysis through estimating capture zones
- Nested monitoring wells installed by SFPUC, Daly City, and San Bruno, which provide depth-specific data sources for new sampling
- Groundwater monitoring efforts by SFPUC, Daly City, Cal Water, and San Bruno, which provide the necessary data to perform the analysis
- Publically available datasets, including GeoTracker and the California Department of Public Health's water quality database, which provide the necessary data to perform the analysis

The proposed project also depends on accurate analysis of the collected data. All of the analytical methods to be used in the project are industry standards readily available for use in the project.

The stable isotope methods proposed for the recharge effort have been utilized across the state and around the world to improve the understanding of recharge conditions. In California, such efforts have investigated the movement of water from recharge basins, the source of recharge between precipitation and imported irrigation water, and other recharge questions. The proposed project is similar in many aspects to these previous investigations.

The laboratory analysis of oxygen-18 and deuterium is specialized and readily available at the University of California (UC) Davis Stable Isotope Facility (SIF), which will perform the work. Anions and cations is a standard analysis that can be performed by most labs. To perform all the analyses, a lab may subcontract to UC Davis, or San Bruno may utilize two laboratories.

Age dating analysis will supplement the stable isotope and general chemistry analysis. Tritium (^{3}H), radioactive isotope of hydrogen, will be used as a tracer of relatively young groundwater (recently recharged). Concentrations of tritium can be used to date groundwater as natural background concentrations of tritium ("pre-bomb") are low and thermonuclear testing injected large quantities of tritium into the atmosphere resulting in higher tritium concentrations in precipitation beginning in the 1950s. Tritium concentrations peaked in the northern hemisphere in 1963, and have been steadily decreasing since that time. The half-life of tritium is 12.43 years.

White tritium measurements alone can be used to locate the depth of the mid-1960s bomb peak, because of radioactive decay, many samples may need to be collected and analyzed today to locate its position. Thus, the tritium sampling will be supplemented with the noble gas helium-3 (^{3}He) and helium-4 (^{4}He). While the presence of tritium indicates water that recharged less than about 50 years

ago, age dating groundwater using tritium alone results in large uncertainties due to spatial and temporal variation in the initial tritium at recharge. Measurement of both tritium and its daughter product helium-3 (^{3}He) allows calculation of the initial tritium present at the time of recharge and allows calculation of the time since the water was last in contact with the atmosphere. The time of travel along with the location of the mid-1960s bomb peak can provide information on recharge rate. Radiogenic ^{4}He is used to determine the presence of pre-modern groundwater (recharge that occurred before 1955) and qualitative estimate of the groundwater component present that can be several hundred years old or more.

4.9 Data, Technical Methods, and Analyses

Existing data required for the project are all readily available from within San Bruno, other South Westside Basin agencies, other public sources, and in-house sources. These data include the following:

- Groundwater elevation data, groundwater quality data, and lithology data from GeoTracker
- Groundwater elevation data and groundwater quality data from SFPUC, Daly City, Cal Water, San Bruno, the California Department of Public Health, and GeoTracker.
- Isotope and age dating data from previous reports, including GAMA; Yates, et al.; and Philips et al. These reports are all available in-house.
- Westside Basin Groundwater Flow model, maintained by Daly City and available in-house.

For the new data, the following accepted technical methods are proposed for the groundwater sampling and groundwater analysis:

- Sample collection will follow the International Atomic Energy Agency's (IAEA) *Sampling Procedures for Isotope Hydrology*[2], with adjustments to reflect any additional needs or procedures of the analytical laboratory. These protocols will be used in conjunction with the general water quality sampling protocols contained in *Sampling and Testing Protocol for the Westside Basin*[3].
- Analysis of water quality samples:
    - It is anticipated that analysis of oxygen-18 and deuterium will be performed using a Laser Water Isotope Analyzer V2. Such equipment is utilized at the UC Davis SIF. For oxygen-18 and deuterium at natural abundance, each sample is injected 8 times. The first 4 injections are discarded to eliminate memory effects and the average of injections numbers 5-8 is used for isotope ratio calculations. For enriched and saline samples, the number of injections is increased to 10 and the average of injections numbers 7-10 is used for isotope ratio calculations. Sample isotope ratios are standardized using a range of working standards calibrated against IAEA standard reference materials.
    - Nitrogen-15 and oxygen-18 for nitrate analysis will be performed at the UC Davis SIF. UC Davis uses a ThermoFinnigan GasBench + PreCon trace gas concentration system interfaced to a ThermoScientific Delta V Plus isotope-ratio mass spectrometer. The analysis includes calibration standards and internal checks.

[2] International Atomic Energy Agency. *Sampling Procedures for Isotope Hydrology*. Accessed online on July 5, 2012 at http://www-naweb.iaea.org/napc/ih/documents/other/Sampling%20booklet%20web.pdf

[3] SFPUC. 2011. Final 2010 *Annual Groundwater Monitoring Report Westside Basin San Francisco and San Mateo Counties, California*. Appendix C: Sampling and Testing Protocol for the Westside Basin. June.

- Tritium and helium-3 sampling will be performed by filling a special copper sample tube for helium analyses and bottles for tritium. Tritium will be analyzed by helium ingrowth and helium-3 will be analyzed by the copper tube method. The age dating analysis will be performed by Hydrotrace, a qualified laboratory utilized by Lawrence Livermore National Laboratory for analysis requiring high levels or precision.
- Anions and cations will be analyzed using standard methods, such as US Environmental Protection Agency (EPA) Method 300.0, 200.7, and 6010, and SM2320B, or equivalent.

4.10 Collaboration

The Groundwater Task Force was established through the SWBGMP and formed out of the cooperative effort of the numerous meetings held while developing the SWBGMP, which was adopted by the City of San Bruno on July 10, 2012. Through the development of the SWBGMP, interested stakeholders were identified and brought in to participate in groundwater management. Stakeholders that have participated to-date include representatives from cemeteries, golf courses, water purveyors, municipalities, California Department of Water Resources, USGS, Regional Water Quality Control Board, and the Bay Area Water Supply and Conservation Agency (BAWSCA). These existing relationships and contacts will be used to bring stakeholders into the project to gain their insight and to inform them about the project and disseminate reports and data.

The proposed project includes four presentations to the Groundwater Task Force along with development of a project website and opportunities for detailed discussions with interested stakeholders. As part of the project outreach, federal and other state agencies will be informed of the project, including the USGS, US EPA, Water Resources Control Board, Regional Water Quality Control Board, and the Department of Toxic Substances Control. The project may be of interest to these agencies due to the importance to water supply and to the migration of known contaminant plumes.

4.11 Funding of Ongoing Use

The ongoing use of the products from the proposed project are inherent in the project as the proposed South Westside Basin Shallow Groundwater Study will provide information and data that will support future groundwater management decisions for years to come. Implementation of the recently adopted GWMP relies on the increased understanding of recharge and nitrogen sources that will be gained from this proposed project. Activities to be undertaken to utilize this information include the refinement of the Westside Basin Groundwater Flow Model and the development of management decisions to improve groundwater conditions.

The update to the groundwater model has already been tentatively scheduled for 2016. This update includes incorporating the latest hydrologic and basin operation data as well as recalibration of the model, if needed. The update provides an opportunity to refine the representation of groundwater recharge to be consistent with the results of the proposed project. Daly City is planning to fund the update in 2016. Other basin agencies may contribute toward the effort. There is little marginal cost to incorporating the new recharge information as the model update would proceed with or without the proposed project. The utilization of recharge information in management decisions would be performed with existing agency staff, and would not incur additional costs.