SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Draft Environmental Impact Report
Appendices

Planning Department Case No. 2008.1122E
State Clearinghouse No. 2009122075

March 2013

City and County of San Francisco
San Francisco Planning Department

Important Dates:

DEIR Publication Date: March 13, 2013
DEIR Public Comment Period: March 13, 2013 to April 27, 2013
DEIR Public Hearing Dates: April 18, 2013

Written comments should be sent to:

Sarah Jones Acting Environmental Review Officer
San Francisco Groundwater Supply Project
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103

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APPENDIX A
Scoping Reports

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2009 Scoping Report

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San Francisco Public Utilities Commission

San Francisco Groundwater Supply Project Environmental Impact Report

Final

Scoping Report

April 2010

Prepared for the San Francisco Planning Department

Prepared by ESA

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1.0 Introduction and Background

1.1 Introduction

The San Francisco Planning Department is the lead agency for implementation of California Environmental Quality Act (CEQA) requirements for all projects sponsored by the City and County of San Francisco (CCSF) or conducted within San Francisco. The San Francisco Planning Department is preparing a Draft Environmental Impact Report (EIR) for the San Francisco Public Utilities Commission's (SFPUC's) proposed San Francisco Groundwater Supply Project (project or proposed project). The Draft EIR, which will assess the potential impacts of the project on the physical environment, is being prepared in accordance with CEQA. CEQA requires the preparation of an EIR when a proposed project could significantly affect the physical environment.

As part of the Draft EIR process, the San Francisco Planning Department conducted a public scoping effort in January 2010, soliciting comments from interested parties, State and natural resource agencies, and the public to help determine the scope of the Draft EIR. This report describes the scoping process and summarizes the public and regulatory agencies' comments received during the scoping period.

1.2 Notice of Preparation

The San Francisco Planning Department published a Notice of Preparation (NOP) on December 30, 2009, announcing the preparation of the Draft EIR for the project under CEQA. The NOP summarized the project objectives and provided a description of the proposed project. The NOP also described the scoping process and included information on the public scoping meeting. The scoping process, notification procedures, and outcome of the scoping meeting are described below, following a brief description of the proposed project.

1.3 San Francisco Groundwater Supply Project

The purpose of the proposed project is to provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin underlying parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of the city of San Francisco on property owned by the CCSF, and managed by the SFPUC or the San Francisco Recreation and Park Department.

As part of the proposed project, the SFPUC would construct and operate six potable groundwater production well facilities. Although nine locations are currently under consideration for the groundwater production well facilities, only six facilities would be constructed—two that would be converted from existing irrigation well facilities, and four new well facilities. Each well facility would include a groundwater production well and a pump station. The SFPUC would also

construct a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection. The project would be implemented in two phases: (1) construction and operation of the four new well facilities to supply an annual average of approximately 2.5 mgd of groundwater, and conversion of two existing irrigation well facilities to potable water well facilities; and (2) operation of the converted irrigation wells to provide an additional annual average of approximately 1.5 mgd of groundwater.

The project is a component of the SFPUC's Water System Improvement Program (WSIP), which includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase delivery reliability and improve the ability to maintain the system; (4) meet customer purchase requests in nondrought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of the project, as a component of the WSIP, would contribute to meeting the overall WSIP goals and objectives, by diversifying water supply options during drought and non-drought periods and improving the use of new water sources and drought management.

2.0 Purpose of the Scoping Process

The purpose of the scoping process is to solicit input from the public, interested parties, and agencies with discretionary authority over the project on the appropriate scope, focus, and content of the Draft EIR. The San Francisco Planning Department will consider all of the input received during the scoping process in the preparation of the Draft EIR.

The Draft EIR will describe the existing environmental conditions of the area that could be affected by the proposed project and evaluate the potential effects of the project on the environment in accordance with CEQA. The comments provided by the public and agencies during scoping will help the San Francisco Planning Department identify pertinent issues, methods of analyses, and level of detail that should be addressed in the Draft EIR. The scoping comments will also provide the input for development of a reasonable range of feasible alternatives to be evaluated in the Draft EIR.

The scoping comments will augment the information developed by the EIR project team, which includes specialists in each of the environmental subject areas covered in the EIR. This combined input will result in an EIR that is both comprehensive and responsive to issues raised by the public and regulatory agencies, and that meets CEQA requirements. The Draft EIR is scheduled to be available for public comment in early 2011.

In addition to facilitating public and regulatory agency input on the scope and focus of the Draft EIR, scoping allows the San Francisco Planning Department to explain the EIR process to the public and to identify additional opportunities for public comment and public involvement during the EIR process.

3.0 Notification of Scoping

The scoping period began on December 30, 2009, with the issuance of the NOP. The San Francisco Planning Department held a scoping meeting on January 20, 2010, and accepted written comments through January 30, 2010. The following methods were used to notify agencies and the public about the availability of the NOP, the scoping meeting dates and locations, and details on the comment process:

- **Mailing List.** A mailing list was compiled, including approximately 3,700 contacts for federal, state, regional, and local agencies; federal, state, regional, and local elected officials; regional and local interest groups; member agencies of the Bay Area Water Supply and Conservation Agency; other potentially affected water districts; SFPUC Community Advisory Committee members; information repositories; media contacts; and property owners and residents 300 feet within the proposed project limits.

- **Notice of Preparation of an EIR and Notice of Public Scoping Meeting.** Copies of the NOP were distributed via certified mail to responsible and trustee agencies and 15 copies were delivered to the State Clearinghouse (See Appendix A for a copy of the NOP and NOP Notice of Availability). In addition, a notice of availability of the NOP was distributed via first-class mail to the entire mailing list (approximately 3,700 addressees):

  - ***Locations to obtain a copy of the NOP.*** The NOP was posted to the San Francisco Planning Department's website (http://mea.sfplanning.org). A printed copy of the NOP was also provided to anyone who requested it from the San Francisco Planning Department.

- **Meeting Notification.** Notice of the scoping meeting was provided to individuals and the general public through the following means:

  - ***Notice to entire mailing list.*** Notifications of the scoping meeting, including information on the project EIR and the scoping process, and instructions on how to obtain a copy of the NOP and provide public comment were mailed to the entire project mailing list approximately three weeks prior to the scoping meeting.

  - ***Legal notices.*** Notices of the scoping meeting and information on how to obtain a copy of the NOP and provide public comment were placed in the legal classified section of the *San Francisco Chronicle* (12/30/09).

Table 1 presents an itemized list of mailings.

TABLE 1
NUMBER OF RECIPIENTS ON MAILING LIST FOR NOP AND NOTICE OF SCOPING MEETING

Category	Number of NOP Recipients	Number of NOP Notice of Availability Recipients
Owners and Occupants	0	3,145
Wholesale Customers	3	48
Responsible and Trustee Agencies, Other Agencies	24	93
SFPUC Citizen's Advisory Committee	0	13
Interested Parties	6	347
Local and Bordering Jurisdictions	0	10
Media, Libraries, and Individuals	13	6
TOTAL	**46**	**3,662**

4.0 Scoping Meeting

The San Francisco Planning Department held a public scoping meeting on January 20, 2010 at the Golden Gate Senior Center (6101 Fulton Street, San Francisco), approximately three weeks after publication of the NOP. The objective of the meeting was to solicit input from the public on potential environmental impacts of the proposed project, the appropriate scope of the EIR, potential mitigation measures, and potential alternatives to the proposed project.

The total attendance for the scoping meeting was 30 (based on the meeting sign-in sheets and excluding CCSF and EIR consultant staff). Meeting attendees primarily consisted of private property owners residing near the proposed project area. A total of six participants provided verbal comments at the meeting. The scoping meeting was recorded by a certified court reporter who provided verbatim written transcripts of the proceedings. The transcripts can be found in Appendix C of this report.

The meeting included presentations on the environmental review process and the proposed project, followed by a formal public comment period. Attendees interested in presenting verbal comments submitted speaker cards and were allowed sufficient time to speak. The meeting concluded with closing remarks. Appendix B includes copies of the scoping meeting presentation, handouts, comment/speaker cards, and sign-in sheets.

Prior to the CEQA scoping meeting, SFPUC held a project open house where attendees were invited to review project display boards and ask questions of the SFPUC project team.

5.0 Overview of Comments Received

Agencies and members of the public utilized several different methods of providing input: verbal comments during the scoping meeting, written comments submitted at the scoping meeting or sent via U.S. mail, email and fax. Table 2 lists agencies and other parties that provided written comments in response to the NOP, listed by comment letter number. Table 3 lists individuals that commented at the scoping meeting, listed in alphabetical order by last name. Copies of comment letters and emails are located in Appendix D, while scoping meeting transcripts are located in Appendix C.

TABLE 2
INDEX OF WRITTEN COMMENTS

Comment Letter No.	Commenter
1. Agencies	
	None
2. Organizations	
2A	Golden Gate Audubon Society (Dan Murphy)
2B	Sierra Club San Francisco Group (Howard Strassner)
3. Individuals	
3A	Gerald Colvin
3B	Dennis Huey
3C	Eileen Kho
3D	Michael P. Laughlin
3E	Steve Lawrence
3F	Steve Lawrence
3G	Steve Lawrence
3H	Steve Lawrence
3I	Steve Lawrence
3J	Maureen Maggiolo
3K	Dick Morten
3L	Jim Spahr
3M	William Wanner
3N	Chunyao Xia
3O	LC Yim

TABLE 3
INDEX OF VERBAL COMMENTS

Verbal Comment No.	Commenter	Organization Name (if applicable)
4A	Andrew Chan	NA
4B	Joan Girardot	NA
4C	Nicole Iroz-Elardo	NA
4D	Joyce Law	NA
4E	Steve Lawrence	NA
4F	Dan Murphy	Golden Gate Audubon Society

NA = Not Applicable

6.0 Summary of Comments by Subject Area

This section summarizes the issues raised in written and verbal comments during the scoping period. Table 4 provides a summary of scoping comments by commenter. (Appendices B and D also contain all of the commenter correspondence and copies of the scoping meeting transcripts.)

TABLE 4
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
2A	Golden Gate Audubon Society	Page 1, Paragraph 1	Discuss surface water impacts	Hydrology (Impacts on Surface Water)	
2A	Golden Gate Audubon Society	Page 1, Paragraph 2	Develop an adaptive management plan to address potential surface water impacts and impacts to the groundwater basin	Project Description Hydrology (Impacts on Surface Water)	
2A	Golden Gate Audubon Society	Page 1, Paragraph 3	Address groundwater recharge	Project Description Hydrology (Groundwater Recharge)	
2A	Golden Gate Audubon Society	Page 2, Paragraph 1	Expresses concern about San Francisco Recreation and Parks Department (SFRPD) conversion of playing fields to synthetic turf and potential impacts to aquifer recharge amounts and quality	Project Description Hydrology (Groundwater Recharge and Quality) Cumulative Impacts	
2A	Golden Gate Audubon Society	Page 2, Paragraph 2	Discuss aquifer recharge and quantify diversion of groundwater to the sewage system as a result of increased impermeable surfaces	Hydrology (Groundwater Recharge and Quality) Cumulative Impacts	Quantification of changes to impermeable surfaces as the result of other projects and related changes in aquifer recharge are not proposed by the project proponent
2A	Golden Gate Audubon Society	Page 2, Paragraph 3	Address strategies and infrastructure to maximize aquifer recharge		Implementation of other projects that would increase aquifer recharge are not proposed by the project proponent
2B	Sierra Club San Francisco Group	Page 1, Paragraph 1	Clarify the purpose of the project	Project Objectives	
2B	Sierra Club San Francisco Group	Page 1, Paragraph 2	Address saltwater intrusion and existing salinity conditions in the groundwater basin	Project Description Hydrology (Groundwater Quality)	
2B	Sierra Club San Francisco Group	Page 1, Paragraph 2	Address groundwater basin recharge	Project Description Hydrology (Groundwater Recharge)	
2B	Sierra Club San Francisco Group	Page 1, Paragraph 2	Address provisions to increase groundwater recharge		Implementation of other projects not under the purview of the project proponent
2B	Sierra Club San Francisco Group	Page 1, Paragraph 3	Address impacts to Lake Merced water levels	Project Description Hydrology (Impacts on Surface Water)	
2B	Sierra Club San Francisco Group	Page 1, Paragraph 4	Include a cost analysis of the proposed pumping requirements in comparison to the cost of delivering surface water supplies		Not applicable to CEQA

TABLE 4 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
2B	Sierra Club San Francisco Group	Page 1, Paragraph 4	Discuss greenhouse gas emissions associated with project operations	Greenhouse Gas Emissions	
3A	Colvin, Gerald (Sierra Club San Francisco)	Page 1, Paragraph 1	Expresses interest in the status of Lake Merced and impacts that the WSIP will have on Lake Merced due to groundwater pumping	Hydrology (Impacts on Surface Water) Cumulative Impacts	
3B	Huey, Dennis	Page 1, Paragraphs 2-6	Expresses concern about soil stability along a portion of the proposed pipeline route and related construction impacts on adjacent homes	Project Location Geology and Soils Alternatives	
3B	Huey, Dennis	Page 1, Paragraph 7	Expresses concern about potential pipeline rupture or failure in the event of an earthquake due to soil conditions along a portion of the proposed pipeline	Project Location Geology and Soils Alternatives	
3B	Huey, Dennis	Page 1, Paragraph 8	Requests that soil surveys be performed to determine soil stability prior to finalizing pipeline routes	Project Description	
3C	Kho, Eileen	Page 1, Paragraphs 2-4	Expresses concern about impacts associated with pipeline rupture or failure that could be worsened due to existing unstable soils conditions	Project Location Geology and Soils	
3C	Kho, Eileen	Page 1, Paragraph 5	Expresses preference that the pipeline route be moved from 40th Avenue	Project Location Alternatives	
3D	Laughlin, Michael P.	Page 1, Paragraph 1	Requests information about where the EIR and related studies will be available	Notice of Availability Introduction and Background	
3D	Laughlin, Michael P.	Page 1, Paragraph 2	Analyze secondary impacts of groundwater pumping such as ground subsidence and saltwater intrusion	Hydrology (Groundwater Recharge and Quality) Geology and Soils	
3D	Laughlin, Michael P.	Page 1, Paragraph 2	Consider strategies for increased groundwater recharge	Project Description	Implementation of other projects not under the purview of the project proponent
3D	Laughlin, Michael P.	Page 1, Paragraph 3	Requests information about location and sizes of production wells and pipeline alignments, and trench depths	Project Location Project Description Geology and Soils	

TABLE 4 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
3D	Laughlin, Michael P.	Page 1, Paragraph 3	Requests information about the project construction schedule	Construction Schedule	
3E	Lawrence, Steve	Page 1, Paragraph 2	Describe Lake Merced lake functions and project relationship to the Lake Merced Pump Station	Project Description Hydrology and Water Quality	
3E	Lawrence, Steve	Page 1, Paragraph 2	Clarify the purpose of the project and proposed water service areas	Project Objectives Project Description	
3E	Lawrence, Steve	Page 1, Paragraph 3	Address the timing of groundwater pumping	Project Description	
3E	Lawrence, Steve	Page 1, Paragraph 4	Address the percentage of groundwater being blended with the regional water supply	Project Description	
3E	Lawrence, Steve	Page 1, Paragraph 5	Address potential land subsidence as a result of groundwater pumping	Hydrology Geology and Soils	
3E	Lawrence, Steve	Page 1, Paragraph 6	Include information about groundwater storage and disinfection.	Project Description	
3F	Lawrence, Steve	Page 1, Paragraph 2	Address groundwater blending with the regional water supply	Project Description	
3F	Lawrence, Steve	Page 1, Paragraph 3	Address duration and timing of groundwater pumping	Project Description	
3F	Lawrence, Steve	Page 1, Paragraph 4	Address groundwater quality	Project Description Hydrology (Groundwater Quality)	
3F	Lawrence, Steve	Page 1, Paragraph 4	Address potential seawater intrusion	Project Description Hydrology (Groundwater Supply)	
3F	Lawrence, Steve	Page 1, Paragraph 5	Include a description of the relationship between the proposed project and other WSIP groundwater projects	Cumulative Impacts	
3F	Lawrence, Steve	Page 1, Paragraph 6	Requests information regarding financial agreements between project proponent and Recreation and Parks Department		Not applicable to CEQA
3F	Lawrence, Steve	Page 1, Paragraph 7	Requests transcript of the public NOP scoping meeting	EIR Appendices	

TABLE 4 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
3G	Lawrence, Steve	Page 1, Paragraphs 2, 3,10; Page 2, Paragraph 1	Address the percentage of groundwater being blended with the regional water supply and groundwater quality	Project Description Hydrology (Groundwater Quality)	
3G	Lawrence, Steve	Page 1, Paragraphs 4 through10	Requests regular testing of groundwater quality and publication of testing results	Project Description Hydrology (Groundwater Quality)	
3G	Lawrence, Steve	Page 2, Paragraph 2	Address alternative water supply in the event groundwater does not meet regulatory standards	Project Description Alternatives	
3G	Lawrence, Steve	Page 2, Paragraph 3	Address disinfection processes and facilities for groundwater during normal and emergency uses	Project Description	
3H	Lawrence, Steve	Page 1, Paragraph 2	Address recycled water intrusion into the groundwater aquifer, and affects on water quality	Project Description Cumulative Impacts	
3H	Lawrence, Steve	Page 1, Paragraph 3	Address conversion of playing fields to synthetic turf and impacts to groundwater quality	Project Description Hydrology (Groundwater Recharge and Quality) Cumulative Impacts	
3H	Lawrence, Steve	Page 1, Paragraph 4	Address groundwater quality and testing	Project Description Hydrology (Groundwater Quality)	
3I	Lawrence, Steve	Page 1, Paragraph 1	Address impacts on Lake Merced water levels associated with groundwater pumping	Hydrology (Impacts on Surface Water)	
3J	Maggiolo, Maureen	Page 1, Paragraphs 2, 3	Concern regarding pipeline location due to traffic impacts and existing soil conditions	Project Location Transportation and Circulation Geology and Soils Alternatives	
3J	Maggiolo, Maureen	Page 1, Paragraph 5	Address construction-related vibration impacts on structures	Noise	
3K	Morten, Dick	Page 1, Paragraph 2	Use the hydrological model developed by Daly City in its groundwater analysis	Project Description Cumulative Impacts	

TABLE 4 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
3K	Morten, Dick	Page 1, Paragraph 3	Address saltwater intrusion impacts and implement a program to monitor saltwater intrusion	Project Description Hydrology (Groundwater Quality)	
3K	Morten, Dick	Page 1, Paragraphs 4, 5	Suggests groundwater for emergency use - fire fighting and potable drinking water; and coordination of the proposed improvements with the Auxiliary and Portable Water Supply System	Project Description Public Services	
3L	Spahr, Jim	Page 1, Paragraphs 1, 6	Requests that construction effects on nearby land uses be considered	Transportation and Circulation Noise Air Quality	
3L	Spahr, Jim	Page 1, Paragraphs 2-5	Describes concerns regarding past CCSF construction activities	Cumulative Impacts	
3M	Wanner, William	Page 1, Paragraphs 2-5; Page 2, Paragraphs 1-4	Address existing ground subsidence along proposed pipeline route and provide measures to mitigate construction impacts	Geology and Soils	
3M	Wanner, William	Page 2, Paragraphs 5-6	Residences should have notice of all construction activities	Construction Schedule Transportation and Circulation Noise Air Quality	
3M	Wanner, William	Page 2, Paragraph 7	Requests notification of availability for additional project documents and meetings	Notice of Availability Introduction and Background	
3N	Xia, Chunyao	Page 1, Paragraph 1	Expresses concern about construction-related effects on adjacent structures	Noise Geology and Soils	
3O	Yim, LC	Page 1, Paragraph 2	Address potential impacts of pipeline rupture or failure, related to existing soil conditions	Project Location Geology and Soils	

TABLE 4 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
3O	Yim, LC	Page 1, Paragraph 2	Address potential construction impacts on adjacent land uses	Land Use Transportation and Circulation Noise Air Quality	
3O	Yim, LC	Page 1, Paragraph 3	Expresses preference regarding the wellsite and pipeline alignment locations	Project Location Alternatives	
4A	Andrew Chan	Page 20, Paragraph 1	Expresses concern about scoping meeting location	Introduction and Background	
4A	Andrew Chan	Page 20, Paragraph 2	Requests information regarding the project construction start date and schedule	Construction Schedule	
4A	Andrew Chan	Page 20, Paragraph 3	Include a maintenance program for the proposed pipeline	Project Description	
4A	Andrew Chan	Page 20, Paragraph 4	Expresses preference regarding pipeline alignment	Project Location Alternatives	
4B	Joan Girardot	Page 24, Paragraphs 4-6; Page 25, Paragraph 2	Address alternative water supply to the proposed project	Alternatives	
4B	Joan Girardot	Page 24, Paragraph 4	Provide a description of the existing aquifer, past groundwater pumping, and the ability of the basin to serve the proposed project	Project Description Hydrology (Groundwater Supply)	
4B	Joan Girardot	Page 25, Paragraph 3	Address potential construction impacts on adjacent land uses	Land Use Transportation and Circulation Noise Air Quality	
4B	Joan Girardot	Page 25, Paragraph 4; Page 25, Paragraph 1	Address potential groundwater contamination from proposed artificial turf soccer fields	Hydrology (Groundwater Supply) Cumulative Impacts	

TABLE 4 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
4C	Nicole Iroz-Elardo	Page 27, Paragraph 7	Address collective management of the overall groundwater basin, to ensure the proposed project is not affected by groundwater contamination that could occur south of San Francisco	Project Description Hydrology (Groundwater Quality) Cumulative Impacts	
4C	Nicole Iroz-Elardo	Page 28, Paragraph 1	Address groundwater recharge and consider replacing impervious surfaces with permeable surfaces following construction of pipelines	Project Description Hydrology (Groundwater Recharge and Quality)	
4D	Joyce Law	Page 27, Paragraphs 1-3	Expresses concern about pipeline leaks	Project Description Geology and Soils	
4E	Steve Lawrence	Page 20, Paragraph 5; Page 21, Paragraphs 1-2	Address groundwater blending with the regional water supply	Project Description Hydrology (Groundwater Quality)	
4E	Steve Lawrence	Page 21, Paragraph 3; Page 22, Paragraph 1	Requests information regarding financial agreements between project proponent and Recreation and Parks Department		Not applicable to CEQA
4E	Steve Lawrence	Page 22, Paragraphs 3-4	Address groundwater quality and water supply availability, should groundwater quality exceed standards for potable use	Project Description Hydrology (Groundwater Quality) Alternatives	
4F	Dan Murphy, Golden Gate Audubon Society	Page 23, Paragraph 2	Recommends that an adaptive management plan be included as part of the proposed project	Project Description	
4F	Dan Murphy, Golden Gate Audubon Society	Page 23, Paragraph 3	Address impacts to Lake Merced and Pine Lake, including habitat effects	Hydrology (Impacts on Surface Water) Biological Resources	
4F	Dan Murphy, Golden Gate Audubon Society	Page 20, Paragraphs 4, 5	Address groundwater recharge	Project Description Hydrology (Groundwater Recharge)	

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APPENDICES

A. Notice of Preparation (NOP) and NOP Notice of Availability
B. Scoping Meeting Materials
C. Scoping Meeting Transcripts
D. Comments Received During EIR Scoping Process

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APPENDIX A

Notice of Preparation and NOP Notice of Availability

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SAN FRANCISCO
PLANNING DEPARTMENT

December 30, 2009

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
415.558.6378

Fax:
415.558.6409

Planning
Information:
415.558.6377

TO: Responsible Agencies, Trustee Agencies, and Interested Parties

RE: **CASE NO. 2008.1122E – SAN FRANCISCO GROUNDWATER SUPPLY PROJECT**

NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT AND NOTICE OF PUBLIC SCOPING MEETING

A Notice of Preparation (NOP) of an Environmental Impact Report (EIR) for the above-referenced project, described below, has been issued by the Planning Department. The NOP and Notice of Public Scoping Meeting is either attached or is available upon request from Jamie Dean, who may be reached at (415) 575-9028 or jamie.dean@sfgov.org, or by mail at the above address. It is also available online at http://mea.sfplanning.org. This notice is being sent to you because you have been identified as potentially having an interest in the project or the project area.

Project Description:

The purpose of the San Francisco Groundwater Supply Project (project or proposed project) is to provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin and underlies parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of the city of San Francisco on property owned by the City and County of San Francisco, and managed by the San Francisco Public Utilities Commission (SFPUC) or the San Francisco Recreation and Park Department.

Under the proposed project, the SFPUC would construct and operate six potable groundwater production well facilities. Although nine locations are currently under consideration for the groundwater production well facilities, only six facilities would be constructed—two that would be converted from existing irrigation well facilities, and four new well facilities. Each well facility would include a groundwater production well and a pump station. The SFPUC would also construct a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection. The project would be implemented in two phases: (1) construction and operation of the four new well facilities to supply an annual average of approximately 2.5 mgd of groundwater, and construction of well facilities required to convert two existing irrigation well facilities to potable water well facilities; and (2) operation of the converted irrigation wells to provide an additional annual average of approximately 1.5 mgd of groundwater.

The project is a component of the SFPUC's Water System Improvement Program (WSIP), which includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase delivery reliability and improve the ability to maintain the system; (4) meet customer purchase requests in nondrought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of the project, as a component of the WSIP, would contribute to meeting the overall

WSIP goals and objectives, by diversifying water supply options during drought and nondrought periods and improving the use of new water sources and drought management.

Pursuant to the NOP, the San Francisco Planning Department has determined that an EIR must be prepared for the project prior to any final decision by the SFPUC regarding whether to approve and implement the project. The purpose of the EIR is to provide information about potentially significant adverse environmental effects of the project, to identify possible ways to minimize any potentially significant adverse effects, and to describe and analyze feasible alternatives to the project. Preparation of a NOP or EIR does not indicate a decision by the City of San Francisco to approve or to disapprove the project, and prior to making any such decision, the SFPUC must review and consider the information contained in the EIR.

The San Francisco Planning Department will hold a **PUBLIC SCOPING MEETING** at the location, date, and time listed below. The purpose of this meeting is to receive oral comments to assist the Planning Department in reviewing the scope and content of the environmental impact analysis and information to be contained in the EIR. The Planning Department also will accept written comments at the meeting or by mail, email, or fax until the close of business (5:00 p.m.) on January 30, 2010. Written comments should be sent by mail to San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, San Francisco Groundwater Supply Project Scoping Comments, 1650 Mission Street, Suite 400, San Francisco, CA 94103-2479; by fax to (415) 558-6409; or by e-mail to jamie.dean@sfgov.org.

PUBLIC SCOPING MEETING LOCATION, DATE, AND TIME:

Golden Gate Park Senior Center – San Francisco
Wednesday, January 20, 2010
7:00 PM (starting promptly)
6101 Fulton Street (at 37th Avenue)

If you work for an agency that is a Responsible or a Trustee Agency, we need to know the views of your agency as to the scope and content of the environmental information that is relevant to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this proposed project. We will also need the name of the contact person for your agency. If you have questions concerning environmental review of the proposed project under CEQA, please contact Jamie Dean at (415) 575-9028 or jamie.dean@sfgov.org.

SAN FRANCISCO
PLANNING DEPARTMENT

1650 Mission St.
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San Francisco,
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Planning
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Notice of Preparation of an Environmental Impact Report

Date:	December 30, 2009
Case No.:	**2008.1122E**
Project Title:	**San Francisco Groundwater Supply Project**
Location:	The project is located in the North Westside Groundwater Basin, which is within the larger Westside Groundwater Basin underlying parts of San Francisco and San Mateo Counties. Project facilities would be constructed in the Sunset District of San Francisco and in Golden Gate Park.
BPA Nos.:	N/A
Zoning:	N/A
Block/Lot:	N/A
Lot Size:	Various
Project Sponsor	Jeff Gilman, San Francisco Public Utilities Commission (415) 551-2952
Lead Agency:	San Francisco Planning Department
Staff Contact:	Jamie Dean – (415) 575-9028; jamie.dean@sfgov.org

PROJECT DESCRIPTION

The purpose of the San Francisco Groundwater Supply Project (project or proposed project) is to provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin that underlies parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of the city of San Francisco on property owned by the City and County of San Francisco (CCSF), and managed by the San Francisco Public Utilities Commission (SFPUC) or the San Francisco Recreation and Park Department.

Under the proposed project, the SFPUC would construct and operate six potable groundwater production well facilities. Although nine locations are currently under consideration for the groundwater production well facilities, only six facilities would be constructed—two that would be converted from existing irrigation well facilities and four new well facilities. Each facility would include a groundwater production well and a pump station. The SFPUC would also construct a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection. The project would be implemented in two phases: (1) construction and operation of the four new well facilities to supply an annual average of approximately 2.5 mgd of groundwater, and construction of well facilities required to convert the two existing irrigation

well facilities to potable water well facilities; and (2) operation of the converted irrigation wells to provide an additional annual average of approximately 1.5 mgd of groundwater.

The project is a component of the SFPUC's Water System Improvement Program (WSIP), which includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase delivery reliability and improve the ability to maintain the system; (4) meet customer purchase requests in nondrought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of the project, as a component of the WSIP, would contribute to meeting the overall WSIP goals and objectives by diversifying water supply options during drought and nondrought periods and improving the use of new water sources and drought management.

FINDING

This project may have a significant effect on the environment and an Environmental Impact Report is required. This determination is based upon the criteria of the State CEQA Guidelines, Sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance) and for the reasons documented in the attached project description and description of potential environmental effects.

PUBLIC SCOPING PROCESS

Pursuant to the State of California Public Resources Code Section 21083.9 and California Environmental Quality Act Guidelines Section 15206, a public scoping meeting will be held to receive oral comments concerning the scope of the EIR. The meeting will be held on **January 20, 2010, 7:00 PM** (starting promptly) at the **Golden Gate Park Senior Center, 6101 Fulton Street (at 37th Avenue), San Francisco, CA 94121**. Written comments will also be accepted at this meeting and until the close of business on January 30, 2010. Written comments should be sent to by mail to the San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, San Francisco Groundwater Supply Project Scoping Comments, 1650 Mission Street, Suite 400, San Francisco, CA 94103; by fax to (415) 558-6409; or by e-mail to jamie.dean@sfgov.org.

If you work for a Responsible or Trustee Agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency.

December 18, 2009
Date

Bill Wycko
Environmental Review Officer

NOTICE OF PREPARATION

San Francisco Groundwater Supply Project
Case No. 2008.1122E

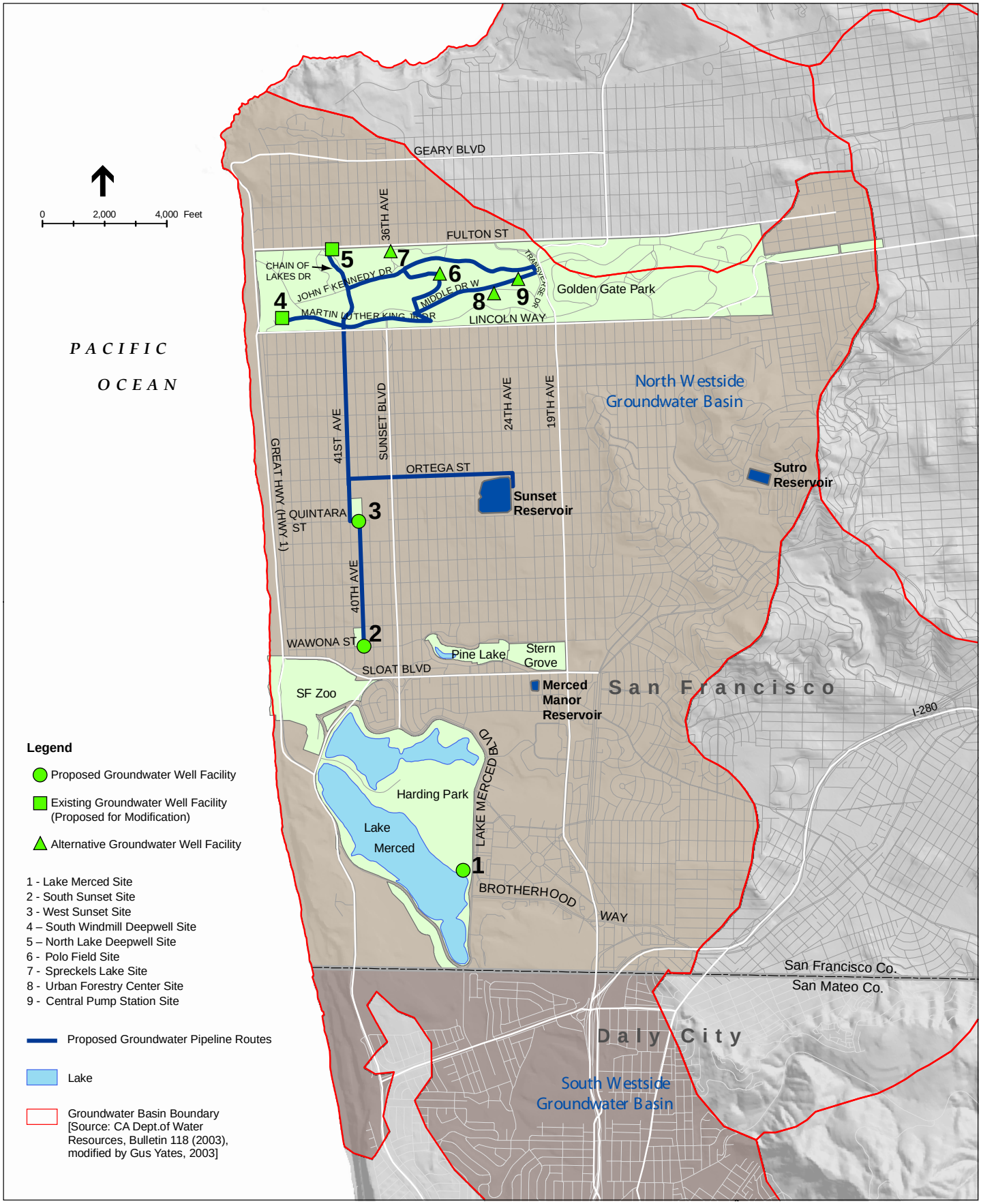
1.0 Overview

The San Francisco Public Utilities Commission (SFPUC) is proposing the San Francisco Groundwater Supply Project (project or proposed project). To meet California Environmental Quality Act (CEQA) requirements, the San Francisco Planning Department's Major Environmental Analysis (MEA) Division will prepare and distribute an environmental impact report (EIR) to describe and analyze the environmental effects of the proposed project. This Notice of Preparation (NOP) describes the proposed project and potential environmental effects, and announces the date of a scoping meeting for public comments.

The project would provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin, which underlies parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of the city of San Francisco (see **Figure 1**), on property owned by the City and County of San Francisco, and managed by the SFPUC or the San Francisco Recreation and Park Department (SFRPD).

As illustrated on Figure 1, nine locations are under consideration for the groundwater production well facilities; however, only six potable groundwater well facilities would be constructed—two that would be converted from existing irrigation well facilities and four new facilities. Each facility would include a groundwater production well and a pump station. The SFPUC also proposes the construction of a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection.

The project is a component of the SFPUC's Water System Improvement Program (WSIP), which includes facility improvement projects designed to maintain high-quality water; reduce vulnerability to earthquakes; increase delivery reliability and improve the ability to maintain the system; meet customer purchase requests in nondrought and drought periods; enhance sustainability in all system activities; and achieve a cost-effective, fully operational system.



SOURCE: SFPUC, 2009

San Francisco Groundwater Supply Project

Figure 1
Project Location

To address the potential environmental impacts of the WSIP, the San Francisco Planning Department prepared a Program EIR on the proposed WSIP, which was certified by the San Francisco Planning Commission on October 30, 2008 and the WSIP was approved by the SFPUC on that same day (San Francisco Planning Department, 2008 and SFPUC, 2008). Implementation of the project, as a component of the WSIP, would contribute to meeting the overall WSIP goals and objectives by diversifying water supply options during drought and nondrought periods and improving the use of new water sources and drought management.

2.0 Environmental Review Process

As described above, the San Francisco Planning Commission certified the WSIP Program EIR in October 2008. The Program EIR addressed the potential environmental impacts of the WSIP facilities on a programmatic level and evaluated regional water supply alternatives. The Program EIR is available on the San Francisco Planning Department website at: http://mea.sfplanning.org.

The Program EIR evaluated the environmental effects of the proposed project at a programmatic level of detail. The San Francisco Planning Department will now prepare a project-specific EIR to evaluate the environmental effects of the proposed project in detail. The EIR will be prepared in compliance with CEQA Guidelines Section 15161, and will address project-specific construction and operational impacts.

The first step in the environmental review process is the formal public scoping process, for which this NOP has been prepared and will be circulated for a 30-day public review period. Following the public scoping phase, a Draft EIR will be prepared and circulated for a 45-day public review period. Public comments on the Draft EIR will be accepted in writing during the review period or verbally at the formal public hearing to be held by the San Francisco Planning Commission. The San Francisco Planning Department will then prepare a Comments and Responses document, which will respond to comments on environmental issues raised during the public review period. This document will be considered by the San Francisco Planning Commission, along with the Draft EIR and any revisions to the draft based on the response to comments, for certification as the Final EIR. Once the Final EIR is certified, the SFPUC will consider project approval.

3.0 Public Scoping Meeting

The San Francisco Planning Department will hold a scoping meeting following release of this NOP as follows:

Golden Gate Park Senior Center – San Francisco
Wednesday, January 20, 2010
7:00 PM (starting promptly)
6101 Fulton Street (at 37th Avenue)

The public will have the opportunity to verbally comment or submit written comments at the scoping meeting. In addition, the San Francisco Planning Department will accept written comments by mail, email, or fax until close of business (5:00 p.m.) on January 30, 2010. The comments received will assist the Planning Department with its review of the proposed scope and content of the EIR as summarized in this NOP.

Written comments may be mailed to the San Francisco Planning Department, Attn: Bill Wycko, Environmental Review Officer, San Francisco Groundwater Supply Project Scoping Comments, 1650 Mission Street, Suite 400, San Francisco, CA 94103; sent by fax to (415) 558-6409; or submitted by email to jamie.dean@sfgov.org.

4.0 Project Description

4.1 Project Goals and Objectives

The proposed project would provide an average of approximately four mgd of groundwater to San Francisco's municipal water supply from the North Westside Groundwater Basin, which would:

- Increase the use of local water supply sources;
- Reduce dependence on imported water; and
- Expand the SFPUC's water supply portfolio to increase system reliability.

In addition, the project would ensure the availability of potable groundwater for emergency supply in the event of an earthquake or other major catastrophe (SFPUC, 2009a).

4.2 Proposed Project

4.2.1 Summary of Proposed Project Components

The proposed project consists of the following components:

- Construction of six groundwater well facilities. This would involve the conversion of two existing irrigation well facilities to potable groundwater well facilities and the construction of four new groundwater well facilities. Each facility would include a groundwater production well and a pump station. Disinfection treatment would be included at the Lake Merced and West Sunset well facilities.

- Construction of a distribution system (including pipelines and connection points) to connect five of the groundwater well facilities to Sunset Reservoir. The sixth groundwater well would connect to the Lake Merced Pump Station, and would require a short length of distribution piping to make this connection.

The project would be implemented in two phases: (1) construction and operation of the four new groundwater well facilities to supply an annual average of approximately 2.5 mgd of groundwater, and construction of well facilities required to convert the two existing irrigation well facilities to

potable groundwater well facilities; and (2) operation of the converted irrigation wells to provide an additional annual average of approximately 1.5 mgd of groundwater.

Implementation of the proposed project is related to the SFPUC's proposed San Francisco Westside Recycled Water Project,[1] which consists of development of a new recycled water supply for non-potable irrigation uses at Golden Gate Park, Lincoln Park Golf Course, and other areas in San Francisco. The proposed San Francisco Westside Recycled Water Project would replace the existing use of two existing irrigation well facilities at Golden Gate Park with recycled water. Thus, Phase 2 of the proposed project could be implemented only if the proposed San Francisco Westside Recycled Water Project is approved and operational, as Phase 2 of the proposed project includes the use of those two well facilities for potable water. If the San Francisco Westside Recycled Water Project is not implemented and a backup source of irrigation water for Golden Gate Park (i.e., other than groundwater) is not made available, the existing irrigation wells in Golden Gate Park would not be used to supply municipal water as part of the San Francisco Groundwater Supply Project. Under this scenario, the proposed project would only include operation of four potable wells which may result in some reduction in the average annual groundwater production.

4.2.2 Proposed Project Component Locations

Proposed Groundwater Well Facility Locations

The project includes three new groundwater well facilities south of Golden Gate Park and, as described above, would convert two existing irrigation well facilities in Golden Gate Park to potable use. The project would also consider four alternative locations for one new groundwater well facility in Golden Gate Park. The proposed and alternative locations for groundwater well facilities are shown on **Figure 1** and described below.

Groundwater Well Facility Sites South of Golden Gate Park

Lake Merced Site. The existing Lake Merced Pump Station is on Lake Merced Boulevard next to Lake Merced and south of the Harding Park Golf Course. A new well facility would be developed approximately 300 feet southeast of the existing pump station in an undeveloped area of SFPUC-managed property. The SFPUC has an existing test well at this location. This area is restricted from public use and access.

South Sunset Site. The South Sunset well facility would be developed in the corner of the South Sunset Playground, at 40th Avenue and Wawona Street, next to a SFRPD-managed public recreational field used for softball, baseball, and soccer. Residences are located across the street along 40th Avenue and Wawona Street. The well facility would be constructed within a landscaped berm adjacent to the sports field. The SFPUC has an existing test well at this location.

[1] The San Francisco Westside Recycled Water Project is one of the projects proposed for implementation under the WSIP, approved by the SFPUC in October, 2008. The environmental review for the San Francisco Westside Recycled Water Project (San Francisco Planning Department Case Number 2008.0091E) is proceeding independently of this project. The NOP for preparation of an EIR for the San Francisco Westside Recycled Water Project is expected to be available for public review in the spring of 2010.

West Sunset Site. The West Sunset well facility would be developed at the West Sunset Playground, at the intersection of 40th Avenue and Quintara Street adjacent to a SFRPD-managed public recreational field used for softball, baseball and soccer. Residences are located across the street along Quintara Street. The proposed well facility would be within a portion of the playground parking lot. The SFPUC has an existing test well at this location.

Existing Well Facilities in Golden Gate Park Proposed for Conversion

South Windmill Deepwell Site. The South Windmill Deepwell facility was constructed in 2001 and is operated by the SFRPD. The facility is within the western area of Golden Gate Park north of Martin Luther King Jr. Drive. Under the proposed project, the SFPUC would remodel the existing building, replace the existing pump, and install new piping and valves. Upgrades to the existing electrical service could also be required.

North Lake Deepwell Site. The North Lake Deepwell facility was constructed in 2001 and is operated by the SFRPD. The facility is next to Chain of Lakes Drive within the western area of Golden Gate Park, south of Fulton Street. Under the proposed project, the SFPUC would remodel the existing building, replace the existing pump, and install new piping and valves. Upgrades to the existing electrical service could also be required.

Alternative Sites in Golden Gate Park for New Groundwater Well Facility

Polo Field. The Polo Field site is south of John F. Kennedy Drive and Lindley Meadow and north of the Golden Gate Park Stadium and Polo Fields, near a horse corral and portable storage container.

Spreckels Lake. The Spreckels Lake site is north of the Model Yacht Club building and west of 36th Avenue and Spreckels Lake.

Urban Forestry Center. The Urban Forestry Center site is to the south of Middle West Drive, adjacent to and west of the Urban Forestry Center. The SFRPD uses the Urban Forestry Center buildings and yard areas for park operations and maintenance activities.

Central Pump Station. The Central Pump Station is part of the park's existing irrigation system, and is located southeast of the John F. Kennedy Drive/Transverse Drive intersection. The proposed well site is to the west of the existing fenced Central Pump Station facility. The yard area at the Central Pump Station is used for the SFRPD's wood waste storage and composting operations.

Pipeline Locations

As shown in **Figure 1**, the proposed groundwater transmission pipelines for five of the well facilities would connect groundwater well facilities with the Sunset Reservoir. The groundwater transmission pipelines would be 8 to 16 inches in diameter.

Groundwater drawn from the Lake Merced well facility would be transferred to the Lake Merced Pump Station via a short connector pipeline, and then conveyed to either the Sunset Reservoir or the Sutro Reservoir through the Lake Merced Pump Station's existing pumping and distribution system.

The SFPUC would install a pipeline along 40th Avenue between Wawona and Quintara Streets to connect the South Sunset and West Sunset well facilities. The pipeline would extend west along Quintara Street and northward two blocks along 41st Avenue, and then continue approximately one mile eastward along Ortega Street to 24th Avenue. The pipeline would continue southward along 24th Avenue for approximately one block, where it would enter the Sunset Reservoir facility. The pipeline would branch and terminate in the north and south basins of Sunset Reservoir where groundwater would be blended with the water in storage and then distributed to local customers.

Within Golden Gate Park, potable water wells would be connected to a single pipeline that would exit the park at Lincoln Way and 41st Avenue (see **Figure 1**). The pipeline would continue south approximately one mile along 41st Avenue and then east one block at Quintara Street to connect to the pipeline alignment at the West Sunset well facility.

4.2.3 Project Construction

Well Facility Construction

Modification of the existing South Windmill Deepwell and North Lake Deepwell facilities could require demolition of some existing facilities to accommodate the upgraded pumping equipment and new pipeline connections. In addition, construction of a well facility at the Polo Fields site would require removal of a horse corral and metal storage container. Tree removal could be required within the construction and staging areas at several of the proposed facilities.

The conversion of existing test wells and irrigation wells would be required to meet municipal well construction standards and include the installation of pumps, valves, and electrical utility connections. Pumps and pump motors would be either vertical turbine or submersible. Well facility buildings would include noise-limiting, 8- to 10-inch-thick concrete walls, 8-inch-thick concrete roofs, and small windows with acoustical louvers.

Pipeline Construction

Pipeline construction would require trench corridors that would generally be 10 feet wide for single pipeline routes, and 16 feet wide along the few segments where two pipelines would run along the same route (e.g., sections of 41st Avenue, near the West Sunset well facility). A 16-foot trench corridor would also be required for the Golden Gate Park well facilities that require new electrical utility connections along the proposed pipeline route (e.g., Polo Field and Spreckels Lake). Site preparation for pipeline construction could include tree removal or ground clearing of the work area, as well as grading or pavement cutting.

Figure 1 shows the locations of pipeline infrastructure and connection points with the Lake Merced Pump Station and the Sunset Reservoir. The pipeline alignment would be located

primarily within existing roadways; after pipeline construction activities were completed, roadways would be restored to pre-construction conditions. In general, the pipeline routes would be excavated to a depth of six feet, except where the pipeline enters/exits individual well facilities. At these locations, the pipeline excavation would be at the same depth as the well facility connection.

The open-cut trench method would primarily be used for the pipeline construction. This method involves excavation of the trench, placement of the pipe, backfilling of the trench, and restoration of the work surface. Typically, excavation of an approximately 4-foot-wide by 6-foot-deep trench would be required to install the pipeline. In accordance with Occupational Safety and Health Administration standards, shoring would be required for trenches over 5 feet deep to prevent the surrounding soil and adjacent structures from collapsing. Dewatering of the trench would be required if groundwater were encountered.

The pipeline route would cross the Taraval MUNI light rail line at its intersection with 40th Avenue and the Judah MUNI light rail line at its intersection with 41st Avenue. Jack and bore pipeline (pipe-jacking) construction would be used to tunnel under the light rail lines without disturbing these rail lines.

Spoils Disposal and Dewatering

Excavated soil would be stockpiled at the construction staging area for reuse at the well facility or pipeline construction site, or would be disposed of at an appropriate landfill. Most of the spoils material is expected to be Class III non-hazardous waste.

Dewatering could be required, and would involve pumping water out of the excavated area and, following appropriate onsite treatment, discharging into a nearby sewer, open channel, or over land. Dewatering must be performed in accordance with the requirements of the Statewide General Construction Permit for Stormwater Discharges Associated with Construction Activity issued by the State Water Resources Control Board, and municipal stormwater permits.

Construction Staging

Except for the Lake Merced site, all of the proposed groundwater well facilities would be located on SFRPD-managed properties. The SFPUC would coordinate with the SFRPD for final site selection and determination of construction/staging areas. Pipeline construction would occur within CCSF roadways, with some pipeline segments between well facilities and paved roadways over land or within existing trails in Golden Gate Park. All temporary construction easements, where applicable, would be obtained before the start of construction.

Each well facility and pipeline construction site would require a staging area for equipment and materials storage (e.g., construction vehicles, building materials, pipes, fuels, lubricants). Staging areas could also be used for stockpiling excavated soil for reuse. Whenever possible, the project staging areas would be located on developed or previously disturbed areas, rights-of-way, or roadsides.

Staging areas would be used for up to 16 months during well facility construction. Pipeline staging would be located sequentially near the pipeline route, and each staging area would operate for a seven-week period during pipeline construction. Once a staging area is no longer needed, the area would be restored to its pre-construction condition. Unpaved roadways would be restored to pre-project conditions, and roadway pavement would be restored in accordance with local design specifications.

4.2.4 Construction Schedule

Table 1 provides the approximate duration of construction work necessary at each well facility and the installation rate for the proposed pipeline system. The construction of new groundwater well facilities would require approximately 16 months at each site. Construction activities would occur primarily Monday through Friday during daytime hours (7:00 a.m. to 5:00 p.m.). At some sites, construction might be necessary during weekend and evening hours to meet construction requirements. If nighttime work were required, work could be performed between 5:00 p.m. and 7:00 a.m.

TABLE 1
CONSTRUCTION DURATION BY ACTIVITY TYPE

Construction Activity	Expected Duration
Well Facility	
Site Clearing, Grubbing, and Preparation	1 month
Foundation and Utility Connections	3 months
Building Construction and Equipment Installation	10 months
Start-up and Testing	2 months
Total Well Facility Construction Duration	**16 months**
Pipeline Installation (at a rate of 500 to 600 feet per week)	**14 to 18 months**

Construction of pipelines would occur at the same time as well facility construction. In general, pipeline installation would progress at a net rate of approximately 100 feet per day for in-street areas and up to 120 feet per day in off-street areas. However, construction activities might not be continuous. For example, pipeline installation could begin several days after completion of excavation, and temporary paving could occur up to several days after completion of backfilling. Final paving of in-street areas would take place after the above activities and would progress at a rate of approximately 300 feet per day.

At two locations, beneath the Taraval and Judah MUNI light rail lines, pipe-jacking (jack and bore) pipeline construction would be necessary, and the duration of this activity would be approximately three weeks.

4.4 Operations and Maintenance

4.4.1 Operations

Normal daily extraction rates from each of the six wells would be 0.6 to 0.7 mgd, for a total average of 4 mgd, and would be blended with San Francisco's municipal water supply. However, due to water quality requirements that dictate a ceiling for blending groundwater in the San Francisco municipal water system, as well as seasonal variations in water demand, production from the proposed wells could vary on a daily basis. During low-demand periods, such as winter months when surface water supplies are more abundant and water use is lower, groundwater extraction would generally be less than 4 mgd. During high-demand periods, the production rate could be greater than 4 mgd, but the total production rate would be equal to 4 mgd averaged over a year. During project operation, the SFPUC would monitor groundwater levels and groundwater quality in the Westside Groundwater Basin monitoring network. The groundwater monitoring results would be used to detect potential adverse effects of seawater intrusion, changes in water levels in surface water features (such as Lake Merced and Pine Lake, which is located to the east of the project area), land subsidence, and interference with other wells. Groundwater pumping would be balanced between the six groundwater production wells to avoid such effects.

In addition to normal operations, the project would provide an available source of drinking water in the event that other imported water sources are interrupted due to earthquake damage or other emergency situations. Each well would be capable of producing up to 1 mgd (each) during a catastrophic emergency and could operate at this rate for up to 30 days, consistent with level-of-service goals established by the SFPUC (2009b). Portable generators would provide backup power to enable use of the proposed wells during a catastrophic emergency.

4.4.2 Maintenance

During project operation, an operator would make daily visits by truck (of approximately 30-minute duration) to check the equipment at each of the groundwater well facility sites. Standard Supervisory Control and Data Acquisition (SCADA) equipment would be installed at each site for remote monitoring of the well facility and pipeline equipment. Longer-term maintenance would include removal and repair (or replacement) of pumps, valves, and other equipment. The production wells might require rehabilitation on an infrequent basis. The estimated operational life of the proposed production wells is 50 years (or more).

5.0 Permits and Approvals Required

The SFPUC may be required to obtain the following permits and approvals for project construction and operation.

5.1 Federal

Based upon the current understanding of project activities and environmental conditions, no federal permits or approvals are expected to be required for implementation of the project. This

determination is contingent on the completion of EIR project description and site surveys to be conducted for analysis of impacts of the proposed project.

5.2 State

- California Department of Public Health, Water Supply Division permit amendments and approval of well construction and operation.
- California Department of Toxic Substances Control Contaminated Soil Treatment Work Plan (required only if contaminated soil were encountered during construction).
- State Water Resources Control Board Stormwater General Permit and Stormwater Pollution Prevention Plan, if more than 1 acre of land were disturbed.

5.3 Local

- San Francisco Planning Commission certification of the Final EIR.
- San Francisco Planning Commission Coastal Development Permit.
- SFPUC consideration of project approval following certification of the Final EIR, adoption of CEQA findings, and mitigation monitoring and reporting program.
- San Francisco Board of Supervisors consideration of any appeals of the Planning Commission's certification of the Final EIR. The San Francisco Board of Supervisors would also appropriate funding (general obligation bond monies, annual budget appropriations) to implement the project.
- Advisory Council on Historic Preservation review, if the project were to affect properties listed or eligible for listing on the National Register of Historic Places.
- San Francisco Historic Preservation Commission review of local, state, and national landmarks and historical landscapes.
- SFRPD determination of project consistency and approval of property use.
- San Francisco Arts Commission approval of exterior design of proposed facilities.
- San Francisco Department of Public Health approval of well construction and operation permits in accordance with California Department of Water Resources standards.
- San Francisco Department of Public Health approval of Certified Unified Program Agencies/Hazardous Materials Business Plan for project operations.
- San Francisco Department of Public Works approval of excavation permits, encroachment permits, and temporary occupancy permits for street space.
- San Francisco Municipal Railway encroachment permits.

6.0 Environmental Analysis

6.1 Environmental Issues to Be Addressed in the EIR

The EIR will address all environmental issue areas required under CEQA. The EIR will discuss the environmental impacts of the proposed project due to construction and operation activities, and will propose mitigation measures for impacts considered to be potentially significant. The following paragraphs describe the key environmental issues that will be addressed in the EIR.

6.1.1 Land Use and Land Use Planning

Project construction and operation could affect land uses at the project sites and surrounding areas. Potential impacts to be evaluated include:

- Temporary and permanent disruption or displacement of existing land uses during construction—including construction impacts on sensitive land uses such as schools and residences, and potential temporary closures of some portions of Golden Gate Park, South Sunset Playground, and West Sunset Playground.

6.1.2 Aesthetics

Project construction and operation could affect aesthetics at the project sites and surrounding areas. Potential impacts to be evaluated include:

- Impacts on scenic vistas or visual character, including potential impacts on the visual character of Golden Gate Park, Lake Merced, South Sunset Playground, and West Sunset Playground.

6.1.3 Cultural Resources

The project could potentially affect archaeological, historical, or paleontological resources through ground-disturbing activities during construction, or by introducing new facilities that could compromise the historical integrity of historical buildings or landscapes. Potential impacts to be evaluated include:

- Impacts on archaeological and paleontological resources.

- Impacts on the historical significance of a historic district, contributor to a historic district, or historic landscape. Of particular focus will be the proposed well facilities in Golden Gate Park.

6.1.4 Traffic, Transportation, and Circulation

Construction could have temporary impacts on traffic volumes, traffic safety, and parking in the vicinity of the groundwater pipelines, well facility sites, and the Sunset Reservoir. Potential impacts to be evaluated include:

- Temporary reduction in roadway capacity and increase in traffic delays, including impacts from short-term closure of one parking and/or traffic lane.
- Temporary displacement of on- or off-street parking.

6.1.5 Noise and Vibration

Project construction noise and vibration impacts associated with facility construction would be temporary and short term. However, operation of the proposed pumps, building ventilation fans, and chemical treatment equipment could create permanent noise impacts. Potential impacts to be evaluated include:

- Impacts of construction noise and vibration on sensitive receptors in the vicinity of project construction sites, especially sensitive land uses such as schools and residences.
- Operational noise impacts from groundwater well facilities, including pumps, building ventilation fans, and groundwater treatment equipment.

6.1.6 Air Quality

Effects on air quality from the project would largely be associated with construction activities and, as such, would be temporary and short term. Potential impacts to be evaluated include:

- Impacts of construction emissions, including dust and greenhouse gases.
- Consistency with regional air quality plans.
- Consistency with state laws regarding greenhouse gases.

6.1.7 Recreation

Project construction could temporarily disrupt recreational uses in the vicinity of the well facility sites as a result of noise, dust, and temporary access restrictions. The EIR will evaluate project impacts on recreational resources. Potential impacts to be evaluated include:

- Temporary and permanent impacts on recreational facilities, including but not limited to closure of some portions of the South Sunset Playground, West Sunset Playground, and Golden Gate Park.

6.1.8 Biological Resources

Temporary impacts on biological resources could result from construction activities related to noise, vibration and dust. Potential impacts to be evaluated include:

- Impacts on sensitive wildlife habitats (including wetlands), migration corridors, and protected/heritage trees.
- Impacts on special-status wildlife and plant species (direct mortality and/or habitat effects).

6.1.9 Geology, Soils, and Seismicity

Construction and operation of new well facilities and below-ground distribution pipelines could result in site-specific impacts on or from local geology and soils conditions. Potential impacts to be evaluated include:

- Seismic hazards and/or increased exposure of structures to seismic hazards, including impacts from ground-shaking in the event of an earthquake on the San Andreas fault or other Bay Area faults.
- Increased exposure of structures to geologic hazards (such as liquefaction, poor soil conditions, or unstable slopes) from construction in geologic hazard zones.
- Soil erosion potential from construction activities.
- Potential for land subsidence from decreases in groundwater level elevations (drawdown) in the groundwater aquifer.

6.1.10 Hydrology and Water Quality

Project construction could affect surface and groundwater water quality in the project area. Project operation could affect groundwater levels and quality in the project area and in the Westside Groundwater Basin. Potential impacts to be evaluated include:

- Changes in local groundwater quality and levels within the project area and the Westside Groundwater Basin.
- Depletion of groundwater supplies or interference with groundwater recharge such that production rates of preexisting wells in the Westside Groundwater Basin would drop to a level that would not support existing or planned land uses, seawater intrusion would occur, or land subsidence would result.
- Changes in surface water bodies or other surface water features, such as Lake Merced, due to changes in groundwater levels in the Westside Groundwater Basin.
- Changes in drinking water quality due to blending of treated groundwater with the imported treated surface water supply.
- Alteration of drainage patterns and increase in stormwater flows due to increase in the amount of impervious surfaces.
- Degradation of surface and groundwater water quality as a result of erosion and sedimentation, hazardous materials release during construction, and construction dewatering discharges.

6.1.11 Other Environmental Issues

Other environmental issues that will be evaluated in the EIR include the project's potential impacts on population and housing; wind and shadow; utilities and service systems; public services, including the project's beneficial effect on water supply; hazards, including the potential

hazards from chemical storage at the well sites; mineral and energy resources; and agricultural resources.

The EIR will evaluate any potential growth-inducing impacts that could result from implementation of the proposed project. The EIR will also address whether the project could result in impacts that would be significant when combined with the impacts of other SFPUC or non-SFPUC projects occurring concurrently within the same geographic area.

6.2 Alternatives

CEQA requires that an EIR evaluate a reasonable range of feasible alternatives to the project, or to the project location that would attain most of the project objectives but avoid or substantially lessen any of the significant effects of the project. The EIR will identify the potentially significant impacts of the proposed project. The findings of the EIR impact analysis will guide the refinement of an appropriate range of alternatives to be evaluated in the EIR that would avoid or substantially lessen significant impacts, while still meeting project objectives. Alternatives suggested during the public scoping period will also be considered. The EIR will also discuss impacts associated with the No Project Alternative.

7.0 References

San Francisco Planning Department, *Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program*, October 2008.

San Francisco Public Utilities Commission (SFPUC), Water System Improvement Program California Environmental Quality Act Findings: Findings of Fact, Evaluation of Mitigation Measures and Alternatives, and Statement of Overriding Considerations, October 2008 (Attachment A to SFPUC Resolution No. 08-0200, adopted October 30, 2008).

San Francisco Public Utilities Commission (SFPUC), CUW 30102 – North Westside Basin Local Supply (Groundwater Project B), CER Checklist for Environmental Review (Project Description Requirements), March 25, 2009a.

San Francisco Public Utilities Commission (SFPUC), Operation Plans for Environmental Review Purposes – WSIP Groundwater Projects, June 30, 2009b.

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APPENDIX B
Scoping Meeting Materials

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SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

Proposed San Francisco Groundwater Supply Project

Golden Gate Park Senior Center, San Francisco – January 20, 2010

AGENDA

Starting promptly at 7:00 PM

Introductions – Jamie Dean, San Francisco Planning Department

Environmental Review Process Overview – Jamie Dean, San Francisco Planning Department

Project Overview – Jeff Gilman, San Francisco Public Utilities Commission

Public Comment

Closing Remarks – Jamie Dean, San Francisco Planning Department

Glossary	MEA: Major Environmental Analysis Division, San Francisco Planning Department
	SFPUC: San Francisco Public Utilities Commission
	CEQA: California Environmental Quality Act
	EIR: Environmental Impact Report
	WSIP: Water System Improvement Program
Documents Currently Available	The following documents are available online at http://mea.sfplanning.org or by calling 415.575.9028:
	- Project Notice of Preparation
	- Program EIR for the SFPUC Water System Improvement Program
For More Information	Planning Department Web Site: http://mea.sfplanning.org
	SFPUC Web Site: www.sfwater.org
	For EIR: Jamie Dean at SF Planning, (415) 575-9030 or jamie.dean@sfgov.org
	For Project: Michelle Liapes at SFPUC, (415) 554-3211 or mliapes@sfwater.org

San Francisco Planning Department
Major Environmental Analysis Division

SCOPING MEETING

SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Environmental Impact Report

JANUARY 20, 2010

Scoping Meeting Purpose

- Hear your comments on the proposed scope and focus of environmental review of the proposed San Francisco Groundwater Supply Project
- Help identify the following to be analyzed in depth:
  - *Range of alternatives*
  - *Environmental effects*
  - *Methods of assessment*
  - *Mitigation measures*

Scoping Meeting Agenda

- Introductions
- Presentation
  - ***Overview of Environmental Review Process***
  - ***Overview of San Francisco Groundwater Supply Project***
- Public Comments
- Closing Remarks

Scoping Meeting Reminders

- Sign in at the table near the entrance.
- Pick up copies of meeting materials.
- If you would like to speak during tonight's hearing, fill out a speaker card.
- To make written comments, pick up comment cards.
  - ***Drop off at the end of the meeting***
  - ***Mail or fax later***
- Please hold all comments until the end of the presentation.

Project Team Introductions

- San Francisco Planning Department (Lead Agency under CEQA)
  - *Jamie Dean, Environmental Planner*
- San Francisco Public Utilities Commission (Project Sponsor)
  - *Jeff Gilman, C.HG., Project Manager*
  - *YinLan Zhang, Environmental Project Manager*
  - *Michele Liapes, Communications*
  - *Debra Temple, P.E., Project Engineer (Department of Public Works)*
  - *Alan R. Wong, P.E., Water Quality Division*

ENVIRONMENTAL REVIEW PROCESS

California Environmental Quality Act

Proposed projects require environmental review under the California Environmental Quality Act (CEQA) before they can be considered for approval

For SFPUC projects, CEQA is implemented by the San Francisco Planning Department

CEQA Objectives

- Present environmental impacts of proposed projects
- Identify ways to avoid or reduce environmental impacts
- Support the agency decision-making process
- Encourage public participation
- Enhance interagency coordination

What will the EIR do?

- Provide a detailed description of the project and the existing environment
- Identify potential environmental impacts
- Identify ways to avoid or reduce significant environmental effects through mitigation or alternatives to the proposed project

PROPOSED SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

SFPUC San Francisco Municipal Water System

Water System Improvement Program (WSIP)

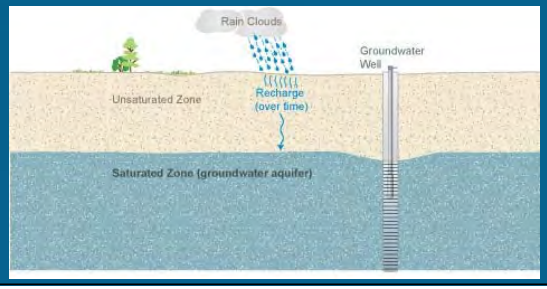
- Bond-funded program approved by voters in November 2002
- Approximately 85 projects to:
  - ***repair, replace and seismically upgrade key water system facilities***
  - ***add new, redundant facilities to insure system reliability***
  - ***develop new sources of groundwater and recycled water***
- October 2008 – the WSIP Program EIR was certified, and the WSIP was adopted

Need for the Project

- WSIP requires 10 million gallons per day (mgd) of new local water supply
- Combination of sources to meet 10 mgd goal:
  - ***Conservation***
  - ***Recycled Water***
  - ***New Groundwater***
  - ***Existing Groundwater (convert irrigation use)***
- SF Groundwater Supply Project is part of portfolio of new sources

What is Groundwater?

- Water-saturated geologic deposits
- Aquifer (underground reservoir)

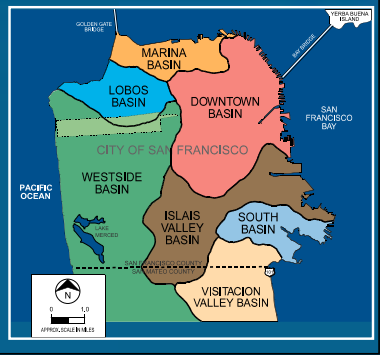


Westside Basin Aquifer

North Westside Basin (SF part of aquifer system)

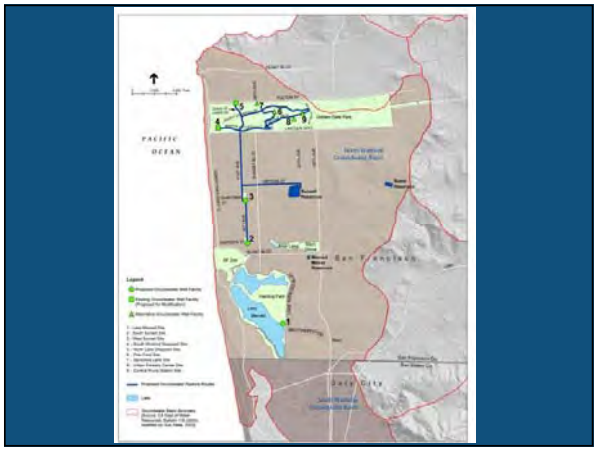
Mainly used for irrigation for past 50+ years

Municipal and irrigation use in northern San Mateo County



Potential Well Locations

- 9 potential well sites advanced for environmental analysis
- 6 well facilities would be developed
- "well facility" = production well + pump station
- size of well facilities
  - *Length – 20 to 30 feet Width – 40 to 60 feet*
    Height – 12 to 16 feet



How Would the Project Work?

- Produce 4 mgd of groundwater (on average) from 6 wells
- Disinfect groundwater per CA Dept. of Public Health requirements
- Pipe groundwater to Sunset Reservoir and Lake Merced Pump Station for blending and distribution in San Francisco
- Why blend the groundwater?
  - *Maintain consistency in taste for customers*
  - *Avoid adding other water treatment chemicals*

Groundwater Quality

- Groundwater samples analyzed from test wells and existing Golden Gate Park irrigation wells
- Groundwater meets all health- based drinking water standards (US EPA and CA DPH)
- Groundwater is safe to drink even before blending
- Groundwater monitoring program

Operation of the Well Facilities

- Normal Operation
  - *Wells would operate daily*
  - *Average annual groundwater production 4 mgd*
  - *Variations in production in response to overall SF water demand*
- Emergency Operation
  - *Each well capable of producing up to 1 mgd during a catastrophic emergency*
  - *North Lake and West Sunset well facilities designed to operate using emergency power supply*

Environmental Review Schedule

- Notice of Preparation – December 30, 2009
- Public Scoping Meeting – January 20, 2010
- Scoping Period Ends – January 29, 2010
- Public Review of Draft EIR – Winter 2011
- Release of Final EIR – Fall 2011
- Certification of Final EIR – Fall 2011

PUBLIC COMMENT

Comment Session Ground Rules

- Submit speaker cards to speak
- Wait until your name is called
- Speak into the microphone and state your name
- Summarize comments verbally and provide more detail in writing
- Use comment forms for more extensive input

CLOSING REMARKS

Where to Send Comments

Scoping comments accepted through January 29, 2010

Send by email to: *jamie.dean@sfgov.org*

Send by fax to: (415) 558- 6409

Send by U.S. mail to:

San Francisco Planning Dept
Attn: Bill Wycko, ERO
San Francisco Groundwater Supply Project
1650 Mission Street, Suite 400
San Francisco, CA 94103

For More Information

About the Environmental Review Process:

Jamie Dean, San Francisco Planning Department, Major Environmental Analysis Division
(415) 575-9028, jamie.dean@sfgov.org

The Notice of Preparation is available online at http://mea.sfplanning.org

About the San Francisco Groundwater Supply Project

Michele Liapes, SFPUC Communications
(415) 554-3211, mliapes@sfwater.org

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

Name:

Affiliation:

Street Address:

City, State, Zip:

Phone:

Email:

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

Name:

Affiliation:

Street Address:

City, State, Zip:

Phone:

Email:

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

January 20, 2010

Thank you for participating in tonight's Public Scoping Meeting on the San Francisco Groundwater Supply Project. Your comments on the scope and focus of the environmental review are encouraged. The San Francisco Planning Department will accept written comments until the close of business on January 30, 2010.

Name (please print): _____

Affiliation (if applicable): _____

Phone: _____ Email: _____

Address: _____

City, State, Zip: _____

COMMENTS

CONTINUED ON BACK

Mail comments to: Bill Wycko, San Francisco Planning Department San Francisco Groundwater Supply Project,
1650 Mission Street, Suite 400, San Francisco, CA 94103
Fax: (415) 558-6409 Email: jamie.dean@sfgov.org

For more information on the SFPUC's project, contact Michelle Liapes, SFPUC Communications Division, mliapes@sfwater.org and 415-554-3211

COMMENTS *(Continued)*

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Golden Gate Park Senior Center, San Francisco, CA – January 20, 2010

SIGN-IN SHEET

(Please print)

NAME	AFFILIATION	ADDRESS	PHONE	EMAIL
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Kathy Symkowick	Resident	839-39th Avenue	415-221-6337	

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Golden Gate Park Senior Center, San Francisco, CA – January 20, 2010

SIGN-IN SHEET

(Please print)

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SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Golden Gate Park Senior Center, San Francisco, CA – January 20, 2010

SIGN-IN SHEET

(Please print)

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Tom Chiosso	"	655 John Muir Dr Esty	740 9493	
Kang Kiang	MCA	1045 Sansome St	3096884	
Jason Gurdak	San Francisco State Univ.	1600 Holloway Ave, SF	415-338-6869	jgurdak@sfsu.edu
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Jorge Law	Resident	2422 40th Ave SF	415-235-3031	
Joan Girardot	CSFN	349 Marina Blvd 94123		

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Golden Gate Park Senior Center, San Francisco, CA – January 20, 2010

SIGN-IN SHEET

(Please print)

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Dan Murphy	Golden Gate Audubon	2945 Alloa St San Francisco, CA 94116	415 564-0074	murphot@comcast.net
Peter Kanios		1418 42nd Ave SF 94122	415-672-3417	peterkanios@gmail.com
Dylan Duverge	ESF			
H Fouls		2000 Vanness SF 94109		
Elizabeth Porta Helbig	Home Owner	2155 40th Ave. SF	(415) 665-3943	RHelbig@sfo.com

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Golden Gate Park Senior Center, San Francisco, CA – January 20, 2010

SIGN-IN SHEET

(Please print)

NAME	AFFILIATION	ADDRESS	PHONE	EMAIL
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Cammy Blackstone	Sup. Carmen Chu's office	City Hall	554-7481	cammy.blackstone@sfgov.org
Helen Yi				

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

Name: Kathy Symkowick

Affiliation: Resident

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City, State, Zip: San Francisco, CA. 94121

Phone: 415-221-6337

Email:

NOTE = Did not speak

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

Name: ANDREW CHAN

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SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

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SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

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SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

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SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

Name: JOAN GIRARDOT

Affiliation: CSFN

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Phone:

Email:

SAN FRANCISCO PLANNING DEPARTMENT

Public Scoping Meeting

San Francisco Groundwater Supply Project

Location: Golden Gate Park Senior Center Date: January 20, 2010

SPEAKER CARD

CONTACT INFORMATION

A.1-66

Name: Joyce Law

Affiliation:

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Phone: 415 235.3031

Email:

APPENDIX C
Scoping Meeting Transcripts

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SAN FRANCISCO PLANNING DEPARTMENT

SCOPING MEETING

SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

ENVIRONMENTAL IMPACT REPORT

Wednesday, January 20, 2010

Golden Gate Senior Center

6101 Fulton Street

San Francisco, California

REPORTED BY: DEBORAH FUQUA, CSR #12948

APPEARANCES

SAN FRANCISCO PLANNING DEPARTMENT
(Lead Agency under CEQA)

JAMIE DEAN, Environmental Planner,

SAN FRANCISCO PUBLIC UTILITIES COMMISSION
(Project Sponsor)

JEFF GILMAN, C.HG., Project Manager

YINLAN ZHANG, Environmental Project Manager

MICHELE LIAPES, Communications

DEBRA TEMPLE, P.E., Project Engineer (Department of Public Works)

ALAN R. WONG, P.E., Water Quality Division

---o0o---

PUBLIC COMMENTS: PAGE NUMBER

Andrew Chan.....19

Steve Lawrence.....20

Dan Murphy.....23

Joan Girardot.....24

Joyce Law.....26

Nicole Iroz-Elardo.....27

Kathy Symkowick.....(NO RESPONSE)

Wednesday, January 20, 2010 7:01 o'clock p.m.

---o0o---

P R O C E E D I N G S

JAMIE DEAN: Hello and good evening. My name is Jamie Dean, and I'm with the San Francisco Planning Department. Welcome to this evening's scoping meeting on the San Francisco Groundwater Supply Project.

So just to go over the purpose for this evening's meeting, the reason that we're all here is to hear from you and to receive your comments on the scope and focus on the environmental review for the proposed project. Your comments will assist the Planning Department, by sharing any information that you have, in completing the environmental impact report, or EIR, for the proposed project. Your comments can assist us in providing information on the range of project alternatives, the environmental effects on the proposed project, the methods of assessment, as well as developing mitigation measures to address potential project impacts.

So after I introduce the folks that are with us this evening, I will provide a brief overview on the environmental review process. And then the San Francisco Public Utilities Commission, who is the project sponsor, will provide an overview of the

project characteristics.

Following these presentations, we will then open the meeting to hear from you and to receive your comments on the proposed environmental review.

I would also like to point out that we do have a court reporter here this evening that will be taking a transcript of this meeting that will go into the environmental review record.

Just a few reminders: We do ask that you please sign in at the back table so that we can keep in touch with you as we move through the environmental review process. We also have quite a few meeting materials at the back table that you're welcome to pick up. If you do wish to make comments tonight, we ask that you please complete a speaker card, and we will be calling names as we receive them. If you don't wish to speak tonight, or you wish to augment your verbal comments with written comments, you're welcome to do so by completing the comment cards that we have in the back of the room. And we'll accept those both this evening as well as through the scoping period, which will extend through the end of this month.

Just to let you know, the restrooms are located behind me, behind this screen. And we do ask that you please turn off your cell phone ringers and,

if you do need to make a call, that you please step outside.

So as I mentioned, my name is Jamie Dean, and I'm here representing the San Francisco Planning Department. We also have a number of people here representing the San Francisco Public Utilities Commission. We have Jeff Gilman, who is the project manager; YinLan Zhang, who is the environmental project manager; Michele Liapes, who is with the communications department; and we have Debra Temple, who is here with the public works department; and we have Allen R. Wong, who is with the water quality commission for the SFPUC.

Now I'll take a moment to provide an overview on the environmental review process. The California Environmental Quality Act, or CEQA, requires that a proposed project undergo the environmental review process before it can be considered for project approval.

Under CEQA, essentially, a document is providing information on the environmental effects of the project and disclosing this information both to the public as well as decision makers. For projects sponsored by or within the City and County of San Francisco, the San Francisco Planning Department is the lead agency pursuant to CEQA.

The objectives of CEQA are to present the environmental effects of the proposed project. The documents that are proposed under CEQA also identify ways to reduce or avoid project impacts. And this is through the identification of mitigation measures or through project alternatives. CEQA is also intended to support the agency decision-making process and encourage public participation as well as enhance interagency coordination.

So just to go over what the environmental impact report will do, the EIR will do a number of things. First off, it will describe the proposed project in detail. It will also provide an overview of the existing conditions or the existing physical environment that could be affected by the proposed project.

The EIR will also disclose the potential environmental effects that are associated with the proposed project and identify ways to avoid or mitigate those potential impacts.

So next I'd like to turn the presentation over to Jeff, who will go over the project characteristics.

JEFF GILMAN: Good evening. I'm Jeff Gilman. I'm a project manager with the San Francisco Public Utilities Commission, and I'm also a certified

hydrogeologist, which means that I am a licensed professional, licensed to practice hydrogeology or groundwater -- to work on groundwater projects in the State of California.

I want to thank everybody for coming out on this rainy week to our scoping meeting. And I do have to say, though, it's times like this, seeing all that rain, that make hydrogeologists very excited because we see all this recharge going down into our groundwater basin.

First, I want to start by showing you an overview of our Hetch Hetchy Water System. This may be common knowledge to a lot of you, but I think it helps explain, you know, where San Francisco is within this system and why we actually need this groundwater project.

The San Francisco Municipal Water System is actually a separately permitted system by the State of California. And it sits at what I consider to be the tail end of the Hetch Hetchy Regional System.

So our regional system has several reservoirs. The biggest is the Hetch Hetchy Reservoir in Yosemite National Park. And the water basically is flowing by gravity from the mountains down to San Francisco and the San Francisco peninsula. We have some reservoirs

in the East Bay -- San Antonio and Calaveras. And then we have some reservoirs on the Peninsula -- the Crystal Springs and San Andreas Reservoirs. But it isn't until the very tail end, that is where the San Francisco Municipal Water System lies.

So when you think about it, San Francisco has to import all of its drinking water. And of that imported water, about 85 percent of that comes from the Hetch Hetchy Reservoir and about 15 percent from what we consider the local reservoirs in the East Bay and on the Peninsula.

The proposed San Francisco Groundwater Supply Project that I'm going to talk about is part of the larger Water System Improvement Program currently being undertaken by the San Francisco PUC. The Water System Improvement Program, we usually call WSIP or W-S-I-P for short. And this is a bond-funded program. It was approved by the voters in 2002. And among the goals -- well, I should say that it consists of approximately 85 separate projects of different goals.

Among these goals are to repair, replace, and seismically upgrade key water system facilities; to add new redundant facilities to ensure system reliability; and part of the objectives is to develop new sources of groundwater and recycled water, so new supplies for our

water system.

In October 2008, the WSIP Program Environmental Impact Report or Program EIR was certified by the San Francisco Planning Department, and the WSIP was adopted.

As part of that program that was adopted by Public Utilities Commission and certified by the Planning Department, it requires that the San Francisco regional system has to develop 10 million gallons a day of new local water supply sources. And we have come up with a combination of things to try to meet that 10-million-gallons-a-day goal.

One of the items is conservation. There has been lots of conservation in San Francisco, but this is a more aggressive program to do more conservation. We also have a Westside Recycled Water Project. And we're looking into more recycled water opportunities on the east side of San Francisco.

And then what I'm going to talk about tonight is new groundwater sources, so groundwater in San Francisco that currently is not being utilized, as well as existing groundwater that is being utilized for irrigation and other non-potable uses. But if we can find other sources to take the place for non-potable use, then we can use that groundwater for municipal

supply.

And so the -- just want to summarize this point by saying the San Francisco Groundwater Supply Project is part of this portfolio of new water supply projects.

Before getting into the detailed description of the project, I just want to make sure I explain what groundwater is. And it really is a pretty simple definition. It is water-saturated geologic deposits. And if you think about going down to the beach, Ocean Beach, sticking your feet in the sand and when you burrow down a little bit, all of a sudden you see that water that was stored in between the little particles of sand; you see it come up to the surface. That is water-saturated deposits.

And if we have a large underground area of those water-saturated deposits and that material is permeable enough to where we can actually tap into that with wells and pump it and use it, we call it an aquifer. Or another name for an aquifer is an underground reservoir. And much like the PUC manages its surface-water reservoirs, we can manage and we have to manage a groundwater reservoir or an aquifer.

The aquifer that we are planning to use or proposing to use for the San Francisco Groundwater

Supply Project is called the Westside Basin Aquifer. And that is actually one of seven aquifers that underlie the city and county of San Francisco.

And this map shows those seven different basins, groundwater basins or aquifers, in different colors. And I'll just point out the Westside Basin. So that is in the western part of San Francisco. It extends from a little bit north of Golden Gate Park down through the Sunset District, through Lake Merced. And the Westside Basin actually extends down into San Mateo County, through Daly City, and then it trends southeastward and ends up coming out by San Francisco Airport in the Millbrae and Burlingame area.

And the reason we are targeting that Westside Basin is it's the largest aquifer in San Francisco. It's in the area where there's been the least amount of industrial or other types of development where we might have to worry about the water quality of that aquifer. And it actually has been used on a limited basis for water supply -- not for drinking water supply but for irrigation water supply -- for over 50 years for watering Golden Gate Park, for supplying non-potable uses at San Francisco Zoo, and then there are a few other small private irrigation uses of that aquifer.

Another point that's important is that the

Westside Basin does continue south of the San Francisco-San Mateo county line. North of that line, we usually refer to that as the North Westside Basin and south of the line as South Westside Basin. But in San Mateo County, the aquifer has been used for municipal supply by Daly City, South San Francisco, San Bruno. It also has been used for irrigation, for watering cemeteries and golf courses. So it's used -- sorry. It's been used in San Mateo County for, I would say, 60 or more years for both municipal and for irrigation and other non-potable uses.

So turning now to the proposed San Francisco Groundwater Supply Project, the infrastructure, the physical facilities that we would use for that project, we're proposing six well facilities and then pipelines that will connect those well facilities to a couple of our existing water supply reservoirs in San Francisco.

In the environmental analysis, in the project description, we're actually showing nine potential well facility locations. And these are numbered 1 through 9 on this map. And then there is a larger version of this map right over on that side of the room. Feel free, after the formal presentation, to come up and take a closer look at that.

Four of the well sites we consider to be

the -- we consider those to be proposed well locations, you know, the best -- some of the most preferred locations we can come up with. And those are 1, 2 and 3, which are in the Sunset District -- 1, down near Lake Merced; 2, which is at the corner of South Sunset Playground; 3, at the corner of West Sunset Playground.

Then we have two more wells in Golden Gate Park, 4 and 5, which are actually existing irrigation wells. And what our project proposes to do is that, when recycled water becomes available to use for irrigation in Golden Gate Park, then we will be able to convert those wells and use them for municipal use.

Then of the remaining one well that we need for our project, we're currently looking at four different alternatives -- 6, 7, 8 and 9 in Golden Gate Park.

We have come up with the term "well facility." When you hear that term, what we mean by that is, it is a well, and it is a building that houses the well, the pump the electrical equipment. And at two of our proposed locations, we will also have some chemical treatment equipment for disinfecting the groundwater.

The size of these well facilities varies, depending on whether we're proposing to do a simple rectangular building or whether the building will be

L-shaped. They can range -- they will range or propose to range anywhere from about 20 feet by 40 feet for the simple rectangular building to -- where that building requires the disinfection equipment, it will add about another 20-foot length to the building.

The proposed project also consists of about four miles of pipelines. I mentioned that pipelines are needed to connect the wells to two different reservoirs in our current San Francisco Water Supply System. The pipelines are shown in blue on the map. And they will be connecting -- five of the wells will connect via the pipelines to Sunset Reservoir. And the well down near Lake Merced will connect with a pretty short pipeline to the Lake Merced pump station. And the water will -- from Lake Merced pump station will either be pumped up to Sunset Reservoir or to Sutro Reservoir.

How we're proposing to operate the project is to pump approximately 4 million gallons a day on an annual average from the six wells that I described. Then all of that groundwater would be disinfected, and then it would be pumped to the two reservoirs I mentioned, where it would be blended with the existing municipal supply.

And the reasons for blending are that

currently we serve very high-quality water in San Francisco. And we don't want that taste, that perception of that high-quality water to change. So we feel that by blending a fairly small percentage of groundwater, that no one will notice a difference in taste when they drink that water out of their tap.

The other main reason for blending is that we don't want to have to add some other water treatment chemicals because, actually, the groundwater would have an effect of diluting some of the things we already have to add to the water before we can serve it, such as fluoride. We also have to maintain a certain pH of the water so that we avoid corrosion of the pipes. So if we were to blend too much water, then we would have to add those other chemicals to meet those requirements.

So the reason for blending is not because there are contaminants in the water. We have tested both monitoring wells and test wells, and the groundwater that we are planning to serve meets all health-based drinking water standards.

So I think I pretty much covered the points on the slide, but just to reiterate that we have undertaken a program of sampling a number of what we call monitoring wells throughout the north Westside

Basin from the existing wells in Golden Gate Park; we've tested them through everything that's required by the California Department of Public Health, and that water meets all health-based drinking water standards.

Now, there will be two main ways in which the wells will operate, which I call "normal operation" and "emergency operation." And I would say probably 99.9 percent of the time we will be operating under normal operation of the groundwater. As I mentioned before, we're proposing to pump an average of 4 million gallons a day from the six wells. The wells would operate daily, and their actual pumping rates or production from the wells will probably vary in response to the overall demand in San Francisco for water throughout the year so that, during the wetter times when, like today, nobody is irrigating or should be irrigating, there's probably less overall demand in San Francisco. And then, in the dryer months, that demand goes up.

So that number of 4-, while we don't know exactly, it might vary between 3 1/2- and 4 1/2 million gallons per day based on looking at how the overall demand has varied over the course of the year.

So this normal operation will use groundwater, blended in a fairly small percentage as part of the everyday San Francisco groundwater supply. And by

serving it -- or by sending it to these two different reservoirs, the Sunset Reservoir and the Sutro Reservoir, it would serve over half of San Francisco.

The other important use for the wells would be emergency operation. And each well by itself is capable of producing 1 million gallons a day or more right at the well. So if we wanted to turn on the well and open up the throttle, you know, to use an analogy, we could pump up to 1 million gallons a day.

And in a catastrophic emergency, like a severe earthquake which could possibly disrupt other sources of supply, we would operate the wells that way. There are actually two well facilities that we are specifically proposing to equip for emergency operations. One of them is the North Lake Well, which I believe is No. 5. It's kind of the top, west end of Golden Gate Park. And the other one is West Sunset Playground, which is No. 3, which is in the middle of the Sunset District.

And for those, we will equip them to be able to use portable generators so they can operate off of portable electrical supply if there should be some disruption of our regular power grid.

Also, we'll have disinfection available at West Sunset Playground and the ability to bring in

portable disinfection on a trailer to disinfectant at the North Lake Well station.

I'd like to give the floor back to Jamie, who will continue with the presentation.

Thank you very much.

JAMIE DEAN: Thank you, Jeff.

So I'd like to take a moment to go over the environmental review schedule for the San Francisco Groundwater Supply Project. It's anticipated to extend over the next year or two. We did publish the notice of preparation at the end of December, and this evening we have our scoping meeting. The scoping period ends the end of January. And we request that you please submit any comments on the environmental review before the close of this period so we can make sure that your input is incorporated into the EIR.

The public review of the Draft EIR is anticipated for winter of 2011. And publication of the Final EIR as well as the EIR certification would be anticipated in fall 2011.

So now we would like to hear from you. Please remember that we're here tonight to receive your comments on the scope and focus of the environmental issues that we incorporated into the environmental impact report. This is not anticipated to be a

question-and-answer session, but rather, we would like to hear from you.

Just a few ground rules before we get started. Please do complete a speaker card. And you can hand those to Alisa and Cherie if you do wish to speak. And also when you do come up to the microphone, if you could please state your name before getting started with your comments, we would appreciate that for the record.

In the interest of time, we do ask that you please keep your comments to approximately three minutes. I understand that you may have more to share than three minutes will allow. But please consider your verbal comments a summary of your primary point. You're welcome to augment those verbal comments with written comments that you can submit either later this evening or before the close of the scoping period.

So we'll start with Kathy Symkowick. Is Kathy still here?

(No response)

JAMIE DEAN: Okay.

Andrew Chan.

ANDREW CHAN: Okay. I have building -- 4A

JAMIE DEAN: Excuse me. If you wouldn't mind coming up to the microphone.

4A

ANDREW CHAN: Sure.

First, I just want to raise, why meeting location would be on this side instead at Sunset side? That's all the people might not even able to make it to this place.

When you think the project is going to start? That's my question.

Then I have a couple other issues. How about this: After the project finish, what is the preventive maintenance program? I really don't have any faith -- sorry, somebody from Public Works Department. And few years ago, they make a dam in -- at the junction of -- near 39th. Up to now, nobody even take a look. Okay? And I just don't understand why, down the road, this pipeline would impact the residential area.

And from the drawing, for me to look at it, why the pipeline is not straight, only one. Want to go up and down the hills? Why don't we build the pipeline all the way against the Great Highway.

That's my comment. Thank you.

JAMIE DEAN: Steve Lawrence?

STEVE LAWRENCE: Generally I support the project and the idea of the project supplying more water. I do have questions. I had understood that there would be be blending to either one part in ten -- 10 percent,

4E

perhaps one part groundwater, nine parts Hetchy water, and that that would be a limitation.

It was my understanding that there was manganese in the groundwater, and this was part of the reason for the blending. But earlier it was said that that wasn't a part of the reason.

And my question has to do with, well, if you're going to serve this primarily to the west side via the Sunset Reservoir, there is that possibility of maybe one MGD, that would be a quarter of it, going off to the Sutro Reservoir, then it seems to me that that might be less than half the city, although I'm guessing. And if you're going to blend in three MGD or maybe a little more at times, groundwater to, you know, half the city, the west side, isn't that going to at least approach and possibly exceed the 10 percent limit on blending? I don't quite understand the arithmetic and would like for somebody to go through it with me.

The other concern that I have is that Park & Rec is going to be paid for, you know, siting these wells on their property. And isn't this just a way of distributing money from the ratepayer to, basically, the general fund? You know, this is another way that we distribute money from the ratepayer, the water ratepayer, to the general fund.

There are others. For instance, the City paid $2 for its new headquarters building. And you all, the ratepayers, will pay $9.9 million for that same property. That is another way of distributing ratepayer money into the general fund, which we all objected to about a decade ago.

Those are the major concerns.

I ask also, what happens if the groundwater is, in future, found to be bad? Will we simply do without that amount of water? Because we've signed a new water sales agreement with our wholesale customers where we've agreed to take a lesser amount of Hetchy water, partly in anticipation of developing this groundwater source, which, while it's a good idea, it's an idea that has not yet come to pass. In other words, we haven't actually implemented it successfully, nor have we implemented the recycled water successfully. And therefore, we're a little ahead of ourselves.

What happens if it doesn't work out, if we get saltwater intrusion, or there is some future problem with the water that prevents us from taking all that? Will there be a way to get back some of the water that we've forgone from Hetch Hetchy Reservoir and that system?

Thank you.

JAMIE DEAN: Dan Murphy?

DAN MURPHY: I'm Dan Murphy, and I represent Golden Gate Audubon Society. I want to thank the Department for incorporating some of the notes we made in a letter on June 5th, 2009, particularly regarding Lake Merced, and incorporating dealing with surface manifestations of this project. I'm glad to see that they're in the notice of preparation.

However, we want to be certain that -- as the previous gentleman said, that there is an adaptive management plan in place for things that go wrong.

If Lake Merced or Pine Lake or something else goes down, our interest is in habitat. We want to see that there's a plan in place to preserve habitat if there is, you know, some kind of an impact.

Further, we have an ongoing concern about paving our city. We're losing water going into the aquifer. Today, we lost a ton of it because there's more and more pavements. It's going on in our streets, our backyards, everywhere -- and our parks. We are now paving playing fields. We are losing water. How are we going to recharge the aquifer?

That's something that needs to be addressed. Aquifer recharge is critical if this is going to be a successful plan. It needs to be dealt with in the EIR.

Thank you very much.

JAMIE DEAN: Is there anyone else who would like to speak? Okay. If you wouldn't mind completing a speaker card.

JOAN GIRARDOT: Before I speak or after? 4B

JAMIE DEAN: You can do it after, in the interest of time.

JOAN GIRARDOT: Yes. My name is Joan Girardot, and I would like the description of alternatives to the project to be clearly laid out. If we don't -- I don't see any alternative to the Groundwater Program stated so far. And if we were unable, for any reason, to produce the 4-MGD average, annual MGD, then what would the consequences of that be on our total water supply?

Mr. Lawrence mentioned the recent contract with the suburbs whereby we have agreed to limit Hetch Hetchy Water System water to 81 MGD, and our demand will most likely be higher than that. So we're dependant upon the Groundwater Program to help us provide for future growth and development in the city.

So I -- I don't see any alternative stated here.

Secondly, I would like to have a clear description in the document regarding the current status of the Westside aquifer from the pumping that

has gone on for 50 years by some of our suburban communities and the impacts to the aquifer that could be a downside effect from this pumping and, if that effect would come to pass, where the 4 MGD would come from because it's clear that we need a groundwater program to provide for the future population increases in San Francisco.

Conservation won't do it alone because San Franciscans are already down to, I believe, 54 gallons per capita per day, which is the lowest in the state of California. And it's debatable how much lower the conservation can go, since we are in the process of huge new developments in the city -- 10,500 housing units at Candlestick Point, Hunters Point, 8,000 at Treasure Island, 5,700 additional at Park Merced, a possible 10,500 additional in the Market-Octavia Plan, not to mention the existing development in the pipeline.

And then, I would like a clear description of what mitigations would be available to the residents nearby from noise, that is, how you are going to mitigate that.

And I would like to know also the well that is currently in operation in the southwest corner of Golden Gate Park -- I forget the number of that well --

4B

No. 4. If there would be -- if the artificial turf that's going into the soccer fields there, I understand that the drainage -- there would be an impermeable barrier, so there would be no negative impact or cross-contamination when the artificial turf is watered -- or is cleaned -- I'm sorry -- with recycled water. You're putting the recycled and the groundwater in the same area. So you should describe clearly the barriers to any kind of cross-contamination.

All right. Thank you.

JAMIE DEAN: Thank you.

Is there anyone else who would like to make any verbal comments? Okay. Then I will move on and close --

JOYCE LAW: Wait. 4D

Hi. My name is Joyce, and I'm a resident on 40th Avenue. And I've lived on 40th for -- gosh, over 15 years. So this project is very important to me.

Unfortunately, I'm strongly against this project. I have to be honest with you. I have no faith in the City at all. I mean, just today, in the newspaper, there were two articles on City projects, and you're failing. I mean, you can read the Examiner on the two articles. I just don't see that this is going to go well at all.

4D

My neighbor is here with me tonight. And he had asked about leaks. And someone had responded, "Oh, don't worry. There wouldn't be any leaks."

Well, my question is, in the likely event that there will be leaks, since my homeowners insurance doesn't cover groundwater, and I doubt if any of your homeowners insurance will cover groundwater, where do I send the claim forms to?

I have a feeling the City's going to do what the City going to want to do. And I just want to make sure that we get coverage in the event you fail.

So that's all. Thank you.

JAMIE DEAN: Is there anyone else that would like to make a comment?

4C

NICOLE IROZ-ELARDO: My name is Nicole Iroz-Elardo. I'm also a resident of the Sunset District, on 43rd.

There's two things that have been touched upon that I want to see clarified in the process. The first is that we know that the Westside Groundwater Basin does go into the southern suburbs. How is that managed collectively? Particularly, how are we going to make sure that the groundwater is not contaminated by future developments in the southern suburbs? So that's important.

4C

And then the other is, this is a part of a larger effort to also recycle and reuse water. It seems to me that, if you're going to do an open-cut trench method of laying this pipe, that we ought to be considering putting down some sort of pervious surface on top of that down 41st, down 40th so that we can increase the recharge to the groundwater that we will be using.

That's it.

JAMIE DEAN: Is there anyone else that would like to make any comments?

(No response)

JAMIE DEAN COURT: So I would like to go ahead and close the public comment portion of this evening's meeting. And just a few reminders: The comments that you submit this evening as well as the written comments that we receive throughout the scoping period will be addressed and reflected in the draft EIR. We will not, however, be producing written responses to your comments.

Also, just a reminder that, as I showed you on the environmental review schedule slide, there will be additional opportunities for your input. And that would be at the Draft EIR stage. And by providing your contact information on the sign-in sheets, we will be

able to keep you apprised of further environmental notices as they become available.

And here, again, is the slide on where you can submit comments, either through e-mail, fax, or regular mail. And this information is also listed on the notices at the table in the back of the room.

Just one final slide of more information. If you do have questions on the environmental review process, you're welcome to contact me. And if you have questions specifically about the project characteristics, I would refer you to the San Francisco Public Utilities Commission. And that would be Michele.

So thank you again for your participation this evening, and thanks for coming through the rain to come and see us.

(Whereupon, the proceedings concluded at 7:47 o'clock p.m.)

STATE OF CALIFORNIA)
) ss.
COUNTY OF MARIN)

I, DEBORAH FUQUA, a Certified Shorthand Reporter of the State of California, duly authorized to administer oaths pursuant to Section 8211 of the California Code of Civil Procedure, do hereby certify that the foregoing proceedings were reported by me, a disinterested person, and thereafter transcribed under my direction into typewriting and is a true and correct transcription of said proceedings.

I further certify that I am not of counsel or attorney for either or any of the parties in the foregoing proceeding and caption named, nor in any way interested in the outcome of the cause named in said caption.

Dated the 29th day of January, 2010.

DEBORAH FUQUA

CSR NO. 12948

APPENDIX D

Comments Received During EIR Scoping Process

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2945 Ulloa St.
San Francisco, CA 94116
January 29, 2010

San Francisco Planning Dept.
Bill Wycko, Environmental Review Officer
San Francisco Groundwater Supply Project Scoping Comments
1650 Mission St, Suite 400
San Francisco, CA 94103-2479

Re: Case No. 2008.1122E
San Francisco Groundwater Supply Project Scoping Comments

Dear Mr. Wycko:

The Golden Gate Audubon Society (GGAS) is concerned with some elements of the San Francisco Groundwater Supply Project (the project) that are not included in the Notice of Preparation (NOP). We also wish to acknowledge the positive response to our comment of June 5, 2009, that the EIR must address potential impacts to surface manifestations of the Westside Aquifer (6.1.10 Hydrology and Water Quality, 3rd bullet).

There remain other issues of which we remain very concerned and that we think should be considered in the Environmental Impact Report (EIR). The first is related to potential impacts on surface manifestations of the project. We believe it is critical to develop an adaptive management plan that anticipates impacts to Lake Merced, Pine Lake and other surface manifestations of the aquifer. That plan should provide courses of action that will be taken if unanticipated problems with the project develop. It would seem prudent to develop a much broader adaptive management plan that anticipates a series of problems that may impact the ground water basin. Examples might include a failure of the aquifer to recharge, salt water and pollutants entering the aquifer, and impacts of sea level rise during the projected life of the project. Adaptive management scenarios should include actions that might be taken up to and including closing down the project should the impacts be dire.

We also remain concerned that the matter of groundwater recharge is not discussed in the NOP. Our concern is based on two ongoing problems in San Francisco. First is the rapid and uncontrolled expansion of impermeable footprints around residential and commercial structures. As more and more ground is covered, we are reducing aquifer recharge at an unknown rate, and at the same time over charging our sewage system. The plan and the EIR must address that issue.

GOLDEN GATE AUDUBON SOCIETY
2530 San Pablo Avenue, Suite G Berkeley, California 94702
phone 510.843.2222 *fax* 510.843.5351 *web* www.goldengateaudubon.org

The related concern is that the San Francisco Recreation and Park Department is in the process of converting ball fields to synthetic turf. We understand that because of the way these fields are constructed, water that once went into the ground is now channeled into the sewage system, thus further over-taxing that system while preventing a significant amount of water from entering the aquifer. To compound the problem, infrastructure is in place to permit run-off to be used for aquifer recharge, but since it is unknown if the water is toxic or if it carries pollutants that could impact the aquifer, that system is not in use. A further problem is that we understand the Recreation and Park Department plans to convert as many as 80 fields to synthetic turf. This action is being carried out piecemeal, so a much needed Environmental Assessment and Environmental Impact Report has been avoided.

Aquifer recharge is critical if the plan becomes operational. To ignore it is unconscionable. It would seem prudent for an element of the EIR to determine how much groundwater is being diverted to the sewage system by increased concrete and paved footprints and how much is being diverted by the synthetic playing fields. We urge the PUC to incorporate specific proposals and projects that will assure groundwater recharge in the Westside Groundwater Basin. Those proposals must include mitigation for any development, either public or private that reduces aquifer recharge. It is likely it will be necessary to not only eliminate further loss of groundwater recharge, it is probable we must increase recharge if we will meet the goal of pumping 4 million gallons per day.

Strategies to assure adequate groundwater recharge are a necessary part of this project if it is to be complete and inclusive. We urge the PUC to include specific strategies and infrastructure in the EIR to accomplish this goal. The strategies might define where infrastructure should be placed to maximize recharge. Specific infrastructure that should be discussed in the EIR process include vegetated roofs, rainwater harvesting, bioretention, infiltration trenches, detention ponds, constructed wetlands, tree basins, creek daylighting, and permeable pavement.

It is clearly necessary the EIR for the groundwater plan must address the matter of potential impacts on surface water features, it needs to incorporate an adaptive management plan, and it must present a plan of action to assure groundwater recharge can sustain the rate of pumping called for in the plan.

Very truly yours,

Dan Murphy
Golden Gate Audubon
Conservation Committee

SIERRA CLUB
SAN FRANCISCO GROUP
85 Second Street, Box SFG, San Francisco, CA 94105

January 8, 2010

Bill Wycko, Environmental Review Officer
Planning Department .
1660 Mission Street, FAX 558-6409
San Francisco CA 94103-2414

Re: Case 2008.1122E – Ground Water Supply Project - Scoping Comments

Dear Mr. Wycko,

Thank you for allowing the Sierra Club to provide EIR Scoping comments for the subject project:

1) The EIR should clearly state the purpose or purposes of the project. Is the project proposed to increase the total water supply for San Francisco and other Hetch-Hetchy water consumers? Is the project to increase the flow of water in the Tuolumne River for endangered fish?

2) The EIR should discuss the impacts of possible salt water intrusion. What is the current salt water contamination of the upper and lower aquifers? The EIR should include a rainwater budget for the aquifers. What provisions will be made to increase rainfall flow into the aquifers? How many square feet of concrete will be removed to provide replacement water flow? How will this be accomplished?

3) The EIR should consider the impacts to the water level of Lake Merced. Shutting down nearby irrigation pumps has allowed the lake level to increase toward previous levels. Will water be pumped from the lower or upper aquifer?

4) The EIR should consider the additional cost of pumping versus the mostly gravity flow Hetch-Hetchy water. This information will be necessary to properly price water sales outside San Francisco. The EIR should also consider the additional global warming gases emitted to produce the additional pumping energy required. Since this is a new energy requirement the EIR should show the total climate change gas emissions based on the net energy requirement based on producing the energy in coal fired power plants. This is reasonable because by the time this project operates we will be consuming as much renewable and low carbon fuels as possible to produce our current power needs. On the other hand because this view of the generation of new energy is an advanced concept the emissions should also be based on average California power generation emissions,

Very truly yours,

Howard Strassner, Secretary
419 Vicente, San Francisco CA 94116, 661-8786, (h,w) email: ruthow@dslextreme.com

Dudegerry@aol.com
12/29/2009 03:00 PM

To jamie.dean@sfgov.org
cc
bcc
Subject RE: Groundwater Supply Proj.

History: This message has been replied to.

This is to notify your organization of the continuing interest of the Sierra Club in the status of Lake Merced. When there is more data available regarding the consequences to Lake Merced resulting from the proposed SFPUC's Water System Improvement Program please convey that to me. We fear there will be an adverse result to the lake when water is taken from the aquifer which feeds it.

Dudegerry@aol.com
02/01/2010 03:06 PM

To Jamie.Dean@sfgov.org
cc
bcc
Subject Re: Groundwater Supply Proj.

History: This message has been replied to.

Thanks. Gerald Colvin
14 Wilshire Ct.
Daly City, CA 94015

January 29, 2010

San Francisco Planning Department
1650 Mission Street
Suite 400
San Francisco, CA, 94103

Attention: Mr. Bill Wycko, Environmental Review Officer

Subject: San Francisco Groundwater Supply Project Scoping Comments Case No. 2008.1122E

This is in reference to the proposed project to develop underground water for supplementing the potable water supply in the Sunset District. The project scope includes the construction of a new groundwater well in the West Sunset Playground and South Sunset Playground and the construction of a water delivery pipeline connecting both wells along 40th Avenue.

I want to bring attention to you that there might be soil instability concerns along portions the proposed 40th Avenue pipeline alignment.

The soil along 40th Avenue between Santiago and Rivera Streets has been very unstable and has caused the settling of the roadway and sidewalk as well as causing the front of the homes & driveways to settle and crack over the last 20 years. Many homes along this portion of 40th Avenue have major structural work performed on their foundations and driveways to correct the problem.

The roadway & sidewalk as well as homes are continuing to settle. Utility poles along this area are leaning due to ground movement with one pole leaning at least 10 degrees from vertical.

About 5 years ago, the Department of Public Works surveyed the street and roadway to monitor the settlement problem and installed storm water catch basins at the low points along 40th Avenue to drain large pools of accumulated rainwater.

Pipeline construction work involving trenching and excavation along the roadway may aggravate the soil settlement problem along the roadway & street; and may undermine the homes with foundations that already are showing signs of cracking and settling.

In addition, if this project is to improve the reliability of the water supply after an earthquake or catastrophe, placing the pipeline through unstable soil may:

> Cause the pipeline & water supply to fail during an earthquake;
>
> May subject any installed pipeline to ground movement from the shifting soil and cause future pipeline breaks or joint separation.

Since the project is still in the planning stage, please investigate and do site surveys along 40th Avenue and analyze whether soil instability will adversely affect the project before finalizing the pipeline alignment.

Regards,

Dennis Huey

By Certified Mail
Return Receipt Requested

January 12, 2010

San Francisco Planning Department
1650 Mission Street
Suite 400
San Francisco, CA 94103-2479

Attn: Mr. Bill Wycko
Environmental Review Officer
San Francisco Groundwater Supply Project Scoping Comments

Re: Case No. 2008.1122E – San Francisco Groundwater Supply Project
Notice of Preparation of an Environmental Impact Report and
Notice of Public Scoping Meeting

Dear Sir,

We are home owners and residents of 2227 40th Avenue, San Francisco, CA 94116. We are writing to show our deep concern that the San Francisco Planning Department is proposing to lay an underground water pipeline along 40th Avenue between Wawona Street and Quintara Street.

All houses in the Sunset and Parkside are built on sand and most of them were built in the 40s and 50s. The foundation of our houses is weak at best. If the proposed pipeline along 40th Avenue leaks or burst due to either poor maintenance, age, earthquakes or accidentally damaged by careless workmen working on the road, water will flood the affected area and this will cause the ground to subside. The foundation of our homes will be destroyed.

All you need to do is to send an expert to 40th Avenue, to the area between Santiago and Rivera Streets. The houses at Nos. 2246, 2250, 2254, 2258, 2262, 2266, 2270, 2274, 2278 had already been affected by ground subsidence. Six of these houses were leaning so badly they had to have their foundation jacked up or repaired in recent years. The most recent being last year. Part of this area had already subsided below street level. The City had sent people to survey this particular stretch of the road several times and had drilled holes to the depth of twelve feet and found evidence of liquefaction and rotted wood. Some of our old-time neighbors say there was once a stream running along this area before houses were built. Ground subsidence can also be caused by draining of water from the groundwater aquifer by the City's proposed water supply project.

Unlike other streets in the Sunset and Parkside, for the past 20 years the stretch of 40th Avenue between Santiago and Rivera has never been dug up and repaved by the San Francisco Department of Public Works. This is because they have been unable to find a solution to deal with the undulating road surface and for fear of endangering the houses on both sides of the road.

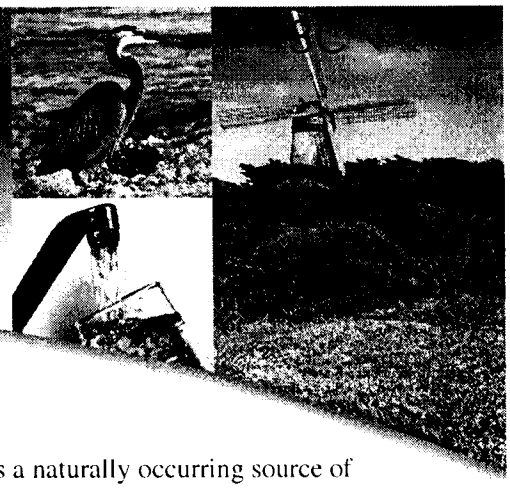
The San Francisco Planning Department and the Public Utilities Commission should find an alternate underground water pipeline location that does not endanger the homes of the residents.

Eileen Kho
Irene Kho
2227 40th Avenue
San Francisco, CA 94116

San Francisco Groundwater Supply Project

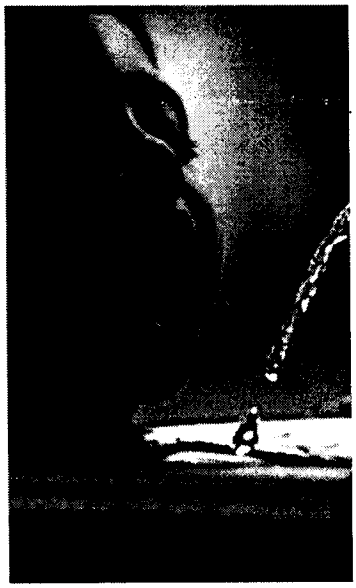
Creating Local and Reliable Water Sources

San Francisco Public Utilities Commission



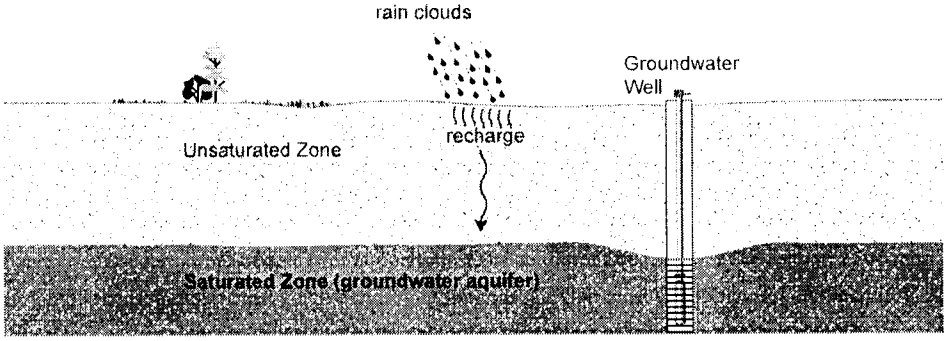
Benefits of Groundwater

San Francisco residents enjoy some of the nation's highest-quality drinking water. The San Francisco Public Utilities Commission's (SFPUC) Regional Water System delivers pristine Sierra snowmelt from the Hetch Hetchy Reservoir, and water from protected local reservoirs, directly to our customers' taps. To supplement our primary supplies and ensure reliable, high quality drinking water in the event of a major earthquake, drought, or decline in the snowpack, the SFPUC is planning to diversify San Francisco's water supplies and increase the use of available local groundwater sources.



What is Groundwater?

Groundwater—also known as well water—is a naturally occurring source of local, renewable, fresh water located underground. As rain water seeps into the ground, it moves downward between soil particles and collects in an underground geologic reservoir (see below). When such a reservoir can readily yield water to springs or wells, it is called an aquifer and is a potential source of drinking water.



Groundwater Is a Vital Drinking Water Source

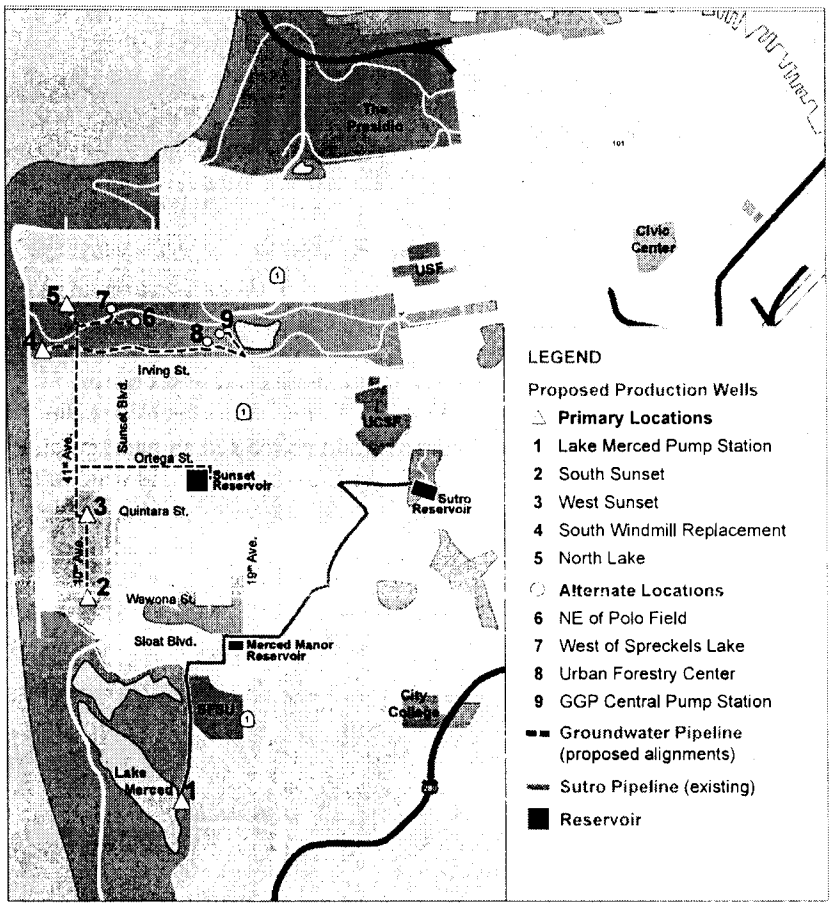
Groundwater is all or part of the drinking water supply for many communities throughout California, and it provides approximately 40% of the entire State's drinking water. The cities of South San Francisco, Daly City, and San Bruno have been pumping groundwater from the Westside Groundwater Basin (an aquifer extending from Golden Gate Park in San Francisco southward through San Bruno) for drinking water and other uses for more than 50 years.

Approximately 100 years ago, groundwater was a major source of San Francisco's drinking water supply, with over 500 wells and springs in use by residents, businesses, hospitals, the Presidio and city parks. The use of groundwater for irrigation and lake filling in Golden Gate Park began in the 1870s and continues today. As part of SFPUC's proposed Westside Recycled Water Project, recycled water will replace groundwater for these non-potable uses in Golden Gate Park, allowing groundwater to be conserved for potable uses.

San Francisco Groundwater Supply Project

As part of the San Francisco Groundwater Supply Project, the SFPUC proposes the construction of up to six wells and associated facilities in the western part of San Francisco. The wells would extract up to 4 million gallons per day of water from the Westside Groundwater Basin. The extracted groundwater, which would be used both for regular and emergency water supply purposes, would be blended with imported surface water before entering the municipal drinking water system for distribution to areas in both the west and east sides of the city. The project would provide a new source of water and improve reliability during system maintenance and drought conditions.

(Continued on Page 2)



This map shows the proposed project facilities including wells and pipelines.

San Francisco Groundwater Supply Project

(From Page 1)

The project would be implemented in two phases. **Phase one** includes:

- Building three new groundwater wells at the Lake Merced Pump Station, West Sunset Playground and South Sunset Playground.
- Installing piping to connect the new well stations to the Sunset Reservoir and the Lake Merced Pump Station.

Phase two includes:

- Modifying two existing irrigation wells and building a new well within Golden Gate Park.
- Installing piping to connect the well stations to the Sunset Reservoir.

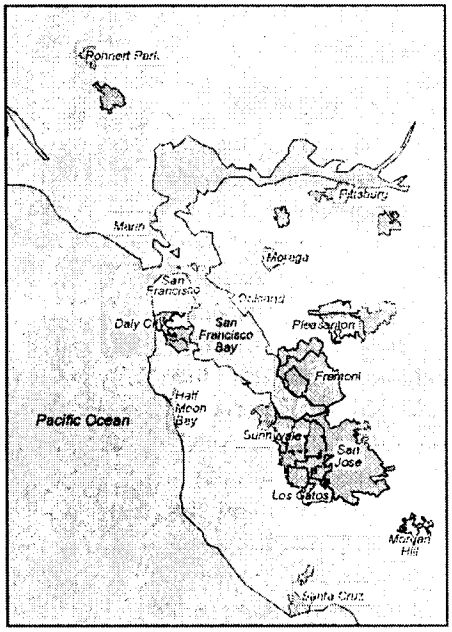
Groundwater production within San Francisco is expected to begin in **2013**.

Groundwater Safety and Quality

The Westside Groundwater Basin offers a local, reliable and safe source of drinking water to San Francisco residents. Pumped groundwater would be treated as necessary to comply with the California Department of Public Health requirements before entering the municipal drinking water system. It would then be blended in small quantities with imported surface water to ensure that the high quality of San Francisco's drinking water is maintained. No change in taste, color or odor is anticipated after the water is blended.

Groundwater Use in the Bay Area

Groundwater from the Westside Basin aquifer has been blended with water from the SFPUC's Regional Water System in Daly City, South San Francisco and San Bruno for more than 50 years.



Communities in the Bay Area currently drinking a blend of groundwater and surface water are shown above.

Key Project Steps

Environmental Review: 2009 to 2011

Design: 2009 to 2011

Construction: 2011 to 2013

Dates subject to change

SFPUC
WATER
WASTEWATER
POWER

HETCH HETCHY
WATER SYSTEM
IMPROVEMENT
PROGRAM

Contact Information
Michele Liapes, Communications
415-554-3211 mliapes@sfwater.org

www.sfwater.org/groundwater

Michael and Carol-Ann Laughlin <laughlinlookout@yahoo.com >

01/06/2010 01:46 PM

To jamie.dean@sfgov.org
cc
bcc
Subject Case 2008.1122E - SF Groundwater Suppy Project

Greetings Jamie –

Thank you for sending a notice of the scoping meeting for this project. I own property at 2118 28th Avenue, just southwest of the reservoir. Since I do not currently live in San Francisco, I will not be able to attend the scoping meeting, but am interested in learning more about the project and in reviewing the EIR when it is released. Is there a website or a location where I will be able to review the EIR, project description, plans etc.? I am sure the EIR will answer most of my questions about the project, but I wanted to raise just a couple of items that I assume will be studied in the EIR, but I wanted to make sure:

Impacts of removal of 4mpg's of groundwater: While I am not opposed to removal of groundwater, I want to understand if there will be any secondary impacts, such as ground subsidence. As you know, the Sunset/Parkside is primarily sand dunes, and the removal of underlying groundwater could cause settlement (similar to the conditions in the Central Valley, or which occured in Long Beach with the removal of oil). Also, is there a possibility that with the removal could cause saltwater intrusion (similar to conditions on the Central Coast, specifically Los Osos)? Are there any plans or strategies being considered to replenish the groundwater as it is being removed?

Construction impacts: I am interested in seeing and understanding the location of the 10 production well sites and seeing where, how large and how deep the connecting pipes will be. Again, I am primarily concerned about the short and long term construction impacts and potential settlement. I am also interested in understanding the construction schedule and locations of the improvements.

Please feel free to contact me at 213.223.1430 if you need to reach me. Otherwise, I will look forward to reviewing the EIR when it is available.
Thank you for your consideration.

Sincerely,

Michael P. Laughlin AICP

"Steve Lawrence"
<splawrence@sbcglobal.net>
12/30/2009 10:53 PM

To "Jamie Dean" <Jamie.Dean@sfgov.org>
cc
bcc
Subject Groundwater Supply Project: comment to Draft EIR's NOP

Please accept this as a comment or comments to the above pursuant to the notice of December 30, 2009.

a) Please better describe the project as it relates to Lake Merced. Is Lake Merced a potable drinking source? I believe it has not been used as such since the 1930s; is that wrong? The sixth well would connect to the Lake Merced Pump Station; does that station pump water into Lake Merced, or does it connect to some other body which is part of the potable water system? The purpose of the project is said to be to provide an average of four mgd to the municipal water supply, which is potable water, is it not? The project is part of WSIP, which protects drinking water. Please clarify whether all 4 mgd of groundwater goes to our drinking water system, and if not, then how much goes elsewhere, and where.

b) Is this water to be provided year around or during certain seasons? If seasonal, when?

c) Groundwater is to be blended with regional water system water so the blend meets manganese standards. But facilities are to connect to Sunset Reservoir, which holds only a portion of the city's water. The city will be receiving some amount from the RWS, say 75 mgd. What portion of that does Sunset receive? Blending is to keep groundwater to what percentage; ten percent? Four mgd is about five percent of the total city usage; if Sunset contains less than half of the city's total, then it would seem hard or impossible to keep blending to under ten percent. Explain how blending will work to keep water served by Sunset equally to the quality customers now enjoy, or better, within manganese standards, and, if ten percent is the goal, within ten percent or less of water served by Sunset.

d) Pumping groundwater has lowered ground elevations in other parts of the state, notably (notoriously) in the Central Valley. Will that happen here? What effect will it have on the environment?

e) The project description omits storage and disinfection. Are these not needed? What steps will be taken to ensure that the groundwater is fit to drink?

Steve Lawrence

"Steve Lawrence"
<splawrence@sbcglobal.net>
01/11/2010 02:55 PM

To "Jamie Dean" <Jamie.Dean@sfgov.org>
cc "Michele Liapes" <mliapes@sfwater.org>
bcc
Subject 1/20 groundwater supply meeting

History: This message has been forwarded.

Jamie,

I'm unavailable for the groundwater supply meeting on 1/20, unfortunately, but I would like to add my questions, if possible:

a) There is manganese in the groundwater at levels higher than recommended. To avoid elevated levels of manganese, I've heard that groundwater will be blended with regional water at 9:1 or 10:1, so that no more than one part in ten is groundwater. But I've also heard that groundwater will be blended in at Sunset--west side; makes sense. But Sunset is only one major city reservoir; I don't know what percentage it serves. 3.5 mgd of groundwater is to be used. The city is using maybe 75 mgd of water. If 3.5 were blended equally with all city water, groundwater would be 4.667% of total water used in city. If Sunset serves 40% of the city, and if all groundwater goes to Sunset, then more than eleven percent of Sunset water will be groundwater. That exceeds the assurance (ten percent as I have it). Please explain.

b) Will 3.5 mgd be pumped out equally throughout the year? If groundwater will be pumped at higher rates during say September - November, won't this skew the ratio of groundwater to regional water even more?

c) What happens if groundwater is found to be bad? Do we do without that amount of water? Do we treat somehow? how? where? What ways might it be bad? (Salty is one that occurs to me--should the ocean somehow intrude and pollute the groundwater basin.)

d) Compare and contrast the other groundwater project, which stores groundwater for a non-rainy day--for a drought. Then, 7.2 mgd will be available to supplement regional water system supplies for up to something like 7 years should the "design drought" come to pass. Does that water suffer from a manganese surfeit, or some other problem, and if it does, how will that problem be met and overcome? What percentage, at max, of the Westside's water will be groundwater (from both projects' basins)?

e) Is Park & Rec being to be paid for siting wells in "their" park, and if so why is this not a backdoor transfer of ratepayer funds to the general fund (-ed Rec & Park)?

Finally, will their be a recording or other record of the meeting so I can learn answers to the above?

Steve Lawrence

"Steve Lawrence"
<splawrence@sbcglobal.net>
01/21/2010 09:38 AM

To "Jamie Dean" <Jamie.Dean@sfgov.org>
cc <jgillman@sfwater.org>
bcc
Subject SF Groundwater project

Ms. Dean:

The Scoping Meeting raised serious questions about groundwater. Would you please consider these along with those I submitted earlier, including that email of 1-11-10.

At the Scoping Meeting the Project Manager asserted that groundwater had no difficulty meeting drinking water standards, and was not to be blended for health. This line is inconsistent with past writing. In the past it was acknowedged that groundwater did have more manganese than desirable (or allowed, I'm unsure which). In the past groundwater was to be blended to reduce the overall concentration of manganese. Last night that was very clearly not the case. Also, last night there were no assurances that groundwater would comprise no more than one part in ten; in the past there were such assurances.

SFPUC has changed course. No longer can the public believe that manganese in its water will be kept less than EPA recommended levels. No longer can the public believe that groundwater will be no more than one part in ten. Groundwater is more important, as it may make up a greater percentage of drinking water--at least for those of us served by Sunset Reservoir.

As a result of these changes, transparency is more essential. Groundwater should be regularly tested, and results should be posted on the SFPUC website. Only in this way will public acceptance of this new water source be optimized.

There will be concerns other than manganese. Pharmaceuticals are an emerging issue. Already last evening citizens asked about recycled water trickling from park fields irrigated with recycled water down into the groundwater aquifer, and whether the water of the aquifer would become polluted. As more of our citizens use ever more pharmaceuticals, some of which may remain even after tertiary treatment of wastewater, there is sure to be concern about the effect of those substances on the development of a child's brain and body. SFPUC should be proactive about this, and should maximize transparency about the groundwater it will serve so that citizens can choose to drink from the tap or not. Whichever way they choose, they must feel that they are given accurate and full information. It is unacceptable to merely assert that "groundwater is safe". People wish to choose for themselves, confident that they are given all relevant facts.

Last evenings meeting was troublesome because 1) course was changed, and 2) issues were avoided or left unaddressed. Examples are: manganese, the intrusion of recycled water into the aquifer, and the proportion of water served to Westside customers that will or may be groundwater. The feeling that transparency is a prime value was not assured last evening.

Finally, there are concerns about sufficiency of water in San Francisco.

1. How will the groundwater be tested, and how will results be made public?

2. Will manganese levels be tested?

3. Will groundwater be tested for pharmaceuticals, even if not required by state or federal authorities? It has been said that SF's water would exceed minimum requirements, would be cleaner and better, as has been customary to date; how will that policy be continued and advanced?

4. Will groundwater be limited to some portion of water served (except during emergencies), such as no more than one part in ten, and what maximum will that be? In non-emergency times, what portion groundwater, at maximum, may Westside drinking water be? (Example answer: one part in ten; 11%.)

5. According to the project Project Manager at the scoping meeting, groundwater will not be blended for health reasons, but will only be blended for taste. Taste seems subjective. How will taste be determined? (Is this a real or illusory limitation? Convince us it is real.)

6. If groundwater tests bad, what will happen? Rationing? Or are there options available to replace groundwater with some other supply? With the 2018 Variant's system limitation (to take no more than 265 mgd), with the Water Sales Agreement (of 2009)'s agreement that San Francisco will limit its draw of regional water, and with rapid growth and development planned for San Francisco (Including Treasure Island, Candlestick/Hunters Pt, Park Merced, and possibly Octavia corridor and more), there is concern that groundwater is absolutely necessary to meet demand for water. Yet it could prove insufficient in quantity, or could fall short in quality. What alternative options are available?

7. One of the disinfection facilities is planned to be mobile, and perhaps for emergency use only. Would you explain how disinfection will be accomplished in non-emergency times, and where? Will there be filtration? If not, is there a waiver?

Should I have failed to make myself clear, above, please communicate. Thank you for taking these matters into consideration.

Steve Lawrence

PS I merely guessed at Mr. Gillman's spelling and email address; if wrong, would you forward this on?

"Steve Lawrence"
<splawrence@sbcglobal.net>
01/25/2010 07:31 PM

To "Jamie Dean" <Jamie.Dean@sfgov.org>
cc
bcc
Subject SF Groundwater scoping (fourth submission)

Ms. Dean,

Sorry to dribble these in, but I have one more (or two):

Recycled water is to be used to irrigate Golden Gate Park. That water will percolate down into the aquifer from which groundwater is to be taken. The question, then, is whether the less than pure recycled water will pollute the groundwater such that levels of harmful substances rise to unacceptable levels. It could take time.

A subsidiary question is: playing fields will or may be converted to the new synthetic soccer field artificial grass. Is this surface permeable? Does water (probably recycled water as well as rain) percolate through the artificial grass, and if it does not all go into the sewer system, will that water, when it reaches the aquifer, pollute the groundwater?

Regular testing of extracted groundwater seems more important given the above concerns. While regular testing would be good, it would be well to try to answer the questions. We do not want to invest money and hopes in something that goes sour in a few years due to a build up of harmful substances. Nor, perhaps in 2018 or so, do we want to have to devise unanticipated treatments for groundwater in order to use it. The decision to develop groundwater should be made, so far as possible, with eyes wide open to what may go wrong, and what it will cost to extract, treat and deliver potable groundwater.

Thank you. Steve Lawrence

"Steve Lawrence"
<splawrence@sbcglobal.net>
01/29/2010 03:53 PM

To "Jamie Dean" <Jamie.Dean@sfgov.org>
cc
bcc
Subject Groundwater NOP

One more: Will groundwater pumping affect the level of Lake Merced? If not, why not?

Steve Lawrence

maureen maggiolo <moflynn510@yahoo.com>
01/29/2010 09:04 PM

To jamie.dean@sfgov.org
cc
bcc
Subject 40th ave project

Dear Jamie,
I was unable to make last weeks meeting and I have some concerns about the project.
1. 40th ave between Taraval and Wawona is a very high traffic area. Walgreens, St Gabriel School and Sunset Supermarket.The kids get dropped off on 40th and get picked up on 41st from school.
2. What about the ponds or lakes on 40th between Santiago and Rivera St. Thats why they did'nt put the sewer project on 42nd ave years ago,plus my father used to swim in them when he was a boy.
3.why can't they put it down Sunset Blvd.instead.
4. Are you going to pay for cracks created by the vibrations from the machinery?
I just had a very expensive paint job inside my house and had all the cracks repaired.

I live on 40th ave near Walgreens.
Maureen Maggiolo

Morten <msarawak@yahoo.com>
01/18/2010 10:17 AM

To mliapes@sfwater.org
cc Tom Doudiet <tom.doudiet@sfgov.org>, Dick Morten <msarawak@yahoo.com>, David Massen <massen@pacbell.net>, Suzanne Gautier <sgautier@sfwater.org>, Patrick Sweetland <psweetland@dalycity.org>, jamie.dean@sfgov.org, Dick Allen <batteryrow@gmail.com>, Jerry Cadagan <socialchr@aol.com>, Dan Murphy
bcc
Subject Ground water supply project EIR

I will be unable to attend the scoping meeting on the 20th due to meeting conflicts.

The project EIR should discuss:

Daly City, in cooperation with the PUC and other Westside Basin water users, has developed a hydrological model. The model was designed to analyze water inputs, outputs and various uses of basin water resources. It is critical that the model be applied to the proposed Groundwater Supply Project.

Coastal saltwater intrusion has negatively impacted many water supplies. The PUC has installed several saltwater intrusion monitoring units along Ocean Beach. A program to use these units to monitor and manage ground water extraction is required. The plan should be identified prior to beginning of pumping.

The use of the water from the proposed pumps for emergency fire fighting water and potable drinking water is essential. As I mentioned in previous communication, the pumps must be fitted with diesel pumps with multi-day fuel supply and fittings to allow immediate fire department emergency/disaster access to water without waiting for PUC staff support. The PUCK should store drinking water manifolds that can be attached easily.

The proposed improvements to the Auxiliary and Portable Water Supply Systems and the Groundwater Supply Project are critical elements of emergency/disaster water supply. The PUC, SFFD and Capital Planning should design and implement the projects in a coordinated manner.

Dick Morten, 566-4351

"Jim Spahr"
<jim2@spahr.com>
01/12/2010 08:37 AM
Please respond to
<jim2@spahr.com>

To <jamie.dean@sfgov.org>
cc
bcc
Subject Case No. 2008.1122E-Groundwater Project

Bill Wycko
Environmental Review Office
SF Groundwater Supply Project
Scoping Comments

Dear Mr. Wycko,

Thank you for the opportunity to comment on the upcoming project. As a resident of San Francisco and a neighbor to the Sunset Reservoir I know firsthand how hard the SFPUC works to maintain our safe drinking water supply. I commend the SFPUC for their planning and foresight to make sure they are ready for any contingency or emergency. With the upcoming project I ask that the Department make a better effort at being a good neighbor out here in the Sunset.

Over the past 6 plus years we've lived with the pipeline extension, the hill stabilization, and the north basin expansion projects. The solar panels project is scheduled to begin any month now as well. In a way it's like living next to an airport: always under construction. In the past the Department has been long on excuses and promises and well short on fulfillment.

During the pipeline extension project full and empty trailers were stored on our streets for weeks at a time attracting garbage and graffiti. One would think with the vast property holdings of the SFPUC in San Francisco and San Mateo, that more suitable storage locations could be found for equipment and material.

During the hillside stabilization project, we lived with workers and equipment waking us up every morning. I've worked on many construction projects where great care is taken not to disturb families in residential areas. This seemed a foreign concept to the Department.

During the north basin expansion project all semblance of neighborly consideration was tossed aside by the Department. Streets were posted 'no parking' in the morning, and cars were towed within an hour of posting. 30 to 40 concrete trucks delivered on a daily basis with limited or no traffic control. For a time it was like living on a dirt road. Dirt and dust would come off the project and settle on our homes and cars. You could not leave windows open during the day or night on any side facing the reservoir. Cars and trucks would drive by the homes and dust would be thrown into the air. Requests for a simple solution like a water truck or street cleaning seemed beyond the Department's or Contractor's comprehension. Why it would be difficult for the Water Department to provide a water truck is a great unanswered question. Verbal promises of mitigation in the form of window cleaning or car washes were made, but never fulfilled. To use water we had to pay for to clean the Department's mess also seemed an excessive tax on the neighbors of the Sunset Reservoir. The Sunset Reservoir is used by the old and young alike and many times sidewalks were left in an unsafe state with no barriers or warning signs.

While my neighbors and I welcome what the SFPUC is trying to do to maintain a safe and clean water supply, we also ask that the Department act like a good neighbor. Is this too much to ask, again?

Sincerely,

Jim Spahr
2079 28th Ave
San Francisco, CA

January 27, 2010

San Francisco Planning Department
Attn: Bill Wycko, Environmental Review Officer
San Francisco Groundwater Supply Project
Scoping Comments
1650 Mission Street, Suite 400
San Francisco, CA 94103-2479

Subject: Comments on Notice of Preparation (NOP) for the Draft EIR for the San Francisco Groundwater Project, Case No. 2008.1122E

Mr. Wycko,

My name is William Wanner and I am the owner of property on 40th Avenue in San Francisco. I want to respond to the NOP for the groundwater project noted above. My comments mainly pertain to the water line that is proposed to connect the two groundwater wells located at both South Sunset and West Sunset playgrounds. I want to state that overall I am not opposed to the use of groundwater to supplement the City's water supply. I am concerned with the potential for significant impacts to residents along 40th Avenue with the construction and operation of the connecting water line. The following environmental issues should be addressed in the DEIR.

1. The cause of subsidence to portions of the street and specific residences on 40th Avenue between Rivera and Santiago Streets should be determined and analyzed.

   For years, calls to San Francisco Planning and Public Works departments have resulted in various explanations for the sinking street and homes. The answers provided by the City ranged from "well it's just shifting sand", to "underground springs", and "the location may have been an unofficial dump site in the 1920's and 1930's". Although it is an existing condition, the DEIR should determine the cause and provide an analysis and possible mitigation measures for future construction related activities on the street. In addition, the project provides an opportunity to create a permanent fix to the problem, and provide a street that will no longer be subjected to ground subsidence.

2. Construction impacts pertaining to the installation of the water line on this portion of 40th Avenue (between Rivera and Santiago) should be analyzed.

   If the cause of the ground subsidence is underground springs, I am concerned that construction work may result in additional ground failure in the impacted area. The DEIR should examine the potential for construction related intrusion into the underground spring(s), or the water table, resulting in

3M

the spreading of water leading to ground subsidence to residences on the street where there currently has not been ground failure. Appropriate construction mitigation measures should be provided. Obviously, it would not be acceptable to create a more widespread area of ground subsidence with this project.

3. Operation and maintenance of the water line should be examined in the DEIR.

   The DEIR should analyze the potential for water line breaks due to subsidence or in the case of a seismic event in conjunction with ground subsidence. The DEIR should examine and propose regular maintenance schedules to monitor ground subsidence and possible water leaks and pipe breakage.

   Since 40th Avenue is not a flat street running between the proposed wells, I assume that the water will be pumped from each location to a point where it will be pumped to the reservoir. Pumping velocity should be examined in relation to the potential for damage to the street and residences in the event of a break or leak in the water line. Mitigation in the form of monitoring and automatic shut-off should be provided.

4. Construction issues, timing, and access to individual residences should be evaluated in the DEIR.

   Residents should have ample notice prior to the start of construction. In addition, it is assumed that the DEIR will discuss noise, dust, and traffic relocation. The document should also provide alternatives for street parking for residents and visitors, and should provide for a minimum amount of disruption to residents during construction.

I look forward to reading the Draft EIR. Please continue to notify me of the availability of project related reports, staff reports, and upcoming public meetings. I can be reached at the address listed below.

Sincerely,

William Wanner
2034 Palm Avenue
Redwood City, CA 94061
Daytime phone: 650-522-7208

chunyao
<cxia2007@gmail.com>
01/15/2010 02:08 PM

To jamie.dean@sfgov.org
cc
bcc
Subject impact to residents house

Dear Jamie Dean

I'm a resident lived at 1979 28th Ave, San Francisco. I've been living here more than 10 years. I'm really scared by getting the letter from San Francisco Public Commission recently, talking about groundwater supply project. Last year, there were a lot underground water works on the street front my house. I know this work is for protection of city water supply system from earthquake. However, during the work, my house was shakes very badly. Right now, as long as some truck pass by front street of my house, the house will shake. This never happened before the underground water works. Not too long ago, the resident on 24th Ave, Ortega, pass the letter to neighborhood, talked about same problems caused by underground water works. We really worry about our property right now. Could you help us to talk to city related department to protect the residents property from this kind of damage or potential damage by earthquake? Thank you very much!

Chunyao Xia

30

January 25, 2010

San Francisco Planning Department

Attn.: Bill Wycko,

Environmental Review Officer,

San Francisco Groundwater Supply Project Scoping Comments

1650 Mission Street, Suite 400

San Francisco, CA 94103-2479

Via Fax: (415) 558-6409

Dear Mr. Wycko,

I would like to express my great concern about the impact on my home and my health from the construction of the two underground water wells (one at West Sunset Playground and the other at South Sunset Playground) and the underground water pipelines under 40th Avenue to connect the two wells.

We are also concerned that in the future if any of the pipelines leaks, it would cause ground subsidence. If the water pipeline bursts, it would destroy our house foundations and thus our houses. As Sunset houses are built on sand, the foundations are already weak. Furthermore, while construction is going on, there will be a lot of harm and inconvenience to the residents of 40th Avenue caused by the dust, noise pollution and traffic diversion. I am allergic to dust and I usually get a headache from noise pollution.

I have worked very hard for years and years to be able to own a house and my house is my only asset. I would like to ask for your kind consideration not to proceed with the construction of the well at West Sunset Playground and the pipelines under 40th Avenue in view of the great adverse effects on the residents of the 40th Avenue.

Sincerely,

LCY

L.C. Yim

(resident of 40th Avenue)

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APPENDIX A-2
2011 Scoping Report

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San Francisco Public Utilities Commission

San Francisco Groundwater Supply Project Environmental Impact Report

Final
Scoping Report

June 2011

Prepared for the San Francisco Planning Department

Prepared by ESA

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San Francisco Public Utilities Commission
San Francisco Groundwater Supply Project
Environmental Impact Report
Scoping Report

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1.0 Introduction and Background

1.1 Introduction

The San Francisco Planning Department is the lead agency for implementation of California Environmental Quality Act (CEQA) requirements for all projects sponsored by the City and County of San Francisco (CCSF) or conducted within San Francisco. The San Francisco Planning Department is preparing a Draft Environmental Impact Report (EIR) for the San Francisco Public Utilities Commission's (SFPUC's) proposed San Francisco Groundwater Supply Project (project or proposed project). The Draft EIR, which will assess the potential impacts of the project on the physical environment, is being prepared in accordance with CEQA. CEQA requires the preparation of an EIR when a proposed project could significantly affect the physical environment.

As part of the Draft EIR process, the San Francisco Planning Department conducted a public scoping effort in March 2011, soliciting comments from interested parties, State and natural resource agencies, and the public to help determine the scope of the Draft EIR. This report describes the scoping process and summarizes the public and regulatory agencies' comments received during the scoping period.

1.2 Notice of Preparation

The San Francisco Planning Department published a Revised Notice of Preparation (NOP) on March 2, 2011, announcing the preparation of the Draft EIR for the project under CEQA. The Revised NOP summarized the project objectives and provided a description of the proposed project. The Revised NOP also described the scoping process. The scoping process, and notification procedures are described below, following a brief description of the proposed project.

1.3 San Francisco Groundwater Supply Project

The purpose of the San Francisco Groundwater Supply Project (project) is to provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Subsequent to the initial NOP and scoping period from December 2009 to January 2010, the SFPUC modified the project. As a result, a revised NOP has been prepared to inform you of the following changes to the project:

- The proposed pipeline alignment between Vicente and Quintara streets has been moved from 40th Avenue to 41st Avenue.
- Project description information regarding Sunset Reservoir connection point requirements has been clarified.
- The West of Spreckels Lake and Polo Field well facility alternatives have been removed from the project description.

- A portion of the pipeline alignment within Golden Gate Park east of 41st Avenue/Chain of Lakes Drive East has been moved from Martin Luther King Jr. Drive to Middle Drive West.

Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin that underlies parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of the city of San Francisco on property owned by the City and County of San Francisco (CCSF), and managed by the San Francisco Public Utilities Commission (SFPUC) or the San Francisco Recreation and Park Department.

Under the project, the SFPUC would construct and operate six potable groundwater production well facilities. Although seven locations are currently under consideration for the groundwater production well facilities, only six facilities would be constructed—two that would be converted from existing irrigation well facilities and four new well facilities. Each facility would include a groundwater production well and a pump station. The SFPUC would also construct a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection. The project would be implemented in two phases: (1) construction and operation of the four new well facilities to supply an annual average of approximately 2.5 to 3.0 mgd of groundwater; and (2) construction of well facilities required to convert the two existing irrigation well facilities to potable water well facilities and operation of the converted irrigation wells to provide an additional annual average of approximately 1.0 to 1.5 mgd of groundwater.

The project is a component of the SFPUC's Water System Improvement Program (WSIP), which includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase delivery reliability and improve the ability to maintain the water system; (4) meet customer purchase requests in nondrought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of the project, as a component of the WSIP, would contribute to meeting the overall WSIP goals and objectives.

2.0 Purpose of the Scoping Process

The purpose of the scoping process is to solicit input from the public, interested parties, and agencies with discretionary authority over the project on the appropriate scope, focus, and content of the Draft EIR. The San Francisco Planning Department will consider all of the input received during the scoping process in the preparation of the Draft EIR.

The Draft EIR will describe the existing environmental conditions of the area that could be affected by the proposed project and evaluate the potential effects of the project on the

environment in accordance with CEQA. The comments provided by the public and agencies during scoping will help the San Francisco Planning Department identify pertinent issues, methods of analyses, and level of detail that should be addressed in the Draft EIR. The scoping comments will also provide the input for development of a reasonable range of feasible alternatives to be evaluated in the Draft EIR.

The scoping comments will augment the information developed by the EIR project team, which includes specialists in each of the environmental subject areas covered in the EIR. This combined input will result in an EIR that is both comprehensive and responsive to issues raised by the public and regulatory agencies, and that meets CEQA requirements. The Draft EIR is scheduled to be available for public comment in late 2011.

In addition to facilitating public and regulatory agency input on the scope and focus of the Draft EIR, scoping allows the San Francisco Planning Department to explain the EIR process to the public and to identify additional opportunities for public comment and public involvement during the EIR process.

3.0 Notification of Scoping

The first scoping period began on December 30, 2009, with the issuance of the NOP. The San Francisco Planning Department held a scoping meeting on January 20, 2010, and accepted written comments through January 30, 2010.

The second scoping period began on March 2, 2011, with the issuance of the Revised NOP. The San Francisco Planning Department accepted written comments through April 1, 2011. The following methods were used to notify agencies and the public about the availability of the Revised NOP:

- **Mailing List.** A mailing list was compiled, including approximately 3,700 contacts for federal, state, regional, and local agencies; federal, state, regional, and local elected officials; regional and local interest groups; member agencies of the Bay Area Water Supply and Conservation Agency; other potentially affected water districts; SFPUC Community Advisory Committee members; information repositories; media contacts; and property owners and residents 300 feet within the proposed project limits.

- **Revised Notice of Preparation of an EIR.** Copies of the Revised NOP were distributed via certified mail to responsible and trustee agencies and 15 copies were delivered to the State Clearinghouse (See Appendix A for a copy of the Revised NOP and Revised NOP Notice of Availability). In addition, a notice of availability of the Revised NOP was distributed via first-class mail to the entire mailing list (approximately 3,700 addressees):

    - ***Locations to obtain a copy of the Revised NOP.*** The revised NOP was posted to the San Francisco Planning Department's website (http://mea.sfplanning.org). A printed copy of the Revised NOP was also provided to anyone who requested it from the San Francisco Planning Department.

TABLE 1
NUMBER OF RECIPIENTS ON MAILING LIST FOR REVISED NOP

Category	Number of NOP Recipients	Number of NOP Notice of Availability Recipients
Owners and Occupants	0	5,813
Wholesale Customers	3	45
Responsible and Trustee Agencies, Other Agencies	9	0
SFPUC Citizen's Advisory Committee	0	17
Interested Parties	6	322
Local and Bordering Jurisdictions	0	9
Media, Libraries, and Individuals	18	6
TOTAL	**36**	**6,212**

4.0 Overview of Comments Received

Agencies and members of the public utilized several different methods of providing input: written comments submitted via U.S. mail, email and fax. Table 2 lists agencies and other parties that provided written comments in response to the Revised NOP, listed by comment letter number. Copies of comment letters and emails are located in Appendix B.

TABLE 2
INDEX OF WRITTEN COMMENTS

Comment Letter No.	Commenter
1. Agencies	
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek
2. Organizations	
2A	Golden Gate Park Preservation Alliance (Katherine Howard)
3. Individuals	
3A	Dale Gutierrez
3B	Dale Gutierrez
3C	Steve Lawrence
3D	Nancy Wuerfel

5.0 Summary of Comments by Subject Area

This section summarizes the issues raised in written during the scoping period. Table 3 provides a summary of scoping comments by commenter. (Appendices B also contain all of the commenter correspondence.

TABLE 3
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 1, Paragraph 1	Opening statement		Not applicable to CEQA
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 1, Paragraph 2	Clarifies that the project involves several properties under the jurisdiction of the Recreation and Parks Department (RPD). An MOU was approved and establishes as a framework for collaboration between RPD and the Public Utilities Commission. Water Use Efficiency programs have been beneficial to RPD and the parks they manage.	Project Description	
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 1, Paragraph 3	The West Sunset Playground and South Street Playground have had test wells installed. Permanent facilities at these properties will require approval.	Project Description	
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 1, Paragraph 4	Confirms that the project does involved Golden Gate Park. The project will affect all of the RPS properties within the scope of work.	Project Description	
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 1, Paragraph 5	States that site alternatives for the well location inside and outside of the Golden Gate Park have already been studied and reviewed by RPD staff. Recommends alignments through Golden Gate Park produce minimal impacts.	Alternatives	
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 1, Paragraph 6	Emphasizes the importance of Golden Gate Parks landscapes, views, recreation, habitat historic and intrinsic value. Recommends the Planning Department's historical planning staff should be consulted to determine the appropriate pipeline alignment.	Cultural and Paleontological Resources Recreation	
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 2, Paragraph 1	States that the project should not impeded the RPD's regular and long term maintenance of operation. Recommends pipeline be located away from maintenance yards, storage areas or waste facilities.	Project Description	
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 2, Paragraph 2	The project should not hinder the use of the parks including recreation facilities.	Recreation	

TABLE 3 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 2, Paragraph 3	The Recreation and Parks Commission would need to review the EIR to make appropriate findings in adopting any agreement.		Not applicable to CEQA
1A	San Francisco Recreation and Parks, Karen Mauney-Brodek	Page 2, Paragraph 4	Closing Comments		Not applicable to CEQA
2A	Golden Gate Park Preservation Alliance	Page 1, Paragraph 1	Opening comments. Suggest the department do a comprehensive outreach to more people who have expressed concern in the past with issues relating to Golden Gate Park.	Public participation process	
2A	Golden Gate Park Preservation Alliance	Page 1, Paragraph 2	Would like to see impacts, alternative design, issues related to other water treatment projects and safety impacts thoroughly analyzed in the EIR.	Project Description Hydrology (Groundwater Recharge and Quality) Cumulative Impacts	
2A	Golden Gate Park Preservation Alliance	Page 2, Paragraph 1	Concerned with construction impacts to the immediate and adjoining parkland in regards to earth-moving and tree removal	Project Description Biological Resources	
2A	Golden Gate Park Preservation Alliance	Page 2, Paragraph 2	Concerned with construction impacts outside of the parkland including construction impacts to nearby residential and commercial areas.	Noise	
2A	Golden Gate Park Preservation Alliance	Page 2, Paragraph 3	Request that the EIR include parking studies and traffic impacts.	Transportation and Circulation	
2A	Golden Gate Park Preservation Alliance	Page 2, Paragraph 4	Request that the EIR include analyses on the impacts to wildlife and other biological resources.	Biological Resources	
2A	Golden Gate Park Preservation Alliance	Page 2, Paragraph 5	Request that the EIR include analyses on impacts related to aesthetics and construction noise. Concerned with the loss of trees as an aesthetics resources.	Aesthetics Noise	
2A	Golden Gate Park Preservation Alliance	Page 2, Paragraph 6	Request that the EIR include analyses on the loss of parkland related to recreation uses. Suggest an alternative of using the construction yard as the location for the pump station.	Recreation Alternatives	

TABLE 3 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
2A	Golden Gate Park Preservation Alliance	Page 3, Paragraph 1	Request that the EIR include analyses on the aquifer underneath Golden Gate Park.	Hydrology (Groundwater Recharge, Groundwater Quality)	
2A	Golden Gate Park Preservation Alliance	Page 3, Paragraph 2	Request that the EIR study the impacts of the energy to power the plant, including the amount of energy needed to pump water out of the ground to Sunset Reservoir.	Utilities	
2A	Golden Gate Park Preservation Alliance	Page 3, Paragraph 3	Request that the EIR include analyses on economic impacts of the project related to cost of water to consumers and taxpayers. Suggest considering a less expensive alternative to the proposed project.	Alternatives	
2A	Golden Gate Park Preservation Alliance	Page 3, Paragraph 4	EIR should explore future expansion of the pumping station at the Golden Gate Park and other parkland locations.	Project Location Alternative	
2A	Golden Gate Park Preservation Alliance	Page 3, Paragraph 5	Request that the EIR include analyses on the cumulative impacts of the existing and proposed athletic/soccer field and Westside Water Treatment Plant.	Cumulative Analyzes	
2A	Golden Gate Park Preservation Alliance	Page 3, Paragraph 6	EIR should explore alternative designs that preserve the natural meadow and forest feeling of Golden Gate Park.	Alternatives	
2A	Golden Gate Park Preservation Alliance	Page 3, Paragraph 7	EIR should explore alternative design for the West Sunset Playground pumping station.	Alternatives	
2A	Golden Gate Park Preservation Alliance	Page 4, Paragraph 1	EIR should explain the relationship of the proposed project to all relevant City documents and agreements.	Cumulative Plans and Policies	
2A	Golden Gate Park Preservation Alliance	Page 4, Paragraph 2	EIR should explain the relationship of the proposed project to all other water projects in San Francisco.	Cumulative Analyzes	
2A	Golden Gate Park Preservation Alliance	Page 4, Paragraph 3	EIR should include analyses on safety issues related to the proposed plant. Safety issues related to risk of damage by earthquakes, tsunamis, and industrial accidents.	Geology Hazardous materials Water Quality	

TABLE 3 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
2A	Golden Gate Park Preservation Alliance	Page 5, Paragraph 1	Request that the EIR include analyses on water conservation alternatives including use of desalinated water, and the use of tertiary water.	Alternatives	
2A	Golden Gate Park Preservation Alliance	Page 5, Paragraph 2-3	EIR should include the non-building of the San Francisco Westside Water Project as an alternative.	Alternatives	
2A	Golden Gate Park Preservation Alliance	Page 5, Paragraph 4	Includes letter addressing scoping issues for the Beach Chalet Soccer Fields Renovation.		Not applicable to CEQA
2A	Golden Gate Park Preservation Alliance	Page 6, Paragraph 1-2	Closing comments. Hopes the EIR will result in a project that will be all around beneficial.		Not applicable to CEQA
3A	Gutierrez, Dale	Page 1, Paragraph 1	References notice from the Planning Commission.	Public participation process	
3A	Gutierrez, Dale	Page 1, Paragraph 2-3	Understands the needs for a diverse water supply but opposes the use of groundwater. Concerned with the cost of groundwater.		Not applicable to CEQA
3A	Gutierrez, Dale	Page 1, Paragraph 4	Opposes the project.		Not applicable to CEQA
3B	Gutierrez, Dale	Page 1, Paragraphs 1	Opposes the project. Concerned with water quality and its impacts to public health. Concerned with economic and social impacts regarding the project.	Water Quality	
3B	Gutierrez, Dale	Page 1, Paragraphs 2	Express interests in voicing concerns during the public commenting phase.	Public participation process	
3C	Lawrence, Steve	Page 1, Paragraphs 1	Expresses concern with the over drawing of the water basins, believes the project will extract too much water.	Hydrology (Groundwater Recharge)	
3C	Lawrence, Steve	Page 1, Paragraph 2	Expresses concern about the possibly of saltwater intrusion into the groundwater. Question the effects of sea level rise and the use of groundwater in wet vs. dry years.	Hydrology (Groundwater Recharge, Groundwater Quality)	
3C	Lawrence, Steve	Page 1, Paragraph 3	Asserts that recycled water will be used to irrigate Golden Gate Park and questions the impacts of recycled water reaching the groundwater table. Expresses concern for water quality.	Hydrology (Groundwater Recharge, Groundwater Quality)	

TABLE 3 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
3C	Lawrence, Steve	Page 1, Paragraph 4	Expresses concern regarding the amount of groundwater that will be used. Questions if season variations during the year will affect the amount of groundwater being used.	Hydrology	
3C	Lawrence, Steve	Page 1, Paragraph 5	Questions if and how an earthquake could damage the aquifer. Expresses concern regarding water quality if the water system is damaged by an earthquake.	Geology Water Quality Hydrology	
3D	Wuerfel, Nancy	Page 1, Paragraph 1	Opening comments		Not applicable to CEQA
3D	Wuerfel, Nancy	Page 1, Paragraph 2-4	Expresses concern about 3 new well facilities being built on park lands, which does not comply with Section 4.113 of the city charter	Project Location Land Use	
3D	Wuerfel, Nancy	Page 1, Paragraph 5-6	Expresses concern for the lost of groundwater as an irrigation source at 2 parks and reliance on a recycled water plant.	Hydrology	
3D	Wuerfel, Nancy	Page 2, Paragraph 1	Questions if groundwater was diverted to park irrigation would Sunset Reservoir be backfilled with Hetch Hetchy water to 100%	Hydrology	
3D	Wuerfel, Nancy	Page 2, Paragraph 2	Questions the effects of using recycled water on Golden Gate Park over time.	Hydrology Water Quality	
3D	Wuerfel, Nancy	Page 2, Paragraph 3	Questions the impacts of operational noise on recreation and wildlife.	Biological Resources Noise	
3D	Wuerfel, Nancy	Page 2, Paragraph 4	Questions why the system cannot be used to transport the groundwater to Sunset Reservoir instead of trenching new pipelines along 41st Avenue.	Project Description	
3D	Wuerfel, Nancy	Page 2, Paragraph 5	Expresses concern for water quality impacting public health if Hetch Hetchy water and groundwater are consumed.	Water Quality	
3D	Wuerfel, Nancy	Page 2, Paragraph 6	Questions if a new EIR will be circulated if the ratio of groundwater is changed.	Recirculation	
3D	Wuerfel, Nancy	Page 2, Paragraph 7	Questions the effects of using groundwater and Hetch Hetchy water blend on home appliances.		Not applicable to CEQA

TABLE 3 (Continued)
SUMMARY OF COMMENTS BY COMMENTER

Commenter		Page, Paragraph	Summary of Comment	CEQA Subject Area	Comments Not Applicable to CEQA or the Proposed Project
3D	Wuerfel, Nancy	Page 2, Paragraph 8	Expresses concern that part of San Francisco will be drinking this water, while other are not.	Water Quality	
3D	Wuerfel, Nancy	Page 2, Paragraph 9	Questions what access would be available to the groundwater site and alternatives points of access.	Project Location Transportation	
3D	Wuerfel, Nancy	Page 2, Paragraph 10	Questions what will be done if 4 mgd of groundwater cannot be produced to blend with Hetch Hetchy water because park access cannot be used.	Project Location Project Description	
3D	Wuerfel, Nancy	Page 2, Paragraph 11	Questions the effect on human health if the groundwater is not blended with the Hetch Hetchy water. Questions what other options are there to meet the water needs.	Water Quality	
3D	Wuerfel, Nancy	Page 3, Paragraph 1	Question how the project promotes population growth in San Francisco. Concerned with conservation and new housing growth.	Land Use Population and Housing	
3D	Wuerfel, Nancy	Page 3, Paragraph 2	Closing comments		Not applicable to CEQA

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APPENDICES

A. Notice of Preparation (NOP) and NOP Notice of Availability
B. Comments Received During EIR Scoping Process

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APPENDIX A

Notice of Preparation and NOP Notice of Availability

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SAN FRANCISCO
PLANNING DEPARTMENT

March 2, 2011

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

Reception:
415.558.6378

Fax:
415.558.6409

Planning
Information:
415.558.6377

TO: Responsible Agencies, Trustee Agencies, and Interested Parties

RE: **CASE NO. 2008.1122E – SAN FRANCISCO GROUNDWATER SUPPLY PROJECT**
REVISED NOTICE OF PREPARATION OF AN ENVIRONMENTAL IMPACT REPORT

A revised Notice of Preparation of an Environmental Impact Report (EIR) for the above-referenced project, described below, has been issued by the Planning Department. The Planning Department previously issued a Notice of Preparation (NOP) for the above-referenced project on December 30, 2009, and a scoping meeting was held on January 20, 2010 in the project vicinity. The San Francisco Public Utilities Commission (SFPUC) has since made certain changes to the proposed project, and the revised NOP for the revised project description is either attached or is available upon request from Timothy Johnston, whom you may reach at (415) 575-9035 or Timothy.Johnston@sfgov.org or by mail at the above address. It is also available online at http://tinyurl.com/puccases. This notice is being sent to you because you have been identified as potentially having an interest in the project or the project area.

Project Description:

Subsequent to the NOP and scoping period from December 2009 to January 2010, the SFPUC has made certain changes to the San Francisco Groundwater Supply Project (the project). As a result, a revised NOP has been prepared to inform you of the following changes to the project:

- The proposed pipeline alignment between Vicente and Quintara streets has been moved from 40th Avenue to 41st Avenue.
- Project description information regarding Sunset Reservoir connection point requirements has been clarified.
- The West of Spreckels Lake and Polo Field well facility alternatives have been removed from the project description.
- A portion of the pipeline alignment within Golden Gate Park east of 41st Avenue/Chain of Lakes Drive East has been moved from Martin Luther King Jr. Drive to Middle Drive West.

As described in the NOP, the purpose of the project is to provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin that underlies parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of the city of San Francisco on property owned by the City and County of San Francisco, and managed by the San Francisco Public Utilities Commission (SFPUC) or the San Francisco Recreation and Park Department.

Under the project, the SFPUC would construct and operate six potable groundwater production well facilities. Although seven locations are currently under consideration for the groundwater production well facilities, only six facilities would be constructed—two that would be converted from existing

irrigation well facilities, and four new well facilities. Each well facility would include a groundwater production well and a pump station. The SFPUC would also construct a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection. The project would be implemented in two phases: (1) construction and operation of the four new well facilities to supply an annual average of approximately 2.5 to 3.0 mgd of groundwater; and (2) construction of well facilities required to convert two existing irrigation well facilities to potable water well facilities and operation of the converted irrigation wells to provide an additional annual average of approximately 1.0 to 1.5 mgd of groundwater.

The project is a component of the SFPUC's Water System Improvement Program (WSIP). The WSIP, approved by the SFPUC in October, 2008, includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase delivery reliability and improve the ability to maintain the water system; (4) meet customer purchase requests in nondrought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of the project, as a component of the WSIP, would contribute to meeting the overall WSIP goals and objectives.

As set forth in the NOP, the San Francisco Planning Department has determined that an EIR must be prepared for the project prior to any final decision regarding whether to approve the project. The purpose of the EIR is to provide information about potential significant physical environmental effects of the project, to identify possible ways to minimize the significant effects, and to describe and analyze possible alternatives to the project. Preparation of a NOP or EIR does not indicate a decision by the City to approve or to disapprove the project. However, prior to making any such decision, the decision-makers must review and consider the information contained in the EIR.

Written comments will be accepted until the close of business on April 1, 2011. These comments will assist the Planning Department in reviewing the scope and content of the environmental impact analysis and information to be contained in the EIR that is being prepared for the project. Written comments should be sent to Bill Wycko, c/o Timothy Johnston, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103-2479; by fax to (415) 558-6409 (Attn: Timothy Johnston); or by e-mail to Timothy.Johnston@sfgov.org. Comments that were received in response to the December 2009 NOP remain on file with the Planning Department and will be considered during environmental review of the project to the extent that they remain relevant to the project, as revised.

If you work for an agency that is a Responsible or a Trustee Agency, we need to know the views of your agency as to the scope and content of the environmental information that is relevant to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this proposed project. We will also need the name of the contact person for your agency. If you have questions concerning environmental review of the proposed project under CEQA, please contact **Timothy Johnston** at **(415) 575-9035** or Timothy.Johnston@sfgov.org.

SAN FRANCISCO
PLANNING DEPARTMENT

1650 Mission St.
Suite 400
San Francisco,
CA 94103-2479

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415.558.6409

Planning
Information:
415.558.6377

Revised Notice of Preparation of an Environmental Impact Report

Date:	March 2, 2011
Case No.:	**2008.1122E**
Project Title:	**San Francisco Groundwater Supply Project**
Location:	The project is located in the North Westside Groundwater Basin, which is within the larger Westside Groundwater Basin underlying parts of San Francisco and San Mateo Counties. Project facilities would be constructed in the Sunset District of San Francisco and in Golden Gate Park.
BPA Nos.:	N/A
Zoning:	Various
Block/Lot:	Various
Lot Size:	Various
Project Sponsor	Antonia Sivyer, San Francisco Public Utilities Commission (415) 554-3238; ASivyer@sfwater.org
Lead Agency:	San Francisco Planning Department
Staff Contact:	Timothy Johnston – (415) 575-9035; timothy.johnston@sfgov.org

PROJECT DESCRIPTION

The purpose of the San Francisco Groundwater Supply Project (project) is to provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Subsequent to the initial Notice of Preparation (NOP) and scoping period from December 2009 to January 2010, the SFPUC modified the project. As a result, a revised NOP has been prepared to inform you of the following changes to the project:

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- A portion of the pipeline alignment within Golden Gate Park east of 41st Avenue/Chain of Lakes Drive East has been moved from Martin Luther King Jr. Drive to Middle Drive West.

Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin that underlies parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of the city of San Francisco on property owned by the City and County of San Francisco (CCSF), and managed by the San Francisco Public Utilities Commission (SFPUC) or the San Francisco Recreation and Park Department.

Under the project, the SFPUC would construct and operate six potable groundwater production well facilities. Although seven locations are currently under consideration for the groundwater production well facilities, only six facilities would be constructed—two that would be converted from existing irrigation well facilities and four new well facilities. Each facility would include a groundwater production well and a pump station. The SFPUC would also construct a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection. The project would be implemented in two phases: (1) construction and operation of the four new well facilities to supply an annual average of approximately 2.5 to 3.0 mgd of groundwater; and (2) construction of well facilities required to convert the two existing irrigation well facilities to potable water well facilities and operation of the converted irrigation wells to provide an additional annual average of approximately 1.0 to 1.5 mgd of groundwater.

The project is a component of the SFPUC's Water System Improvement Program (WSIP), which includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase delivery reliability and improve the ability to maintain the water system; (4) meet customer purchase requests in nondrought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of the project, as a component of the WSIP, would contribute to meeting the overall WSIP goals and objectives.

FINDING

This project may have a significant effect on the environment and an Environmental Impact Report (EIR) is required. This determination is based upon the criteria of the CEQA Guidelines, Sections 15063 (Initial Study), 15064 (Determining Significant Effect), and 15065 (Mandatory Findings of Significance), and for the reasons documented in the Environmental Evaluation (Initial Study), which is attached.

PUBLIC SCOPING PROCESS

Written comments will be accepted on the scope of the EIR until the close of business on April 1, 2011. These comments will assist the Planning Department in reviewing the scope and content of the environmental impact analysis and information to be contained in the EIR. Written comments should be sent to Bill Wycko, c/o Timothy Johnston, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA, 94103; or faxed to: 415-558-6409 (Attn: Timothy Johnston); or e-mailed to Timothy.Johnston@sfgov.org. Comments that were received in response to the initial December 2009 NOP remain on file with the Planning Department and will be considered during environmental review of the revised project proposal to the extent that they remain relevant to the revised project.

If you work for a Responsible or Trustee Agency, we need to know the views of your agency regarding the scope and content of the environmental information that is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency may need to use the EIR when considering a permit or other approval for this project. Please include the name of a contact person in your agency.

February 23, 2011
Date

Bill Wycko
Environmental Review Officer

REVISED NOTICE OF PREPARATION

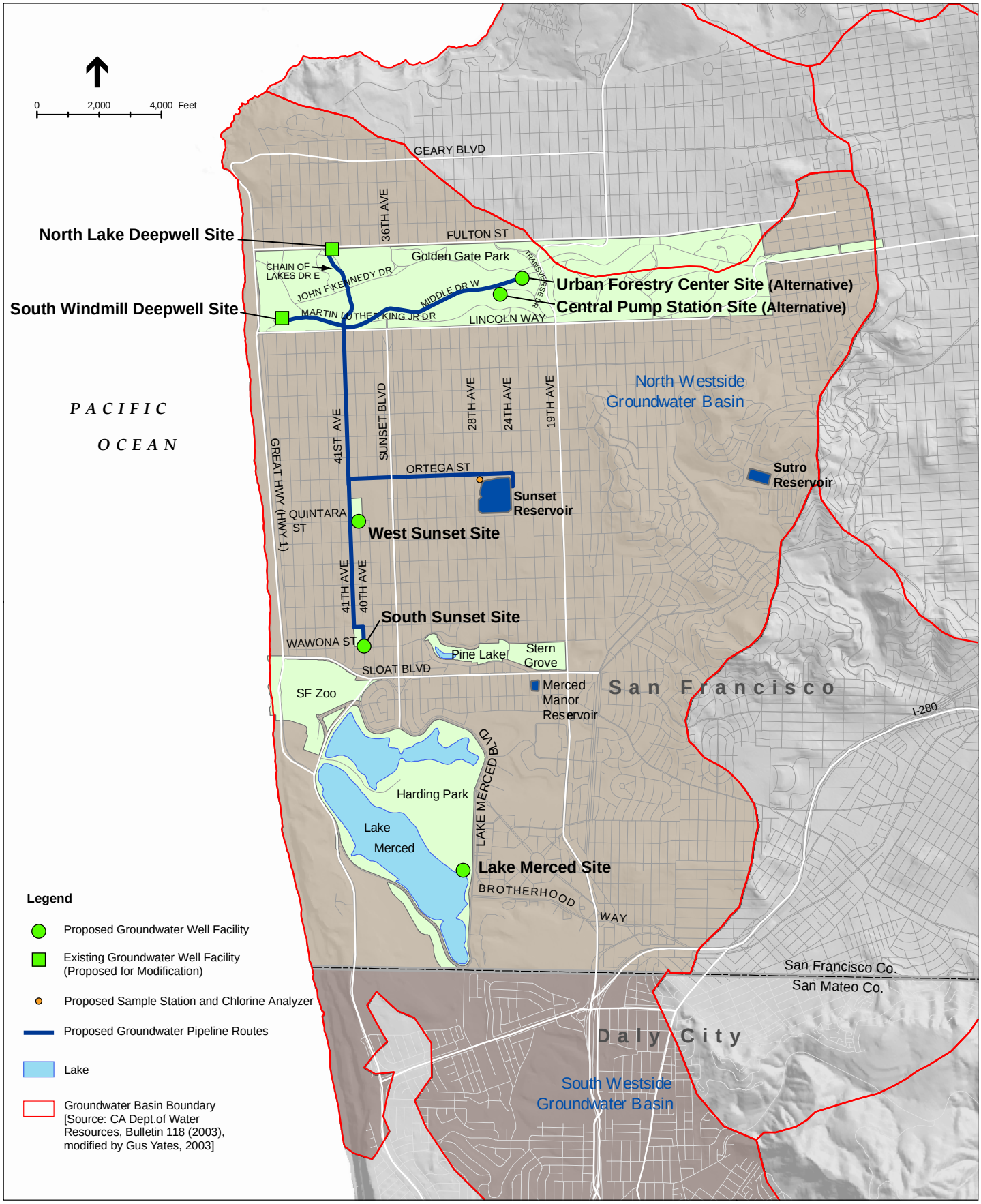
San Francisco Groundwater Supply Project Case No. 2008.1122E

1.0 Overview

The San Francisco Public Utilities Commission (SFPUC) is proposing the San Francisco Groundwater Supply Project (the project). To meet California Environmental Quality Act (CEQA) requirements, the San Francisco Planning Department's Major Environmental Analysis (MEA) Division is preparing and will distribute an environmental impact report (EIR) to describe and analyze the environmental effects of the proposed project. The Planning Department previously issued a Notice of Preparation (NOP) for the project on December 30, 2009, and a scoping meeting was held on January 20, 2010 in the project vicinity. The SFPUC has since made certain changes to the proposed project (as discussed below in Sections 1.1 and 4.0), and this revised NOP has been prepared in order to identify those changes and describe the proposed facilities and potential environmental effects of the project, as revised, that are being analyzed in the EIR.

As described in the NOP, the project would provide an average of four million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. Groundwater would be blended with San Francisco's existing municipal water supply for distribution within San Francisco. The groundwater would be pumped from the North Westside Groundwater Basin, which is located within the larger Westside Groundwater Basin, which underlies parts of San Francisco and San Mateo Counties. Facilities required to implement the project, including groundwater production well facilities, would be located on the western side of San Francisco (see **Figure 1**), on property owned by the City and County of San Francisco, and managed by the SFPUC or the San Francisco Recreation and Park Department (SFRPD).

As illustrated on Figure 1, seven locations are under consideration for the groundwater production well facilities; however, only six potable groundwater well facilities would be constructed—two that would be converted from existing irrigation well facilities and four new facilities. Each facility would include a groundwater production well and a pump station. The SFPUC also proposes the construction of a distribution system (including pipelines and connection points) that would connect five of the well facilities to Sunset Reservoir; the sixth well would connect to the existing Lake Merced Pump Station, and would require a short length of distribution piping to make this connection.



SOURCE: SFPUC, 2009; 2010

San Francisco Groundwater Supply Project

Figure 1
Project Location

The project is a component of the SFPUC's Water System Improvement Program (WSIP). The WSIP, approved by the San Francisco Public Utilities Commission in October, 2008, includes facility improvement projects designed to: (1) maintain high-quality water; (2) reduce vulnerability to earthquakes; (3) increase water delivery reliability and improve the ability to maintain the water system; (4) meet customer purchase requests in non-drought and drought periods; (5) enhance sustainability in all system activities; and (6) achieve a cost-effective, fully operational system. Implementation of the project, as a component of the WSIP, would contribute to meeting the overall WSIP goals and objectives (San Francisco Planning Department, 2008).

1.1 Project Changes Following the 2009 NOP Release

Following the December 2009 NOP release date and scoping meeting by the San Francisco Planning Department, the SFPUC revised the following project components:

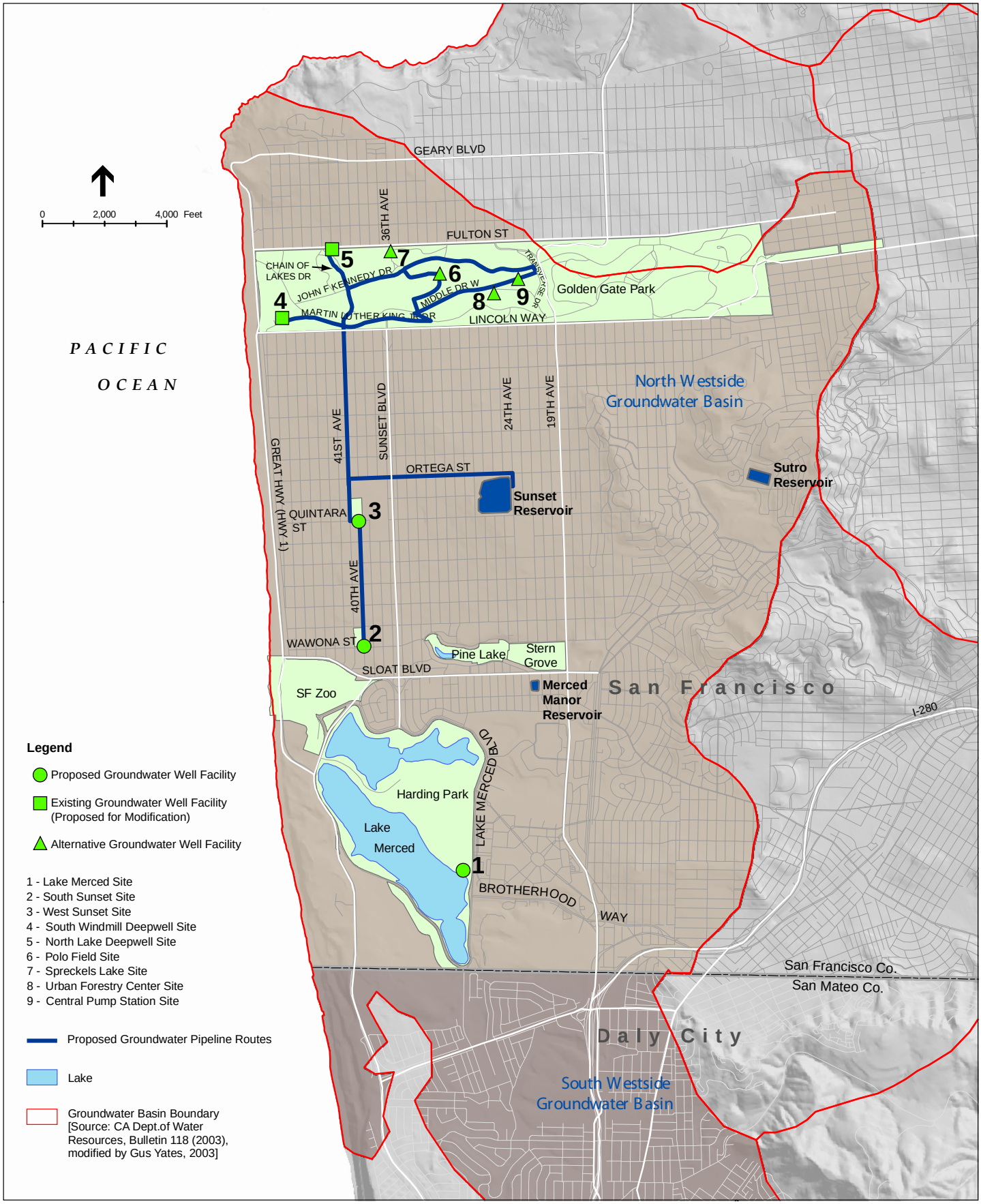
- The proposed pipeline alignment between Vicente and Quintara streets has been moved from 40th Avenue to 41st Avenue.

- Project description information regarding Sunset Reservoir connection point requirements has been clarified.

- The West of Spreckels Lake and Polo Field well facility alternatives have been removed from the project description. Pipeline alignments required to connect those well facility alternatives to the project distribution system have also been removed from the project description.

- A portion of the pipeline alignment within Golden Gate Park east of 41st Avenue/Chain of Lakes Drive East has been moved from Martin Luther King Jr. Drive to Middle Drive West.

The project location and facilities included in the December 2009 NOP are shown in **Figure 2**. Following receipt of scoping comments on localized differential settlement along 40th Avenue, SFPUC conducted geotechnical investigations along 40th Avenue and 41st Avenue and determined that the proposed pipeline alignment between Vicente and Quintara streets should be moved to 41st Avenue. At the time of preparation of the December 2009 NOP, the location and requirements for connecting five of the well facilities to Sunset Reservoir was not known. Since that time, SFPUC has clarified the potential connection points, and identified the need for a sample station and chlorine analyzer that would be installed on a concrete pad to the northwest of Sunset Reservoir and two flowmeters that would be installed within an existing vault. The December 2009 NOP included consideration of nine locations for the groundwater production well facilities. Since that time, the SFPUC has decided, after further consideration and in consultation with the San Francisco Recreation and Park Department, to remove the West of Spreckels Lake and Polo Field well facility alternatives from the project description. Finally, pipeline alignments proposed within Golden Gate Park have been refined to remove alignments related to the West of Spreckels Lake and Polo Field well facility alternatives, and to reduce the length of pipelines needed to connect either the Central Pump Station or Urban Forestry well facility alternatives to the distribution system.



SOURCE: SFPUC, 2009

San Francisco Groundwater Supply Project

Figure 2

2009 NOP Project Location

2.0 Environmental Review Process

The San Francisco Planning Commission certified the WSIP Program Environmental Impact Report (PEIR) in October 2008. The PEIR addressed the potential environmental impacts of the WSIP facilities on a programmatic level and evaluated regional water supply alternatives. The PEIR is available on the San Francisco Planning Department website at: http://tinyurl.com/puccases. The San Francisco Planning Department is now preparing a project-specific EIR to evaluate the environmental effects of the proposed project on the environment. The EIR will be prepared in compliance with CEQA Guidelines Section 15161 and will address project-specific construction and operational impacts.

The first step in the environmental review process is the formal public scoping process, for which the NOP was prepared. The San Francisco Planning Department is issuing this revised NOP to inform agencies and the public of the changes made to the proposed project that will be included as part of the project being analyzed in the EIR. This revised NOP will be circulated for a 30-day public review period. The purpose of this public review period is to solicit public comments to aid in determining the scope and focus of the environmental impact analysis to be addressed in the EIR. All comments received in response to the NOP issued in December, 2009 NOP remain on file with the Planning Department and will be considered during environmental review of the project, to the extent they remain relevant to the project, as revised. Following the public scoping phase, a Draft EIR will be prepared and circulated for a 45-day public review period. Public comments on the Draft EIR will be accepted in writing during the review period, or verbally at the formal public hearing to be held by the San Francisco Planning Commission. The San Francisco Planning Department will then prepare a Comments and Responses document, which will respond to comments on environmental issues raised during the public review period. This document will be considered by the San Francisco Planning Commission, along with the Draft EIR and any revisions to the draft based on the comments and responses, for certification as the Final EIR.

3.0 Public Scoping Comments

The San Francisco Planning Department will accept written comments by mail, email, or fax until close of business on April 1, 2011. The comments received will assist the San Francisco Planning Department in determining the scope and focus of the environmental impact analysis for the project, as revised, to be addressed in the EIR.

Written comments may be mailed to the Bill Wycko, San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA 94103; sent by fax to (415) 558-6409; or submitted by email to Timothy Johnston, the CEQA coordinator for this project, at timothy.johnston@sfgov.org.

4.0 Project Description

4.1 Project Goals and Objectives

The proposed project would provide an average of approximately four mgd of groundwater to San Francisco's municipal water supply from the North Westside Groundwater Basin, which would:

- Expand the SFPUC's water supply portfolio to increase system reliability
- Increase the use of local water supply sources
- Reduce dependence on imported water

In addition, the project would ensure the availability of potable groundwater for emergency supply in the event of an earthquake or other major catastrophe (SFPUC, 2009a).

4.2 Proposed Project

4.2.1 Summary of Proposed Project Components

The Groundwater Supply Project includes following components:

- Construction of six groundwater well facilities, including the conversion of two existing irrigation well facilities in Golden Gate Park to potable groundwater well facilities and the construction of four new groundwater well facilities. Each facility would include a groundwater production well and a pump station. Disinfection equipment would be included at the Lake Merced and West Sunset well facilities.

- Construction of a distribution system (including pipelines and connection points) to connect five of the groundwater well facilities to Sunset Reservoir. The sixth groundwater well would connect to the Lake Merced Pump Station, and would require a short length of distribution piping to make this connection.

The project would be implemented in two phases: (1) construction and operation of the four new groundwater well facilities to supply an annual average of approximately 2.5 to 3.0 mgd of groundwater; and (2) construction of well facilities required to convert the two existing irrigation well facilities to potable groundwater well facilities and operation of the converted irrigation wells to provide an additional annual average of approximately 1.0 to 1.5 mgd of groundwater.

Phase 2 of the proposed project would be implemented if the SFPUC's proposed San Francisco Westside Recycled Water Project,[1] which is another WSIP project that proposes development of a new recycled water supply for non-potable irrigation uses at Golden Gate Park, Lincoln Park Golf Course, and the Presidio Golf Course, is implemented. The availability of a recycled water

[1] The San Francisco Westside Recycled Water Project is one of the projects proposed for implementation under the WSIP, approved by the SFPUC in October, 2008. The environmental review for the San Francisco Westside Recycled Water Project (San Francisco Planning Department Case Number 2008.0091E) is proceeding independently of this project. The revised Notice of Preparation (NOP) of an EIR for the San Francisco Westside Recycled Water Project is available at http:tinyurl.com/puccases, and was published on September 8, 2010. The Draft EIR is expected to be available for public review in late 2011.

supply for the Park would enable the SFPUC to operate two existing well facilities at Golden Gate Park; the wells then could be used for the production of potable water instead of irrigation water. Thus, Phase 2 of the proposed project could be implemented only if the proposed San Francisco Westside Recycled Water Project is approved and operational, as Phase 2 of the proposed project includes the use of those two well facilities for potable water. If the San Francisco Westside Recycled Water Project is not implemented and a backup source of irrigation water for Golden Gate Park (i.e., other than groundwater) is not made available, the existing irrigation wells in Golden Gate Park would not be used to supply municipal water as part of the San Francisco Groundwater Supply Project. Under this scenario, the proposed project would only include operation of four potable wells, which may result in some reduction in the average annual groundwater production.

4.2.2 Proposed Project Component Locations

Proposed Groundwater Well Facility Locations

The proposed project includes the construction and operation of three new groundwater well facilities south of Golden Gate Park and, as described above, would convert two existing irrigation well facilities in Golden Gate Park to municipal use. The project also includes the construction and operation of a new groundwater well facility at one of two alternative locations in Golden Gate Park. The proposed and alternative locations for groundwater well facilities are shown on **Figure 1** and described below.

Groundwater Well Facility Sites Proposed South of Golden Gate Park

Lake Merced Site. The existing Lake Merced Pump Station is on Lake Merced Boulevard next to Lake Merced and south of the Harding Park Golf Course. A new well facility would be developed approximately 300 feet southeast of the existing pump station in an undeveloped area of SFPUC-managed property. The SFPUC has an existing test well at this location. This area is restricted from public use and access.

South Sunset Site. The South Sunset well facility would be developed in the corner of the South Sunset Playground, at 40th Avenue and Wawona Street, next to a SFRPD-managed public recreational field used for softball, baseball, and soccer. Residences are located across the street along 40th Avenue and Wawona Street. The well facility would be constructed within a landscaped berm adjacent to the sports field and would include storage facilities for playground and field maintenance equipment. The SFPUC has an existing test well at this location.

West Sunset Site. The West Sunset well facility would be developed at the West Sunset Playground, at the intersection of 40th Avenue and Quintara Street adjacent to a SFRPD-managed public recreational field used for softball, baseball and soccer. Residences are located across the street along Quintara Street. The proposed well facility would be constructed within a small area at the northeast corner of the playground parking lot. The SFPUC has an existing test well at this location.

Alternative Sites in Golden Gate Park Proposed for New Groundwater Well Facility

Urban Forestry Center. The Urban Forestry Center site is located to the south of Middle Drive West, adjacent to and west of the Urban Forestry Center. The SFRPD uses the Urban Forestry Center buildings and yard areas for park operations and maintenance activities. The proposed well facility site is to the west of the existing Urban Forestry Center.

Central Pump Station. The Central Pump Station, located southwest of the John F. Kennedy Drive/Transverse Drive intersection, is part of the park's existing irrigation system. The yard area at the Central Pump Station is used for the SFRPD's wood waste storage and composting operations. The proposed well facility site is to the west of the existing fenced Central Pump Station facility. The SFPUC has an existing test well at this location.

Existing Well Facilities in Golden Gate Park Proposed for Conversion

South Windmill Deepwell Site. The South Windmill Deepwell facility was constructed in 2001 and is operated by the SFRPD as an irrigation well. The facility is within the western area of Golden Gate Park north of Martin Luther King Jr. Drive.

North Lake Deepwell Site. The North Lake Deepwell facility was constructed in 2001 and is operated by the SFRPD as an irrigation well. The facility is next to Chain of Lakes Drive within the western area of Golden Gate Park, south of Fulton Street.

Pipeline Locations

As shown in **Figure 1**, the proposed groundwater transmission pipelines for five of the well facilities would connect groundwater well facilities with the Sunset Reservoir. The groundwater transmission pipelines would be 8 to 16 inches in diameter.

Groundwater drawn from the Lake Merced well facility would be transferred to the Lake Merced Pump Station via a short connector pipeline, and then conveyed to either the Sunset Reservoir or the Sutro Reservoir through the Lake Merced Pump Station's existing pumping and distribution system.

The SFPUC would install a pipeline along 40th Avenue between Wawona and Vicente streets, west along Vicente Street to 41st Avenue, then north along 41st Avenue between Vicente and Quintara Streets and east one block along Quintara Street to connect the South Sunset and West Sunset well facilities. The pipeline would extend north along 41st Avenue from Quintara Street, and then continue approximately one mile eastward along Ortega Street to 28th Avenue. A chlorine analyzer sample station would be constructed at the northwest corner of the Sunset Reservoir site, where the groundwater supply would be tested for chlorine levels. The pipeline would extend east along Ortega Street to 24th Avenue, and then continue southward along 24th Avenue for approximately one block, where it would enter the Sunset Reservoir facility. The pipeline would terminate in both the north and south basins of Sunset Reservoir. Two 12-inch flowmeters would be installed within vaults located on the east side of the Sunset Reservoir. At Sunset Reservoir, groundwater would be blended with the water in storage and then distributed to local customers.

Within Golden Gate Park, potable water wells would be connected to pipeline branches that would converge and that would exit the park at Lincoln Way and 41st Avenue (see **Figure 1**). The pipeline would continue south approximately one mile along 41st Avenue and then east one block at Quintara Street to connect to the pipeline alignment at the West Sunset well facility.

4.2.3 Project Construction

Well Facility Construction

Modification of the existing South Windmill Deepwell and North Lake Deepwell facilities would require demolition of some existing facilities to accommodate the upgraded pumping equipment and new pipeline connections. Tree removal could be required within the construction and staging areas at several of the proposed facilities.

Construction of well facilities and conversion of irrigation wells would consist of upgrades and equipment required to meet municipal well construction standards and could include, as applicable, construction of the well, installation of pumps, valves, monitoring equipment, and electrical utility connections. Pumps and pump motors would be the vertical turbine type. Well facility buildings would include noise-limiting 10-inch-thick concrete walls, 8-inch-thick concrete roofs, and acoustical louvers shielding vented openings and windows.

Pipeline Construction

Pipeline construction would require trench corridors that would generally be 10 feet wide for single pipeline routes, and 16 feet wide along the few segments where up to three pipelines would run along the same route (e.g., sections of Quintara Street, near the West Sunset well facility). Site preparation for pipeline construction could include tree removal or ground clearing of the work area, as well as grading or pavement cutting.

Figure 1 shows the locations of pipeline infrastructure and connection points with the Lake Merced Pump Station and the Sunset Reservoir. The pipeline alignment would be located primarily within existing roadways; after pipeline construction activities were completed, roadways would be restored to pre-construction conditions. In general, the pipeline routes would be excavated to a depth of six feet, except where the pipeline enters/exits individual well facilities. At these locations, the pipeline excavation would be at the same depth as the well facility connection.

The open-cut trench method would primarily be used for the pipeline construction. This method involves excavation of the trench, placement of the pipe, backfilling of the trench, and restoration of the work surface. Typically, excavation of an approximately 4-foot-wide by 6-foot-deep trench would be required to install the pipeline. In accordance with Occupational Safety and Health Administration standards, shoring would be required for trenches 5 or more feet deep to prevent the surrounding soil and adjacent structures from collapsing. Dewatering of the trench would be required if groundwater were encountered.

The pipeline route would cross the Taraval and Judah MUNI light rail lines at their intersections with 41st Avenue. Jack and bore pipeline (pipe-jacking) construction would be used to tunnel under the light rail lines without disturbing these rail lines.

Spoils Disposal and Dewatering

Excavated soil would be stockpiled at the construction staging area for reuse at the well facility or pipeline construction site, or would be disposed of at an appropriate landfill. Most of the spoils material is expected to be Class III non-hazardous waste.

Dewatering could be required, and would involve pumping water out of the excavated area and, following appropriate onsite treatment, discharging into a nearby sewer, open channel, or over land. Discharge to the San Francisco combined sewer system would require a permit from the SFPUC Wastewater Enterprise, which would be the case for most project sites. Discharge to an open channel or over land must be performed in accordance with the requirements of the Statewide General Construction Permit for Stormwater Discharges Associated with Construction Activity issued by the State Water Resources Control Board, and municipal stormwater permits.

Construction Staging

Each well facility and pipeline construction site would require a staging area for equipment and materials storage (e.g., construction vehicles, building materials, pipes, fuels, lubricants). Staging areas could also be used for stockpiling excavated soil for reuse. Whenever possible, the project staging areas would be located on developed or previously disturbed areas, rights-of-way, or roadsides.

Staging areas would be used for up to 15 months during well facility construction. Pipeline staging would be located sequentially near the pipeline route, and each staging area would typically operate for an approximate seven-week period during pipeline construction. Once a staging area is no longer needed, the area would be restored to its pre-construction condition. Unpaved roadways would be restored to pre-project conditions, and roadway pavement would be restored in accordance with local design specifications.

4.2.4 Construction Schedule

Table 1 provides the approximate duration of construction work necessary at each well facility and the installation rate for the proposed pipeline system. The construction of new groundwater well facilities would require approximately 15 months at each site. Construction activities would occur primarily Monday through Friday during daytime hours (7:00 a.m. to 5:00 p.m.). At some sites, construction might be necessary during weekend and evening hours to reduce disruption to traffic or meet other construction requirements. If nighttime work is required, work could be performed between 8:00 p.m. and 6:00 a.m. but would be restricted to weekdays.

TABLE 1
CONSTRUCTION DURATION BY ACTIVITY TYPE

Construction Activity	Expected Duration per Facility
Well Facility	
Site Clearing, Grubbing, and Preparation	1 month
Foundation and Utility Connections	2 months
Building and Well Construction and Equipment Installation	10 months
Start-up and Testing	2 months
Total Well Facility Construction Duration	***15 months***
Pipeline Installation	
Normal Construction—Open-Cut Trench (at a rate of 300 to 600 feet per week)	12 to 16 months
Pipe Jacking (concurrent with open-cut trench)	3 weeks per site
Total Pipeline Installation Duration	***12-16 months***

Construction of pipelines would occur at the same time as well facility construction. In general, pipeline installation would progress at a net rate of approximately 60 feet per day for in-street areas and up to 120 feet per day in off-street areas. However, construction activities might not be continuous. For example, pipeline installation could begin several days after completion of excavation, and temporary paving could occur up to several days after completion of backfilling.

At two locations, beneath the Taraval and Judah MUNI light rail lines, pipe-jacking (jack and bore) construction would be necessary, and the duration of this activity at each site would be approximately three weeks.

4.3 Operations and Maintenance

4.3.1 Operations

Normal daily extraction rates from the six wells would vary by well from approximately 0.4 to 1.4 mgd, for a total average of 4 mgd, and groundwater would be blended with San Francisco's municipal water supply and distributed to San Francisco residents served through the Sunset and Sutro Reservoirs. However, due to water quality requirements that dictate a ceiling for blending groundwater in the San Francisco municipal water system, as well as seasonal variations in water demand, production from the proposed wells could vary on a daily basis. During low-demand periods, such as winter months when surface water supplies are more abundant and water use is lower, groundwater extraction would generally be less than 4 mgd. During high-demand periods, the production rate could be greater than 4 mgd, but the total production rate would be equal to 4 mgd averaged over a year. During project operation, the SFPUC would monitor groundwater levels and groundwater quality in the Westside Groundwater Basin monitoring network. The groundwater monitoring results would be used to detect potential adverse effects of seawater intrusion, changes in water levels in surface water features (such as Lake Merced),

and interference with other wells. Groundwater pumping would be balanced between the six groundwater production wells to avoid such effects.

In addition to normal operations, the project would provide an available source of drinking water in the event that other imported water sources are interrupted due to earthquake damage or other repairs and unplanned outages. The six wells would be capable of producing up to 6 mgd (total) during a catastrophic emergency and could operate at this rate for up to 30 days, consistent with level-of-service goals established by the SFPUC (2009b). Portable generators would provide backup power to enable use of the West Sunset well facility and the North Lake Deepwell facility during a catastrophic emergency. In addition, the project also would provide an available backup water supply for irrigation in Golden Gate Park if needed during repair or unplanned outages of recycled water facilities supplying water for park irrigation.

4.3.2 Maintenance

During project operation, an operator would make daily visits by truck (of approximately 30-minute duration) to check the equipment at each of the groundwater well facility sites. Standard Supervisory Control and Data Acquisition equipment would be installed at each site for remote monitoring of the well facility and pipeline equipment. Longer-term maintenance would include removal and repair (or replacement) of pumps, valves, and other equipment. The production wells might require rehabilitation on an infrequent basis. The estimated operational life of the proposed production wells is 50 years (or more).

5.0 Permits and Approvals Required

The SFPUC may be required to obtain the following permits and approvals for project construction and operation.

5.1 Federal

Based upon the current understanding of project activities and environmental conditions, no federal permits or approvals are expected to be required for implementation of the project. This determination is contingent on the completion of EIR project description and site surveys to be conducted for analysis of impacts of the proposed project.

5.2 State

- California Department of Public Health, Water Supply Division permit amendments and approval of well construction and operation.

- California Department of Toxic Substances Control Contaminated Soil Treatment Work Plan (required only if contaminated soil were encountered during construction).

- State Water Resources Control Board Stormwater General Permit and Stormwater Pollution Prevention Plan, if more than one acre of land were disturbed[2].

5.3 Local

- San Francisco Planning Commission certification of the Final EIR, issuance of Coastal Development Permit, and determination of consistency with the general plan.

- SFPUC approval of project, adoption of CEQA findings, approval of an MOU or other agreement with SFRPD for coordination of construction activities and ongoing project operationon SFRPD-managed land and other implementation actions.

- San Francisco Board of Supervisors consideration of any appeals of the Planning Commission's certification of the Final EIR, appropriation of funding, and adoption of CEQA and project related findings.

- San Francisco Recreation and Park Commission approval of an MOU or other agreement with the SFPUC regarding coordination of construction activities and ongoing project operation on park property and related findings.

- San Francisco Arts Commission approval of exterior design of structures on City property.

- San Francisco Department of Public Health approval of well construction and operation permits in accordance with California Department of Water Resources standards.

- SFPUC Wastewater Enterprise permit for discharge to the San Francisco combined sewer system.

6.0 Environmental Analysis

6.1 Environmental Issues to Be Addressed in the EIR

The EIR that is being prepared will address all environmental issue areas required under CEQA. The EIR will discuss the environmental impacts of the proposed project due to construction and operation activities, and will propose mitigation measures for impacts considered to be potentially significant.

6.1.1 Land Use and Land Use Planning

Project construction and operation could affect land uses at the project sites and surrounding areas. Potential impacts to be evaluated include:

- Temporary and permanent disruption or displacement of existing land uses during construction—including construction impacts on sensitive land uses such as schools and residences, and potential temporary closures of some portions of Golden Gate Park, South Sunset Playground, and West Sunset Playground.

[2] Applicable to areas that do not drain to the City's combined sewer system.

6.1.2 Aesthetics

Project construction and operation could affect aesthetics at the project sites and surrounding areas. Potential impacts to be evaluated include:

- Impacts on scenic vistas or visual character, including potential impacts on the visual character of Golden Gate Park, Lake Merced, South Sunset Playground, and West Sunset Playground.

6.1.3 Population and Housing

Construction and operation of the proposed project could affect adjacent population and housing. Potential effects to be evaluated include:

- Inducement of direct or indirect substantial population growth.
- Displacement of substantial numbers of existing housing or people.

6.1.4 Cultural and Paleontological Resources

The project could potentially affect archaeological, historical, or paleontological resources through ground-disturbing activities during construction, or by introducing new facilities that could compromise the historical integrity of historical buildings or landscapes. Potential impacts to be evaluated include:

- Impacts on archaeological and paleontological resources.
- Impacts on the historical significance of a historic district, contributor to a historic district, or historic landscape. Of particular focus will be the proposed well facilities in Golden Gate Park.

6.1.5 Traffic, Transportation, and Circulation

Construction could have temporary impacts on traffic volumes, traffic safety, and parking in the vicinity of the groundwater pipelines, well facility sites, and the Sunset Reservoir. Potential impacts to be evaluated include:

- Temporary reduction in roadway capacity and increase in traffic delays, including impacts from short-term closure of one parking and/or traffic lane.
- Temporary displacement of on- or off-street parking.

6.1.6 Noise

Project construction noise and vibration impacts associated with facility construction would be temporary and short term. However, operation of the proposed pumps, building ventilation fans, and chemical treatment equipment could create permanent noise impacts. Potential impacts to be evaluated include:

- Impacts of construction noise and vibration on sensitive receptors in the vicinity of project construction sites, especially sensitive land uses such as schools and residences.

- Operational noise impacts from groundwater well facilities, including pumps, building ventilation fans, and groundwater treatment equipment.

6.1.7 Air Quality

Effects on air quality from the project would largely be associated with construction activities and, as such, would be temporary and short term. Potential impacts to be evaluated include:

- Impacts of construction emissions, including fugitive dust.

6.1.8 Greenhouse Gas Emissions

Effects related to greenhouse gas emissions from the proposed project would be both temporary and short term (associated with construction activities) and long-term (associated with operation of the well facilities). Potential effects to be evaluated include:

- Generation of greenhouse gas emissions that have a significant impact on the environment.
- Consistency with plans and policies regarding the reduction of greenhouse gases.

6.1.9 Wind and Shadow

Construction of aboveground project facilities could result in wind and shadow effects. Potential effects to be evaluated include:

- Alteration of wind in a manner that substantially affects public areas.
- Creation of new shadow in a manner that substantially affects outdoor recreation facilities or other public areas.

6.1.10 Recreation

Project construction could temporarily disrupt recreational uses in the vicinity of the well facility sites as a result of noise, dust, and temporary access restrictions. The EIR will evaluate project impacts on recreational resources. Potential impacts to be evaluated include:

- Temporary and permanent impacts on recreational facilities, including but not limited to closure of some portions of the South Sunset Playground, West Sunset Playground, and Golden Gate Park.

6.1.11 Utilities and Service Systems

Construction could result in temporary effects on utilities and service systems. Potential effects to be evaluated include:

- Consistency with wastewater treatment requirements of the applicable Regional Water Quality Control Board.

- Effects associated with construction of new service systems.
- Effects on storm water drainage facilities.
- Effects on water supplies.
- Effects on wastewater treatment capacity.
- Effects on landfill capacity.
- Consistency with federal, state, and local statues and regulations related to solid waste.

6.1.12 Public Services

Construction and implementation of the proposed project could temporarily affect public services. Potential effects to be evaluated include:

- Substantial adverse physical impacts associated with provision of, or need for, new or physically altered government facility (fire or police station, school, and/or park).

6.1.13 Biological Resources

Temporary impacts on biological resources could result from construction activities related to noise, vibration and dust. Potential impacts to be evaluated include:

- Impacts on sensitive wildlife habitats (including wetlands), migration corridors, and protected/heritage trees.
- Impacts on special-status wildlife and plant species (direct mortality and/or habitat effects).

6.1.14 Geology, Soils, and Seismicity

Construction and operation of new well facilities and below-ground distribution pipelines could result in site-specific impacts on or from local geology and soils conditions. Potential impacts to be evaluated include:

- Seismic hazards and/or increased exposure of structures to seismic hazards, including impacts from ground-shaking in the event of an earthquake on the San Andreas fault or other Bay Area faults.
- Increased exposure of structures to geologic hazards (such as liquefaction, poor soil conditions, or unstable slopes) from construction in geologic hazard zones.
- Soil erosion potential from construction activities.
- Potential for land subsidence from decreases in groundwater level elevations (drawdown) in the groundwater aquifer.

6.1.15 Hydrology and Water Quality

Project construction could affect surface and groundwater water quality in the project area. Project operation could affect groundwater levels and quality in the project area and in the Westside Groundwater Basin. Potential impacts to be evaluated include:

- Changes in local groundwater quality and levels within the project area and the Westside Groundwater Basin.
- Depletion of groundwater supplies or interference with groundwater recharge such that production rates of preexisting wells in the Westside Groundwater Basin would drop to a level that would not support existing or planned land uses, seawater intrusion would occur, or land subsidence would result.
- Changes in surface water bodies or other surface water features, such as Lake Merced, due to changes in groundwater levels in the Westside Groundwater Basin.
- Changes in drinking water quality due to blending of treated groundwater with the imported treated surface water supply.
- Alteration of drainage patterns and increase in stormwater flows due to increase in the amount of impervious surfaces.
- Degradation of surface and groundwater water quality as a result of erosion and sedimentation, hazardous materials release during construction, and construction dewatering discharges.

6.1.16 Hazards and Hazardous Materials

Construction and operation of the proposed project could require the use of hazardous material, including fuels and oil. Additionally, project construction (mainly excavation) could expose workers to existing hazardous materials sites. Potential effects to be evaluated include:

- Creation of a significant hazard through the routine transport, use, or disposal of hazardous materials.
- Creation of a significant hazard through upset or accident conditions involving the release of hazardous materials.
- Emission of hazardous materials within the vicinity of a school.
- Creation of a significant hazard associated with existing hazardous materials sites.
- Conflicts with adopted emergency response plan or evacuation plan.
- Exposure to people or structures to fires.

6.1.17 Mineral/Energy Resources

Construction activities (mainly excavation) associated with the project could affect mineral resources, if present in the project area. Construction and operation of the project would require the use of energy resources. Potential effects to be evaluated include:

- Loss of the availability of a known mineral resource.
- Conflicts or loss of locally-important mineral resource recovery site on a local general, specific, or land use plan.
- Use of large amounts of fuel, water, or energy.

6.1.18 Agriculture and Forestry Resources

While it is not likely that agricultural or forestry resources would be located within the project area given the urban nature of the City and County of San Francisco, potential effects to be evaluated include:

- Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide Importance.
- Consistency with existing zoning for agricultural use, a Williamson Act contract, forest land, timberland, and/or timberland zoned Timberland Product.
- Loss or conversion of forest land or agricultural land from to non-forest or non-agricultural uses.

6.1.19 Other Environmental Issues

The EIR will evaluate any potential growth-inducing impacts that could result from implementation of the proposed project. The EIR will also address whether the project could result in impacts that would be significant when combined with the impacts of other SFPUC or non-SFPUC projects occurring concurrently within the same geographic area.

6.2 Alternatives

CEQA requires that an EIR evaluate a reasonable range of feasible alternatives to the project, or to the project location that would attain most of the project objectives but avoid or substantially lessen any of the significant effects of the project. The EIR will identify the potentially significant impacts of the proposed project. The findings of the EIR impact analysis will guide the refinement of an appropriate range of alternatives to be evaluated in the EIR that would avoid or substantially lessen significant impacts, while still meeting project objectives. Alternatives suggested during the public scoping period will also be considered. The EIR will also discuss impacts associated with the No Project Alternative.

7.0 References

San Francisco Planning Department, *Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program*, October 2008.

San Francisco Public Utilities Commission (SFPUC), Water System Improvement Program California Environmental Quality Act Findings: Findings of Fact, Evaluation of Mitigation Measures and Alternatives, and Statement of Overriding Considerations, October 2008 (Attachment A to SFPUC Resolution No. 08-0200, adopted October 30, 2008).

San Francisco Public Utilities Commission (SFPUC), CUW 30102 – North Westside Basin Local Supply (Groundwater Project B), CER Checklist for Environmental Review (Project Description Requirements), March 25, 2009a.

San Francisco Public Utilities Commission (SFPUC), Operation Plans for Environmental Review Purposes – WSIP Groundwater Projects, June 30, 2009b.

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APPENDIX B

Comments Received During EIR Scoping Process

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Edwin M. Lee, Mayor
Philip A. Ginsburg, General Manager

April 1, 2011

Bill Wycko
(c/o Timothy Johnston),
San Francisco Planning Department,
1650 Mission Street, Suite 400,
San Francisco, CA, 94103

RE: Notice of Preparation of an Environmental Impact Report: San Francisco Groundwater Supply Project

Dear Mr. Wycko,

Thank you for the opportunity to review and comment on the Notice of Preparation of an Environmental Impact Report for the San Francisco Groundwater Supply Project. The Recreation and Park Department (RPD) staff has reviewed the Notice or Preparation and offers the following comments.

The Proposed Groundwater Supply Project involves the use of several properties under the jurisdiction of RPD. In January 2009, a Memorandum of Understanding (MOU) was approved by the Recreation and Parks Commission (please see attachment 1). The MOU establishes a framework for collaboration between RPD and the Public Utilities Commission (PUC) by assigning responsibilities for the planning and design of the project and includes general design and construction considerations and guidelines for coordination efforts. As discussed in the attached MOU, the long term effects of the Water Use Efficiency program are beneficial to RPD and the parks they manage. However, please find our feedback and areas to carefully evaluate in the upcoming Environmental Impact Report detailed below.

The proposed Groundwater Supply Project involves the use of RPD properties including West Sunset Playground and South Sunset Playground where test wells at these sites have already been installed. Conditions issued by RPD for permanent facilities at these properties shall be adhered to by the PUC as detailed in letters issued by RPD planning staff dated June 25, 2007 and March 10, 2008, respectively (please see attachments 2 and 3). As stated in the attached letters, approval from the Recreation and Park Commission through resolution is required and CEQA review of the project must be completed prior to Commission Action.

To a greater extent, the proposed Groundwater Supply Project involves Golden Gate Park. While all of the RPD properties within the scope of this project will be affected, Golden Gate Park could incur more significant impacts associated with this project. These potential impacts should be studied, avoided, and mitigated for if necessary.

Site alternatives for the well location inside and outside of Golden Gate Park have already been studied and reviewed by RPD at staff level. The pipeline alignment through Golden Gate Park should be assessed to determine the route with the least amount of impact to the park. This may require positioning pipelines near or adjacent to existing roadways for long term access and minimal impacts to existing infrastructure. The PUC should continue to work closely with RPD in determining the most appropriate pipeline alignment and should coordinate with RPD paving and improvement projects.

Golden Gate Park is comprised of a variety of diverse and often times sensitive landscapes, some of which are protected by special designation. Various landscapes, features, and use areas found within the park have scenic, recreational, habitat, historic, and/or intrinsic value. The Golden Gate Park Master Plan identifies these landscapes and habitat types.

Additionally, in 2004, Golden Gate Park was placed on the National Register of Historic Places. Specific landscapes and features within the park contribute to this designation. Furthermore, Golden Gate Park is being studied for possible designation as a Historic District under Article 10 of the Planning Code. Currently, numerous park features are locally landmarked and may require a certificate of appropriateness issued by the Historic Preservation Commission if altered or changed. The Planning Department's historical planning staff should be consulted to determine the appropriate pipeline alignment with respect to Golden Gate Park's historical resources. The Groundwater Supply Project should limit or mitigate impacts to Golden Gate Park landscapes and park features.

The Groundwater Supply Project should not impede RPD's regular or long term maintenance of and operations within Golden Gate Park or other RPD properties. Pipelines should not be located near or in anyway interfere with maintenance yards, storage areas, or waste facilities. The transition period should be such that current RPD operations are not affected. Additionally, in the event that recycled water is not available, RPD must maintain access to the current groundwater supply.

The Groundwater Supply Project should not hinder use of the RPD parks. Golden Gate Park and other parks within the scope of the Groundwater Supply Project provide for a variety of uses including passive and active recreation, scenic observation, and natural resources protection. The project should not obstruct the ability of members of the public to use RPD parks for recreational purposes. Implementation of the project should limit and mitigate for any impacts to park use.

The Recreation and Parks Commission will need to review and consider the information in the Environmental Impact Report for the Groundwater Supply Project, and in accordance with applicable City Charter provisions, make appropriate findings in adopting any agreement or MOU for construction, maintenance and operation of the PUC facilities on park property, should the PUC approve the Groundwater Supply Project. The project Environmental Impact Report should analyze the consistency of the project with the RPD mission.

We look forward to working closely with you and PUC staff as this project proceeds. Do not hesitate to contact Dan Mauer (Project Manager, Capital Improvement Division) with questions or comments that you may have in regard to this matter.

Respectfully,

Karen Mauney-Brodek
Deputy Director for Park Planning
Planning and Capital Division
City of San Francisco
Recreation and Parks
Karen.Mauney-Brodek@sfgov.org
(415) 575- 5601

Attachments:

1.) RPD / PUC Memorandum of Understanding dated January 2011
2.) RPD letter dated June 25, 2007
3.) RPD letter dated March 10, 2008

DRAFT

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE SAN FRANCISCO PUBLIC UTILITIES COMMISSION

AND

THE SAN FRANCISCO RECREATION AND PARK DEPARTMENT

FOR THE APPLICATION AND MANAGEMENT OF WATER USE EFFICIENCY PROGRAMS

January____, 2009

This MOU is entered into this _____ day in January 2009, in the City and County of San Francisco, by and between the San Francisco Public Utilities Commission (SFPUC) and the San Francisco Recreation and Park Department (SFRPD) to further project planning and design for the replacement of groundwater and potable water with recycled water for irrigation on SFRPD property and to maximize water use efficiency on SFRPD property.

Recitals

Whereas, the SFPUC is implementing a multi-billion dollar capital improvement program to upgrade the San Francisco's regional and local drinking water system. The program will deliver improvements that enhance San Francisco's ability to provide reliable, affordable, high quality drinking water to 800,000 retail customers in San Francisco and 27 wholesale customers, in an environmentally sustainable manner.

Whereas, SFRPD is currently pumping potable groundwater for irrigation and other non-potable uses in Golden Gate Park. Groundwater is pumped from three active water-supply wells located in Golden Gate Park and one water-supply well at the San Francisco Zoo. The water-supply wells draw on the Westside Basin aquifer, a source of groundwater that extends from Golden Gate Park to the San Francisco County line and south into San Mateo County. The SFPUC has undertaken planning and feasibility studies to replace the groundwater with recycled water for irrigation purposes within Golden Gate Park and at the San Francisco Zoo.

Whereas, potable water is used for irrigation at SFRPD golf courses, such as Harding Park and Fleming Park Golf Courses, Sharp Park Golf Course and Lincoln Park Golf Course. The SFPUC has undertaken design and feasibility studies to provide recycled water for irrigation at SFRPD golf courses as well as other parks and open spaces managed by SFRPD and other areas of the City.

Whereas, Golden Gate Park, Harding Park and Fleming Park Golf Courses, Lincoln Park Golf Course and the San Francisco Zoo are located within designated Recycled Water Use Areas as set forth in San Francisco Public Works Code Section 1209.

Whereas, the SFPUC Groundwater Program proposes to pump approximately four million gallons (mgd) of groundwater a day to blend with the municipal system for drinking water purposes. Approximately six wells are proposed for the Western portion of San Francisco and would begin production after 2011. The proposal includes building three new well stations on SFRPD lands and modifying two existing wells in Golden Gate Park.

Whereas, the SFPUC Recycled Water Program proposes to build a reverse osmosis recycled water facility on SFRPD property to produce recycled water for irrigation purposes at Golden Gate Park, Lincoln Park Golf Course, San Francisco Zoo and other appropriate facilities by 2013. The SFPUC also proposes to replace potable water used for irrigation purposes with recycled water at Harding Park Golf Course and Sharp Park Golf Course in 2010.

Whereas, the SFPUC Water Conservation Program implements a number of programs to assist residential, municipal and commercial sectors to reduce water usage. Programs include water audits, rebates and technical and financial support to implement the water-saving technologies set forth in this MOU. The SFPUC proposes to save up to four mgd of water through implementation of conservation measures in San Francisco by 2018.

Whereas, in order to undertake environmental review of these proposed projects, it is necessary to coordinate with SFRPD to better define the possible design and programmatic concepts.

Now, therefore, the Parties agree as follows:

AGREEMENT

I. Definitions

A. “Groundwater Facilities” refers to groundwater wells and all related fixed assets owned and operated by the SFPUC, including transmission, storage, pumping and appurtenant facilities necessary to deliver groundwater to the SFPUC distribution system for potable purposes. Groundwater Facilities include SFRPD groundwater infrastructure that the SFPUC will modify and use for potable purposes. The SFPUC will compensate SFRPD for assuming groundwater infrastructure owned by SFRPD. The term “Groundwater Facilities” does not include any SFRPD groundwater infrastructure that is not part of the SFPUC's program to develop groundwater for potable purposes that SFRPD owns, operates and maintains for its own purposes.

B. "Irrigation System Retrofits" means the retrofits to Park Irrigation Systems and associated capital costs that are required under Title 22 of the California Code of Regulations to enable SFRPD to irrigate city parks and golf courses using recycled water.

C. "Park Irrigation Systems" refers to all SFRPD owned and operated components of irrigation systems downstream of the discharge side of the SFPUC's potable water or recycled water meters, including irrigation piping systems, hoses, fittings and associated valves, sprinklers and controllers.

D. "Park Water Conservation Plan" refers to the plan to be prepared by SFRPD and SFPUC that identifies the top water consuming parks in the City, excluding park lands identified for recycled water and artificial turf conversion, and to develop measures and recommendations to install water use efficiency measures, such as retrofits to existing irrigation systems, new irrigation systems, automatic controllers, climate-appropriate plants, by September 2009. The Plan will include a schedule for implementation and budget recommendations.

E. "Point of Delivery" refers to the meters to be installed by the SFPUC to measure the quantities of potable surface water, groundwater, or recycled water delivered to Park Irrigation Systems, up to the discharge side of the meters.

F. “Recycled Water Facilities” refers to SFPUC-owned and operated recycled water treatment plants, transmission, storage, pumping and appurtenant facilities to and including the Point of Delivery that are necessary to produce and deliver recycled water to Park Irrigation Systems.

II. Financial Responsibilities; Cooperation Regarding Development and Use of Recycled Water, Groundwater, and Promotion of Water Use Efficiency

A. SFPUC will fund the design and, if approved, construction of all Groundwater and Recycled Water Facilities and retrofits to Park Irrigation Systems that are required to use recycled water in place of potable surface or groundwater. The SFPUC will maintain and operate all Recycled Water and Groundwater Facilities. The SFPUC will coordinate the design and implementation of any Groundwater and Recycled Water Facilities with SFRPD.

B. SFRPD will properly use and apply recycled water where available and maximize water efficiency irrigation measures on park lands using Park Irrigation Systems. SFRPD will provide access to park lands and associated property interests, as necessary, following completion of CEQA review where required, for the construction and operation of any approved Groundwater and Recycled Water Facilities.

C. SFPUC, as part of its ongoing water conservation program, will contribute towards the cost of retrofits to Park Irrigation Systems that are required to maximize water use efficiency and conserve water at parks based upon the Park Water Conservation Plan, in a manner similar to water conservation funding provided by the SFPUC to other large irrigation water users. SFPUC and SFRPD will develop a list of prioritized sites for retrofits. Upon completion of the improvements to the irrigation systems, SFRPD and SFPUC will negotiate another agreement for the SFPUC to operate and maintain the Park Irrigation Systems.

III. General Design And Construction Considerations For Recycled Water And Groundwater Projects

A. SFRPD shall assist the SFPUC in identifying all existing utilities in City parks that are located in the vicinity of all proposed Groundwater and Recycled Water Facilities, including, but not limited to, water, sewer, electrical, gas, telephone and cable television.

B. All Recycled Water and Groundwater Facility engineering, design and, if approved, construction documentation prepared by or for the SFPUC will be reviewed by SFRPD. All Recycled Water and

Groundwater Facility construction, modification and related appurtenances will be performed in accordance with mutually approved engineering design and construction plans. The SFPUC and SFRPD will develop access routes, storage and staging areas for Recycled Water and Groundwater Facility construction on SFRPD park lands.

D. SFRPD will work with the SFPUC to identify opportunities to beneficially use "overboard water" produced by Groundwater Facilities (groundwater that is generated through pumping that is otherwise not delivered to the SFPUC's potable water distribution system or to Park Irrigation Systems) when the well stations initially start up during each pumping cycle.

E. The SFPUC, in consultation with SFRPD, will prepare maps of the existing and proposed Park Irrigation Systems within Golden Gate Park, Harding Park and Fleming Park Golf Courses, Sharp Park Golf, Lincoln Park Golf Course and the San Francisco Zoo. The proposed Park Irrigation System maps will show all Recycled Water and Groundwater Facilities and associated Points of Delivery to Park Irrigation Systems. The SFPUC and SFRPD will review and update these maps as they may change in relation to capital work at Golden Gate Park, San Francisco Zoo and/or SFRPD Golf Courses.

G. After fair compensation has been provided to SFRPD, SFRPD will allow the SFPUC permanent access, with applicable easements, to all Groundwater and Recycled Water Facilities constructed on SFRPD property for the short- and long-term operation and maintenance of these facilities, if approved, following completion of CEQA review where required.

IV. Coordination of Planning and Design Activities for Recycled Water and Groundwater Facilities by SFRPD and SFPUC

A. Groundwater

1. Municipal Well Stations – Permanent Supply

a. SFPUC, in consultation with SFRPD, will modify two existing irrigation wells located in Golden Gate Park for potable purposes. Additionally, the SFPUC will build two new groundwater well stations at West Sunset Playground and South Sunset Playground for potable purposes. Modification and construction of the groundwater well stations are subject to compliance with CEQA, and subsequent approval, if required

b. SFPUC, in consultation with SFRPD, will develop a conceptual design for an additional groundwater well

station to be located within Golden Gate Park, including the orientation, layout and footprint of this facility.

c. SFRPD will allow the SFPUC to construct a test well at the new proposed groundwater well station site. The purpose of the test well is to verify that the pumping rate and groundwater quality are sufficient for proceeding with a new municipal water-supply well station at this location, subject to compliance with CEQA, and subsequent approval, if required.

2. Municipal Well Stations – Emergency Supply

a. The parties agree that SFPUC will use the San Francisco Zoo Well No. 5 as an emergency water supply on a permanent basis. The SFPUC will coordinate with SRPD and the San Francisco Zoo.

b. The parties agree that SFPUC will use the SFPUC-constructed San Francisco Zoo Well Emergency Drinking Water Fill Station on a permanent basis.

c. SFRPD will coordinate with SFPUC in the semi-annual testing of the San Francisco Zoo Well Emergency Drinking Water Fill Station.

3. Groundwater Pipelines

a. SFRPD and the SFPUC will identify locations and routes for the groundwater branch pipelines (from well stations to trunk line) in Golden Gate Park, West Sunset Playground and South Sunset Playground.

4. Groundwater Basin Management

a. SFRPD will work with the SFPUC to develop a plan to decommission inactive wells in Golden Gate Park as required by the California Water Code and Article 12B of the San Francisco Health Code. SFRPD and SFPUC will develop a well inventory that documents the condition and location of the inactive irrigation and monitoring wells under its jurisdiction and in prepare specifications for well decommissioning.

b. To protect groundwater quality, the SFPUC will work with SFRPD to develop plans to maintain a buffer around

all current and future groundwater well stations, including potable and irrigations well stations on SFRPD property, that is free and clear of construction debris, wood waste and manure. This buffer area also shall not be used to store fertilizer, fuels or toxic chemicals.

c. SFRPD will manage groundwater use for irrigation in the western part of Golden Gate Park in order to avoid salt water intrusion impacts on the aquifer.

d. SFRPD will allow the SFPUC permanent access to collect flow rate and flow totalizer data from the flow meters installed at the South Windmill (Replacement) Deepwell Pump Station, North Lake Deepwell Pump Station, San Francisco Zoo Well no. 5, and Pine Lake Well. SFRPD and the SFPUC will coordinate to allow the periodic calibration of these flow meters and for troubleshooting apparent problems with these meters.

B. Recycled Water

1. SFRPD will coordinate with the SFPUC to assess the Park Irrigation Systems at Golden Gate Park, Lincoln Park Golf Course, Harding Park and Fleming Park Golf Courses, Sharp Park Golf Course and the San Francisco Zoo to determine the necessary retrofits that are required to irrigate with recycled water.

2. The SFPUC will contribute toward the costs of the irrigation system retrofits to meet state and local requirements for application of recycled water and the operational requirements of the SFRPD. The irrigation system to be installed, at the SFPUC's direction, shall be the best available technology (BET) and shall include evapotranspiration sensors and two-way communications computer controls.

3. SFRPD will operate all Park Irrigation Systems in compliance with all City, state and federal guidelines on recycled water use requirements and applicable health, building and plumbing codes, including but not limited to, backflow prevention, cross connection control and customer and public interaction, notification, signage & postings.

4. The SFPUC will train SFRPD employees on the proper use and application of recycled water on SFRPD property. SFRPD employees will be responsible for complying with all laws, regulations and requirements of Federal, state, county and municipal authorities on the proper application of recycled water.

5. SFRPD will comply with the San Francisco Reclaimed Water Ordinance (Title 22, Public Works Code) for parks located within designated "Reclaimed Water Use Areas" by designing and installing Park Irrigation Systems that meet Title 17 and Title 22 requirements for application of recycled water.

C. Water Use Efficiency

1. Water Conservation

a. The SFPUC will conduct water audits of SFRPD parks to identify the largest water users, other than Golden Gate Park, develop water budgets and install meters if necessary.
b. SFRPD, with assistance provided by the SFPUC, will develop a Park Water Conservation Plan by September 2009, including measures and budget recommendations to conserve water in SFRPD parks.
c. The SFPUC shall immediately establish an assessment program of SFRPD facilities to verify the location and accuracy of water meters and water usage.

2. Landscape Practices

a. SFRPD will promote climate appropriate planting unless the new/renovated area is designed for recreational purposes or subject to other restrictions such as landmark designation.

b. All landscape-related activities under SFRPD will be in compliance with AB 1881.

c. Park Irrigation Systems will be designed, installed and operated to ensure the efficient use of water during operation, including but not limited to operating irrigation systems to prevent run off and overspray.

3. SFRPD Park Facility Renovations

a. SFRPD, with the assistance of the SFPUC Water Conservation Program, will incorporate water efficient

fixtures in all SFRPD facility renovations and new facilities built on SFRPD property.

b. SFRPD will use re-circulating water in non-potable water features, such as decorative fountains, located on SFRPD property as allowed by local and state regulatory agencies.

V. Post Project Implementation Activities – Items for Future Agreement Following Completion of Review Under California Environmental Quality Act

The SFPUC's recycled water and groundwater projects in San Francisco must undergo CEQA review by the Department of City Planning prior to the exercise of discretion by either SFPUC or SFRPD in initiating construction; allocating funding for construction; or allowing use of SFRPD property for SFPUC project facilities. SFRPD must in addition make required findings under the City Charter and Administrative Code regarding whether SFPUC's proposed use of park property is consistent or otherwise related to park use prior to authorizing use of park lands for project purposes by the SFPUC. Notwithstanding anything to the contrary in this MOU, neither party is in any way limiting its discretion or the discretion of any department, board or commission with jurisdiction over these projects, including but not limited to the SFPUC, the SFRPD or the Board of Supervisors, from exercising any discretion available to such department, board or commission with respect to these projects, including but not limited to the discretion to (i) make such modifications deemed necessary to mitigate significant environmental impacts, (ii) select other feasible alternatives to avoid such impacts; (iii) balance the benefits against unavoidable significant impacts prior to taking final action if such significant impacts cannot otherwise be avoided, or (iv) determine not to proceed with the proposed Projects.SFPUC and SFRPD agree to cooperate and use best efforts to reach agreement, including agreement on the project description required to perform the necessary environmental analysis, on the following matters:

A. Groundwater

1. Conversion by the SFPUC of two existing irrigation wells in Golden Gate Park, the South Windmill (Replacement) Deepwell Pump Station and the North Lake Deepwell Pump Station, for permanent use as permitted water sources for the San Francisco municipal water supply.

2 Construction and permanent operation of a new municipal water-supply well station by the SFPUC in Golden Gate Park.

3. Construction and permanent operation of a new municipal water-supply well station by the SFPUC at a site at the West Sunset Playground. This site is located in the northeast corner

of the parking lot for the playground, near 40th Avenue and Quintara Street.

4. Construction and permanent operation of a new municipal water-supply well station by the SFPUC at a site at the South Sunset Playground. This site is located behind the southeast corner of the new playing fields at the playground near 40th Avenue and Wawona Street.

5. Conversion of the new West Sunset Playground municipal water-supply well station for use as an emergency water supply and drinking water fill station.

B. Recycled Water

1. Construction and operation by SFPUC of a reverse osmosis recycled water treatment facility, or similar recycled water treatment facility, within Golden Gate Park to produce recycled water for irrigation purposes. SFPUC and SFRPD will jointly determine the location of the treatment facility. If the facility is located above-ground, the SFPUC will provide fair compensation to SFRPD.

2. Modification by SFPUC of the existing reservoir within Golden Gate Park to store recycled water for use at Golden Gate Park and Lincoln Park Golf Course.

3. Construction by SFPUC of a 700,000 gallon underground tank and above ground pump station to store and pump recycled water for irrigation at Harding Park and Fleming Park Golf Courses.

each site visit with a vehicle. Any additional cost incurred toremove and re-install removable site furniture will be paid by PUC.

- For vehicle access using the gate along the first base side of the field, which will require driving onto the field, PUC will adhere to the load limits for a vehicle as specified by the synthetic turf manufacturer.

- PUC's City Distribution Division shall provide the Recreation and Park Department (RPD)'s Neighborhood Services Manager with a minimum of 3-days advance notice prior to a site visit with a vehicle that would require removing the players' benches and bleachers and/or field access. The advance notice shall not apply under emergency conditions.

- Rooftop of the facility should be no higher than 3' above the elevation of the sidewalk on the abutting side. (The roof may, however, be sloped from front to back where the front side would be higher than the back side adjacent to the sidewalk). The fence line between the sidewalk and the facility shall be coordinated with fence height currently being designed by RPD consistent with PUC's security requirements.

- Wherever possible minimize potential adverse permanent effects from noise, odors and lighting.

- The contractor specs will provide detailed instructions on construction staging and access. Constructing activities will not spill over onto the field nor substantially affect recreation use of the field. The site will be accessed for construction from the adjacent right of way (as opposed to the field).

- The athletic field fence lines, backstops and field turf shall not be removed or damaged by construction activities.

- The final design will not interfere with recreational programs or pedestrian circulation.

- The (new) test well (south/east corner) will need to be completed prior to the start of field construction, which is anticipated to begin late June 2007. This corner of the park will be made accessible to PUC starting May 28, 2007. PUC shall coordinate with on-site staff regarding access and temporary fencing.

- Since the PUC project will not be constructed for several years, we request that the test well surface elevation be set at the final grade of our project drawings. This elevation can be modified once your project moves forward.

- The (new) test well (south/east corner) must be adequately capped so that it does not pose a safety hazard to the general public or interfere with construction activities related to the Fields Project.

- PUC shall remove the existing monitoring well located in the south/west corner of the park prior to the start of construction on the Fields Project

- PUC shall coordinate with RPD on all electrical requirements needed for this facility prior to the end of April 2007 so that both projects can be coordinated with PG&E without impacting the

City and County of San Francisco
Recreation and Park Department

McLaren Lodge in Golden Gate Park
501 Stanyan Street, San Francisco, CA 94117
TEL: 415.831.2700 FAX: 415.831.2096 WEB: http://parks.sfgov.org

June 25, 2007

Jeff Gilman
SFPUC Water Enterprise
1145 Market Street, Ste 401
San Francisco, CA 94103

Dear Mr. Gilman:

Thank you for meeting with us on March 16, 2007 regarding your proposal for a Groundwater well pump station ("facility") at South Sunset Playground. As a follow up to that meeting, and the meetings on April 5 and May 23, 2007 we have compiled a list of conditions for the use of the site for a new groundwater well facility. The conditions will provide the necessary framework to implement your project without interfering with recreational programming or conflict with our efforts to renovate the existing athletic field through the Fields Project.

General Conditions

- Move the facility closer to the corner space of Wawona Avenue and 40th Street, or move a portion of the building under the sidewalks (DPW right-of-way) to open up more space for the field. This will minimize the risk for potential interference with recreational activities on the park. The proposed facility should not protrude into the park any further than the new block retaining wall that will be constructed as part of the new Fields Project.

- The facility shall be constructed substantially similar to the site plan as depicted on Attachment "A." The long edge of the facility shall be along 40th Ave. The facility shall contain a storage room with a minimum clear floor space area of 8' deep by 15' long. This room shall be accessed by a 10' wide roll down door.

- The storage room will be used solely by RecPark for maintenance storage.

- A barrier fence shall be constructed along the side of the facility on the berm to detract park users from jumping or climbing on the roof.

- Routine PUC access to the facility for operation and maintenance will be on foot, using the playground gate along Wawona Street. When occasionally required for major maintenance, PUC may access the facility by vehicle by removing the players' benches, fence sections and bleachers ("removable site furniture") along the Wawona Street (third base) side of the field, or by using the access gate for the RecPark storage room along the first base side of the field. PUC and RecPark will establish an appropriate visitation protocol as part of a future Memorandum of Understanding between the Departments.

- For vehicle access requiring the removal of removable site furniture along the third base side of the field, PUC will be responsible for removing and re-installing removable site furniture after

Field renovation project. PUC and RPD shall share equally all costs required to bring electrical service from the utility pole to the project site. Either party reserves the right to terminate its coordination on electrical requirements if that party will not proceed with its project. In the case that a party will not be proceeding with its project, that party shall give timely written notice to the other party. The terminating party shall be obligated to compensate the other party for incremental costs incurred up to the point of termination.

As we discussed, the South Sunset project will require approval in the form of a resolution and Memorandum of Understanding from the Recreation and Park Commission. The Project EIR for the facilities must be complete prior to Commission action. You indicated at our last meeting that the Project EIR would be certified sometime in 2009.

The PUC may continue with the temporary groundwater drilling for the site, however, provided that the PUC understands and has agreed to the conditions contained in this letter and CEQA review is satisfactorily completed for the drilling. In the event that the pump station is not constructed, the PUC shall remove the test well and restore the park to the appropriate condition.

In order to effectively carry out your proposal, the Department recommends holding at least two community meetings in the South Sunset neighborhood area and at least one information presentation to the Recreation and Park Commission.

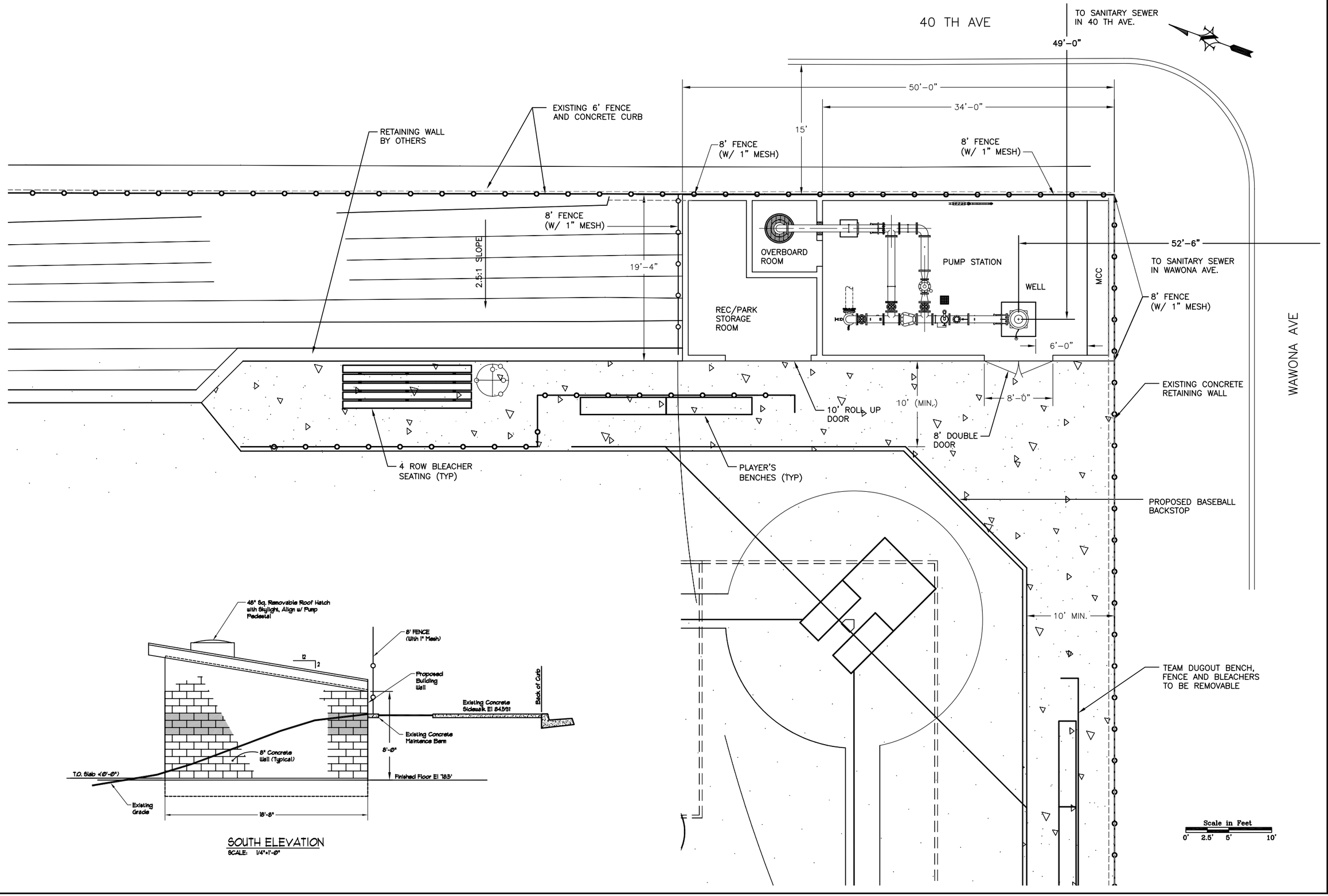
Thank you for your continued cooperation. If you have any questions, please contact me at (415) 831-2742.

Regards,

Daniel LaForte
Park Planner

Attachment: "Attachment "A", Preferred Layout for South Sunset Playground

Cc: Yomi Agunbiade
Dan Mauer
Ronnie Scott
Denny Kern
Scott Reese
Barry Pearl
Dawn Kamalanathan



SOUTH ELEVATION
SCALE: 1/4"=1'-0"

SITE PLAN
South Sunset Playground
Well Station
San Francisco, California

LUHDORFF & SCALMANINI CONSULTING ENGINEERS

A.2-64

REVISIONS		
NO.	DATE	REVISION

DATE: MAY 2007
JOB NO.: 06-6-069
DESIGN BY: WG
DRAWN BY: DWT
CHECKED BY: WG
FILE: C-1.dwg

OPTION:
CDD Preferred Layout

CAD FILE: G:/Projects/Ellison & Schneider/06-6-069/South Sunset/Pump Sta/C-1.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 05-09-07 3:56pm

City and County of San Francisco
Recreation and Park Department

McLaren Lodge in Golden Gate Park
501 Stanyan Street, San Francisco, CA 94117
TEL: 415.831.2700 FAX: 415.831.2096 WEB: http://parks.sfgov.org

March 10, 2008

Jeff Gilman
SFPUC Water Enterprise
1145 Market Street, Ste 401
San Francisco, CA 94103

Dear Mr. Gilman:

Thank you for meeting with us on December 20, 2007 regarding your proposal for a Groundwater well pump station at West Sunset Playground. As a follow up to that meeting we have compiled a list of conditions for the use of the site for a new groundwater well facility. The conditions will provide the necessary framework to implement your project without interfering with recreational programming or operations.

General Conditions

- The facility shall be constructed substantially similar to the site plan as depicted on Attachment "A" (Option E2).
- Wherever possible minimize potential adverse permanent effects from noise, odors and lighting.
- The contractor specs will provide detailed instructions on construction staging and access.
- The final design will not interfere with recreational programs, traffic or pedestrian circulation.
- A (new) test well (north/east corner of parking lot) is anticipated to be constructed in April and May 2008. The PUC shall coordinate with on-site staff regarding access and temporary fencing for this construction activity.
- When completed, the (new) test well (north/east corner of parking lot) must be adequately capped so that it does not pose a safety hazard to the general public.
- The PUC shall incur expenses for all electrical requirements needed for this facility.
- The PUC shall coordinate with RPD in identifying all irrigation lines. The PUC shall incur expenses related to capping, repair, removal or adding new irrigation lines required for the construction of the new groundwater well facility.
- The project must meet Department's tree removal guidelines. Tree posting requirement is a 30-day minimum.

- Stormwater runoff will be controlled and managed so that the water is diverted from the material storage area. The PUC shall also be responsible for landscaping around the facility to reduce erosion and stabilize the berm.

As we discussed, the West Sunset pump station project will require approval in the form of a resolution and Memorandum of Understanding from the Recreation and Park Commission. The Project-Specific EIR for the North Westside Basin Local Groundwater Supply project must be complete prior to Commission action. You indicated at our last meeting that the Project-Specific EIR would be certified sometime in 2009.

The PUC may continue with the temporary groundwater drilling for the site, however, provided that the PUC understands and has agreed to the conditions contained in this letter and CEQA review is satisfactorily completed for the drilling. In the event that the pump station is not constructed, the PUC shall remove the test well and restore the park to the pre-existing condition.

In order to effectively carry out your proposal, the Department recommends holding at least two community meetings in the Outer Sunset neighborhood area and at least one information presentation to the Recreation and Park Commission.

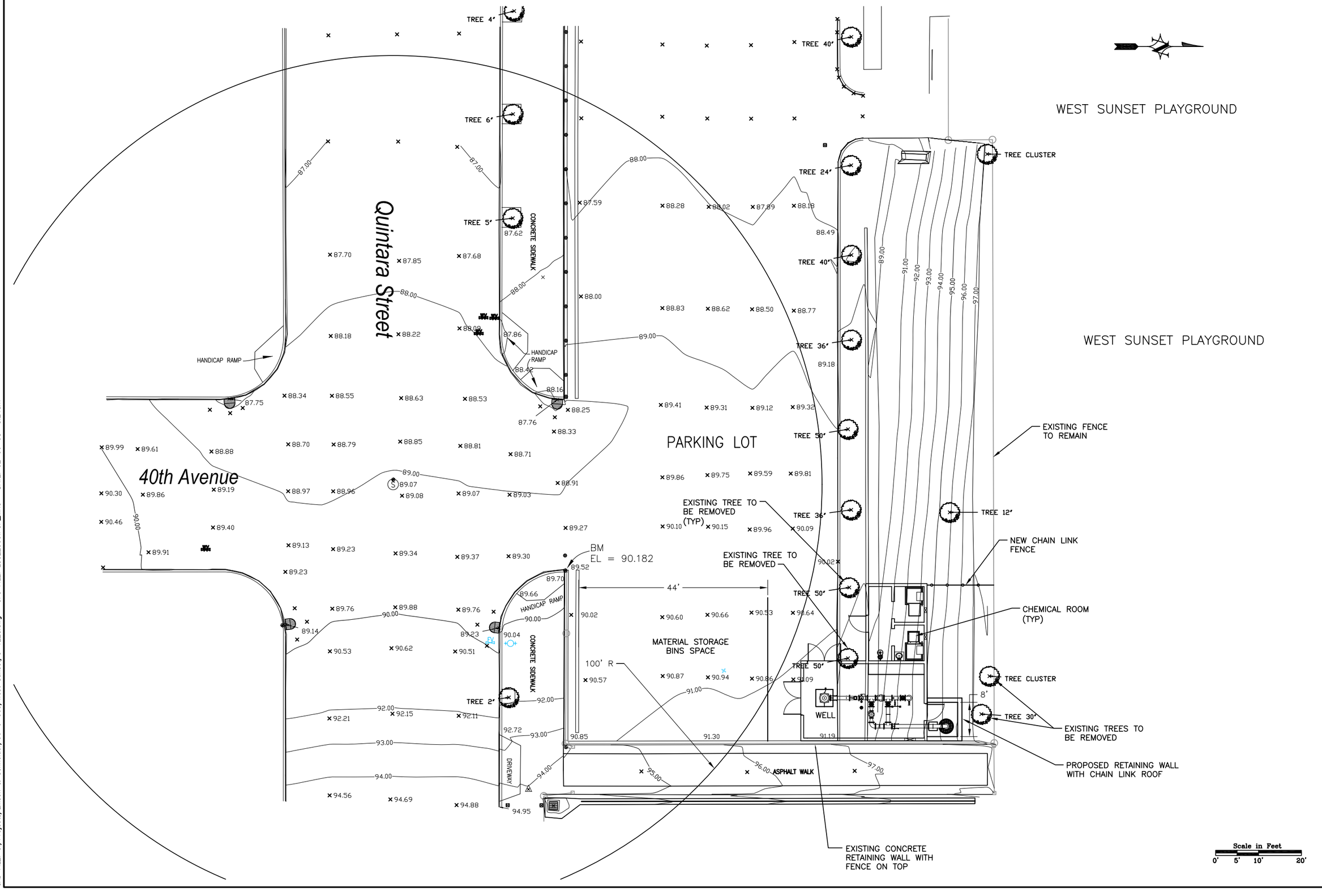
Thank you for your continued cooperation. If you have any questions, please contact me at (415) 831-2742.

Regards,

Daniel LaForte
Park Planner

Attachment: Attachment "A", Site Plan, West Sunset Playground Well Station, Option E-2

Cc: Yomi Agunbiade
Dan Mauer
Ronnie Scott
Denny Kern
Barry Pearl
Dawn Kamalanathan



SITE PLAN

West Sunset Playground
Well Station
San Francisco, California

LUHDORFF & SCALMANINI
CONSULTING ENGINEERS

A.2-67

REVISIONS

NO.	DATE	REVISION

DATE: FEBRUARY 2008
JOB NO.: 06-6-069
DESIGN BY: WG
DRAWN BY: DWT
CHECKED BY: WG
FILE: C-1E2a.dwg

OPTION:

E-2

CAD FILE: G:/Projects/Ellison & Schneider/06-6-069/West Sunset/C-1E2a.dwg CFG FILE: LSCE2500.PCP_MRG DATE: 02-06-08 8:24am

Golden Gate Park Preservation Alliance ©

"Destroy a public building and it can be rebuilt in a year; destroy a city woodland park and all the people living at the time will have passed away before its restoration can be effected."

William Hammond Hall, Surveyor
First Superintendent of Golden Gate Park

March 31, 2011

Mr. Bill Wycko
c/o Timothy Johnston
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA, 94103-2479

Re: **EIR Case No.2008.1122E**
San Francisco Groundwater Supply Project
Revised NOP for EIR, March 2, 2011

Dear Mr. Wycko:

Following are comments pursuant to the March 2, 2011, Revised Notice of Preparation for the Environmental Impact Report for the referenced project (herein referred to as the project). We would like to take this opportunity to outline some of the issues that we feel must be included in the EIR. We also encourage the Department to start comprehensive outreach to a broader range of members of the public who have expressed concern in the past with issues relating to Golden Gate Park. All San Franciscans and Bay Area residents must have the opportunity to raise their own concerns about the project with the Department.

SUMMARY:

The following are issues which we feel must be thoroughly explored in an EIR:

- **Potential impacts of the proposed project;**
- **Alternative designs for the proposed project;**
- **Review of documents and agreements relating to the proposed project;**
- **Issues related to other water treatment projects;**
- **Safety of all aspects of the proposed project;**
- **Issues related to additional and/or adjacent projects, including but not limited to the SF Westside Recycled Water Project and the Beach Chalet Athletic Fields;**
- **Water conservation alternatives;**
- **Limit of project to wells outside of Golden Gate Park;**
- **Scoping letters for related projects**

DETAILS:

Potential impacts of the proposed project

- The EIR must analyze how construction will impact all the immediate and adjoining parkland sites, including but not limited to:
    - The use of earth-moving equipment and cranes;
    - Removal of sand and soil;
    - Construction zone needed for building the pumping stations ;
    - Removal of specific trees and shrubs;
    - Damage to remaining trees, and tree roots damaged, by construction, including trenching for underground utilities.

- The EIR must analyze how construction will impact the area outside of parkland, including but not limited to:
    - The impact of the construction of the project on adjoining residential and commercial neighborhoods.

- The EIR must study parking and traffic impacts, including but not limited to:
    - Impact on traffic in the neighborhood surrounding the project sites;
    - Impact on the above traffic and parking issues not only during ordinary weekdays and weekends, but also during special, heavy-park usage events such as the Outside Lands Festival, the Bay to Breakers, and all the other events that take place throughout Golden Gate Park and at Ocean Beach.

- The EIR must study the impacts to wildlife at all project sites, including but not limited to:
    - Loss of open space, trees, and shrubs;
    - Loss of windbreaks;
    - Loss of, and damage to, tree roots for trees that are to remain;
    - Increase in paved surfaces;
    - Increase in noise from pumps, motors, trucks and other equipment;
    - Increase in heavy vehicular traffic;
    - Introduction of all of these elements along the Pacific Flyway and to the green corridor that is Golden Gate Park.

- The EIR must study aesthetic impacts and the impacts on the quality of life of surrounding areas due to the proposed project, including but not limited to:
    - Loss of trees and shrubs;
    - All impacts due to noise related to the proposed project - both construction and ongoing facility operations;
    - All impacts due to artificial lighting related to the proposed project;
    - The aesthetic impact on the parkland experience of the pumping stations.

- The EIR must study the loss of parkland use for a wider variety of users, including but not limited to:
    - Loss of the potential general recreation uses;
    - Specific description of land areas needed for pumping stations and justification for these land areas. For example, the Tree Report[1] shows a large land area at the Central Pump Station in Golden Gate Park. The report lists 52 trees in this area, with

[1] "San Francisco Groundwater Supply Project, Tree and Large Shrub Assessment Report," Figure 7, SFPUC, February 2011.

seven to be removed for "health" reasons, but there is no indication of what kind of construction will take place in this area and or how much room will be needed.
    - The Central Pump Station is located next to a construction yard. The EIR must consider the alternative of using this construction yard as the location for the pump station, instead of using forested parkland.

- The EIR must study the impact of the project on the aquifer underneath Golden Gate Park, including but not limited to:
    - Depletion of the aquifer;
    - Cumulative contamination of the aquifer with inorganic and organic contaminants, including but not limited to heavy metals, halogens, pharmaceutical waste, pesticides, hormones, from the proposed Westside Recycled Water Treatment plant output which is planned to irrigate Golden Gate Park;
    - Cumulative contamination of the aquifer due to the possible presence of artificial turf at the proposed Beach Chalet Athletic Fields project.

- The EIR must study the impact of the energy needed to power the plant, including but not limited to:
    - Amount of energy needed to pump water out of the ground and to the Sunset Reservoir;
    - Energy needed to process the water according to various water treatment standards.

- The EIR must study the economic impact of the project, including but not limited to:
    - The impact on the cost of water to consumers;
    - The impact on the cost of the project to the taxpayers;
    - Consideration of less expensive alternatives to the proposed project.

- The EIR must explore the possibility of future expansion of the pumping stations at the Golden Gate Park and other parkland locations, and the impact on all of the issues included in this document.

- The EIR must study the cumulative impact of the existing and proposed athletic/soccer field and the Westside Water Treatment Plant, if built in Golden Gate Park, including but not limited to:
    - Cumulative impact on historic and aesthetic character of Golden Gate Park and Ocean Beach.
    - Cumulative effect of increased lighting, paving, traffic and all other issues considered in both this document and in the attached document for the Westside Water Treatment Plant.

<u>Alternative designs for the proposed project</u>

- The EIR must explore alternative designs that preserve the natural meadow and forest feelings of Golden Gate Park, including but not limited to:
    - Construction of pumping and equipment stations that are completely underground;
    - Construction of minimal, park-friendly security measures that do not detract from the bucolic experience of Golden Gate Park; for example, if fencing is necessary, then other types of fence than chain link must be considered.

- The EIR must explore alternative designs for the West Sunset Playground pumping station, including but not limited to:

- Placing the pumping station away from the existing mature and significant Cupressus macrocarpa trees, so that they can be preserved. (Trees # 783, 784, 785, and 786.) [2] For example, the pumping station can be placed in the parking lot.

Review of documents and agreements relating to the proposed project

- The EIR must explain the relationship of the proposed project to all relevant City documents and agreements. The individual and cumulative impact of these documents and agreements on parkland must be examined and explored in detail. These documents include but are not limited to:
  - The San Francisco General Plan;
  - The Golden Gate Park Master Plan;
  - All current and proposed water supply agreements entered into or to be entered into by the SFPUC;
  - All agreements with other Departments and Agencies in the City related to the proposed project, including but limited to all Memoranda of Understanding between the SFPUC and the SF Recreation and Parks Department.

Issues related to other water treatment projects

- The EIR must explain the relationship of the proposed project to all other water projects in San Francisco and related areas as well as their impact on San Francisco parkland, including but not limited to:
  - Proposed water treatment projects in San Francisco;
  - Proposed water treatment projects in surrounding communities with which San Francisco has water supply agreements.

- The EIR must consider coordinating the Groundwater Supply Project piping with the piping necessary for the Westside Recycled Treatment Plant, including but not limited to consideration of sharing trenches and/or construction with piping from the Westside Recycled Treatment Plant alternative locations up to Golden Gate Park. These locations include, but may not be limited to, the Sunset Circle, the Armory and the Zoo Parking Lot sites.

Safety of all aspects of the proposed project

- The EIR must explore all environmental safety issues related to the proposed plant, including but not limited to:
  - The risk of damage to the project by earthquakes, tsunamis, and other natural disasters;
  - The risk of damage to the project by terrorists, industrial accidents and other man-made disasters.
  - The impact of security measures on all project locations, in the eventuality that the risk of damage to projects by terrorists be considered heightened.

[2] "San Francisco Groundwater Supply Project, Tree and Large Shrub Assessment Report," Figure 3, SFPUC, February 2011.

Water conservation alternatives

- The EIR must discuss water conservation alternatives to the proposed project, including but not limited to:
    - Use of desalinated water;
    - Collaboration with other agencies, including but not limited to Bay Area Water Users Association, for construction of a water recycling plant outside of San Francisco
    - Retrofitting of Recreation and Park piping and other irrigation fixtures to achieve water savings;
    - Use of permeable paving and permeable pavers throughout San Francisco to promote replenishment of the aquifer;
    - Removing additional paving in Golden Gate Park to promote replenishment of the aquifer;
    - Use of tertiary water in all buildings in San Francisco.

Limit of project to wells outside of Golden Gate Park

- Section 4.2.1 of the Groundwater NOP states:

  "If the San Francisco Westside Recycled Water Project is not implemented and a backup source of irrigation water for Golden Gate Park (i.e., other than groundwater) is not made available, the existing irrigation wells in Golden Gate Park would not be used to supply municipal water as part of the San Francisco Groundwater Supply Project. Under this scenario, the proposed project would only include operation of four potable wells, which may result in some reduction in the average annual groundwater production."

- The EIR must therefore include the non-building of the San Francisco Westside Water Project as an alternative, with information in detail about this alternative, including but not limited to:
    - The amount of water projected to come from each Golden Gate Park pumping station;
    - The amount of water per day expected to come from each pumping station outside of Golden Gate Park.
- If the non-building of the Westside Recycled Water Project is not included as an alternative, the EIR must still include the above information.

Scoping letters for related projects

In addition to the foregoing, also attached are letters dated October 12th, 2010 addressing scoping issues for the Westside Recycled Water Project and March 3, 2011 addressing scoping issues for the Beach Chalet Soccer Fields Renovation. All requests for consideration in those letters are hereby incorporated by reference.

CONCLUSION:

We are looking forward to the inclusion of the above issues and other related issues in the EIR, so that the resulting project can be the most beneficial for preserving the beauty and historic context and current uses of Golden Gate Park, the recreation opportunities in all San Francisco parkland, as well as providing safe drinking water and irrigation water for San Francisco.

In addition, we remain very interested in the steps that will be taken in the development of the EIR and the pursuit of this project. We request that the Department notify us and the people copied on this letter about the Department's plans at this time and throughout the EIR process.

Thank you for your consideration.

Sincerely,

Katherine Howard
Member, Steering Committee
Golden Gate Park Preservation Alliance

Attachments - Scoping and comment letters:
October 12th, 2010, Westside Recycled Water Project
March 3, 2011, Beach Chalet Soccer Fields Renovation.

cc:
Timothy Johnston, San Francisco Planning Department
Mark Buell, President, Recreation and Park Commission
Margaret McArthur, Secretary, Recreation and Park Commission
Dan Mauer, Project Manager, Recreation and Park Department
Parks and Recreation Open Space Committee, San Francisco (PROSAC)

Mayor Ed Lee
Clerk of the Board of Supervisors
David Chiu, President, San Francisco Board of Supervisors, District 3
Ross Mirkarimi, San Francisco Board of Supervisors, District 5
Eric Mar, San Francisco Board of Supervisors, District 1
Mark Farrell, San Francisco Board of Supervisors, District 2
John Avalos, San Francisco Board of Supervisors, District 11
David Campos, San Francisco Board of Supervisors, District 9
Carmen Chu, San Francisco Board of Supervisors, District 4
Jane Kim, San Francisco Board of Supervisors, District 6
Scott Wiener, San Francisco Board of Supervisors, District 8
Sean Elsbernd, San Francisco Board of Supervisors, District 7
Malia Cohen, San Francisco Board of Supervisors, District 10

Dr. Eliot Katz, In Defense of Animals
Arthur Feinstein, Sierra Club
John Rizzo, Sierra Club
Michael Lynes, Golden Gate Audubon Society
Noreen Weeden, Golden Gate Audubon Society
Peter Brastow, Nature in the City
Roy C. Leggitt, III, Consulting Arborist

Amy Westervelt, Managing Editor, *Earth Island Journal*
California Academy of Sciences
California Communities Against Toxics
Caroline Cox, Research Director, Center for Environmental Health
Dave Phillips Executive Director, Earth Island Institute
Deb Self, Executive Director San Francisco Baykeeper
Greenaction for Health and Environmental Justice
San Francisco Foundation
San Francisco Green Party
Save the Bay
Surfrider Foundation, San Francisco Chapter

Melanie Macchio, The Cultural Landscape Foundation
Jennifer Gates, California Preservation Foundation
Mike Buhler, San Francisco Architectural Heritage
Alexandra Bevk, San Francisco Architectural Heritage
Charles Chase, SF Historic Preservation Commission
Janet Gracyk, Historic American Landscape Survey (HALS)
Jim Chappell, San Francisco Beautiful
Sheila Kolenc, San Francisco Beautiful
Susan Brandt-Hawley, Preservation Lawyers

Carolyn Blair, San Francisco Tree Council
David Eldred, Keep the Arboretum Free
David Goggin, San Franciscans for Smart Lighting
George Wooding, West of Twin Peaks Central Council (WTPCC)
Gerry Crowley, Telegraph Hill Dwellers
John Frykman, Coalition to Save Ocean Beach, Friends of Sutro Park
Judy Berkowitz, Coalition for San Francisco Neighborhoods (CSFN)
Judy Irving, Telegraph Hill Dwellers
Julie Burns, Friends of Lands End
Kelley Watts, Francisco Heights Civic Association
Libby Benedict, Friends of Rossi Park
Marc Duffett, Sunset Parkside Education and Action Committee (SPEAK)
Mary Anne Miller, San Francisco Tomorrow
Nancy Wuerfel, Golden Gate Park Preservation Alliance
Ray Holland, Planning Association for the Richmond (PAR)
Suzanne Dumont, Save the Stowe Lake Boathouse Coalition

Golden Gate Park Preservation Alliance ©

"Destroy a public building and it can be rebuilt in a year; destroy a city woodland park and all the people living at the time will have passed away before its restoration can be effected."

William Hammond Hall, Surveyor
First Superintendent of Golden Gate Park

October 12, 2010

Mr. Bill Wycko
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA, 94103

Re: **EIR Case No.2008.0091E**
SF Westside Recycled Water Project
(Recycled water project, including factory planned for Golden Gate Park)

Dear Mr. Wycko:

Following are comments pursuant to a September 8, 2010, Notice of Preparation for the Environmental Impact Report for the referenced project (herein referred to as the Factory). We would like to take this opportunity to outline some of the issues that we feel should be included in the EIR. We also encourage the Department to start comprehensive outreach to a broader range of members of the public who have expressed concern in the past with issues relating to Golden Gate Park. All San Franciscans and Bay Area residents should have the opportunity to raise their own concerns about the project with the Department.

SUMMARY:

The following are issues which we feel should be thoroughly explored in an EIR:

- **Potential impacts of the proposed project;**
- **Alternative locations for the proposed project;**
- **Alternative designs for the proposed project;**
- **Review of documents and agreements relating to the proposed project;**
- **Issues related to other water treatment projects;**
- **The safety of all aspects of the proposed project;**
- **Issues related to the use of membrane filtration and reverse osmosis in the proposed project;**
- **Customer retrofits;**
- **Future Expansion of the project:**
- **Issues related to additional and/or adjacent projects, including both the existing and proposed renovated athletic fields adjoining the proposed project;**
- **Water conservation alternatives**
- **Beach Chalet Athletic Field Renovation Project scoping letter**

DETAILS:

Potential impacts of the proposed project

- The EIR should discuss the ways in which the project described by the PUC may have a substantial adverse impact on the historic integrity of Golden Gate Park. The National Register of Historic Places lists the characteristics of the Park as pastoral, with recreation areas that blend into that setting. The EIR should discuss the ways in which the proposed project may considerably change this area because, among other things, the project:
    - Adds a building where this is no building at this time
    - Takes away land from an area that could be recovered and used to fulfill the landscape needs of Golden Gate park
    - Has lighting where there is no lighting at this time;
    - Removes trees and shrubs;
    - Removes trees that provide a windbreak, which protects the rest of Golden Gate Park**;**
    - Injects a factory building into an area that is adjacent to landmarks, removing the possibility of establishing connections between them in the western end of Golden Gate Park Adds paving for more parking, introducing more cars to parkland;
    - Introduces truck traffic to the space
    - Changes the space from an open space to one dominated by a large building and related driveways and parking
    - Introduces 24 hour activity to a space that is currently used only during the day
    -
- The EIR should analyze how construction will impact the immediate and adjoining parkland, including but not limited to:
    - The use of earth-moving equipment and cranes;
    - Removal of sand and soil down to the depth of the storage tanks;
    - construction zone needed for building this type of factory ;
    - Removal of trees and shrubs;
    - Damage to remaining trees, and tree roots damaged, by construction, including trenching for underground utilities.

- The EIR should analyze how construction will impact the area outside Golden Gate Park, including but not limited to:
    - The impact of constructing a pipeline below the Great Highway, including but not limited to;
        - The safety of the proposed pipeline;
        - The impact of erosion on the proposed pipeline;
        - The impact of the proposed pipeline on the character of Ocean Beach;
        - The impact of global warming and project sea-level rising on the proposed pipeline and the location of the factory;
    - The impact of the construction of the project on adjoining residential and commercial neighborhoods;
    - The impact of construction on all parklands that will be receiving water treated in the proposed plant, including but not limited to Lincoln Park and Golf Course, and Presidio Golf Course.

- The EIR should study parking and traffic impacts, including but not limited to:

- Impact on traffic in Golden Gate Park;
- Impact on traffic along the Great Highway;
- Impact on bicycle lanes in Golden Gate Park;
- Impact on traffic in the neighborhood surrounding Golden Gate Park;
- Impact on the above traffic and parking issues not only during ordinary weekdays and weekends, but also during special, heavy-park usage events such as the Outside Lands Festival, the Bay to Breakers, and all the other events that take place throughout Golden Gate Park and at Ocean Beach.

- The EIR should study the impacts to wildlife, including but not limited to:
  - Loss of meadow, trees, and shrubs;
  - Loss of windbreak which protects the rest of Golden Gate Park;
  - Loss of tree roots for trees that are to remain;
  - Loss of irrigation for trees that are to remain;
  - Loss of food sources, such as insects and gophers, for wildlife;
  - Increase in paved surfaces;
  - Increase in trash and food waste;
  - Increase in noise from factory motors, trucks and other equipment
  - Increase in truck traffic
  - Increase in foot traffic to the visitor center
  - Introduction of all of these elements next to a native plant planting area and the impact on the insect, butterfly and other species that are attracted to the native plants;
  - Introduction of all of these elements along the Pacific Flyway and to the green corridor that is Golden Gate Park.

- The EIR should study aesthetic impacts and the impacts on the quality of life of surrounding areas due to the proposed project, including but not limited to:
  - Loss of trees and shrubs;
  - All impacts due to the release of odoriferous material as a result of the proposed project;
  - All impacts due to noise related by the proposed project;
  - All impacts due to artificial lighting related to the proposed project;
  - The aesthetic impact on the areas adjoining the proposed plant, including but not limited to Murphy Windmill and the historic millwright's cottage;
  - The impact of the proposed project on a nearby playground near 26th Avenue;
  - Presence of a large, 3-story above-ground facility.

- The EIR should study the loss of parkland use for a wider variety of users, including but not limited to:
  - Loss of the potential for general recreation uses, including but not limited to kite flying, individual exercise, picnicking, sun-bathing, bird-watching, concerts, dog exercise, nature walks, enjoyment of darker skies at Ocean Beach, astronomy, and any sport activity that requires a stake (for example, volleyball, croquet, footbag/hacky sack with a net.)

- The EIR should study the impact of the project on the aquifer underneath Golden Gate Park, including but not limited to:
  - Depletion of the aquifer;

- Cumulative contamination of the aquifer with inorganic and organic contaminants, including but not limited to heavy metals, halogens, pharmaceutical waste, pesticides, hormones, etc.

- The EIR should study the impact of the energy needed to power the plant, including but not limited to:
  - Amount of energy needed to pump water into and out of the water recycling plant;
  - Energy needed to process the water according to various water treatment standards

- The EIR should study the impact of tertiary treated water from the proposed project on the environment, including but not limited to the following:
  - The impact of exposure to tertiary treated water on the health and viability of vegetation;
  - The impact of exposure to tertiary treated water on humans and all other vertebrate and invertebrate species.

- The EIR should study and identify contaminants in the water from the proposed plant, including but not limited to heavy metals, halogens, endocrine disrupters, and pharmaceuticals; and the impact of any contaminants on the environment, including but not limited to:
  - Contamination of the ground water below Golden Gate Park;
  - Contamination of the air;
  - Contamination of the ocean;
  - Contamination of foliage and grass.

- The EIR should study the economic impact of the project, including but not limited to:
  - The impact on the cost of water to consumers;
  - The impact on the cost of the project to the taxpayers;
  - Consideration of less expensive alternatives to the proposed project.

<u>Alternative locations for the proposed project</u>

- The EIR should explore all other alternative locations that could be used for this project, including but not limited to:
  - Other locations owned by SFPUC, including but not limited to Lake Merced and Fleishacker Zoo;
  - Other locations owned by other City agencies.
- The EIR should explain why each alternative site, if rejected, is not acceptable

<u>Alternative designs for the proposed project</u>

- The EIR should explore alternative designs that preserve the natural meadow and forest feeling of the area, including but not limited to:
  - Construction of a plant that is completely underground;
  - Construction of an above-ground factory that has a smaller footprint and is lower in height than the currently proposed factory.
  - Construction of berms surrounding the factory, so that the factory is not visible from any angles to Park visitors.

Review of documents and agreements relating to the proposed project

- The EIR should explain the relationship of the proposed project to all relevant City documents and agreements. The individual and cumulative impact of these documents and agreements on Golden Gate Park and Ocean Beach should be examined and explored in detail. These documents include but are not limited to:
    - The San Francisco General Plan;
    - The Golden Gate Park Master Plan;
    - All current and proposed water supply agreements entered into or to be entered into by the SFPUC;
    - All agreements with other Departments and Agencies in the City related to the proposed project, including but limited to all Memoranda of Understanding between the SFPUC and the SF Recreation and Parks Department.

Issues related to other water treatment projects

- The EIR should explain the relationship of the proposed project to all other water recycling projects in San Francisco and related areas as well as their impact on Golden Gate Park, including but not limited to:
    - Proposed water treatment projects in San Francisco;
    - Proposed water treatment projects in surrounding communities with which San Francisco has water supply agreements.
    - Proposed use of groundwater from under Golden Gate Park.

Safety of all aspects of the proposed project

- The EIR should explore all environmental safety issues related to the proposed plant, including but not limited to:
    - Contamination of ground water by secondary or tertiary treated water;
    - Contamination of secondary treated water by raw sewage while the secondary treated water is traveling in pipes from its origin at the Oceanside water treatment plant to the proposed plant in Golden Gate Park;
    - The risk of damage to the project by earthquakes, tsunamis, and other natural disasters;
    - The risk of damage to the project by terrorists, industrial accidents and other man-made disasters.

Issues related to the use of membrane filtration and reverse osmosis in the proposed project

- The EIR should explore all issues related to the use of membrane filtration and reverse osmosis in the proposed plant, including but not limited to:
    - The removal of waste material resulting from the membrane filtration process;
    - The removal of a reverse osmosis concentrate, which is a concentrated brine solution containing contaminants including, but not limited to, bacteria, viruses, organic particles (pesticides), and inorganic particles (heavy metals);
    - The impact of dumping the reverse osmosis concentrate into the ocean.

Customer Retrofits

- The EIR should explore all retrofits required to bring the systems to be used in the project into compliance with all local, State and Federal regulations, including but not limited to:
    - Compliance with California Department of Public Health Services Title 22 and Title 17 requirements, regulating the production and use of recycled water;
    - The installation of limited sections of pipeline, the installation of backflow preventers, and the replacement of noncompliant irrigation system components.

Future Expansion of the Project

- The EIR should explore the possibility of future expansion of the factory at the Golden Gate Park location and the impact on all of the issues included in this document.

Issues related to additional and/or adjacent projects, including both the existing and proposed renovated athletic fields adjoining the proposed project

- The EIR should discuss how the proposed water recycling plant is related to additional and related projects being considered by the SF PUC, including but not limited to:
    - Removal of water from the aquifer under Golden Gate Park;
    - Purification of the water from the aquifer under Golden Gate Park;
    - Transport of the water from the aquifer under Golden Gate Park to reservoirs
    - Safety of combining water from the aquifer under Golden Gate Park with the current drinking water provided to San Francisco;
    - Construction of additional water recycling plants elsewhere in San Francisco.

- The EIR should study the cumulative impact of the existing and proposed athletic/soccer field adjoining the project, including but not limited to:
    - Toxic and safety impacts on the underlying aquifer relating to artificial turf and its infill, including but not limited to heavy metals, volatile organic compounds, carcinogens, asthma triggers, bacterial growth and infection risk (including MRSA).
    - Cumulative impact on historic and aesthetic character of Golden Gate Park and Ocean Beach.
    - Cumulative effect of increased lighting, paving, traffic and all other issues considered in both this document and in the attached document for the Beach Chalet Athletic Field renovation EIR.

Water conservation alternatives

- The EIR should discuss water conservation alternatives to the proposed project, including but not limited to:
    - Use of desalinated water;
    - Use of water in wells in Golden Gate Park and other areas to be served by the proposed project;
    - Collaboration with other agencies, including but not limited to Bay Area Water Users Association, for construction of a water recycling plant outside of San Francisco
    - Retrofitting of Recreation and Park piping and other irrigation fixtures to achieve water savings;

- Use of permeable paving and permeable pavers throughout San Francisco parks to promote replenishment of the aquifer
- Removable of additional paving in golden Gate Park to promote replenishment of the aquifer
- Use of tertiary water in all buildings in all Parks in San Francisco, including the major institutions in Golden Gate Park.

Beach Chalet Soccer Field Scoping letter

In addition to the foregoing, also attached is a letter dated September 25th, 2010 addressing scoping issues of Beach Chalet Soccer Fields proposed for construction in Golden Gate Park. All requests for consideration in that letter are hereby incorporated by reference.

CONCLUSION:

We are looking forward to the inclusion of the above issues and other related issues in the EIR, so that the resulting project can be the most beneficial for preserving the beauty and historic context of Golden Gate Park, as well as providing safe drinking water and irrigation water for San Francisco.

In addition, we remain very interested in the steps that will be taken in the development of the EIR and the pursuit of this project. We request that the Department notify us and the people copied on this letter about the Department's plans at this time and throughout the EIR process.

Thank you for your consideration.

Sincerely,

Katherine Howard, Co-Chair
Golden Gate Park Preservation Alliance

cc:
Carrie Dovzak,the CEQA coordinator, San Francisco Planning Department
Mark Buell, President, Recreation and Park Commission
Margaret McArthur, Secretary, Recreation and Park Commission
Dan Mauer, Project Manager, Recreation and Park Department
Parks and Recreation Open Space Committee, San Francisco (PROSAC)

Mayor Gavin Newsom
Clerk of the Board of Supervisors
David Chiu, President, San Francisco Board of Supervisors, District 3
Ross Mirkarimi, San Francisco Board of Supervisors, District 5
Eric Mar, San Francisco Board of Supervisors, District 1
Michela Alioto-Pier, San Francisco Board of Supervisors, District 2
John Avalos, San Francisco Board of Supervisors, District 11
David Campos, San Francisco Board of Supervisors, District 9
Carmen Chu, San Francisco Board of Supervisors, District 4
Chris Daly, San Francisco Board of Supervisors, District 6
Bevan Dufty, San Francisco Board of Supervisors, District 8

Sean Elsbernd, San Francisco Board of Supervisors, District 7
Sophie Maxwell, San Francisco Board of Supervisors, District 10

Arthur Feinstein, Sierra Club
Dr. Eliot Katz, In Defense of Animals
John Rizzo, Sierra Club
Michael Lynes, Golden Gate Audubon Society
Noreen Weeden, Golden Gate Audubon Society
Peter Brastow, Nature in the City
Roy C. Leggitt, III, Consulting Arborist

Amy Westervelt Managing Editor, *Earth Island Journal*
California Academy of Sciences
California Communities Against Toxics
Caroline Cox, Research Director, Center for Environmental Health
Dave Phillips Executive Director, Earth Island Institute
Deb Self, Executive Director San Francisco Baykeeper
Greenaction for Health and Environmental Justice
San Francisco Foundation
San Francisco Green Party
Save the Bay
Surfrider Foundation, San Francisco Chapter

Melanie Macchio, The Cultural Landscape Foundation
Jennifer Gates, California Preservation Foundation
Mike Buhler, San Francisco Architectural Heritage
Alexandra Bevk, San Francisco Architectural Heritage
Charles Chase, SF Historic Preservation Commission
Janet Gracyk, Historic American Landscape Survey (HALS)
Jim Chappell, San Francisco Beautiful
Sheila Kolenc, San Francisco Beautiful
Susan Brandt-Hawley, Preservation Lawyers

Carolyn Blair, San Francisco Tree Council
David Eldred, Keep the Arboretum Free
David Goggin, San Franciscans for Smart Lighting
George Wooding, West of Twin Peaks Central Council (WTPCC)
Gerry Crowley, Telegraph Hill Dwellers
John Frykman, Coalition to Save Ocean Beach, Friends of Sutro Park
Judy Berkowitz, Coalition for San Francisco Neighborhoods (CSFN)
Judy Irving, Telegraph Hill Dwellers
Julie Burns, Friends of Lands End
Kelley Watts, Francisco Heights Civic Association
Libby Benedict, Friends of Rossi Park
Marc Duffett, Sunset Parkside Education and Action Committee (SPEAK)
Mary Anne Miller, San Francisco Tomorrow
Nancy Wuerfel, Golden Gate Park Preservation Alliance
Ray Holland, Planning Association for the Richmond (PAR)
Suzanne Dumont, Save the Stowe Lake Boathouse Coalition

SF Ocean Edge

Where Golden Gate Park meets Ocean Beach . . .

www.sfoceanedge.org

March 3, 2011

Mr. Bill Wycko
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA 94103

Subject: **Case No. 2010.0016E**
Beach Chalet Athletic Fields Renovation

Dear Mr. Wycko:

SUMMARY:

The following are issues which must be thoroughly explored in an EIR, including but not limited to:

- A range of alternative construction methods for renovation of the Beach Chalet athletic fields (herein referred to as " the project"), with natural, living grass;
- A range of alternative designs to provide some amenities at Beach Chalet without losing the parkland character of the meadow and surrounding forest;
- A range of alternative locations outside of Golden Gate Park for the artificial turf athletic fields, for the purposes of increasing play time;
- Documentation of the site, using the National Park Service, HALS (Historic American Landscape Survey) methodology, and documenting at a Level I status, for significant American Landscapes.

DETAILS:

<u>The potential impacts of the proposed project</u>

- The EIR must discuss the ways in which the project described by RPD has a substantial adverse impact on the historic integrity of Golden Gate Park. The National Register of Historic Places lists the characteristics of the Park as pastoral, with recreation areas that blend into that setting. The EIR must discuss the ways in which the proposed project may negatively change this area because, among other things, the project:
  - Has a non-pastoral design;
  - Changes the space from an irregular meadow-like outline to a rectilinear space;
  - Has lighting where there is no lighting at this time;
  - Introduces sports complex lighting to a pastoral space;
  - Adds paving where there is no paving at this time;
  - Removes trees and shrubs from a pastoral space;
  - Removes trees that provide a windbreak, which protects the rest of Golden Gate Park**;**
  - Replaces natural (living) grass with artificial turf;
  - Changes the views into and out of the area;
  - Removes current links to adjacent landmarks;

- Adds a concession area, new play equipment, and more paving for this area;
- Adds more paving for more parking
- Introduces more cars to parkland;
- Changes the space from a multi-use space to a limited sport-specific use area.

- The EIR must analyze how construction will impact the parkland, including but not limited to:
  - The use of earth-moving equipment and cranes;
  - Removal of two feet or more of topsoil for the artificial turf ;
  - The sports lights excavation to 10 feet or more and installation of supports for the lights;
  - Trees and shrubs removal;
  - Damage to remaining trees, and tree roots damaged, by construction, including trenching for underground utilities.

- Parking and traffic impacts to be studied in the EIR must include but are not limited to:
  - Impact on the parking at Ocean Beach;
  - impact on traffic in Golden Gate Park;
  - Impact on traffic along the Great Highway;
  - Impact on bicycle lanes in Golden Gate Park;
  - Impact on traffic in the neighborhood surrounding Golden Gate Park;
  - Impact on the above traffic and parking issues not only during ordinary weekdays and weekends, but also during special, heavy-park usage events such as the Outside Lands Festival, the Bay to Breakers, and all the other events that take place throughout Golden Gate Park and at Ocean Beach, at various times of the year

- Impacts to wildlife to be studied in the EIR must include but are not limited to:
  - Use of artificial turf;
  - Loss of meadow, trees, and shrubs;
  - Loss of windbreak which protects the rest of Golden Gate Park;
  - Loss of tree roots for trees that are to remain;
  - Loss of irrigation for trees that are to remain;
  - Loss of food sources, such as insects and gophers, for wildlife;
  - Increase in paved surfaces;
  - Increase in trash and food waste;
  - Introduction of night lighting to an area that is currently not lighted;
  - Introduction of intensely bright sports night lighting in an area that is currently not lighted;
  - Introduction of all of these elements next to a native plant planting area and the impact on the insect, butterfly and other species that are attracted to the native plants;
  - Introduction of all of these elements along the Pacific Flyway and to the green corridor that is Golden Gate Park.

- Aesthetic impacts to be studied in the EIR must include but are not limited to:
  - Use of artificial turf
  - Loss of meadows, trees and shrubs;
  - Loss of screening of views into the construction area to the south of the field;
  - Loss of screening of the area from the surrounding roads;
  - Direct and reflected night lighting affecting the Dark Sky;
  - Direct and reflected night lighting affecting the evening sunset and beach experience at Ocean Beach, the Great Highway Parking lot, Sutro Heights, and the Cliff House area.

- Water usage to be studied in the EIR must include but is not limited to:
  - Quantity of water needed for cleaning the artificial turf and frequency of application;
  - Type and chemical make-up of cleansing solutions for the artificial turf;
  - Impact of increase in sending cleansing solutions and water to the sewer system;
  - Impact of sending rainwater to the sewer system for processing, include amount of water and increase in need to process at sewage treatment plant;
  - Impact of preventing rainwater from percolating into the aquifer.

- Artificial turf impacts to be studied in the EIR must include but are not limited to:
  - Impact of the eventual removal , replacement and disposal of the artificial turf, when it reaches the end of its lifespan; the EIR should consider the impact of several cycles of such replacement;
  - All toxic and safety impacts relating to artificial turf and its infill, including but not limited to heavy metals, volatile organic compounds, carcinogens, asthma triggers, increased risk of injury, bacterial growth and infection risk (including MRSA);
  - Since the selection of artificial turf manufacturer is not known at this time, an evaluation of all of the artificial turf products on the market at this time.
  - The migration of infill material from the site by wind, leaching, sewer overflow , and through shoes and clothing.
  - The identification of any components of artificial turf that are listed as carcinogenic and/or endocrine disrupters under Proposition 65;
  - The need for additional "infill" below the artificial turf;
  - Cooling with water because of unacceptable high temperatures;
  - The impact of chemical treatment to disinfect;
  - The need for an adequate drainage system;
  - The use of fabric softener to reduce static cling;
  - The impact of elevated temperatures on artificial turf;
  - The impact of breakdown of materials used in artificial turf;
  - The need to periodically replace infill, including amounts needed and frequency of replacement.

- Climate change impacts to be studied in the EIR must include but are not limited to:
  - Artificial turf installation;
  - Urban heat island effect;
  - Loss of natural grass, plants and trees.

- Loss of park use for a wider variety of users must be studied in the EIR, including but not limited to:
  - Reduction of general recreation uses, including but not limited to kite flying, individual exercise, picnicking, sun-bathing, bird-watching, concerts, dog exercise, nature walks, enjoyment of darker skies at Ocean Beach, astronomy, and any sport activity that requires a stake (for example, volleyball, croquet, footbag/hacky sack with a net.)

- Inconsistencies with City planning documents must be studied in the EIR, including but not limited to:
  - The San Francisco General Plan
  - The Golden Gate Park Master Plan

Alternative construction methods for natural grass playing fields

- Alternative field construction methods.
    - The EIR must explore various types of field construction that will result in a safe, consistent, long-wearing, natural-grass playing surface. The EIR must study other fields that are successful and propose new methods of field construction and maintenance, including but not limited to:
        - Investigation of state of the art natural grass playing fields throughout the US and internationally;
        - Investigation of state of the art drainage systems ;
        - Soil improvement methods to ameliorate compaction and promote root growth;
        - Introduction of synthetic fibers into the soil to promote strong grass roots, decrease maintenance, and improve playing time;
        - Investigation of lawn grass species that use less water and are suited to a park-like setting;
        - Investigation of water-efficient irrigation systems ;
        - The impact of utilizing the forthcoming PUC recycled water project for Golden Gate Park to irrigate natural grass;
        - Investigation of subsurface water –storage systems for irrigation purposes;
        - Investigation of efficient maintenance methods;
        - Gopher control methods, including but not limited to:
            - Increase in the habitat for gopher predator species, such as the Great Blue Heron or the red-tailed hawk, currently seen hunting at the fields;
            - Gaps in the fencing to allow access by coyotes and other wingless predators;
            - Gopher barriers buried in the ground, including but not limited to chicken wire, concrete, rock, gravel, or other barriers;
            - Gopher repellent added to the irrigation system;
            - Gopher trapping – both by staff and contracted out.

Alternative designs for the project

- The EIR must explore alternative designs that preserve the natural meadow and forest feeling of the area, including but not limited to:
    - Investigation of minimal low-level lighting for the parking lot that is keyed to motion activated sensors that people, not animals, can trigger;
    - Investigation of designs that can create seating areas that are not bleachers, can be used for games, and look like natural parkland when sports or other organized activities are not being engaged in;
    - Elimination of the rectilinear sidewalk that surrounds the field and other elements that destroy the park-like feeling for the area;
    - Investigation of more effective public transport to the fields, such as bringing a bus line into the park or providing a bus stop on the Great Highway, to avoid expansion of the parking lot;
    - Restriping of the parking lot for efficient traffic flow without expanding the lot;
    - Planting of trees in the parking lot to further disguise its purpose;
    - Using grass in the parking lot to promote a park-like atmosphere, for example in grass-pavers or using fibers mixed into the soil to promote soil strength;

- Evaluating the major events that will take place along the Great Highway and Golden Gate Park and the impact on traffic in Golden Gate Park and the availability of parking for the project and for these events, if the fields are developed.

Alternative field locations

- The EIR must explore other locations that can be improved for longer play times, including but not limited to:
  - Fields in San Francisco that are currently natural grass and could be renovated with artificial turf; specifically, West Sunset, Balboa Park, including Boxer Stadium, and Minnie and Lovie Ward Recreation fields. The EIR must explore the increase in play hours that would be provided by these fields.
  - The EIR must analyze the potential increase in play hours that would be provided by a combination of renovating one of the above fields with artificial turf and renovating the Golden Gate Park Beach Chalet fields with natural, living grass, with state of the art construction including but not limited to improved drainage, soil amendment, gopher barriers, and species of grass.
  - Fields associated with schools, resulting in the dual benefit of improving school field use and locating fields near where children are already present;
  - Public property that could be developed as fields; for example, newly acquired property, property that must be targeted for appropriation, tops of parking garages, new redevelopment areas, sections of larger parks such as Sharp Park, unused streets, or empty lots in various areas of San Francisco.

Cumulative Impacts with Westside Water Treatment Plant

- The SFPUC is planning to build a Westside Water Treatment Plant in western San Francisco. The SFPUC preferred location is the area immediately adjacent to the Beach Chalet Soccer Fields in Golden Gate Park. Therefore, the EIR for the Beach Chalet Athletic fields must explore the cumulative impacts that both of these projects will have on Golden Gate Park and on this area, for all of the categories of analysis that are detailed in this letter, including but not limited to:
  - Impact on parkland
  - Impacts on traffic
  - impacts to wildlife
  - Impacts on traffic
  - Impacts of construction on parkland
  - Impacts of water usage
  - Impacts of artificial turf in conjunction with the new irrigation and the use of water from under Golden Gate Park for drinking water
  - Impacts on climate change
  - Loss of additional acreage to recreational uses
  - Impact of reduction of general recreation uses for this section of Golden Gate Park
  - Inconsistencies with the City Planning Documents
  - Possible us of the open area in the current construction yard for an additional practice field, yielding more playing hours

Cumulative impacts with Ocean Beach Master Plan of both the Beach Chalet Athletic Tields project and the combined Beach Chalet project and the Westside Water Treatment Plant:

- Currently, the city is undertaking an analysis of the uses and preservation of Ocean Beach and will be creating a new Master Plan for this area. The EIR for the Beach Chalet Athletic fields must explore the cumulative impacts that the Athletic fields project could have on these plans including but not limited to:
  - Proposals in the current Ocean Beach Master Planning process to connect golden Gate Park with the Ocean through elimination or undergrounding of the Great Highway
  - Proposals in the current Ocean Beach Master Planning process to make beach restoration and environmental conservation major tenets of that process;
  - Proposals in the current Ocean Beach Master Planning process to increase habitat at Ocean Beach with the possibility of attracting endangered species to that area.
  - Impact on parkland
  - Impacts on traffic of bringing more people out to Ocean Beach
  - impacts to wildlife of the
  - Impacts on traffic
  - Impacts of construction on neighboring Ocean Beach
  - Impacts of water usage
  - Impacts of artificial turf in conjunction with the new irrigation and the use of water from under Golden Gate Park for drinking water
  - Impacts on climate change
  - Loss of additional acreage to recreational uses
  - Impact of reduction of general recreation uses for this section of Golden Gate Park
  - Inconsistencies with the City Planning Documents

NPS HALS Documentation - Level I

- The Historic American Landscapes Survey (HALS) mission is to record historic landscapes in the United States and its territories through measured drawings and interpretive drawings, written histories, and large-format black and white photographs and color photographs. The National Park Service oversees the daily operation of HALS and formulates policies, sets standards, and drafts procedural guidelines in consultation with the American Society of Landscape Architects (ASLA). The ASLA provides professional guidance and technical advice through their Historic Preservation Professional Practice Network. The Prints & Photographs Division of the Library of Congress preserves the documentation for posterity and makes it available to the general public.
- The EIR must include a full documentation of the site, using the National Park Service, HALS (Historic American Landscape Survey) methodology, and documenting at a Level I status, for significant American Landscapes.
- This documentation must in no way be construed to replace preservation of the historic context and value of the site.

CONCLUSION:

We are looking forward to the inclusion in the EIR of the above issues and other related issues discussed by the public since the beginning of the public input into this project, so that the resulting project can

be the most beneficial for preserving the beauty and historic context of Golden Gate Park, as well as providing a safe playing field for the City's children.

We request that the Department notify us and the people copied on this letter about the Department's plans at this time and with full documentation throughout the EIR process.

Thank you for your consideration.

Sincerely,

Katherine Howard
Member, Steering Committee
SF Ocean Edge

cc:
Mayor Ed Lee
Clerk of the Board of Supervisors
Each member of the San Francisco Board of Supervisors

Michael Lynes, Golden Gate Audubon Society
Noreen Weeden, Golden Gate Audubon Society
John Rizzo, Sierra Club
Arthur Feinstein, Sierra Club
Peter Brastow, Nature in the City
Dr. Eliot Katz, In Defense of Animals
Roy C. Leggitt, III, Consulting Arborist

Save the Bay
California Academy of Science
Caroline Cox, Research Director, Center for Environmental Health
Greenaction for Health and Environmental Justice
California Communities Against Toxics
The San Francisco Foundation
San Francisco Green Party
Surfrider Foundation, San Francisco Chapter
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Alexandra Bevk, San Francisco Architectural Heritage
Melanie Macchio, The Cultural Landscape Foundation
Jim Chappell, San Francisco Beautiful
Susan Brandt-Hawley, Preservation Lawyers

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David Eldred, Keep the Arboretum Free
Suzanne Dumont, Save the Stowe Lake Boathouse Coalition
Julie Burns, Friends of Lands End
Carolyn Blair, San Francisco Tree Council
Gerry Crowley, Telegraph Hill Dwellers
Judy Irving, Telegraph Hill Dwellers
Libby Benedict, Friends of Rossi Park
Kelley Watts, Francisco Heights Civic Association
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Mark Buell, President, Recreation and Park Commission
Margaret McArthur, Secretary, Recreation and Park Commission
Dan Mauer, Project Manager, Recreation and Park Department
Parks and Recreation Open Space Committee, San Francisco (PROSAC)
Don Lewis, MEA, San Francisco Planning Department
City Fields Foundation

Dale Gutierrez to Sup Carmen Chu 2001-03-09
Diana Sokolove/CTYPLN/SFGOV

04/01/2011 12:27 PM

To: Timothy J Johnston/CTYPLN/SFGOV@SFGOV

cc:

bcc:

Subject: Fw: San Francisco Groundwater Supply Project

----- Forwarded by Diana Sokolove/CTYPLN/SFGOV on 04/01/2011 12:29 PM -----
"Liapes, Michele" <MLiapes@sfwater.org>

04/01/2011 11:59 AM

To: <dalegut@gmail.com>

cc: "Chu, Carmen" <Carmen.Chu@sfgov.org>, "Harrington, Ed" <EHarrington@sfwater.org>, "Ritchie, Steve" <SRitchie@sfwater.org>, "Kehoe, Paula" <pkehoe@sfwater.org>, "Sokolove, Diana" <diana.sokolove@sfgov.org>, "Gilman, Jeff" <JGilman@sfwater.org>

Subject: San Francisco Groundwater Supply Project

Dear Mr. Gutierrez,
We have received your email message of March 25, 2011 to Supervisor Carmen Chu, which Supervisor Chu forwarded to us for a response.
We understand that you have spoken with Diana Sokolove of the San Francisco Planning Department about the environmental aspects of the proposed San Francisco Groundwater Supply Project. As Diana likely explained, the Draft Environmental Impact Report for the San Francisco Groundwater Supply Project is scheduled to be published in early 2012. The Planning Department will notify you when that document is published. You will have an opportunity to review and comment on the Draft Environmental Impact Report at that time.
Groundwater from the proposed project would be pumped from the Westside Groundwater Basin aquifer, which extends from Golden Gate Park southward through San Bruno. As you may already know, groundwater makes up all or part of the drinking water supply for many communities throughout California, and provides approximately 40% of the State's drinking water. The cities of Daly City, South San Francisco and San Bruno have utilized groundwater from the Westside Basin aquifer for more than 50 years. Blending of the extracted groundwater with imported surface water would be in quantities small enough to ensure the continued high quality and taste of San Francisco's drinking water. The groundwater would be treated as necessary to comply with California Department of Public Health requirements before entering the municipal water system for distribution to areas throughout the City.
Your email also mentioned that the cost of treated groundwater would be ten times as expensive as Hetch Hetchy water. However, the cost of treated groundwater supplied by the San Francisco Groundwater Supply Project would be less than the imported retail cost of water in 2018 (the time horizon for our financial planning).
Thank you for taking the time to express your concerns regarding the proposed San Francisco Groundwater Supply Project.

Sincerely yours,

Michele Liapes, Community Liaison

P Please consider the environment before printing this email.

Michele Liapes
SFPUC Communications and Public Outreach
1155 Market Street, 11th Floor
San Francisco, CA 94103
415-554-3211

From: Dale G <dalegut@gmail.com>

To: Carmen Chu <Carmen.Chu@sfgov.org>

Date: 03/25/2011 09:19 PM

Subject: Resend Re: Groundwater Supply

On Wed, Mar 9, 2011 at 9:49 AM, Dale G <dalegut@gmail.com> wrote:

Hi, Carmen.

Just got a notice from the Planning Commission about a massive project that was in the works
many years ago. Much of this work entails water well facilities and delivery systems that are to be
constructed under our Sunset District 4 streets. I'm just catching on now. Though there are
many abbreviations and acronyms, I"m seeing SFPUC, BAWSA, WSIP, MSWA, bla, bla...

While I understand the need for a reliable, scaleable, diversified water supply and delivery system,
as still must opine:

I'm opposed to blending our higher-quality, gravity-delivery Hetch Hetchy water, with treated
groundwater that is ten times as expensive as HH water, and will result in the doubling of SF's
users' bills -- one tenth our water will be treated groundwater that costs ten times as much as
HH water.

Since funding mechanism management and governance has long ago (2002 California legislation) been lost,
and this is already in the stages of final EIR, what can I as citizen do to oppose this? Can I protest through
you, in any way? Or can you log my vote on this matter? I think the environmental and financial costs
are enormous. You already know what I think about what's underground at the South East corridor --
radionuclides.

I sincerely hope you are well.

Thanks,
Dale
Dale Gutierrez

Dale Gutierrez 2011-03-31

Dale G <dalegut@gmail.com>

03/31/2011 01:14 PM

To: diana.sokolove@sfgov.org

cc: timothy.johnston@sfgov.org, EHarrington@sfwater.org, cityattorney@sfgov.org, board.of.supervisors@sfgov.org

bcc:

Subject: San Francisco Groundwater Supply Project outreach

Diana Sokolove
Senior Environmental Planner
San Francisco Planning Department
Major Environmental Analysis Division
1650 Mission Street, Suite 400
San Francisco, CA 94103-2479

Thursday 31 Mar 2011

Diana.

It was a pleasure to chat with you today.

I spoke to you on the phone about 12:15 pm today. I called to voice my opposition to the SF Groundwater Supply project because of the blending of Hetch Hetchy water with lower-quality, expensive, treated water from the SF Ground Supply Project, based on concerns for public health and safety; taste and odor of the treated water; its possible toxic, chemical, mineral content, and other non-environmental concerns. That would include a desire to review some of the economics, regulation, statistics and databases, policy-making, social impact, and politics surrounding this project. I'll be taking a closer look at this in the context of the possible reliability and redundancy that is advertised with the project. I'll be talking to an economist friend
to get his sense.

You also told me that we had not reached the Public Comment phase, and I could directly voice concerns to the SF Water Dept.

Thanks for your patience, cooperation, and valuable time,

Dale Gutierrez family
D4 Residents & SF Water Dept ratepayer (2 buildings)

Steven Lawrence <splawrence@sbcglobal.net>

03/03/2011 09:40 AM

To Timothy.Johnston@sfgov.org
cc
bcc

Subject: SF Groundwater Supply

Please accept these comments to the revised proposed project, SF Groundwater Supply, WSIP.

Is the project too ambitious? Is there enough water? Recent minutes of an advisory committee for a Groundwater Management Plan concluded that the Southwestside basin contains 8700 acre feet per year yield. The whole Westside Basin contains 10,600.The difference would seem to be the volume of the Northwestside Basin, which the project is to tap: 1900 acre feet per year. That is about 619 million gallons. Yet the project aims to extract nearly 1.5 billion gallons per year. It seems that the basin would be overdrawn.

In addition, there is concern about saltwater instrusion into groundwater. The Regional Groundwater Storage & Recovery project is expected to allow water to build up during wet years. Then, during drought water is to be sucked out for human use. In comparison to what happens today, and what has happened in the recent past, this would seem to create large suction during the next drought. That combined with sea level rise foreseeably could cause saltwater intrusion, just when it would be worst to have it. Sea levels are said to have risen some inches over the past hundred years. They are predicted to rise by something like four feet over the next hundred. I'm not able to provide good figures. But it seems to me that the matter should be addressed: more suction, higher seas...where does this lead?

Recycled water is to irrigate GG Park. How long before this trickles down to the groundwater table, and once there, does it pollute significantly after...10 years, 20, 30? Recycled water may contain pharmaceuticals.

WSIP once promised water as good as what has been received during past years. Is that promise still made. It was once promised that no more than ten percent of water served would be groundwater. Is that promise still made? Do the arithmetic: is that promise credible? Sunset Reservoir is the terminus for how much of the 4 mgd of groundwater? Does Sunset serve more than 40 mgd? Are there season variations so that during parts of the year more than 10% of served water is groundwater?

Finally, is it wise to rely on groundwater in an area prone to earthquakes? Would or could a quake damage the aquifer? Would it or could a quake allow saltwater intrusion, or might a quake pollute in other ways? To what extent should the water system be designed not only for every day times, but also for emergency situations, such as post-earthquake? Will the wells work? Will the water be potable? Will the pipelines leak? Will demand rise (due to leaking pipes and fire suppression)? Is counting on groundwater for normal supply safe and effective in an earthquake-prone city?

Steve Lawrence

NANCY WUERFEL, 2516 23RD AVENUE, SAN FRANCISCO, CA 94116

April 1, 2011

Mr. Bill Wycko
c/o Timothy Johnston
San Francisco Planning Department
1650 Mission Street, Suite 400
San Francisco, CA, 94103-2479

Re: **EIR Case No.2008.1122E**
San Francisco Groundwater Supply Project
Revised NOP for EIR, March 2, 2011

Dear Mr. Wycko:

Following are my comments pursuant to the March 2, 2011, Revised Notice of Preparation for the Environmental Impact Report for the referenced project

I. NOP section 5.0 PERMITS AND APPROVALS REQUIRED has omitted the following *required approval* necessary for this project to use land managed by the Recreation and Park Commission:

Section 4.113 of the city charter states that "No park land may be sold or leased for non-recreational purposes, **nor shall any structure on park property be built**, maintained or used for non-recreational purposes, **unless approved by a vote of the electors**."

- This project intends to build 3 new well facilities on park lands (2 outside of Golden Gate Park and 1 inside of GGP) that are for non recreational purposes. These wells are to siphon 4 mgd of groundwater to the San Francisco **municipal water supply.** These wells are not built to irrigate park lands. Therefore, these structures on park lands MUST BE APPROVED by the voters.

The NOP documents must be corrected to include this requirement of the city charter .

II. What are the potential impacts of the proposed project on the Recreation and Park properties involved in the project:

1. There will be a permanent loss of groundwater as source of irrigation to GGP and 2 other parks. There will be total reliance on the output of a recycled water plant (RWP) to support the irrigation of these parks. Please evaluate if these parks can be switched back to using ground water through the wells on park land for an indefinite period of time, if the RWP is unable to provide recycled water for any reason. If not, what will happen to the parks that once had ground water to irrigate them, if recycled water is not available?

2. If groundwater were diverted to park irrigation, would Sunset Reservoir be backfilled with Hetch Hetchy water to 100% for an indefinite period?

3. What are the negative effects of using recycled water on GGP over time?

4. If voters approve using the parks for accessing groundwater for this project by building new wells, what impacts will there be from the operational noise of these new facilities on recreation, wildlife and neighbors of the parks?

III. Request alternatives to proposed pipelines:

The NOP states that "pipeline infrastructure and connection points" exist between the Lake Merced Pump Station and the Sunset Reservoir (page 9). Since this is in place, why can't this system be used to transport the ground water to Sunset Reservoir instead of trenching new pipelines along 41st Avenue? EIR should study linking South Sunset and West Sunset sites into this existing pipeline to Sunset Reservoir.

IV. Issues about the safety of blending water:

1. What are the potential health effects of consuming the proposed blend of 90% Hetch Hetchy water and 10% groundwater?

2. If the SFPUC elects to change this ratio, will a new EIR have to be conducted to evaluate the new potential health hazards? What ratio would trigger another EIR? 80 -20?

3. What are the effects of using the blended groundwater-HH water on appliances in people's homes? What effect will the less pure water have on any machinery that uses water currently supplied by Hetch Hetchy?

4. The residents of the western portion of the city will drink blended water, while the residents on the eastern side will drink pure Hetch Hetchy water. The EIR should require ill effects of this experiment to be evaluated before subjecting the rest of San Francisco to the change.

V. Miscellaneous concerns:

1. Besides using park property to access the ground water, what other alternative sites can be used to access groundwater for the project?

2. What happens if 4 mgd of ground water cannot be produced to blend with Hetch Hetchy water because the park access to this water cannot be used? Will the project be feasible with less than 4 mgd of ground water? What is the lowest level mgd required?

3. What are the effects of not implementing this project of blending ground water with Hetch Hetchy water for human use? What other options are there to meet water needs?

4. How does this project, which conserves Hetch Hetchy water use on the West side of SF, promote population growth in SF? Will the conserved water be used as the water supply for the new required number of housing units in SF, included in the proposed Housing Element of the General Plan?

Thank you for considering these comments. Please acknowledge receipt of this letter. Please let me review the results of the draft EIR.

Sincerely,

Nancy Wuerfel

APPENDIX B

WSIP PEIR Consistency Analysis and Mitigation Measures, Applicability to the Proposed Project

WSIP PEIR Consistency Analysis

The Groundwater Supply Project (proposed project) was analyzed at a program-level in the Water System Improvement Program (WSIP) Program Environmental Impact Report (PEIR)[1] as one of the facility improvement projects under the WSIP. The project details presented in the PEIR were based on the best information available at that time with respect to project design and construction. Details regarding project design, facility layout, construction, staging areas, etc, were not available at the time the PEIR was prepared.

The Groundwater Supply Project EIR (File No. 2008.1122E) provides a detailed, project-level analysis of the proposed project based on site-specific and up-to-date information developed subsequent to the preparation of the PEIR. Subsequent to publication of the PEIR, several modifications were made to the proposed project as more detailed information regarding project impacts was developed during project design and site-specific analyses. The most notable project change is the siting of proposed well facility locations and groundwater pipelines. Overall, the project changes reduce the impacts associated with the Groundwater Supply project as described in the PEIR. Because less detailed information about the Groundwater Supply project was available at the time the PEIR was prepared, many of the impacts were conservatively assumed to be more severe than those determined in the Groundwater Supply Project EIR. **Table 1** evaluates the consistency of the project-level impact analysis in the Groundwater Supply Project EIR with the program-level impact analysis previously conducted in the PEIR. Where significance determinations vary between these documents, a brief explanation of the rationale for this determination is provided.

[1] San Francisco Planning Department, *Final Program Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program*, File No. 2005-0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.

TABLE 1
PEIR IMPACTS – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Impact	PEIR Significance Determination for Groundwater Supply Project	Project-Level Significance Determination	Same Rationale for Significance Determination as PEIR? (Y/N)	Notes (Explain difference in significance determinations and/or rationale for determinations)
Land Use				
Impact 4.3-1: Temporary disruption or displacement of existing land uses during construction.	PSM	LS	N	See Impact LU-1: Project operations would not result in substantial long-term or permanent impacts on the existing character of the vicinity. The PEIR assumed that the 24-hour construction activities would be required for well facility construction and assumed that a new well would be constructed at the Francis Scott Key Elementary School. The analysis assumed that construction activities could disrupt sensitive land uses such as schools and nearby residential uses but implementation of SFPUC Construction Measures #1, #3, #5, #6, #10 and mitigation measures identified in Chapter 6, would reduce the impact to less than significant. Since publication of the PEIR, the SFPUC determined that 24-hour construction would not be required and the well facility location at Francis Scott Key Elementary School was eliminated. As stated in Impact LU-1, although the Groundwater Supply Project would result in temporary disruption of activities in the project vicinity as a result of construction staging, excavation, and pipeline installation activities, once construction is complete, all proposed pipelines would be belowground and would not be visible upon completion. Direct effects associated with temporary noise, traffic, and air quality effects are described in EIR Sections 5.6, 5.7, and 5.8, respectively.
Impact 4.3-2: Permanent displacement or long-term disruption of existing land uses.	PSU	LS	N	See Impact LU-1: Project operations would not result in substantial long-term or permanent impacts on the existing character of the vicinity. The PEIR conservatively assumed that the Groundwater Supply Project could include sites adjacent to Francis Scott Key School or other sites in San Francisco and northern San Mateo County, which could have resulted in significant and unavoidable impacts on these sensitive land uses even with implementation of SFPUC Construction Measures #6 (compliance with local noise ordinances to the extent feasible) and #10 (locating staging areas away from public view and directing nighttime lighting away from residential areas) as well as recommendations of facility siting studies (Measure 4.3-2). Since publication of the PEIR, the SFPUC has determined that all project facilities would be sited on lands zoned for public uses that the City and County of San Francisco owns. Since new pipelines would be belowground and would not be visible upon completion, operation of the pipelines would not alter the existing character of the project area in the long-term. Proposed well facilities would also be constructed adjacent to public uses and would not result in any substantial blockage of publicly accessible vistas or trails.

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Visual Quality				
Impact 4.3-3: Temporary construction impacts on scenic vistas or visual character.	LS	LS	Y	See Impact AE-1: Temporary construction-related disturbances would not have an adverse effect on a scenic vista, scenic resource, or the existing visual character or quality of the site and its surroundings. The PEIR assumed that temporary effects on visual character would be less than significant with implementation of SFPUC Construction Measure #10 (Project Site). The project-level analysis does not assume implementation of SFPUC Construction Measure #10 and determined that since construction would be temporary, and would not be out of character, in terms of scale and duration, for construction in a typical urban environment (e.g., road improvements, utility maintenance, etc.); construction impacts at the West Sunset Well Facility site and South Sunset Well Facility site would be less than significant. The Lake Merced, Central Pump Station, South Windmill, and North Lake well facility sites have low visual quality and are poorly exposed. Construction activities at these sites would be relatively short and would not have a substantial adverse effect on the visual character or quality of the sites and surrounding areas.
Impact 4.3-4: Permanent adverse impacts on scenic vistas or visual character.	PSM	LS/LSM (equivalent to PSM)	N	See Impact AE-3: The proposed project would not have an adverse effect on a scenic vista. Also see Impact AE-4: The project would have a substantial adverse effect on scenic resources or the existing visual character or quality of the site and its surroundings. The PEIR conservatively assumed that the Groundwater well facilities could be within viewsheds of I-280 and the Great Highway, Lake Merced, Pine lake, San Francisco Zoo, and or Golden Gate Park. Implementation of PEIR Measures 4.3-4a (Architectural Design), 4.3-4c (Landscape Screens), and 4.3-4d (Tree Removal) would reduce these potentially significant impacts to a less-than-significant level. The project-level analysis determined that some locations near the proposed Lake Merced well facility could be considered vista points due to their unique and high-quality views. However, because the well facility is co-located with an existing water infrastructure facility and because viewers would be focused on views across the lake, the lake Merced well facility would not result in an adverse effect on scenic vistas. All other well facility sites do not include scenic vistas; there construction of the project would have a less than significant impact on scenic vistas. As described in Impact AE-4, the proposed project's pumping would

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Visual Quality (cont.)				
Impact 4.3-4 (cont.)				exacerbate surface water levels at Lake Merced such that reduced lake levels could detract from the scenic quality of the lake as viewed from the pedestrian path around the perimeter of the lake, adjacent roadways, trails, picnic areas, docks, and golf courses. Implementation of Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced) would reduce impacts on the visual character and quality of Lake Merced area to a less-than-significant level.
Impact 4.3-5: New permanent sources of light or glare.	PSM	LS	Y	See Impact AE-5: The proposed project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area. The PEIR conservatively assumed that all WSIP projects that include aboveground improvements could include a new source of light or glare and required implementation of design measures (Mitigation Measure 4.3-5) to reduce this impact to a less-than-significant level. Other well facilities would not result in substantial view blockage and therefore would not result in a substantial adverse effect on the site's visual quality. The project-level analysis determined that the Lake Merced and Golden Gate Park well facility sites would not be in the vicinity of residences or other land uses that would be sensitive to light and glare. Potentially affected viewers in the vicinity of the South Sunset and West Sunset well facilities would not be exposed to direct illumination or glare from reflective surfaces but might be exposed to soft light reflected off of the door of the building. In an urban context with many existing light sources, this would not be a substantial source of light or glare and no mitigation is required.
Geology, Soils, and Seismicity				
Impact 4.4-1: Slope instability during construction.	PSM	LS	N	See Impact GE-1: The proposed project is not located on a geologic unit that could become unstable as a result of project construction. The WSIP PEIR assumed that the pipelines associated with the Groundwater Supply project could cross areas of potential landslide susceptibility in San Mateo County but implementation of SFPUC Construction Measure #2 Seismic and Geotechnical Studies) as well as a quantified landslide analysis (Measure 4.4-1) would reduce this impact to a less-than-significant level.

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Geology, Soils, and Seismicity (cont.)				
Impact 4.4-1 (cont.)				While the PEIR conservatively assumed that some of the pipelines for the Groundwater Supply project could extend into San Mateo County, this is not the case under the proposed project which is located entirely in San Francisco. The project-level analysis determined that the proposed facilities would not lie in designated landslide zones. Pipeline installation would include open-cut excavation activities but implementation of shoring techniques, as required by Occupational Safety and Health Administration (OSHA) and standard geotechnical practice, would ensure that potential impacts related to slope instability are less than significant.
Impact 4.4-2: Erosion during construction.	LS	LS	Y	See Impact GE-2: The proposed project would not result in substantial soil erosion or the loss of topsoil during construction.
Impact 4.4-3: Substantial alteration of topography.	LS	N/A	N	See Section 5.15.3 under the heading "Approach to Analysis." While construction at the West Sunset and South Sunset well facility sites would require excavation into the adjacent slopes to create a flat area for the well facilities, such alternatives would not substantially alter the topography of the surrounding area. Therefore, there would be no impact related to substantial changes to topography or geologic or physical features of the site.
Impact 4.4-4: Squeezing ground and subsidence during tunneling.	N/A	N/A	Y	As described in EIR Chapter 3, Project Description, trenchless construction (auger boring) would be used to tunnel under the light rail lines. Subsidence is not expected to be an issue.
Impact 4.4-5: Surface fault rupture.	LS	N/A	N	See Section 5.15.3 under the heading "Approach to Analysis." The project-level analysis determined that because the project sites are not located within an Alquist-Priolo Fault Zone, and no mapped or potentially active faults are known to pass through the project area, the significance criterion related to exposing people or structures to risk of ground rupture along a fault line is not applicable to the proposed project.
Impact 4.4-6: Seismically induced groundshaking.	LS	LS	Y	See Impact GE-3: The proposed project would not expose people or structures to substantial adverse effects related to the risk of property loss, injury, or death due to seismically induced groundshaking.
Impact 4.4-7: Seismically induced ground failure, including liquefaction and settlement.	LS	LS	Y	See Impact GE-4: The proposed project would not expose people or structures to substantial adverse effects related to the risk of property loss, injury, or death due to seismically induced ground failure, including liquefaction, lateral spreading, and settlement.
Impact 4.4-8: Seismically induced landslides or other slope failures.	LS	LS	Y	See Impact GE-1: The proposed project is not located on a geologic unit that could become unstable as a result of project construction.

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Geology, Soils, and Seismicity (cont.)				
Impact 4.4-9: Expansive or corrosive soils.	PSM	LS	N	See Impact GE-5: The proposed project would not create substantial risks to life or property due to expansive or corrosive soils. Based on regional mapping reviewed for the PEIR, expansive and corrosive soils are mapped in the project area, and impacts related to these soils were considered potentially significant. The analysis presented in the PEIR was based on the preliminary project information available at that time. Since preparation of the PEIR, geotechnical investigations have been conducted for the proposed project, which concluded that the project area soils have a mild to moderate corrosion potential, and advised that all buried ductile iron or steel pipelines be protected against corrosion. Implementation of these recommendations, which have been incorporated into the project design of the groundwater pipeline, would ensure that potential impacts related to corrosive soils are less than significant.
Hydrology and Water Quality				
Impact 4.5-1: Degradation of water bodies as a result of erosion and sedimentation or a hazardous materials release during construction.	LS	LSM	Y	See Impact HY-1: Project construction would possibly violate water quality standards and waste discharge requirements or otherwise substantially degrade water quality. Although final locations of the Groundwater Supply Project were not determined at the time of publication of the WSIP PEIR, the PEIR indicated that implementation of SFPUC Construction Measure #3 (onsite air and water quality measures during construction), implementation of control measures in compliance with NPDES permit requirements for projects disturbing more than one acre, and implementation of measures in compliance with Article 4.1 of the San Francisco's Public Works Code would ensure that this impact is less than significant. Similar to the PEIR, the project-level analysis indicates that through compliance with Article 4.1 of the San Francisco Public Works Code, the SFPUC would be required to develop and implement an erosion and sediment control plan. Impact HY-1 also evaluated potential effects on water quality in the combined sewer system and Lake Merced by discharges of dewatered groundwater. The project-level analysis determined that if dewatered groundwater were discharged to Lake Merced, these discharges could degrade water quality but implementation of Mitigation Measure HY-1 (Implement Groundwater Dewatering BMPs at Lake Merced Well Facility) would reduce these effects to a less-than-significant level.

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Hydrology and Water Quality (cont.)				
Impact 4.5-2: Depletion of groundwater resources.	LS/PSM	LS/LSM (equivalent to PSM)	Y	See Impact HY-12: Project operation would not have a substantial adverse effect on groundwater depletion in the Westside Groundwater Basin. As described in Section 5.16.1, the project-level EIR also addresses other negative effects on the groundwater basin relative to subsidence, seawater intrusion, groundwater/surface water interactions, and water quality (Impacts HY-7 through HY-11). The PEIR evaluates potential impacts related to the depletion of groundwater resources in Section 5.6. Impacts 5.6-1 through 5.6-6 in the PEIR address potential impacts on the Westside Groundwater Basin, including basin overdraft, changes in water levels in Lake Merced, seawater intrusion due to decreased groundwater levels, land subsidence, and contamination of drinking water. In the North Westside Groundwater Basin, land subsidence and the potential for drinking water contaminants to exceed maximum contaminant levels as a result of groundwater pumping were determined to be less than significant. The program-level analysis determined that effects related to basin overdraft, changes in water levels in Lake Merced, seawater intrusion, and contamination of drinking water would be potentially significant but implementation of Mitigation Measures 5.6-1 (Groundwater Monitoring to Determine Basin Safe Yield), 5.6-2 (Implementation of a Lake Management Plan), and 5.6-5 (Drinking Water Source Assessments for Groundwater Wells) would reduce such impacts to less-than-significant levels. The project-level analysis also determined that project-related groundwater pumping would not result in substantial land subsidence nor would it have a substantial adverse effect on water quality in Pine Lake. Similar to the PEIR, the analysis determined that operations could result in seawater intrusion, adverse effects on water quality affecting beneficial uses of Lake Merced, and could cause a violation of water quality standards. However, implementation of Mitigation Measures M-HY-8a (Expand Coastal Monitoring Network), M-HY-8b (Continuous Groundwater Monitoring in the Primary Production Aquifer), M-HY-8c (Adaptive Management Program for Seawater Intrusion), M-HY-9 (Lake-Level Management for Lake Merced), and M-HY-11 (Prepare a Source Water Protection Program and Update Drinking Water Source Assessment) would reduce aforementioned impacts to a less-than-significant level.

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Hydrology and Water Quality (cont.)				
Impact 4.5-3a: Degradation of water quality due to construction dewatering discharges.	N/A	LSM	N	See Impact HY-1: Project construction would possibly violate water quality standards and waste discharge requirements or otherwise substantially degrade water quality. The PEIR assumed that the Groundwater Supply Project would not involve dewatering. As described above for PEIR Impact 4.5-1, dewatered groundwater could degrade water quality at Lake Merced but Mitigation Measure HY-1 would reduce this potential impact to a less-than-significant level.
Impact 4.5-3b: Degradation of water quality due to construction-related discharges of treated water.	N/A	LSM (equivalent to PSM)	N	See Impact HY-1: Project construction would possibly violate water quality standards and waste discharge requirements or otherwise substantially degrade water quality. The PEIR assumed that the Groundwater Supply Project would not involve construction-related discharges of water; therefore this impact was determined to not be applicable. The project-level analysis indicates that, consistent with Article 4.1 of the San Francisco Public Works Code, a permit from the SFPUC would be required. This permit would contain appropriate standards to regulate the quantity and quality of discharges and would ensure that discharges to the sewer age system are less than significant.
Impact 4.5-4: Flooding and water quality impacts associated with impeding or redirecting flood flows.	PSM	LS	N	See Impact HY-5: The proposed project would not result in adverse effects related to the placement of structures within a 100-year flood hazard area. At the time the PEIR was prepared, the project design conservatively assumed that some Groundwater Supply Project components could be constructed in San Mateo County and could be constructed in a flood zone. Thus, the PEIR determined that impacts related to flooding would be potentially significant but implementation of flood flow protection measures (Measure 4.5-4a), which would be prepared for the project, would reduce impacts to a less-than-significant level. The project-level analysis determined that none of the proposed project sites are within a special flood hazard zone nor are they located in San Mateo County. The project-level analysis determined that the South Windmill Replacement well facility site is within an area

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Hydrology and Water Quality (cont.)				
Impact 4.5-4 (cont.)				of potential flooding under existing conditions as well as with a 55-inch sea level rise. Given that the proposed well facility would be smaller than the existing irrigation well building that would be demolished at the same location, and because the facility would not be inhabited by people, this impact would be less than significant.
Impact 4.5-5: Degradation of water quality and increased flows due to discharges to surface water during operation.	PSM	LSM (equivalent to PSM)	N	See Impact HY-9: The proposed project would possibly have a substantial, adverse effect on water quality that could affect the beneficial uses of Lake Merced. The PEIR analysis determined that the use of treated stormwater for groundwater recharge could affect groundwater quality if the bacterial standards for the source water were less stringent than those for drinking water, a potentially significant impact. Implementation of Measure 4.5-5, which requires treatment to remove nutrients from stormwater and implementation of groundwater monitoring in the vicinity of Lake Merced, would reduce this impact to less than significant. While the PEIR analysis focused on potential drinking water quality impacts associated with the Lake Merced project (a separate WSIP project), the project-level analysis focuses on whether the proposed project would result in significant changes in water quality that could affect the beneficial uses of Lake Merced using modeled existing conditions compared with lake water levels modeled to occur with implementation of the proposed project. The project is predicted to cause Lake Merced water levels to fall, which could result in water quality changes that could cause exceedences of water quality objectives related to warm and cold freshwater habitat, a potentially significant impact. Implementation of Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced) would reduce this impact to a less-than-significant level.
Impact 4.5-6: Degradation of water quality due to an alteration of drainage patterns or an increase in impervious surfaces.	LS	LS	Y	See Impact HY-2: Project operation would not violate any water quality standards or waste discharge requirements or otherwise degrade water quality. Also see Impact HY-3: The proposed project would not substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner that would result in substantial erosion, siltation, or flooding on or off the site.

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Biological Resources				
Impact 4.6-1: Impacts on wetlands and aquatic resources.	PSM	LS/LSM (equivalent to PSM)	N	See Impact BI-2: Construction of the proposed project would not adversely affect federally protected wetlands. Also see Impact BI-7: Operation of the proposed project would adversely affect wetland habitats and other waters of the United States associated with Lake Merced. The PEIR analysis assumed that the Groundwater Supply Project could affect wetlands and stream crossings at undetermined locations but implementation of SFPUC Construction Measure #8 (biological screening survey) would help determine whether wetland and aquatic resources would be affected. If needed, Measures 4.6-1 and 4.6-1b would have been implemented. Since publication of the PEIR, several biological surveys have been conducted at project sites. The project-level analysis determined that the project sites do not support federally protected wetlands or waters of the U.S. but given that the sites are located near several water bodies, construction activities (e.g., grading and excavation) could result in erosion to adjacent areas such as Lake Merced, North Lake, and wetlands associated with these features. Development and implementation of an Erosion and Sedimentation Control Plan, as required by Article 4.1 of the San Francisco Public Works Code, would ensure that potential impacts on wetlands are less than significant. The project-level analysis also evaluates potential effects on wetlands due to groundwater pumping and decreases in water levels at Lake Merced (see Impact BI-7), which could be potentially significant. The analysis determined that implementation of Mitigation Measure M-HY-9 (Lake Level Management for Lake Merced) would maintain water levels to avoid or minimize adverse effects on wetlands at Lake Merced.
Impact 4.6-2: Impacts on sensitive habitats, common habitats, and heritage trees.	PSM	LSM (equivalent to PSM)	Y	See Impact BI-3: Construction of the proposed project would conflict with applicable local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance.

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Biological Resources (cont.)				
Impact 4.6-3: Impacts on key special-status species – direct mortality and/or habitat effects.	LS	LSM (equivalent to PSM)	Y	See Impact BI-1: Construction of the proposed project would potentially adversely affect species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS. The PEIR analysis assumed that proposed Groundwater Supply Project facilities would be located in previously disturbed areas that do not support key special-status species. Since publication of the PEIR, the project-level analysis determined that the project could result in adverse impacts on sensitive species that utilize aquatic habitats at Lake Merced, North Lake, and Central Pump Station well facility sites. Vegetation clearing could also result in impacts on special-status bats and monarch butterflies. Implementation of Mitigation Measures M-BI-1a, -1b, and -1c would reduce this impact to a less-than-significant level.
Impact 4.6-4: Water discharge effects on riparian and/or aquatic resources.	N/A	LS	N	See Impact HY-1: Project construction would possibly violate water quality standards and waste discharge requirements or otherwise substantially degrade water quality. The PEIR assumed that the Groundwater Supply Project would not involve dewatering. As described above for PEIR Impact 4.5-1, the project-level analysis determined that dewatered groundwater could degrade water quality at Lake Merced but Mitigation Measure M-HY-1 would reduce this potential impact to less than significant.
Impact 4.6-5: Conflicts with adopted conservation plans or other approved biological resources plans.	N/A	NI	Y	See Section 5.14.3 in the Biological Resources section.
Cultural Resources				
Impact 4.7-1: Impacts on paleontological resources.	PSM	LS	N	See Impact CP-3: The proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature. The WSIP PEIR assumed that since the Groundwater Supply Project would involve excavation, the likelihood that this project could affect paleontological resources was considered potentially significant but implementation of PEIR Measure 4.7-1 would reduce the impact to less than significant.

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Cultural Resources (cont.)				
Impact 4.7-1 (cont.)				Since publication of the PEIR, the project-level analysis determined there is a low potential for project construction to uncover unique or significant fossils within the paleontological C-APE. Therefore, the impact related to direct or indirect effects on paleontological resources would be less than significant, and no mitigation would be required.
Impact 4.7-2: Impacts on archaeological resources.	PSM	LSM (equivalent to PSM)	Y	See Impact CP-2a: The proposed project would potentially cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5. Also see Impact CP-2b: Construction of the proposed Lake Merced well facility would potentially cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5.
Impact 4.7-3: Impacts on the historical significance of a historic district or a contributor to a historic district.	N/A	LS	N	Impact CP-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco Planning Code. The WSIP PEIR concluded that the Groundwater Supply Project would add new facilities to the WSIP system or upgrade existing non-historic facilities; therefore, the project would not affect historic components of the regional system. The project-level analysis evaluated the potential for proposed well facilities and new groundwater supply pipeline to affect any historical resources, including those within the Golden Gate Park National Historic District. The project-level analysis determined that none of the proposed components or staging areas would cause impacts on historical resources.
Impact 4.7-4: Impacts on the historical significance of individual facilities resulting from demolition or alteration.	N/A	LS	N	See Impact CP-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco Planning Code. The PEIR assumed that demolition would be limited to paved areas and playgrounds at the Francis Scott Key School Annex, and West and South Sunset Playgrounds.

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Cultural Resources (cont.)				
Impact 4.7-4 (cont.)				The project-level analysis determined that demolition of the existing well facilities at the North Lake site and South Windmill site would not result in the removal of any features that contribute to the Golden Gate National Register Historic District. The project does not include a well facility site at the Francis Scott Key School. This impact would be less than significant.
Impact 4.7-5: Impacts on adjacent historic architectural resources.	LS	LS	Y	See Impact CP-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5, including those resources listed in Article 10 or Article 11 of the San Francisco Planning Code.
Traffic, Transportation, and Circulation				
Impact 4.8-1: Temporary reduction in roadway capacity and increased traffic delays.	PSM	LS	Y	See Impact TR-1: Closure of travel lanes during project construction would temporarily reduce roadway capacity and increase traffic delays on area roadways, causing temporary and intermittent conflicts with all modes of travel, but the effects would be of short duration and limited in magnitude. The PEIR conservatively assumed that because the Groundwater Supply project would require construction within or across local roadways, this impact would be potentially significant. Implementation of SFPUC Construction Measure #5 (traffic control plan) and additional control measures identified in Measure 4.8-1a would reduce this impact to a less-than-significant level. The project-level analysis indicates that the SFPUC would implement a Construction Management Plan as part of the SFMTA's Transportation Advisory Staff Committee, which includes representatives from the SFDPW, the SFMTA, and the Fire, Planning, Police, Port, and Public Health Departments. Due to the short duration and limited magnitude of traffic disruptions and through coordination and review of the Construction Management Plan, construction impacts would be less than significant.
Impact 4.8-2: Short-term traffic increases on roadways.	LS	LS	Y	See Impact TR-2: Project construction would cause temporary increases in traffic volumes on area roadways, but would not cause substantial conflicts with the performance of the circulation system.

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Traffic, Transportation, and Circulation (cont.)				
Impact 4.8-3: Impaired access to adjacent roadways and land uses.	PSM	LS	Y	See Impact TR-3: Project construction would not substantially limit access to adjacent roadways and land uses due to construction within roadways. The WSIP PEIR assumed that the Groundwater Supply Project would have the potential to result in impacts on adjacent land uses and on pedestrian and bicycle circulation, especially in a densely populated area. Implementation of SFPUC Construction Measure #5 (traffic control plan) and additional control measures identified in PEIR Measure 4.8-1a were thought to reduce this impact to a less-than-significant level. The project-level review determined that given the expected pace of work, impaired access to adjacent land uses, driveways, and cross-streets along the pipeline construction routes would be limited to one or two days at most. The analysis also revealed that the project would restore access and travel or parking lanes during non-construction hours by covering trenches with steel plates and that the SFPUC would be required to provide notification to all emergency service providers prior to lane closures. For these reasons, the impact determination is less than significant.
Impact 4.8-4: Temporary displacement of on-street parking.	PSM	NI	N	Since publication of the PEIR, the significance criterion specifically pertaining to displacement of on-street parking has been deleted from the San Francisco Planning Department's initial study checklist (San Francisco Planning Department, 2010).
Impact 4.8-5: Increased traffic safety hazards during construction.	PSM	NI	N	See Impacts TR-1: Closure of travel lanes during project construction would temporarily reduce roadway capacity and increase traffic delays on area roadways, causing temporary and intermittent conflicts with all modes of travel, but the effects would be of short duration and limited in magnitude. Also see Impact TR-4: Project construction would not substantially impair access to alternative transportation facilities (public transit, bicycle, or pedestrian facilities), although it could temporarily decrease the performance of such facilities. The PEIR conservatively assumed that the WSIP projects in all regions would increase safety hazards but implementation of SFPUC Construction Measure #5 (traffic control plan) and additional traffic control measures identified in Measure 4.8-1a would reduce this impact to a less-than-significant level.

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Traffic, Transportation, and Circulation (cont.)				
Impact 4.8-5 (cont.)				The project-level analysis determined that transportation impacts, including potential for increased safety hazards, are generally not considered significant because of the project's temporary and limited duration. Implementation of a Construction Management Plan as part of the Transportation Advisory Staff Committee (TASC) process would ensure that the SFPUC coordinates appropriately with jurisdictional agencies through the Street Construction Coordination Center of the SFDPW and the TASC. Implementation of this plan would ensure that potential safety hazards would be less than significant.
Impact 4.8-6: Long-term traffic increases during facility operation.	LS	LS	Y	See Impact TR-5: Project operations and maintenance activities would cause some increases in traffic volumes on area roadways, but would not substantially alter transportation conditions and would not cause conflicts with alternative travel modes, including vehicles, emergency vehicles, transit, pedestrians, and bicycle traffic.
Air Quality				
Impact 4.9-1: Construction emissions of criteria pollutants.	LS	LS	Y	See Impact AQ-1: Project construction activities would not generate emissions of criteria pollutants and precursors such that a violation of air quality standards and substantial contribution to an existing air quality violation would occur.
Impact 4.9-2: Exposure to diesel particulate matter during construction.	LS	LS	Y	See Impact AQ-2: Project construction would not result in substantial exposure of sensitive receptors to pollutant concentrations.
Impact 4.9-3: Exposure to emissions (possibly including asbestos) from tunneling.	PSM	N/A	N	See Impact AQ-3: Project construction activities would not result in the creation of objectionable odors that affect a substantial number of people. The PEIR analysis conservatively assumed that the Groundwater Supply Project could require the use of jack-and-bore construction, which could result in exposure of nuisance odors. Though tunneling would be required under the two MUNI light rail line crossings, the project-level analysis determined that tunneling would not result in the creation of objectionable odors. Rather, in general, the EIR determined that the use of construction equipment and well facility construction would generate diesel exhaust emissions, which could result in objectionable odors for nearby residents but since the odors would be temporary, the impact would be less than significant.

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Air Quality (cont.)				
Impact 4.9-4: Air pollutant emissions during project operation.	LS	LS	Y	See Impact AQ-5: Project operations would expose sensitive receptors to pollutant concentrations, but concentrations would not be substantial.
Impact 4.9-5: Odors generated during project operation.	LS	LS	Y	See Impact AQ-6: Project operations could create objectionable odors, but the odors would not affect a substantial number of people.
Impact 4.9-6: Secondary emissions at power plants.	LS	LS	N	See Impact ME-2: Project operations would not result in substantial adverse effects related to the long-term use of large amounts of fuel or energy, or the use of these resources in a wasteful manner. For all WSIP facility improvement projects, the PEIR analysis assumed any incremental increase in power demand would not result in significant secondary air quality impacts. The EIR analysis is consistent with the PEIR analysis and estimated the increase in power demand from implementation of the project to be less than 1 percent. Thus, this PEIR impact was not specifically called-out in the project-level analysis.
Impact 4.9-7: Conflict with implementation of applicable regional air quality plans addressing criteria air pollutants and state goals to limit greenhouse gas emissions.	LS	LS	Y	See Impact C-GG-1: The proposed project would generate greenhouse gas emissions, but not in levels that would result in a significant impact on the environment or conflict with any policy, plan, or regulation adopted for the purpose of reducing greenhouse gas emissions.
Noise and Vibration				
Impact 4.10-1: Disturbance from temporary construction-related noise increases.	PSU	LSM (equivalent to PSM)	N	See Impact NO-1: The proposed project would result in the exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance or result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. When the PEIR was prepared, the primary construction noise issue related to the Groundwater Supply Project pertained to 24-hour drilling required as part of proposed well construction, which could exceed the sleep interference criterion if sensitive receptors were located within approximately 900 feet of well sites. Implementation of Noise controls

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Noise and Vibration (cont.)				
Impact 4.10-1 (cont.)				(Measure 4.10-1a) could reduce this effect if setbacks were less than 300 feet, construction noise impacts would be potentially significant and unavoidable. Project-level review indicates that construction-related noise associated with well facilities and pipeline segments south of Golden Gate Park would result in a noticeable but temporary increase in ambient noise levels. Implementation of Mitigation Measure M-NO-1, which requires adherence to San Francisco Noise Ordinance daytime threshold of 80 dBA at 100 feet (or 86 dBA at 50 feet) at all locations between 7 a.m. to 8 p.m. would reduce this impact to less-than-significant levels.
Impact 4.10-2: Temporary noise disturbance along construction haul routes.	PSU	LSM (equivalent to PSM)	N	See Impact NO-1: The proposed project would result in the exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance or result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. The PEIR assumed that any nighttime truck operations greater than 1 truck per hour could exceed the sleep interference criterion during construction of the Groundwater Supply Project. Implementation Mitigation Measures 4.10-2a (limiting hourly truck volumes during the day) and 4.10-2b (restricting of nighttime truck operations) could reduce the impact but even with implementation of this measure, the impact would be potentially significant and unavoidable. The project-level analysis determined that, with implementation of the proposed project, increases of up to 10 trucks per hour would be noticeable but less than significant. Thus, project haul trips would not result in a noticeable noise increase at sensitive receptors. Contrary to the PEIR analysis, no nighttime construction would occur.
Impact 4.10-3: Disturbance due to construction-related vibration.	PSU	LS	N	See Impact NO-2: Construction activities would not result in substantial groundborne vibration or groundborne noise levels. The PEIR assumed that potentially significant vibration effects could result if there are any sensitive receptors located within 100 feet of proposed facilities but implementation of vibration controls (Measures 4.10-31 and 4.10-3b) would help reduce impacts. The analysis conservatively assumed that construction could occur during nighttime hours; therefore, the impact was considered potentially significant and unavoidable.

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Noise and Vibration (cont.)				
Impact 4.10-3 (cont.)				The project does not propose nighttime construction. The analysis assumed that caisson drilling could be required for drilling under the MUNI light rail lines at Taraval Street and Judah Street, which could generate vibration levels of approximately 0.04 PPV for receptors at 40 feet. However, given the temporary nature of this work and because vibration levels would not exceed the building damage threshold of 0.2 PPV, this impact would be less than significant.
Impact 4.10-4: Disturbance due to long-term noise increases.	LS	LS	Y	See Impact NO-3: Project operations would not result in the exposure of persons to, or generation of, noise levels in excess of standards or a substantial increase in ambient noise levels in the project vicinity.
Public Services and Utilities				
Impact 4.11-1: Potential temporary damage to or disruption of existing regional or local public utilities.	PSM	LSM (equivalent to PSM)	Y	See Impact UT-3: Project construction would potentially result in a substantial adverse effect related to disruption of utility operations or accidental damage to existing utilities.
Impact 4.11-2: Temporary adverse effects on solid waste landfill capacity.	PSM	LS	N	See Impact UT-1: Project construction would not result in a substantial adverse effect related to landfill capacity. The analysis presented in the PEIR was based on preliminary project information available at that time and no estimated volumes of waste were available. Therefore, the PEIR conservatively assumed that impacts on solid waste landfill capacity would be potentially significant. Updated project information developed since the preparation of the PEIR indicates that project construction activities would produce approximately 3,040 cubic yards of excess spoils. Through compliance with the San Francisco Construction and Demolition (C&D) Ordinance (Ordinance No. 27-06), it is assumed that 65 percent of the excess spoils would be diverted from nearby landfill. The receiving landfill would receive up to 65 percent of the 1,065 cubic yards of construction and demolition debris. The project-level analysis determined that there is adequate landfill capacity to accept the project's construction waste. Therefore, impacts related to adverse effects on solid waste landfill capacity would be less than significant.

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Public Services and Utilities (cont.)				
Impact 4.11-3: Impacts related to compliance with statutes and regulations related to solid waste.	PSM	LS	N	See Impact UT-2: Project construction would not result in a substantial adverse effect related to compliance with federal, State, and local statutes and regulations pertaining to solid waste. The PEIR was conservative in assuming that large amounts of spoils could be disposed of off-site for all WSIP projects and required preparation of a waste management or recycling plan to achieve waste diversion rates in compliance with applicable statutes and regulations. The project-level analysis determined that compliance with the San Francisco C&D Ordinance (Ordinance No. 27-06), which prohibits C&D materials from being placed into the trash or sent directly to a landfill, would ensure that the project properly recycles, reuses and disposes of the C&D materials that the project produces. Therefore, potential impacts related to compliance with federal, State, and local solid waste statutes and regulations would be less than significant.
Impact 4.11-4: Impacts related to the relocation of utilities.	PSM	LSM (equivalent to PSM)	Y	See Impact UT-4: Project construction would potentially result in a substantial adverse effect related to the relocation of local utilities.
Recreational Resources				
Impact 4.12-1: Temporary conflicts with established recreational uses during construction.	PSM	LS	N	See Impact RE-1: The proposed project's construction would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated or otherwise result in substantial degradation of existing recreational resources. The PEIR conservatively assumed that the Groundwater Supply Project could disrupt recreational uses at several CCSF locations, including the South Sunset and West Sunset Playgrounds, and the playground at Francis Scott Key School, Lake Merced, two sites in Golden Gate Park, the San Francisco Zoo, and Pine Lake. In the absence of detailed project information, this impact was identified as potentially significant. Implementation of SFPUC Construction Measures #1, #3, #5, and #6, mitigation measures identified in PEIR Chapter 6, and coordination with golf course/recreational facility managers (Measure 4.12-1) would reduce the impact to a less-than-significant level.

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Recreational Resources (cont.)				
Impact 4.12-1 (cont.)				The project-level review concluded that although the proposed well facilities would be located within and immediately adjacent to parks and other recreation resources, construction would not result in removal or deterioration of such uses. The project-level review also indicated that access within the western Golden Gate Park would be slightly altered during project construction through the temporary restrictions and closures of roads and bicycle lanes but since construction activities would occur on weekdays only and any open trenches would be covered during non-work hours, the proposed project would not conflict with the high recreation use on weekend days. Therefore, this impact would be less than significant.
Impact 4.12-2: Conflicts with established recreational uses due to facility siting and project operation.	PSM	LS	N	See Impact RE-2: The proposed project's operation would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated. The PEIR analysis assumed that the groundwater wells at the South Sunset Playground and West Sunset Playground would result in potentially significant impacts on recreational resources but implementation of architectural design, landscaping, and tree removal measures (Measures 4.3-4a, 4.3-4b, 4.3-4c, and 4.3-4d), as well as appropriate siting of proposed facilities (Measure 4.12-2), would reduce potential impacts to a less-than-significant level. The project-level analysis indicates that the South Sunset and West Sunset well facilities would not be located on active play fields at the South Sunset or West Sunset Playgrounds. Other well facilities would also not be located in high visitor use areas of Golden Gate Park. For these reasons, potential increases in the use of existing neighborhood and regional parks or other recreational facilities would be less than significant.
Agricultural Resources				
Impact 4.13-1: Temporary conflicts with established agricultural resources.	N/A	NI (equivalent to NA)	Y	As described in Section 5.19 of the Groundwater Supply Project EIR, the project would not result in impacts related to agricultural resources.
Impact 4.13-2: Conversion of farmlands to nonagricultural uses.	N/A	NI (equivalent to N/A)	Y	As described in Section 5.19 of the Groundwater Supply Project EIR, the project would not result in impacts related to agricultural resources.

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Hazards				
Impact 4.14-1: Potential to encounter hazardous materials in soil or groundwater.	PSM	LSM (equivalent to PSM)	Y	See Impact HZ-2: Project construction would possibly result in a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials present in soil and groundwater. Based on a voluntary study performed on behalf of the SFPUC in 2004, the PEIR assumed that raising the water level in Lake Merced under the Groundwater Supply Project would inundate a portion of the Pacific Road and Gun Club property and could result in lead and arsenic concentrations that exceed drinking water standards and cause adverse effects on aquatic organisms. For this reason, environmental effects were considered potentially significant. Lake Merced water levels would not be raised under the proposed project. The project-level analysis was based on information obtained from site investigation reports and geotechnical engineering reports prepared subsequent to publication of the WSIP PEIR. Similar to the PEIR, the project-level analysis determined that the potential hazard to construction workers and/or the environment from exposure to known elevated lead levels in soil at the North Lake and Central Pump Station well facility sites would be potentially significant. Implementation of Mitigation Measures M-HZ-2a through M-HZ-2c, Preconstruction Hazardous Materials Assessment, Health and Safety Plan, and Hazardous Materials Management Plan, would reduce this impact to a less-than-significant level.
Impact 4.14-2: Exposure to naturally occurring asbestos during construction.	LS	LS	Y	See Impact HZ-1: Project construction would not result in a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or result in reasonably foreseeable upset and accident conditions involving the release of hazardous construction materials to the environment.
Impact 4.14-3: Risk of fires during construction.	LS	N/A	N	At the time the WSIP PEIR was prepared, the locations of specific Groundwater Supply Project components had not been determined. Therefore, the PEIR conservatively assumed that the project could be located within high fire hazard zones in San Francisco. As described in Section 5.17.3 of the EIR, the project-level analysis has determined that the project sites are not within areas designated as very high or high fire hazard zones. Thus, the significance criterion related to exposing people or structures to a significant risk of loss, injury, or death involving fires is not applicable.

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Hazards (cont.)				
Impact 4.14-4: Gassy conditions in tunnels.	LS	NI	N	The PEIR analysis was based on a project design that could require tunneling using jack-and-bore construction at roadway crossings. Updated project design information indicates that the project would not involve jack-and-bore construction; rather, the project would entail trenchless construction (auger boring) to tunnel under MUNI rail lines.
Impact 4.14-5: Exposure to hazardous building materials.	PSM	LS	N	See Impact HZ-1: Project construction would not result in a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or result in reasonably foreseeable upset and accident conditions involving the release of hazardous construction materials to the environment. At the time that the WSIP PEIR was prepared, the need for demolition under the Groundwater Supply Project had not been determined. Therefore, the PEIR conservatively assumed that demolition could be required and the impact was considered potentially significant. Updated project design information indicates that the proposed project would require demolition of existing structures at the North Lake and South Windmill Replacement well facility sites. However, analytical testing of building materials indicated that asbestos-containing materials are not present and lead concentrations in paint are below the U.S. Department of Housing and Urban Development definition of lead-based paint. Further, through compliance with regulations, impacts related to demolition, transportation and disposal of hazardous building materials would be less than significant.
Impact 4.14-6: Accidental hazardous materials release from construction equipment.	LS	LS	Y	See Impact HZ-1: Project construction would not result in a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials or result in reasonably foreseeable upset and accident conditions involving the release of hazardous construction materials to the environment.
Impact 4.14-7: Increased use of hazardous materials during operation.	LS	LS	Y	See Impact HZ-5: Project operations would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
Impact 4.14-8: Emission or use of hazardous materials within 1/4 mile of a school.	LS	LS	Y	See Impact HZ-6: Project operations would not cause hazardous emissions or handle acutely hazardous materials within ¼ mile of a school.

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Energy Resources				
Impact 4.15-1: Construction-related energy use.	PSM	LS	Y	See Impact ME-1: Project construction would not result in substantial adverse effects related to the use of large amounts of fuel or energy, or the use of these resources in a wasteful manner. The PEIR analysis assumed that during construction activities, fuel use for construction activities, including worker commute trips, the excessive idling and other inefficient site operations could result in the wasteful use of fuels, a potentially significant impact. Implementation of exhaust control measures specified in PEIR Section 4.9, Air Quality, and exhaust control measures (Measures 4.9-1b and 4.9-1d) would reduce the impact to less-than-significant levels. The project-level analysis also assumed that excessive idling and other inefficient site operations could result in the wasteful use of fuels. Implementation of SFPUC actions described in Section 3.4.5, SFPUC Standard Construction Measures and Greenhouse Gas Reduction Measures and compliance with the Airborne Toxic Control Measure (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling would ensure that this potential energy impact is less than significant.
Impact 4.15-2: Long-term energy use during operation.	PSM	LS	N	See Impact ME-2: Project operations would not result in substantial adverse effects related to the long-term use of large amounts of fuel or energy, or the use of these resources in a wasteful manner. The PEIR estimated that the Groundwater Supply Project would require up to 5,100,000 kWh for project operations. The PEIR determined that implementation of this project in addition to other WSIP projects in the San Francisco region (e.g., San Andreas Pipeline 3 Installation and Recycled Water Project) would increase energy use in the San Francisco region by approximately 87 percent, a potentially significant impact. Similar to the WSIP PEIR, the project-level analysis determined that the proposed project would require an estimated total of 4,994,000 kWh per year. Rather than comparing this usage to San Francisco energy usage, the analysis focused on the project's effect on energy produced by the Hetch Hetchy system. Since the project would constitute approximately 0.3 percent of the total energy produced by the Hetch Hetchy system, this impact would be less than significant.

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Collective Facilities Impacts (Consider these to be potential cumulative impacts)				
Impact 4.16-1a: Collective temporary and permanent impacts on existing land uses in the vicinity of proposed facility sites.	N/A	N/A	N/A	
Impact 4.16-1b: Collective temporary and permanent impacts on the visual character of the surrounding area.	LSM	N/A	N/A	
Impact 4.16-2: Collective exposure of people or structures to geologic and seismic hazards.	N/A	N/A	N/A	
Impact 4.16-3: Collective WSIP impacts related to flooding hazards and the degradation of surface waters.	LSM	N/A	N/A	
Impact 4.16-4: Collective loss of sensitive biological resources.	N/A	N/A	N/A	
Impact 4.16-5: Collective increase in impacts related to archaeological, paleontological, and historic resources.	N/A	N/A	N/A	
Impact 4.16-6: Collective traffic increases on local and regional roads.	PSM	N/A	N/A	
Impact 4.16-7: Collective increases in construction and operational emissions in the region.	LS	N/A	N/A	
Impact 4.16-8: Collective increases in construction-related and operational noise.	PSU	N/A	N/A	

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Collective Facilities Impacts (Consider these to be potential cumulative impacts) (cont.)				
Impact 4.16-9: Collective impacts on utilities and landfill capacity.	N/A	N/A	N/A	
Impact 4.16-10: Collective effects on recreational resources during construction.	LSM	N/A	N/A	
Impact 4.16-11: Collective conversion of farmland to nonagricultural uses.	N/A	N/A	N/A	
Impact 4.16-12: Collective effects related to hazardous conditions and exposure to or release of hazardous materials.	LSM	N/A	N/A	
Impact 4.16-13: Collective increases in the use of nonrenewable energy resources during operation.	LSM	N/A	N/A	
Cumulative Facilities Impacts				
Impact 4.17-1: Cumulative disruption of established communities, changes in existing land use patterns, and impacts on the existing visual character.	LS	LS/LSM (equivalent to PSM)	Y	See Section 5.2, Impact C-LU: Implementation of the proposed project would not result in a cumulatively considerable contribution to a significant cumulative impact on the existing character of the vicinity. Also see Section 5.3, Impact C-AE: The proposed project would have a cumulatively considerable contribution to a significant cumulative aesthetic impact. The PEIR determined that cumulative development in the vicinity of WSIP projects could disrupt established communities and significantly alter existing land use patterns. However, implementation of SFPUC construction measures and PEIR Measure 4.3-2 would ensure that the WSIP's contribution to cumulative land use and visual impacts are less than significant. The EIR analysis determined that with operation of the North Westside Groundwater Basin Management Plan, Daly City's proposed Vista Grande Drainage Basin Improvement Project,

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Cumulative Facilities Impacts (cont.)				
Impact 4.17-1 (cont.)				SFPUC's proposed Regional Groundwater Storage and Recovery project, as well as the proposed project, estimated Lake Merced water levels are predicted to be mostly higher than under modeled existing conditions. During some years, however, water levels are predicted to be less than levels that would otherwise be expected under modeled existing conditions and Impound Lake would likely be substantially reduced. Groundwater pumping associated with the proposed project and the Regional Groundwater Storage and Recovery Project would worsen the hydrologic conditions and the scenic qualities of Lake Merced. However, implementation of Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced), would ensure that the proposed project's contribution to this cumulative impact would not be cumulatively considerable.
Impact 4.17-2: Cumulative exposure of people or structures to geologic and seismic hazards.	LS	LS	Y	See Section 5.15, Impact C-GE: Project implementation would not result in cumulatively considerable impacts related to geology, soils, and seismicity. The PEIR determined that cumulative geologic and seismic impacts would be site-specific and would be less than significant or mitigated through implementation of PEIR Measures 4.4-1, 4.4-4, and 4.4-9.
Impact 4.17-3: Cumulative impacts related to the degradation of water quality, alteration of drainage patterns, increased surface runoff, and flooding hazards.	B/LS	LS/LSM (equivalent to PSM)	N	See Section 5.16, Impacts C-HY-1 through C-HY-7. The PEIR determined that the WSIP projects in conjunction with other projects would not result in cumulative water quality and hydrology effects related to increased erosion and sedimentation, construction-related discharges of treated water or groundwater produced during dewatering, or operational discharges of treated water with implementation of proper BMPs for temporary and permanent erosion control. The project-level analysis evaluated cumulative hydrology and water quality impacts due to facility construction, operation and maintenance activities as well as the cumulative effects related to groundwater pumping (including well interference, subsidence, seawater intrusion, and water quality effects on beneficial uses of Lake Merced, and groundwater depletion). The project-level analysis determined that the project's contribution to most

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Cumulative Facilities Impacts (cont.)				
Impact 4.17-3 (cont.)				cumulative hydrology and water quality impacts would not be cumulatively considerable. However, as described in Impact C-HY-4, the proposed project could contribute to cumulative impacts related to seawater intrusion but implementation of Mitigation Measures M-HY-8a (Expand Coastal Monitoring Network), M-HY-8b (Continuous Groundwater Monitoring in the Primary Production Aquifer), and M-HY-8c (Adaptive Management Program for Seawater Intrusion) would ensure that that chloride concentrations are kept below 250 mg/L at any coastal monitoring location. Regarding the project's contribution to cumulative water quality impacts that would affect beneficial uses of Lake Merced (see Impact C-HY-5), the project as well as the Daly City Vista Grande Drainage Basin Improvement Project and the Regional Groundwater Storage project could potentially cause increased eutrophication of Lake Merced and adverse effects on other water quality parameters due do water level declines. Implementation of Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced) would ensure that the project's contribution to this impact would not be cumulatively considerable.
Impact 4.17-4: Cumulative loss of sensitive biological resources.	LS	LSM	Y	See Section 5.15, Impact C-BI: The proposed project would result in cumulative impacts related to special-status species, wetlands, waters of the United States, riparian habitat, wildlife nursery sites, and compliance with local policies and ordinances protecting biological resources. The PEIR determined that cumulative impacts on biological resources would be less than significant through implementation of PEIR Measures 4.6-1 through 4.6-3as well as Measure 4.16-4a. The project-level analysis determined that the proposed project and cumulative projects (e.g., Murphy Windmill/Millwright's Cottage Restoration, the Beach Chalet Athletic Fields Renovation Project, the Parkmerced Project, and the San Francisco Botanical Garden Sustainable Gardening Project; and construction of new pipelines and facilities associated with the San Francisco Westside Recycled Water Project, and the Lake Merced Pump Station Essential Upgrade Project) could result in potentially significant cumulative impacts on biological resources. Implementation of Mitigation Measures M-BI-1a, M-BI-1b, M-BI-1c, M-BI-3 would ensure that the project's contribution to impacts on sensitive species and trees would not be

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Cumulative Facilities Impacts (cont.)				
Impact 4.17-4 (cont.)				cumulatively considerable. The project-level analysis also evaluated cumulative impacts related to groundwater pumping operations. Pumping associated with the Regional Groundwater Storage and Recovery Project and the proposed project would cause lake levels to fall and could decrease water quality in Lake Merced. Implementation of Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced) would ensure that the project's contribution to cumulative impacts on fisheries and fish habitat would not be cumulatively considerable.
Impact 4.17-5: Cumulative increase in impacts on archaeological, paleontological, and historical resources.	PSU	LSM	N	See Section 5.5, Impact C-CP: The proposed project would possibly result in cumulatively considerable impacts related to historical, archaeological, or paleontological resources or human remains. The PEIR conservatively assumed that, in combination, projects in the Sunol Valley and Peninsula regions could result in significant impacts on individual historical resources or on potential historic districts (if historic districts were determined to be present). The PEIR did not describe cumulative impacts on cultural resources in the San Francisco region. The project-level analysis determined that the proposed project as well as adjacent cumulative projects including the Beach Chalet Athletic Fields Renovation Project, the Murphy Windmill/ Millwright's Cottage Restoration Project, and the San Francisco Botanical Gardens Center for Sustainable Gardening Project, could encounter previously unrecorded archaeological resources or human remains, a potentially significant cumulative impact. Implementation of Mitigation Measures M-CP-2a, M-CP-4, and M-CP-2b would ensure that the project's contribution to this cumulative impact would not be cumulatively considerable.
Impact 4.17-6: Cumulative traffic increases on local and regional roads.	PSU	LS	N	See Section 5.6, Impact C-TR: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not substantially contribute to cumulative traffic increases on local and regional roads. The PEIR cumulative analysis determined that significant cumulative impacts could occur during concurrent construction of nearby projects, including non-SFPUC projects, and based on the conservative assumption that interagency coordination of construction traffic might not always be possible; this impact was determined to be potentially significant and unavoidable.

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Cumulative Facilities Impacts (cont.)				
Impact 4.17-6 (cont.)				The project-level analysis determined that the proposed project in combination with construction activities from cumulative projects such as the Parkmerced Project, San Francisco Botanical Gardens: Center for Sustainable Gardening, Beach Chalet Athletic Fields Renovation Project, San Francisco Westside Recycled Water Project, Vista Grande Drainage Basin Improvement Project, could result in temporary and intermittent travel lane or road closures near work sites and increased construction traffic on local and regional roadways. However, the Construction Management Plan would require the SFPUC to engage in ongoing coordination with the appropriate jurisdictional agencies through the TASC to address any potential cumulative transportation impacts. Thus, implementation of this plan would ensure that the project's contribution to this cumulative impact would not be cumulatively considerable.
Impact 4.17-7: Cumulative increases in construction and/or operational emissions in the region.	PSU	LS	N	See Section 5.8, Impact C-AQ: Construction and operation of the proposed project could result in cumulative air quality impacts associated with criteria pollutant and precursor emissions and health risks, but the project's contribution would not be cumulatively considerable. The PEIR determined that cumulative impacts due to emissions of criteria pollutants would be PSU because the WSIP projects in combination with the cumulative projects would result in regionwide cumulative increases in air emissions during project operations and the residual contribution from each project would contribute to the region's nonattainment status for ozone and particulate matter. Cumulative impacts related to exposure to diesel particulate matter would also be potentially significant and unavoidable because of the lack the lack of certainty about the timing of many of the cumulative projects that might use common haul routes. The project-level analysis determined that construction-related criteria pollutant and precursor exhaust emissions associated with the project would not exceed the significance thresholds and would therefore not result in cumulative construction-related air quality impacts. The analysis also determined that the cumulative lifetime excess cancer risk and the cumulative particulate matter from the proposed project and existing nearby sources would not exceed the cumulative significance criteria; thus no cumulative construction-related health risk impact would occur.

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Cumulative Facilities Impacts (cont.)				
Impact 4.17-8: Cumulative increases in construction-related and operational noise.	PSU	LS	N	See Section 5.7, Impact C-NO: Construction and operation of the proposed project, in combination with other past, present and reasonably foreseeable future projects in the project vicinity, would not result in a cumulatively considerable contribution to significant noise and vibration impacts. The PEIR determined that cumulative impacts related to noise from truck traffic could occur if the cumulative projects generated truck traffic and used the same delivery/haul/access routes at the same time as the WSIP projects, causing localized cumulative construction-related noise increases. Given the lack of certainty about the timing of many of cumulative projects, this cumulative impact was considered potentially significant and unavoidable. The project-level review indicates that cumulative noise increases from construction of cumulative projects (e.g., Parkmerced Project) in combination with the proposed project would be below the threshold of human detection for normal environmental noise. Noise generated during project operation would also be reduced through implementation of Mitigation Measure M-NO-1. Thus, the project's contribution to cumulative noise effects would not be cumulatively considerable.
Impact 4.17-9: Cumulative impacts related to the disruption of utility service or the relocation of utilities.	LS	LSM	N	See Section 5.12, Impact C-UT: Project implementation would result in cumulatively considerable impacts related to disruption or relocation of utilities, landfill capacity, or compliance with solid waste statutes and regulations. The PEIR determined that construction of the WSIP projects could disrupt utility services or require temporary or permanent relocation of utilities. However, PEIR determined that these potential impacts would be site-specific rather than additive and would be mitigated on a site-specific basis and, thus, this cumulative impact was considered less than significant. The project-level analysis determined that the proposed project, the San Francisco Westside Recycled Water Project and the Beach Chalet Athletic Fields Renovation Project would overlap and could damage or disrupt utilities in the same area. Collectively, implementation of Mitigation Measures M-UT-3a (Preconstruction Utility Identification and Coordination), M-UT-3b (Protection of Other Utilities during Construction), M-UT-3c (Safeguard Employees

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Cumulative Facilities Impacts (cont.)				
Impact 4.17-9 (cont.)				from Potential Accidents Related to Underground Utilities), M-UT-3d (Notify San Francisco Fire Department), M-UT-3e (Emergency Response Plan and Notification), M-UT-3f (Ensure Prompt Reconnection of Utilities), and M-UT-3g (Coordinate Final Construction Plans with Affected Utilities) would ensure that the project's contribution to this impact would not be cumulatively considerable.
Impact 4.17-10: Cumulative effects on recreational resources during construction.	LS	LSM (equivalent to PSM)	N	See Section 5.11, Impact C-RE: The project's contribution to cumulative impacts on recreational resources and uses would be cumulatively considerable. The PEIR determined that construction activities associated with some WSIP facilities could temporarily disrupt access to or use of recreational facilities during construction. However, implementation of SFPUC construction measures (including advanced notification) and coordination with recreational facility managers and schools (PEIR Measures 4.12-1a and 4.12-1b) would reduce the WSIP's impact to a less-than-significant level. The project-level analysis determined that the combination of the groundwater pumping associated with the proposed project, Regional Groundwater Storage and Recovery Project, and other ongoing groundwater pumping activities, would exacerbate decreased water levels at Lake Merced, a recreation resource. However, implementation of Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced) would ensure that water levels are maintained at water levels similar to those that would be expected without project-related pumping, and would ensure that the project's contribution to cumulative impacts on recreational resources at Lake Merced would not be cumulatively considerable.
Impact 4.17-11: Cumulative conversion of farmland to nonagricultural uses.	LS	N/A	Y	See Section 5.19, Agricultural Resources. The PEIR determined that the WSIP would not contribute to any regionwide cumulative loss of farmland in the Bay Area but could incrementally contribute to the regional cumulative loss of farmland in the San Joaquin Region. Siting WSIP facilities to avoid prime agricultural lands or to offset any loss of such lands (PEIR Measure 4.13-2) reduce the WSIP's contribution to this impact to a less-than-significant level. The project-level analysis determined that the proposed project would not result in any adverse effects on agricultural resources; therefore no cumulative impacts on agricultural resources would occur.

PEIR Significance Categories
N/A = Not Applicable or no impact
LS = Less than Significant
PSM = Potentially Significant impact with Mitigation
SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

EIR Significance Categories
NI = No Impact or not applicable (equivalent to N/A)
LS = Less than Significant
LSM = Less than Significant impact with Mitigation (equivalent to PSM)
SU = Significant and Unavoidable impact, no feasible mitigation is available
SUM = Significant and Unavoidable impact with Mitigation

TABLE 1 (Continued)
PEIR IMPACTS – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Impact	PEIR Significance Determination for Groundwater Supply Project	Project-Level Significance Determination	Same Rationale for Significance Determination as PEIR? (Y/N)	Notes (Explain difference in significance determinations and/or rationale for determinations)
Cumulative Facilities Impacts (cont.)				
Impact 4.17-12: Cumulative effects related to hazardous conditions and exposure to or release of hazardous materials.	LS	LSM	N	See Section 5.17, Impact C-HZ: Implementation of the proposed project would possibly result in cumulatively considerable impacts related to hazards and hazardous materials. The PEIR determined that due to the site-specific nature of hazardous materials impacts and mitigation measures, there would be no potential for cumulative effects from construction of WSIP projects in conjunction with other cumulative developments. The PEIR determined that compliance with applicable laws and regulations, and with implementation of SFPUC construction measures, this cumulative impact would be less than significant. The project-level analysis determined that operation of the proposed project in combination with the North Westside Groundwater Basin Management Plan, SFPUC's proposed Regional Groundwater Storage and Recovery Project, and Daly City's proposed Vista Grande Drainage Basin Improvements Project, Lake Merced water surface elevations are expected to be higher than under modeled conditions but during some dry years, the levels are predicted to be lower than those that would occur without operation of the cumulative projects. In the event of a major disaster, Lake Merced water could be pumped into the City's drinking water system and as a result, decreased water levels in Lake Merced could result in a significant cumulative impact. However, with implementation of Mitigation Measure M-HY-9, Lake-Level Management for Lake Merced, the project's contribution to this impact would not be cumulatively considerable.
Impact 4.17-13: Cumulative increases in the use of nonrenewable energy resources.	LS	LS	Y	See Section 5.18, Impact C-ME: Project implementation would not result in cumulatively considerable impacts related to mineral and energy resources.

PEIR Significance Categories
N/A = Not Applicable or no impact
LS = Less than Significant
PSM = Potentially Significant impact with Mitigation
SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

EIR Significance Categories
NI = No Impact or not applicable (equivalent to N/A)
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LSM = Less than Significant impact with Mitigation (equivalent to PSM)
SU = Significant and Unavoidable impact, no feasible mitigation is available
SUM = Significant and Unavoidable impact with Mitigation

WSIP PEIR Mitigation Measures, Applicability to the Proposed Project

The San Francisco Groundwater Supply Project (Groundwater Supply Project or proposed project) was analyzed at a program-level in the Water System Improvement Program (WSIP) Program Environmental Impact Report (PEIR)[2] as one of the facility improvement projects under the WSIP. The PEIR identified programmatic mitigation measures, and under Resolution No. 08-200, the SFPUC adopted the WSIP Mitigation Monitoring and Reporting Program that applies the programmatic mitigation measures to the WSIP facility improvements projects, including the Groundwater Supply Project. This Groundwater Supply Project Environmental Impact Report (EIR) provides a detailed, project-level analysis of the proposed project based on site-specific and up-to-date information developed subsequent to the preparation of the PEIR. This section identifies the applicability of the WSIP PEIR mitigation measures to the proposed project based on the project-level impact analysis.

Table B-1 lists the programmatic mitigation measures identified in the WSIP PEIR and indicates which of these mitigation measures are applicable to the proposed project. For the programmatic mitigation measures that are applicable, the table identifies the comparable project-level mitigation measure identified in the Groundwater Supply Project EIR that either relies on the programmatic measures or identifies an equivalent or better site-specific mitigation measure to replace the programmatic mitigation measure. The table also provides an explanation for those programmatic mitigation measures that are not applicable to the proposed project.

[2] San Francisco Planning Department, *Final Program Environmental Impact Report for the San Francisco Public Utilities Commission's Water System Improvement Program*, San Francisco Planning Department File No. 2005.0159E, State Clearinghouse No. 2005092026. Certified October 30, 2008.

TABLE B-1
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Land Use		
Measure 4.3-2, Facility Siting Studies: Conduct project-specific facility siting studies for non-SFPUC land and implement these studies' recommendations to avoid or minimize impacts on existing land uses.	N	Not applicable; all project facilities are sited on land owned by the City and County of San Francisco. As described in Chapter 3, Project Description, well facilities would be managed by the SFPUC, including those located on land currently managed by the San Francisco Recreation and Park Department (SFRPD). New well facilities would be sited adjacent to existing facilities used for operation and maintenance activities such as the Lake Merced Pump Station and the Central Pump Station. The proposed well facilities that would be adjacent to the South Sunset Playground and West Sunset Playground would be sited in areas that are not highly used by the public. In addition, the South Windmill Replacement well facility and the North Lake well facility would replace existing well facilities. No additional mitigation would be required.
Measure 4.3-4a, Architectural Design: Design permanent new, aboveground facilities to be compatible with existing visual character of the site and surrounding area.	N	The walls of proposed aboveground well facilities would generally be a dark stone-gray color and exterior finishes and textures were selected to avoid an industrial or indistinct appearance. Further, planting areas would be located around well facilities to provide partial screening. Both the South Windmill Replacement well and the North Lake well facilities would replace existing well facilities and the style of the buildings would be similar to Golden Gate Park buildings in the vicinity. Some trees would be removed from the well facilities but the areas are generally heavily vegetated such that removal of a few trees would not substantially alter views of the area. For these reasons, no additional mitigation would be required.
Measure 4.3-4b, Landscaping Plans: Prepare and implement landscaping plans to restore (recontour, revegetate, landscape) sites to preconstruction conditions. Monitor landscape plantings.	N	As part of the proposed project, landscape plans have been prepared for all proposed well facility sites. Refer to Section 5.3, Aesthetics, for depictions of the landscaped areas.
Measure 4.3-4c, Landscape Screens: Include new plantings and landscape berms to screen views of new structures and equipment from scenic roads.	N	As described above, landscape plans have been prepared for the proposed well facility sites to provide screening. Refer to Section 5.3, Aesthetics, for depictions of the landscaped areas. In addition, the proposed aboveground facilities would be designed to result in minimal adverse visual effects; exterior finishes and textures were selected to avoid an industrial or indistinct appearance. See Impact AE-4, The project would not have a substantial adverse effect on scenic resources or the existing visual character or quality of the site and its surroundings.
Measure 4.3-4d, Minimize Tree Removal: Minimize or avoid the removal of trees that screen existing and proposed WSIP facility sites; implement tree replacement plan.	Y	See Mitigation Measure M-BI-3 (Plant Replacement Trees).

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Land Use (cont.)		
Measure 4.3-4d (cont.)		The project-level mitigation measure requires the SFPUC to replace any trees removed within SFRPD-managed lands with trees of equivalent ecological value (i.e., similar species) of the trees removed. If the project site does not have adequate room for replanting trees, the SFPUC will coordinate with SFRPD to identify acceptable replanting locations in the vicinity of the project site.
Measure 4.3-5, Reduce Lighting Effects: Use cut-off shields and nonglare fixture design, direct lighting onsite and downward, prevent use of highly reflective building materials or finishes.	N	As part of the proposed project, permanent lighting for the proposed well facilities would be recessed lights above the doors of each building. The Lake Merced and Golden Gate Park sites would not be in the vicinity of residences or land uses sensitive to light and glare. Lighting at the South Sunset and West Sunset facilities would not generate substantial sources of light or glare since these sites are in urban areas with many existing light sources. Furthermore, building materials would be light grey or dark in color and would be nonreflective. No mitigation is necessary. See Impact AE-5, The proposed project would not create a new source of substantial light or glare that would adversely affect day or nighttime views in the area.
Geology		
Measure 4.4-1, Quantified Landslide Analysis: Avoid sites with landslide hazards; where they cannot be avoided, conduct site-specific slope stability analyses and implement recommendations.	N	The proposed facilities do not lie within designated landslide zones, and thus landsliding would not be expected. Therefore, this PEIR measure is not applicable. See Impact GE-1, The proposed project is not located on a geologic unit that could become unstable as a result of project construction.
Measure 4.4-4, Subsidence Monitoring Program: Monitor subsidence and implement corrective actions as warranted.	N	Not applicable; the project does not involve tunneling.
Measure 4.4-9, Characterize Extent of Expansive and Corrosive Soil: Characterize the presence of expansive/corrosive soils; implement recommendations.	N	The presence of expansive and corrosive soils was evaluated as part of the project-specific geotechnical report. The project would be located on soils with a low shrink-swell potential; therefore potential impacts related to expansive soils would be less than significant at these sites. With respect to corrosive soils, the proposed project would be located on potentially corrosive soils. However, because corrosion protection measures have been incorporated into the design of the groundwater pipeline (see Section 3.4.1), no mitigation is required. See Impact GE-5, The proposed project would not create substantial risks to life or property due to expansive soils or corrosive soils.
Hydrology		
Measure 4.5-2, Site-Specific Groundwater Analysis and Identified Measures: Conduct project-specific analysis of dewatering and implement measures to ensure that groundwater resources and the beneficial uses of groundwater are not adversely affected.	N	Not necessary. During construction, any project-related effects on the shallow groundwater table would be temporary in nature, as dewatering would be required only during certain phases of construction and only if groundwater is encountered.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Hydrology (cont.)		
Measure 4.5-4a, Flood Flow Protection Measures: Preclude exposure of stockpiled soils, hazardous materials, and construction materials to flood flows.	N	The project area (including staging areas) is located outside of the designated 100-year FEMA flood hazard zone. See Impact HY-5, The proposed project would not result in adverse effects related to the placement of structures within a 100-year flood hazard area. No additional mitigation is necessary.
Measure 4.5-4b, Site-Specific Flooding Analysis and Identified Measures: Implement design measures to preclude projects from causing flooding or damage from redirected flood flows.	N	No mitigation is necessary. The project-level analysis determined that none of the project areas is within a special flood hazard zone. See Impact HY-5, The proposed project would not result in adverse effects related to the placement of structures within a 100-year flood hazard area. Although the South Windmill Replacement well site is within areas of potential flooding, the proposed 685-square foot well facility would be smaller than the existing 900-square foot irrigation well building that would be demolished under the proposed project. Thus, any potential for the well facility to redirect or exacerbate flood flows would be less compared to existing conditions.
Measure 4.5-5, Stormwater Treatment and Groundwater Monitoring: If treated stormwater is used to maintain Lake Merced water levels, monitor surface water and groundwater quality in the vicinity of Lake Merced. Identify and implement corrective actions (e.g., treatment).	Y	See Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced). This program requires the SFPUC to conduct monitoring to detect changes in lake level and water quality as well as groundwater-level elevations add supplemental water to augment lake levels if available; and alter pumping as necessary to avoid adverse effects on Lake Merced should a supplemental water source be unavailable. See Measure M-HY-9 for additional details.
Measure 4.5-6, Appropriate Source Controls and Site Design Measures: For projects located in areas not covered by a municipal stormwater permit and disturbing less than one acre of land during construction, implement appropriate source control and site design measures. These measures will ensure compliance with applicable water quality criteria and goals and protect the beneficial uses of the receiving water.	N	Consistent with the San Francisco's Green Building Ordinance, Article 4.1 of the San Francisco Public Works Code, and the SFPUC's Water Pollution Prevention Program, the SFPUC would be required to implement an erosion and sediment control plan, which includes provisions to prevent stormwater pollution and control runoff at each site during project construction. In addition, SFPUC would be required to obtain a permit in accordance with Article 4.1 of the San Francisco Public Works Code, for groundwater dewatering discharges to the combined sewer system.
Biology		
Measure 4.6-1a, Wetlands Assessment: Wetland scientist will determine whether wetlands could be affected by the project, and, if so, perform a wetland delineation and develop mitigation.	N	The proposed project facilities are not located in wetland areas. A wetland delineation prepared in 2007 was used to assess operational impacts on wetlands at Lake Merced. See Section 5.14, Biological Resources, for additional information.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)		Applicable to Proposed Project (Y/N)?	Discussion
Biology (cont)			
Measure 4.6-1b, Compensation for Wetlands and Other Biological Resources: If a WSIP project will affect jurisdictional wetlands, implement avoidance measures, restoration procedures, and compensatory creation or enhancement to ensure no net loss of wetland extent or function. Compensate for sensitive riparian and upland habitats supporting key special-status species. Obtain permits for each project and comply with applicable regulations addressing sensitive habitats and species. The Habitat Reserve Program is an alternative for implementing offsite habitat compensation.		Y	See Mitigation Measure M-BI-7. The project-level analysis determined that operation of the Groundwater Supply Project would result in fluctuations in water surface elevation at Lake Merced between -10.4 and 10.7 feet City Datum. With implementation of the project, modeling results indicate that a net loss of wetlands would occur over time under the proposed project in comparison to existing conditions. Implementation of Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced) would require the SFPUC to maintain average annual lake levels at water elevations within which no net loss of wetlands would occur as a result of the project.
Measure 4.6-2, Habitat Restoration/Tree Replacement: Restore temporarily affected sensitive habitats. Replace trees designated as heritage trees (or similar local designation) consistent with requirements of local ordinances. Minimize loss of sensitive habitats by coordinating WSIP projects.		Y	See Mitigation Measure M-BI-3 (Plant Replacement Trees). The project-level mitigation measure requires the SFPUC to replace any trees removed within SFRPD-managed lands with trees of equivalent ecological value at a 1:1 ratio (i.e., similar species) of the trees removed. If the project site does not have adequate room for replanting trees, the SFPUC will coordinate with SFRPD to identify acceptable replanting locations in the vicinity of the project site.
Measure 4.6-3a, Protection Measures During Construction for Key Special-Status Species and Other Species of Concern: Where key special-status species and other species of concern are potentially present, implement general practice measures (preconstruction surveys, worker awareness program, environmental inspector, minimization of habitat loss).		Y	See Mitigation Measures M-BI-1a (Avoidance and Minimization Measures for California Red-Legged Frog and Western Pond Turtle), M-BI-1b (Avoidance and Minimization Measures for Special-Status Bats), M-BI-1c (Avoidance and Minimization Measures for Monarch Butterfly). The project-level measures are consistent with the PEIR measure and provide additional site- and project-specific details where key special-status species and other species of concern are potentially present. An environmental inspector in not required, but a biological monitor is required under Mitigation Measure M-BI-1a.
Measure 4.6-3b, Standard Mitigation Measures for Key Special-Status Plants and Animals: Implement measures to reduce impacts on key special-status species. ***See below for specific species and corresponding sub-PEIR mitigation number.***			
Invertebrates			
Valley Elderberry Longhorn Beetle	I.1	N	Species not identified in project vicinity.
Vernal Pool Crustaceans (Vernal Pool Fairy Shrimp; Conservancy Fairy Shrimp; Vernal Pool Tadpole Shrimp)	I.2	N	Species not identified in project vicinity.
Bay Checkerspot Butterfly; Callippe Silverspot Butterfly	I.3	N	Species not identified in project vicinity.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)		Applicable to Proposed Project (Y/N)?	Discussion
Biology (cont)			
Central Valley Fall- and Late-Fall-Run DPS Chinook Salmon; Central Valley DPS Steelhead; Green Sturgeon Southern District DPS; Central Coast DPS Steelhead; Rainbow Trout	F.1	N	Species not identified in project vicinity.
Reptiles and Amphibians			
California Red-Legged Frog; Foothill Yellow-Legged Frog	RA.1	Y	See Mitigation Measure M-BI-1a (Avoidance and Minimization Measures for California Red-Legged Frog and Western Pond Turtle). The project-level measures are consistent with the PEIR measure and include site-specific protection measures for all special status species potentially present in the project area.
California Tiger Salamander	RA.2	N	Species not identified in project vicinity.
San Francisco Garter Snake	RA.3	N	Species has a low potential to occur within the project vicinity. No mitigation required.
Alameda Whipsnake	RA.4	N	Species not identified in project vicinity.
Birds			
Swainson's Hawk	B.1	N	Species not identified in project vicinity.
Western Burrowing Owl	B.2 and B.3	N	Species not identified in project vicinity.
Raptors (including Bald Eagle)	B.4	N	Species not identified in project vicinity.
Least Bell's Vireo	B.5	N	Species not identified in project vicinity.
California Black Rail, California Clapper Rail	B.6	N	Species has a low potential to occur within the project vicinity. No mitigation required.
Western Snowy Plover	B.7	N	Species has a low potential to occur within the project vicinity. No mitigation required.
Mammals			
Salt Marsh Harvest Mouse	M.1	N	Species not identified in project vicinity.
San Joaquin Kit Fox	M.2	N	Species not identified in project vicinity.
Riparian Woodrat	M.3	N	Species not identified in project vicinity.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)		Applicable to Proposed Project (Y/N)?	Discussion
Biology (cont)			
Plants			
Vernal Pool Plants (Succulent Owl's Clover; Hoover's Spurge; Colusa Grass; San Joaquin Valley Orcutt Grass; Greene's Tuctoria; Hairy Orcutt Grass)	P.1	N	Species not identified in project vicinity.
Riparian Plants			
Delta Button-Celery	P.2	N	Species not identified in project vicinity.
Large-Flowered Fiddleneck	P.3	N	Species not identified in project vicinity.
San Francisco Woolly Sunflower; Marin Western Flax; Fountain Thistle	P.4	N	Marin Western Flax has a low potential to occur within the project vicinity. Other species not identified in project vicinity.
Measure 4.6-4, Pipeline and Water Treatment Plant Treated Water Discharge Restrictions: Design planned discharges from the WSIP pipelines and water treatment plants to natural water bodies to minimize impacts on riparian and aquatic resources and to avoid or minimize temperature effects on aquatic resources.		N	Not applicable; as described in Section 5.14, normal operations and maintenance of project facilities are not expected to impact biological resources. As described in Section 3.5.1, Operations, overboard pumping would occur after the initial conversion of the wells to drinking water production and after maintenance within the well. At the Lake Merced well facility, overboard pumping discharges would be directed into Lake Merced via the Lake Merced Pump Station's wet well. At the West Sunset and South Sunset well facilities, overboard discharges would be directed to an onsite percolation basin and drain pipe, respectively, to allow the groundwater to percolate back to the aquifer. At the Golden Gate Park well facility sites, water from overboard pumping would be used to fill North Lake or would infiltrate into the ground surface.
Cultural			
Measure 4.7-1, Suspend Construction Work if Paleontological Resource Is Identified: Suspend work and notify a qualified paleontologist when a paleontological resource is discovered at any of the project sites. The paleontologist will document the discovery as needed, evaluate the potential resource, and assess the significance of the find under CEQA criteria. Temporarily halt or divert excavation within 50 feet of a fossil find until the discovery is examined by a paleontologist. If avoidance is not feasible, the paleontologist will prepare an excavation plan.		N	Not applicable; there is a low potential for project activities to uncover unique or significant fossils within the paleontological C-APE. No mitigation is required. See Impact CP-3: The proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Cultural (cont.)		
Measure 4.7-2a, Archaeological Testing, Monitoring, and Treatment of Human Remains: Determine if implementation of an archaeological testing or archaeological monitoring program or both is the appropriate strategy for avoidance of potential adverse effects on significant archaeological resources. Review any requirements approved by the State Historic Preservation Officer. Prepare an archaeological testing plan, archaeological monitoring plan, final archeological resources report and, if applicable, an archaeological data recovery plan. The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activity will comply with applicable state laws.	Y	See Mitigation Measure M-CP-4 (Accidental Discovery of Human Remains). Although no known human burial locations have been identified within the project area, the EIR measure addresses the possibility of discovery during construction activities.
Measure 4.7-2b, Accidental Discovery Measures: Distribute archaeological resource "ALERT" sheet to contractors. If an archaeological resource may be present within the project site, an archaeological consultant will evaluate it and make a recommendation as to what action (e.g., preservation in situ) is warranted. The SFPUC will implement appropriate measures.	Y	See Mitigation Measure M-CP-2a (Accidental Discovery of Archaeological Resources).
Measure 4.7-3, Protection of Historic Districts: A qualified historian will assess the city's water system facilities affected by WSIP facility projects for their potential contribution to a historic district. If a historic district would be affected by one or more proposed WSIP facility project(s), develop and implement mitigation measures for effects with attention to the potential district as a whole. If a historic district is identified at the project level, it should be recorded as such, using National/California Register criteria of significance. Document the district by completing the State of California Department of Parks and Recreation Form 523 and submit to the State Historic Preservation Officer.	N	No historical resources, including those within the Golden Gate Park National Historic District, would be affected as a result of the proposed project.
Measure 4.7-4a, Alternatives Identification and Resource Relocation: Identify feasible project alternatives to eliminate or reduce the need for demolition or removal of a historic resource to the greatest extent possible. If preservation of the affected historical resource at the current site is determined to be infeasible, the structure will be stabilized and relocated to other appropriate nearby sites, if feasible. After relocation, the resource will be treated according to the Secretary of the Interior's *Standards for the Treatment of Historic Properties.* If the affected historic resource is to be demolished, consult with local historical societies and governmental agencies regarding salvage of materials for public information or reuse in other locations.	N	No historic resources would be demolished or removed as a result of the project.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Cultural (cont.)		
Measure 4.7-4b, Historical Resources Documentation: Prepare documentation of historic resources prior to any construction work associated with demolition or removal. The appropriate level of documentation will be selected by a qualified professional who meets the standards for history, architectural history, and/or architecture (as appropriate) set forth by the Secretary of the Interior's *Professional Qualification Standards* (36 CFR 61) in consultation with a preservation specialist assigned by the San Francisco Planning Department and the local jurisdiction, if deemed appropriate by the Planning Department.	N	No historic resources would be demolished or removed as a result of the project.
Measure 4.7-4c, Secretary of the Interior's Standards for the Treatment of Historic Properties: Prepare materials describing and depicting the proposed project. Review the proposed project for compliance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. If a project is determined to be inconsistent with the *Standards for the Treatment of Historic Properties*, pursue and implement redesign of the project such that consistency with the standards is achieved.	N	No historic properties would be altered as a result of project implementation.
Measure 4.7-4d, Historic Resources Survey and Redesign: Undertake a historic resources survey to identify and evaluate potential historic resources that may exist in the project's area of potential effect. If a survey identifies one or more historical resources, assess the impact the project may have on those historical resources. If the project will cause a substantial adverse change to a historic resource, assign a preservation specialist to review the proposed project for compliance with the Secretary of the Interior's *Standards for the Treatment of Historic Properties*. If the project is determined to be inconsistent with those standards, pursue and implement redesign of the project such that consistency with the standards is achieved.	N	The historic resources survey was conducted as part of background technical study for the project and is documented in Section 5.5, Cultural and Paleontological Resources.
Measure 4.7-4e, Historic Resources Protection Plan: A qualified historian will prepare a plan that specifies procedures for protecting and monitoring historic resources during construction.	N	No historic properties would be altered as a result of project implementation.
Measure 4.7-4f, Preconstruction Surveys and Vibration Monitoring: Include geotechnical investigations if vibration-related impacts could affect historic resources. Follow recommendations of the final geotechnical reports. Conduct a preconstruction survey of existing conditions and monitor the adjacent buildings for damage during construction, if recommended.	N	Not applicable; no historic resources would be affected as a result of project construction.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Traffic		
Measure 4.8-1a, Traffic Control Plan Measures: Elements of the traffic control plan could include: circulation and detour plans, designated truck routes, sufficient staging area, access to driveways, use of standard construction specifications for controlling construction vehicle movements, restrictions on truck trips during peak morning and evening commute hours, lane closure restrictions, maintenance of alternate one-way traffic flow, detour signing, pedestrian and bicycle access and circulation, equipment and materials storage, construction worker parking, roadside safety protocols, considerations for sensitive land uses, coordination with local transit service providers, roadway repair, and conformance with the state's *Manual of Traffic Controls for Construction and Maintenance Work Areas*.	N	Not applicable; as described in Section 5.6, Transportation and Circulation, to minimize temporary effects on traffic in the vicinity of the construction area, the SFPUC would implement a Construction Management Plan as part of the San Francisco Municipal Transportation Authority's Transportation Advisory Staff Committee (TASC) process. The SFPUC would coordinate with appropriate jurisdictional agencies through the Street Construction Coordination Center of the San Francisco Department of Public Works and the TASC.
Measure 4.8-1b, Coordination of Individual Traffic Control Plans: In the event that more than one construction contract is issued for work along existing or new pipelines, and where construction could occur within and/or across multiple streets in the same vicinity, coordinate the traffic control plans in order to mitigate the impact of traffic disruption by including measures that address overlapping construction schedules and activities, truck arrivals and departures, lane closures and detours, and the adequacy of on-street staging requirements.	N	Not applicable. Implementation of a project-specific Construction Management Plan would require the project to address potential transportation impacts and would require the SFPUC to engage in ongoing coordination with appropriate jurisdictional agencies through the TASC. See Impact C-TR: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not substantially contribute to cumulative traffic increases on local and regional roads.
Measure 4.8-4, Accommodation of Displaced Public Parking Supply for Recreational Visitors: Include an additional measure in the traffic control plans to accommodate any anticipated visitor parking demand that would be displaced by proposed projects at public recreational facilities.	N	No recreational parking would be permanently displaced under the project, with the potential exception of one parking space at the West Sunset Playground parking lot.
Air Quality		
Measure 4.9-1a, SJVAPCD Dust Control Measures: Include San Joaquin Valley Air Pollution Control District (SJVAPCD) Basic Control Measures in contract specifications for all construction sites. Include SJVAPCD Enhanced Control Measures in contract specifications when required to mitigate significant PM_{10} impacts. Include SJVAPCD Additional Control Measures in contract specifications for construction sites that are large in area, located near sensitive receptors, or which for any other reason warrant additional emissions reductions. Include SJVAPCD Rule 9510, Indirect Source Review, Section 6.1, Construction Equipment Emissions in contract specifications for any project subject to discretionary approval by a public agency that ultimately results in the construction of a new building, facility, or structure or reconstruction of a building, facility, or structure for the purpose of increasing capacity or activity and also involving 9,000 square feet of space.	N	The project is not located within the jurisdiction of the SJVAPCD.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Air Quality (cont.)		
Measure 4.9-1b, SJVAPCD Exhaust Control Measures: Include SJVAPCD Exhaust Control Measures in contract specifications, where applicable, for heavy-duty equipment to limit exhaust emissions within the San Joaquin Region.	N	The project is not located within the jurisdiction of the SJVAPCD.
Measure 4.9-1c, BAAQMD Dust Control Measures: For projects in the Sunol Valley, Bay Division, Peninsula, and San Francisco Regions, include Bay Area Air Quality Management District (BAAQMD) Basic Control Measures in contract specifications for all construction sites. Include BAAQMD Enhanced Control Measures in contract specifications for sites over four acres. Include BAAQMD Optional Control Measures in contract specifications for sites that are large in area, located near sensitive receptors, or which for any other reason warrant additional emissions reductions.	N	Not applicable; the SFPUC would comply with the San Francisco Construction Dust Control Ordinance (Ordinance No. 176-08), which requires the project sponsor to designate an individual to monitor compliance with dust control requirements.
Measure 4.9-1d, BAAQMD Exhaust Control Measures: For projects in the Sunol Valley, Bay Division, Peninsula, and San Francisco Regions, include BAAQMD Exhaust Control Measures to limit exhaust emissions, where applicable.	N	Not applicable. Emissions estimated from construction equipment and vehicle exhaust would not exceed applicable average daily significance thresholds for construction activities; therefore no mitigation is required.
Measure 4.9-2a, Health Risk Screening or Use of Soot Filters: Complete a health risk screening if truck volumes associated with a particular project along a particular haul route exceed 40,000 truck trips over the entire construction period. If a potentially significant impact is indicated, complete a site-specific health risk assessment. Consider diesel particulate matter (DPM) emission rates in separate project-level analysis at the time of construction. Develop a mitigation program based on the site-specific health risk assessment implementing methods of reducing DPM emission or exposure to a less-than-significant level.	N	The health risk assessment conducted as part of the background studies for the proposed project determined that DPM exposure at sensitive receptors (including adult and child residents, daycare facilities, schools, and playgrounds) would not exceed the BAAQMD's cancer and non-cancer risk thresholds. No mitigation is required.
Measure 4.9-2b, Vacate SFPUC Land Managers' Residences in Sunol Valley: Vacate the two SFPUC Land Managers' residences in the Sunol Valley during construction of the Calaveras Dam or SVWTP – Treated Water Reservoirs projects or complete a health risk screening (and, if warranted, a health risk assessment) to determine health risks at these residences from either of these two projects.	N	The project is not located in the Sunol Valley.
Measure 4.9-3, Tunnel Gas Odor Control: Add water scrubbers and appropriate chemicals to tunnel ventilation systems if odorous gases become a nuisance odor problem (i.e., odor complaints are received).	N	The project does not include tunneling.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Noise/Vibration		
Measure 4.10-1a, Noise Controls: For all WSIP projects located within 500 feet of any noise-sensitive receptors, implement appropriate noise controls to reduce daytime construction noise levels to meet the 70-dBA daytime speech interference criterion to the extent feasible. For all WSIP projects involving nighttime construction and located within 3,000 feet of any noise-sensitive receptors, implement appropriate noise controls to maintain noise levels at or below any applicable ordinance nighttime noise limits or the 50-dBA nighttime sleep interference criterion to the extent feasible.	Y	See Mitigation Measure M-NO-1 (Administrative and Source Controls). The project-level mitigation measure requires SFPUC to develop and implement a noise control plan that includes compliance with the San Francisco Noise Ordinance daytime threshold of 80 dBA at 100 feet at all project locations between 7 a.m. and 8 p.m. and other performance standards.
Measure 4.10-1b, Vacate SFPUC Caretaker's Residence at Tesla Portal: Vacate caretaker's residence at Tesla Portal during construction of the Advanced Disinfection and Tesla Portal Disinfection Station projects as well as those portions of the San Joaquin Pipeline System and Rehabilitation of Existing San Joaquin Pipelines projects located at Tesla Portal.	N	The project is not located at the Tesla Portal.
Measure 4.10-2a, Limit Hourly Truck Volumes: Haul and delivery truck routes for all WSIP projects will, to the extent feasible, avoid local residential streets and follow local designated truck routes. Total project-related haul and delivery truck volumes on any particular haul truck route will be limited to 80 trucks per hour.	N	Not applicable. The number of construction-related haul truck trips per day would vary depending on the type of construction technique, volume of spoils and fill. According to background noise levels estimated for San Francisco streets, increases of up to 10 trucks per hour would be noticeable but less than significant. Truck volumes would vary day to day but would not generate more than 10 haul trucks per hour on any one street providing access to and from a site. See Impact NO-1, The proposed project would result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
Measure 4.10-2b, Restrict Truck Operations: Prohibit haul and delivery trucks from operating within 200 feet of any residential uses during the nighttime hours. For receptors beyond 200 feet from a haul route, limit noise levels to the 50-dBA sleep interference criterion at the closest receptor.	N	Not applicable; project-related haul and delivery trucks would not operate during the nighttime or evening hours (8 p.m. to 7 a.m.).
Measure 4.10-2c, Vacate SFPUC Land Manager's Residence: Vacate Land Manager's residence adjacent to Alameda East Portal during offsite truck operations associated with the New Irvington Tunnel project, if truck operations occur during the nighttime hours (10 p.m. to 7 a.m.) and are estimated to exceed the 50-dBA sleep interference criterion at this residence.	N	Not applicable; the project is not located in the vicinity of the Alameda East Portal.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Noise/Vibration (cont.)		
Measure 4.10-3a, Vibration Controls to Prevent Cosmetic or Structural Damage: Incorporate restrictions into all contract specifications (primarily for sheetpile driving, pile driving, or tunnel construction activities), whereby surface vibration will be limited to 0.2 inch/second peak particle velocity (PPV) for continuous vibration (e.g., vibratory equipment and impact pile drivers) and 0.5 inch/second PPV for controlled detonations at the closest receptors to ensure that cosmetic or structural damage does not occur.	N	Not applicable; the project's vibration impacts were determined to be less than significant. See Impact NO-2.
Measure 4.10-3b, Limit Vibration Levels At or Below Vibration Perception Threshold: Maintain vibration levels at or below the vibration perception threshold at adjacent properties to the extent feasible during nighttime. If vibration complaints are received, operational adjustments will be made to reduce vibration annoyance effects.	N	Not applicable; the project's vibration impacts were determined to be less than significant. See Impact NO-2.
Measure 4.10-3c, Limit Tunnel-Related Detonation to Daylight Hours: Limit controlled detonation associated with tunnel construction to daylight hours, Monday through Saturday.	N	Not applicable; the project does not include tunneling.
Services/Utilities		
Measure 4.11-1a, Notify Neighbors of Potential Utility Service Disruption: Notify residents and businesses in project area of potential utility service disruption two to four days in advance of construction.	N	Project construction is not anticipated to result in utility service disruption for residences or businesses.
Measure 4.11-1b, Locate Utility Lines Prior to Excavation: Locate overhead and underground utility lines prior to excavation work.	Y	See Mitigation Measure M-UT-3a (Preconstruction Utility Identification and Coordination).
Measure 4.11-1c, Confirmation of Utility Line Information: Find the exact location of underground utilities by safe and acceptable means. Confirm information regarding the size, color, and location of existing utilities before construction activities commence.	Y	See Mitigation Measure M-UT-3a (Preconstruction Utility Identification and Coordination).
Measure 4.11-1d, Safeguard Employees from Potential Accidents Related to Underground Utilities: While any excavation is open, protect, support, or remove underground utilities as necessary to safeguard employees.	Y	See Mitigation Measure M-UT-3c (Safeguard Employees from Potential Accidents Related to Underground Utilities).
Measure 4.11-1e, Notify Local Fire Departments: Notify local fire departments any time damage to a gas utility results in a leak or suspected leak, or whenever damage to any utility results in a threat to public safety.	Y	See Mitigation Measure M-UT-3d (Notify Local Fire Department).
Measure 4.11-1f, Emergency Response Plan: Develop an emergency response plan in the event of a leak or explosion prior to commencing construction activities.	Y	See Mitigation Measure M-UT-3e (Emergency Response Plan and Notification).

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Services/Utilities (cont.)		
Measure 4.11-1g, Prompt Reconnection of Utilities: Promptly reconnect any disconnected utility lines.	Y	See Mitigation Measure M-UT-3f (Ensure Prompt Reconnection of Utilities).
Measure 4.11-1h, Coordinate Final Construction Plans with Affected Utilities: Coordinate final construction plans and specifications with affected utilities.	Y	See Mitigation Measure M-UT-3g (Coordinate Final Construction Plans with Affected Utilities).
Measure 4.11-2, Waste Reduction Measures: Incorporate into contract specifications for each WSIP project the requirement to obtain any necessary waste management permits prior to construction and to comply with conditions of approval attached to project implementation.	N	Consistent with the San Francisco Construction and Demolition Ordinance (Ordinance No. 27-06), sixty-five percent of excavated materials would be reused or recycled, which would meet or exceed the State of California's San Francisco's waste diversion goals. Additionally, San Francisco has a goal to divert 75 percent of all waste from landfills, which would also be met by the proposed project. See Impact UT-2, Project construction would not result in a substantial adverse effect related to compliance with federal, state, and local statutes and regulations pertaining to solid waste.
Recreation		
Measure 4.12-1, Coordination with Golf Course/Recreational Facility Managers: Coordinate with managers of golf courses or other recreational facilities directly affected by pipeline construction to minimize adverse impacts on golfers and other recreational users.	N	The project would not directly affect golf courses or other designated recreational facilities. Pedestrian and bicycle resources in Golden Gate Park would be slightly altered during pipeline construction through temporary construction disturbance; however the resources would be restored to their general preconstruction condition and no mitigation is required. See Impact RE-1, The proposed project's construction would not increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facilities would occur or be accelerated or otherwise result in substantial degradation of existing recreational resources.
Measure 4.12-2, Appropriate Siting of Proposed Facilities: Locate WSIP project facilities on park and recreation properties in consultation with park planning staff to minimize the direct loss of recreation and play space and to minimize inconvenience to park and recreation users.	N	Not applicable; proposed well facilities would not be located on active play fields or high visitor use areas of Golden Gate Park, West Sunset Playground, or South Sunset Playground. As part of the proposed project, for well facilities that are proposed in Golden Gate Park, the SFPUC would operate and maintain these facilities in consultation and coordination with SFRPD. Thus, no mitigation would be required.
Agriculture		
Measure 4.13-1a, Supplemental Noticing and Soil Stockpiling: For the San Joaquin Pipeline projects (San Joaquin System and Rehabilitation of Existing San Joaquin Pipeline), stockpile and replace topsoil in mapped areas of Prime and Unique Farmland and Farmland of Statewide Importance that would be temporarily disturbed by pipeline construction, unless other actions are required under specific agreements with individual landowners.	N	The project is not located in the San Joaquin Region.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Agriculture (cont.)		
Measure 4.13-1b, Avoidance or Soil Stockpiling: Minimize any potential impacts on agricultural lands in the Sunol Valley by avoiding these resources wherever possible. Where this is not possible, stockpile, replace, and hydroseed topsoil to prevent erosion, unless other actions are required as a result of contracts affecting use of the property or under specific agreements with individual landowners.	N	The project is not located in the Sunol Valley Region.
Measure 4.13-2, Siting Facilities to Avoid Prime Farmland: Avoid areas identified as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. If avoidance is not feasible, adopt a permanent set-aside for an equivalent acreage of similarly valued farmland in the area.	N	Not applicable; the project would not affect agricultural resources. See Section 5.19, Agricultural and Forest Resources.
Hazards		
Measure 4.14-1a, Site Health and Safety Plan: For all projects where the site assessment indicates the potential to encounter hazardous materials, prepare a site health and safety plan identifying the chemicals present, potential health and safety hazards, monitoring, soil-handling methods, appropriate personnel protective equipment, and emergency response procedures.	Y	See Mitigation Measures M-HZ-2a (Preconstruction Hazardous Materials Assessment), M-HZ-2b (Health and Safety Plan) and M-HZ-2c (Hazardous Materials Management Plan). The project-level mitigation measures require the construction contractor to conduct a regulatory agency database review of hazardous materials sites in the project vicinity. If this review indicates a high likelihood of encountering contamination at the project sites, additional soil and groundwater sampling would need to occur prior to preparation of a site-specific health and safety plan (Mitigation Measure M-HZ-2b) and hazardous materials disposal plan (Mitigation Measure M-HZ-2c).
Measure 4.14-1b, Materials Disposal Plan: For all projects where the site assessment indicates the potential to encounter hazardous materials in the soil, prepare a materials disposal plan that specifies the disposal method and approved disposal site for the soil.	Y	See Mitigation Measure M-HZ-2c (Hazardous Materials Management Plan). The project-level mitigation measure requires the contractor to prepare a hazardous materials management plan that specifies the method for handling and disposal of contaminated soil and building debris, should any be encountered during construction.
Measure 4.14-1c, Coordination with Property Owners and Regulatory Agencies: Based on regulatory agency file reviews, assess the potential to encounter unacceptable levels of hazardous materials at known environmental cases, for construction activities to cause groundwater plume migration or interfere with ongoing remediations at known environmental cases, and for increased water levels in reservoirs or lakes to inundate known environmental cases. Modify construction or remediation activities.	N	The project is not expected to interfere with the investigation or remediation of a known environmental case. See Section 5.17.1, Setting.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Hazards (cont.)		
Measure 4.14-2, Health Risk Screening and Airborne Asbestos Monitoring Plan: For tunneling projects where soil or rock may contain naturally occurring asbestos, conduct a health risk screening assessment to identify acceptable levels of asbestos in tunnel emissions. Prepare an airborne asbestos monitoring plan for approval by the BAAQMD.	N	The project would not disturb a rock unit or soil that contains naturally occurring asbestos. See Section 5.15.1, Setting.
Measure 4.14-5, Hazardous Building Materials Surveys and Abatement: For all WSIP projects involving demolition or renovation of existing facilities, perform a hazardous building materials survey for each structure prior to demolition or renovation activities. If any friable asbestos-containing materials, lead-containing materials, or hazardous components of building materials are identified, implement adequate abatement practices prior to demolition or renovation.	N	Not applicable; an asbestos-containing materials and lead-based paint survey was performed in January 2011 and no asbestos was detected in any of the samples. Therefore, the potential hazards related to encountering asbestos-containing materials during demolition would be less than significant. No mitigation would be required.
Energy		
Measure 4.15-2, Incorporation of Energy Efficiency Measures: Consistent with the Energy Action Plan II priorities for reducing energy usage, ensure that energy-efficient equipment is used in all WSIP projects. Prepare a repair and maintenance plan for each facility to minimize power use. Evaluate the potential for use of renewable energy resources.	N	Not applicable; the SFPUC would consult with the SFPUC Power Enterprise's Energy Efficiency Group to incorporate all feasible energy efficiency measures into project design and no mitigation would be required. See Impact ME-2, Project operations would not result in substantial adverse effects related to the long-term use of large amounts of fuel or energy, or the use of these resources in a wasteful manner.
Collective Impacts (These are considered cumulative mitigation measures in project-level CEQA documents)		
Measure 4.16-1a, Construction Coordination at Irvington Portal: If construction schedules of multiple WSIP projects occurring at and near Irvington Portal coincide or overlap, the SFPUC will coordinate with construction contractor(s) and neighbors to minimize disturbance of residents in the adjacent neighborhood to the extent practicable. Such coordination will need to balance the duration of construction with the magnitude of construction-related impacts on the same sensitive receptors.	N	The project is not located at the Irvington Portal.
Measure 4.16-4a, Bioregional Habitat Restoration Measures: Address the following bioregional effects and implement conservation principles when implementing habitat compensation mitigation required for individual WSIP facility projects: compound impacts on functional units of habitat as WSIP projects simplify vegetation structure and increase "edge" (the boundary between two different habitats); increased habitat impacts due to the spread of weedy, non-native plant species; genetic diversity impacts on small populations; impacts on wildlife movement due to habitat fragmentation; suppression of natural disturbance regimes; and reduced population recovery opportunities from stochastic events.	N	The project's contribution to cumulative effects on biological resources would be mitigated with project-specific mitigation measures and therefore would not require implementation of bioregional habitat restoration measures. See Impact C-BI, The proposed project would not result in a considerable contribution to cumulative impacts related to special-status species, wetlands, waters of the United States, riparian habitat, wildlife nursery sites, or conflicts with local policies and ordinances protecting biological resources.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Collective Impacts (cont.)		
Measure 4.16-4b, Coordination of Construction Staging and Access: Coordinate construction contractor(s) to minimize surface disturbance when construction schedules for WSIP projects affecting the same areas overlap.	N	Not required. As described in the Section 5.6, Transportation and Circulation, as part of the TASC process, the SFPUC would work with the SFDPW and SFMTA to develop a Construction Management Plan. As part of this plan, SFPUC would be required to engage in ongoing coordination with the appropriate jurisdictional agencies through the TASC.
Measure 4.16-6a, SFPUC WSIP Projects Construction Coordinator: Identify a qualified construction coordinator to coordinate project-specific traffic control plans; develop a public information campaign to inform the public of construction activities, detour routes, and alternate routes; and work with local and regional agencies to pursue additional traffic mitigation measures and incorporate such measures into the project-specific traffic control plans.	N	Not required. As described in the Section 5.6, Transportation and Circulation, as part of the TASC process, the SFPUC would work with the SFDPW and SFMTA to develop a Construction Management Plan. As part of this plan, SFPUC would be required to engage in ongoing coordination with the appropriate jurisdictional agencies through the TASC.
Measure 4.16-6b, Combined San Joaquin Traffic Control Plan: Develop a San Joaquin Traffic Control Plan that coordinates the project-specific traffic control plans and identifies additional measures (consistent with the standards of San Joaquin County, Stanislaus County, and Caltrans) to minimize the combined impacts of multiple WSIP project construction traffic on I-580, Chrisman Road, and Vernalis Road.	N	The project is not located in San Joaquin County.
Measure 4.16-6c, Combined Sunol Valley Traffic Control Plan: Develop a Sunol Valley Traffic Control Plan that coordinates the project-specific traffic control plans and identifies additional measures (consistent with the standards of Alameda County and Caltrans) to minimize the impacts of construction traffic on Calaveras Road and I-680.	N	The project is not located in the Sunol Valley.
Measure 4.16-7a, Dust and Exhaust Control Measures for All WSIP Projects: Require implementation of Air Quality Measures 4.9-1a thru 4.9-1d for all WSIP projects to address collective construction-related air quality impacts.	N	As specified above, the SFPUC would comply with the San Francisco Building Code and Health Code regulations and procedures identified in the Dust Control Ordinance to ensure that construction-related fugitive dust impacts are less than significant. In addition, the project's contribution of non-point sources within the project vicinity would not exceed the cumulative significance criteria. Therefore, no additional mitigation would be required.
Measure 4.16-7b, Health Risk Screening or Use of Soot Filters for All Projects in the San Joaquin and Sunol Valley Regions: Require Measure 4.9-2a for all WSIP projects in the San Joaquin and Sunol Valley Regions to address collective DPM impacts. When this requirement is applied to the New Irvington Tunnel project, it will be applied to both the Sunol Valley and Fremont tunnel portals, taking into account truck traffic from other WSIP projects in the vicinity of both portals.	N	The project is not located in the San Joaquin or Sunol Valley Regions.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Collective Impacts (cont.)		
Measure 4.16-7c, Vacate SFPUC Land Managers' Residences for All Projects in the Sunol Valley Region: Require Measure 4.9-2b for all WSIP projects in the Sunol Valley Region to address collective DPM impacts.	N	The project is not located in the Sunol Valley Region.
Measure 4.16-8a, Limiting Hourly Truck Volumes and Restricting Truck Operations on Haul Routes for Multiple WSIP Projects: Apply Measures 4.10-2a and 4.10-2b to total haul and delivery truck volumes attributable to all WSIP projects on any particular haul truck route (including haul routes in the Tesla Portal, Irvington Portal, and Lower Crystal Springs Dam vicinities as well as haul routes in the San Francisco Region) to address collective truck-related noise impacts.	N	Based on project traffic volumes for known projects in the vicinity of the Groundwater Supply Project, cumulative impacts related to temporary noise disturbance along construction access routes would be less than significant.
Measure 4.16-8b, Vacate Land Manager's Residence for All Projects in Sunol Valley Region: To address collective noise impacts, vacate Land Manager's residence adjacent to Alameda East Portal during construction truck operations associated with all WSIP projects in this region if collective daytime truck volumes exceed the 70-dBA speech interference criterion or nighttime truck volumes exceed the 50-dBA sleep interference criterion.	N	The project would not be located in the Sunol Valley Region.
Cumulative Effects		
Measure 4.17-6, SFPUC WSIP Projects Construction Coordinator – Other Agencies: The SFPUC WSIP construction coordinator designated in accordance with Measure 4.16-6a will also consider the effects of any traffic generated by SFPUC maintenance activities and other SFPUC projects; and coordinate with Caltrans, other county agencies, and local jurisdictions regarding construction of other private and public development projects so as to minimize traffic impacts on local access roads.	N	Not required. As described above and in Section 5.6, Transportation and Circulation, the SFPUC would work with the SFDPW and SFMTA to develop a Construction Management Plan. As part of this plan, SFPUC would be required to engage in ongoing coordination with the appropriate jurisdictional agencies through the TASC. No additional mitigation would be required.
Measure 4.17-8, Coordination of Truck Traffic on Local Streets: The SFPUC WSIP construction coordinator designated in Measure 4.17-6 will also be responsible for coordinating truck traffic generated on these same streets by SFPUC maintenance activities and other SFPUC projects so that SFPUC-related truck noise increases are maintained at or below threshold levels specified in Measures 4.10-2a and 4.10-2b to the extent feasible.	N	Not required. As described above and in Section 5.6, Transportation and Circulation, the SFPUC would work with the SFDPW and SFMTA to develop a Construction Management Plan. As part of this plan, SFPUC would be required to engage in ongoing coordination with the appropriate jurisdictional agencies through the TASC. No additional mitigation would be required.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
Westside Groundwater Basin Resources		
Measure 5.6-1, Groundwater Monitoring to Determine Basin Safe Yield: The SFPUC will continue ongoing studies, including the existing groundwater and lake level monitoring programs, to determine the safe yield of the North Westside Groundwater Basin in order to avoid overdraft and associated effects including adverse effects on surface water features and seawater intrusion. Using this data, the SFPUC will develop and implement a plan identifying appropriate pumping patterns to avoid overdraft and the undesirable effects associated with overdraft. The plan will establish both a regular (average annual) and an intermittent (dry year or emergency) yield as well as a strategy for modifying pumping patterns such that the pumping levels can be sustained as an ongoing reliable water supply without depletion of groundwater storage or degradation of water quality.	Y	See Mitigation Measure M-HY-8a (Expand Coastal Monitoring Network) and Mitigation Measure M-HY-8b (Continuous Groundwater Monitoring in the Primary Production Aquifer) and Mitigation Measure M-HY-8c (Adaptive Management Program for Seawater Intrusion). The project-level measures require the SFPUC to rehabilitate existing groundwater wells in the western portion of Golden Gate Park or install new groundwater monitoring wells between the Pacific Coast and the South Windmill Replacement and North Lake well facilities. The wells would be monitored on a quarterly basis for a minimum of one year prior to operation of the well facilities proposed in Golden Gate Park. To effectively detect for seawater intrusion, the SFPUC shall also install transducers in coastal monitoring wells in the Primary Production Aquifer. Measure M-HY-8c would ensure that the project is implemented in a stepwise manner, conduct monitoring to detect seawater intrusion and alter pumping to prevent seawater intrusion.
Measure 5.6-2, Implementation of a Lake Level Management Plan: The SFPUC will develop and implement a lake level management plan identifying strategies for altering pumping patterns or lake augmentation to maintain Lake Merced water levels within the desired long-term range should monitoring conducted under Measure 5.6-1 indicate the potential for adverse effects on lake levels due to groundwater pumping. The SFPUC will coordinate the implementation of this measure with Measure 5.6-1.	Y	See Mitigation Measure M-HY-9 (Lake-Level Management for Lake Merced). The project-level measure requires that the SFPUC implement the proposed project in a stepwise manner and to conduct monitoring to detect changes in lake level and water quality as well as groundwater-level elevations, and respond to project-related changes. If needed, lake levels may be augmented by adding supplemental water (SFPUC system water, treated stormwater, or recycled water) if available. The measure includes a list of procedures to be implemented for the purposes of detecting potential adverse effects on water quality at Lake Merced.
Measure 5.6-5, Drinking Water Source Assessments for Groundwater Wells: As required by the California Department of Health Services and incorporated as part of the WSIP, the SFPUC will prepare drinking water source assessments for groundwater wells constructed under the Local and Regional Groundwater Projects (SF-2) and will update these assessments every five years. If the assessment indicates no potential for contamination, then no mitigation is required. However, for wells that are considered vulnerable to contamination on the basis of the drinking water source assessment, the SFPUC will develop and implement a source water protection program specifying actions and a program to be implemented to prevent contamination of the drinking water source. The source water protection program could include nonregulatory components such as watershed restoration, stormwater monitoring, groundwater monitoring, and public	Y	See Mitigation Measure M-HY-11 (Prepare a Source Water Protection Program and Update Drinking Water Source Assessment). To prevent contamination of well facilities, the project-level measure requires the SFPUC to develop and implement a source water protection program that includes various components including integration with the Westside Basin Groundwater Monitoring Program, cooperation with the San Francisco Department of Public Health, cooperation with the SFPUC Wastewater Enterprise's Urban Watershed Management Program and coordination with the San Francisco Planning Department. In the event that potential contamination is identified, the measure also requires the SFPUC to increase monitoring frequency at the potentially affected well, investigate the potential source of contamination and coordination with the San Francisco Department of Public Health or RWQCB.

TABLE B-1 (Continued)
PEIR MITIGATION MEASURES – CONSISTENCY REVIEW FOR THE GROUNDWATER SUPPLY PROJECT

PEIR Mitigation Measure(s)	Applicable to Proposed Project (Y/N)?	Discussion
education to protect drinking water quality. Land use planning, permitting, and possibly more restrictive regulatory methods may also be implemented by the local municipality where a threat to drinking water quality is indicated, and management of potential sources of microbiological or direct chemical contamination to eliminate or reduce the risk of contamination of the water supply may be considered. The SFPUC will encourage public participation in the development of the program and will update the program every five years along with the drinking water source assessments.		

NOTES:
[a] See WSIP PEIR, Volume 4, Chapter 6, Table 6-2, for description of standard programmatic biological resources mitigation measures that correspond to each special status species.

APPENDIX C
Vegetation Change Analysis Methodology

Appendix C summarizes the Lake Merced vegetation change analysis conducted by ESA for the San Francisco Groundwater Supply Project and the Groundwater Storage and Recovery Project EIRs. Both projects have the potential to result in lake level decreases and the Groundwater Storage and Recovery Project has the potential to result in lake level increases. Therefore, this methodology addresses both water level increases and decreases. Building upon prior studies, ESA updated a GIS vegetation layer created by Nomad Ecology in 2010[1]. Using ArcGIS, ESA overlaid the 2010 vegetation data on a high resolution 2011 aerial photograph and then ground-truthed the resulting imagery in the field in May 2012. In general, the 2010 data correlated well with aerial signatures of the various vegetation types on the 2010 aerial photo and conditions on the ground. All discrepancies were mapped in the field and the 2010 vegetation layer was updated using the annotated field maps and aerial interpretation comparing the 2008 and 2011 aerials. To reduce the complexity of modeling vegetation change in response to water level management, many of the distinct vegetation types mapped by Nomad Ecology (2011) were combined with similar types. Table 5.14-5 in the Approach to Analysis subsection of the Biological Resources Groundwater Pumping Impacts section presents the results of the vegetation mapping update, along with results from 2002, and 2010, for comparative purposes. See Figure 5.14-1 in the Biological Resources Environmental Setting section for the updated Lake Merced vegetation map.

A GIS database was constructed using LIDAR (Foxgrover and Barnard, 2012) surface topographic data, and bathymetric data supplied by SFPUC (Sea Survey/Entrix, 1987; Talavera & Richardson, 2001). The two data sets differ substantially in precision and vertical control, such that the bathymetric data were adjusted by hand to conform more closely with the greater vertical precision of the LIDAR data[2] as well as current aerial photos (USGS, 2011). For example, in many cases, overlays of vegetation mapping and the bathymetric data resulted in the appearance of certain species or vegetation types occurring in much deeper water than field observations would support.

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1 The 2010 GIS vegetation layer was created by Nomad (2011) using heads up digitizing on a 2008 aerial photo base and then verifying the results in the field.

2 The original bathymetric data created by Sea Survey and Entrix in 1987 was digitized from a scanned image and adjusted to "fit" a 2001 orthophoto background by Talavera & Richardson in 2001. Upon comparing the bathymetric data with April, 2011 aerial imagery it was clear that the data did not fit within the confines of lake as shown in the current aerial imagery. ESA adjusted the bathymetry again to fit the current imagery. The accuracy of the bathymetric data affects the amount of vegetation impacted with decreasing water surface elevation, which may be overestimated or underestimated.

A set action of 'action rules' was developed to predict the response of different vegetation types to changing inundation levels. Action rules were drawn from previous modeling efforts specific to Lake Merced (Stillwater Sciences, 2009; EDAW, 2004) and Lower Crystal Springs Reservoir (ESA, 2009), available literature on vegetation tolerance to inundation, and field observations. The action rules (see Table C-1) are based on the following general principles:

TABLE C-1
VEGETATION MODEL ACTION RULES

Class/Vegetation Type	Remove:	Add:	Replacer Status	Conflict rule for Adding:
Class1[a]				
Bulrush wetland	<-5	0 to -5	Primary Replacer	In areas of replacement overlap, the adjacent replacer wins. In areas where both replacers are adjacent, bulrush wins. In areas of no replacer adjacency, bulrush wins.
Cattail	<-3	0 to -3	Secondary Replacer	
Knotweed wetland	<-2	0 to -2	Secondary Replacer	
Class 2[a]				
Arroyo willow	<0	1 to 0	Primary Replacer	In areas of replacement overlap, the adjacent replacer wins. In areas where both replacers are adjacent, willow wins. In areas where no adjacency, willow wins.
Rush meadow	<-1	1 to 0	Secondary Replacer	
Giant vetch	<-1	na	na	
Class 3[a,b]				
Coastal scrub	<1	na	na	
Dune scrub	<1	na	na	
Oak woodland	<1	na	na	
Non-native forest	<1	na	na	
Non-native herbaceous	<1	na	na	
Annual grassland	<1	na	na	
Perennial grassland	<1	na	na	

NOTES: Seasonal variation is 1 foot higher than average in wet season and 1 foot less than average in dry season.
Elevations are relative to modeled water surface elevation.

[a] **Class 1 - Tolerant:** Can survive permanent inundation at depths equal to or less than 5 feet below average annual WSE.
Class 2 - Moderately Intolerant: Survives inundation up to 3 months during dormant season.
Class 3 - Intolerant: This class is generally unable to survive inundation for more than two consecutive weeks.
[b] Upland vegetation types would not replace others as WSE rises.

SOURCE: ESA, 2012

The lower limit of both woody and herbaceous upland vegetation is determined by the maximum water surface elevation (WSE). The lower limit of upland vegetation is determined by inundation frequency and duration, a principal that also is applied in the federal method for determining the boundary between wetlands and non-wetlands for jurisdictional purposes. Observations of current conditions at Lake Merced, coupled with previous mapping and descriptions (SFRPD, 2006; May and Associates, 2009; Nomad Ecology, 2011) indicate that the lower limit of upland woody vegetation is above the maximum WSE, which restricts upland plant species lacking adaptation to prolonged inundation or soil saturation. Upland woody vegetation will occur, but not persist, at the mean water level, and will be replaced by opportunistic wetland vegetation dominated by bulrush and knotweed. The lower limits of upland herbaceous communities also extend down to the maximum WSE, and would be replaced by wetlands if the water level rises.

The upper and lower limits of wetland vegetation depend on depth of inundation and inundation tolerance. For example, most herbaceous wetlands fringing Lake Merced occur no higher than one foot above the projected existing conditions mean WSE of 5.7 feet and at assumed depths no greater than two feet below WSE. The wetland species that make up these communities do not require year-round inundation. In contrast, bulrush wetlands require at least 9 months inundation or soil saturation, readily tolerate permanent inundation, and are found at elevations no more than 1 foot above the seasonal high water elevation, and no greater than 5 feet lower than mean WSE.

Vegetation was categorized into three classes associated with water inundation tolerance. Inundation tolerance is largely a function of seasonal fluctuations in lake levels. Monthly water levels increase up to one foot above the annual average during winter (February through May), declining to one foot below average annual water level towards the end of the growing season (August through November) (Stillwater, 2009). Class 1 includes vegetation types that are extremely tolerant and can survive permanent inundation. Class 2 vegetation is somewhat tolerant and can survive partial inundation due to seasonal variations. Class 3 vegetation is intolerant and cannot survive seasonal inundation. ESA developed action rules based on this classification that determined how vegetation would die or establish as WSE rises.

Replacement criteria not only took elevation relative to WSE into account but also adjacency of vegetation types. Overlapping depth tolerance among different wetland types requires complex rules for resolving conflicts when two wetland types have the potential to occupy the same elevation zone. For the purposes of the analysis, therefore, these conflicts were resolved by creating action rules that restrict the amount of overlap. The action rules also govern interactions between vegetation types for projected WSE that would cause the loss of one type and its replacement by one or more other type. For example, bulrush and knotweed have a somewhat overlapping tolerance to inundation. Priority rules for replacement instruct the GIS-based analysis to replace a "drowned" vegetation type with bulrush or knotweed (the most aggressive "replacer" types) based on the elevation of the replaced vegetation and its proximity to the nearest replacer type.

The GIS-based analysis was conducted to estimate vegetation response to changes in lake levels over time using the newly updated vegetation data, topography, bathymetry, slope, output from the water level models (Kennedy/Jenks, 2012), and the action rules for vegetation change. The 2012 vegetation mapping update was based on an April 2011 aerial photograph, at which time, according to historic water surface elevation data (SFPUC, 2011), Lake Merced water surface elevation was at about 7 feet City Datum, and field observations made in May, 2012. Because the field mapping corresponded well with the 2011 aerial photograph, existing acreages for each vegetation type were assigned to the 7 foot water surface elevation. Based on the 2012 vegetation data and the 7 foot water surface elevation acreages and using the methods described below for rising and receding water levels, the GIS-based analysis then calculated a predicted acreage for each vegetation type at each water surface elevation between -10 and 13 feet City Datum (see Table C-18, which includes predicted acreages for all vegetation and cover types). The analysis only included vegetation at or below 13 feet City Datum, since this is the maximum possible lake water level due to the existing spillway height and therefore, elevation, at which vegetation

change would be expected due to changes in WSE. Therefore, for the upland vegetation types and for arroyo willow riparian scrub, acreage located above the 13 foot elevation, as mapped in Figure 15.4-1 in Section 15.4, Biological Resources, would remain unchanged.

To estimate impacts to vegetation associated with water surface elevation change it is necessary to have an accurate topographical representation of the area. For elevation above the surface of Lake Merced, ESA obtained a high resolution Lidar derived digital elevation model (DEM) to provide accurate elevation data. Past Lake Merced inundation studies used 1 foot photogrametically created elevation contour data derived from flights of the area in 1996. The Lidar derived elevation data were used in place of the photogrammetry data because they are considerably more current (2010) and determined to be a better representation of current conditions[3]. From the DEM, ESA created 1 foot elevation contour polygons so that areas could be calculated for each elevation range. For bathymetric topography ESA used contour data provided by the SFPUC. These contours were originally created from depth soundings of the lakes in 1987; the data was subsequently adjusted in 2001 to fit current aerial photos of that time. Visual analysis of the contour data compared to current aerial photos (2011) revealed inconsistencies along the shoreline. It was therefore necessary to modify the bathymetric data to match the aerial photos and surface DEM to create an accurate topographical representation. The adjusted bathymetric data was converted to a Triangular Irregular Network (TIN) which in turn was used to produce 1 foot contour polygons by interpolating elevation gaps in the original contour data. The 1 foot bathymetric elevation contours and the 1 foot DEM derived surface elevation contours were then combined to create a complete elevation dataset of the area. This finished elevation dataset was intersected with the vegetation data to determine distribution of vegetation by elevation ranges.

Two different approaches were used to estimate impacts to vegetation associated with increasing and decreasing water surface elevation under the proposed project. For impacts associated with water surface increase, a GIS approach similar to past inundation studies was used. As described above, action rules were established for each vegetation type dictating how vegetation would respond to increasing water surface elevation. Once the action rules were established for a relative water surface elevation, they were applied to every 1 foot contour up to the 13 foot spillway elevation. The resulting vegetation statistics were used to determine impacts to vegetation types due to increase in water surface elevation.

For decreasing water levels, a statistical approach was used to determine vegetation response. Unlike water rising scenarios in which parameters can be applied to current vegetation, the majority of land associated with decreasing water levels is currently inundated and free of vegetation (except for certain wetland species). For this approach ESA analyzed the proportions of vegetation at each elevation contour relative to the current water surface level and applied the statistics to lower water surface elevation. This approach keeps the vegetation distribution the same for each elevation range relative to the WSE, but due to differences in area for each

[3] Lidar tends to be superior when there is dense vegetative cover. ESA compared aerial photos where the historic WSE was known with the LIDAR and the photogrammetry derived elevation data and the LIDAR was a better match relative to the shoreline, which represents the WSE.

elevation range the vegetation area totals are different for each modeled WSE. For example, if the contour range of 0 to 1 foot is currently inhabited with 60 percent bulrush wetland and 40 percent knotweed wetlands, that proportion (60 percent and 40 percent) would be assigned to the -1 to 0 foot contour range modeling a water surface decrease of 1 foot.

In order to determine project impacts on wetlands it was necessary to separate project-related impacts from those related to background hydrologic conditions absent the project. The predicted acreages for each vegetation type in Table C-18 were used as a base to calculate vegetation changes relative to each one foot water surface elevation increment between -10 feet and 13 feet City Datum. Since the focus was wetlands, all upland vegetation types were combined for this analysis. For example, assuming natural hydrology resulted in a water surface elevation of -5 feet City Datum, the calculated increase or decrease in each wetland vegetation type was derived from their predicted values at each water surface elevation expressed as a percentage of the area for the vegetation type at -5 feet City Datum (see **Tables C-2** through **C-25**). Thus, for each water surface elevation, it was possible to determine a range of elevations within which there would be no net loss attributable to the proposed project when compared to the impacts of background hydrology alone.

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TABLE C-2: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -10 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																							
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	37.89	*32.02*	*27.15*	*24.11*	*21.80*	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	*24.45*	*26.07*	*24.95*	*21.54*	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	0.0%	-15.5%	-28.4%	-36.4%	-42.5%	-46.8%	-49.1%	-50.3%	-51.6%	-53.1%	-51.5%	-44.2%	-35.5%	-31.2%	-34.1%	-43.2%	-55.1%	-66.8%	-68.7%	-77.7%	-83.8%	-88.7%	-92.4%	-100.0%
Bulrush Wetland	49.12	*46.43*	*31.72*	*30.60*	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	*25.05*	***28.15***	***32.57***	***38.18***	***44.74***	***48.97***	***40.05***	*26.81*
Percent change	0.0%	-5.5%	-35.4%	-37.7%	-42.9%	-55.7%	-66.8%	-70.8%	-74.0%	-76.0%	-78.0%	-78.8%	-78.5%	-76.0%	-70.5%	-60.9%	-49.0%	-42.7%	-33.7%	-22.3%	-8.9%	-0.3%	-18.5%	-45.4%
Giant Vetch Wetland	0.38	*0.33*	*0.27*	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	*0.29*	**0.38**	**0.43**	**0.42**	*0.35*	*0.25*	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	0.0%	-12.6%	-29.6%	-47.2%	-53.7%	-54.8%	-55.2%	-55.6%	-56.0%	-56.4%	-48.0%	-23.3%	1.7%	14.5%	11.7%	-7.6%	-34.4%	-56.0%	-56.0%	-57.5%	-66.2%	-78.5%	-86.2%	-93.4%
Knotweed Wetland	9.56	*6.15*	*4.94*	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	*5.63*	7.02	*6.42*	*6.89*	*6.13*	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	0.0%	-35.7%	-48.3%	-50.3%	-64.3%	-80.0%	-85.3%	-85.6%	-85.4%	-85.2%	-85.1%	-84.8%	-84.3%	-79.4%	-63.8%	-41.1%	-26.6%	-32.8%	-27.9%	-35.9%	-65.9%	-87.4%	-94.6%	-96.5%
Rush Meadow	0.49	*0.40*	*0.32*	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	**0.48**	**0.53**	**0.50**	0.40	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	0.0%	-18.5%	-34.7%	-50.9%	-63.7%	-67.7%	-68.8%	-68.7%	-68.6%	-68.6%	-63.1%	-45.8%	-22.2%	-2.0%	6.5%	0.6%	-19.1%	-42.0%	-36.8%	-47.5%	-71.2%	-73.9%	-86.6%	-96.2%
Cattail Wetland	0.01	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	**0.01**	**0.01**	**0.01**	**0.01**	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	0.0%	-22.4%	-47.0%	-64.9%	-71.0%	-70.7%	-70.3%	-70.0%	-69.6%	-69.2%	-63.3%	-37.4%	6.5%	38.4%	37.3%	8.9%	-26.0%	-50.6%	-50.6%	-50.6%	-50.6%	-50.6%	-60.5%	-72.8%
Sum Herbaceous Wetland	59.54	*53.31*	*37.24*	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	*39.94*	*44.74*	*48.27*	*50.38*	*40.69*	*27.19*
Percent change	0.0%	-10.5%	-37.5%	-39.9%	-46.6%	-59.7%	-69.8%	-73.0%	-75.7%	-77.3%	-78.8%	-79.1%	-78.4%	-75.3%	-68.3%	-56.8%	-45.1%	-41.2%	-32.9%	-24.9%	-18.9%	-15.4%	-31.7%	-54.3%
Total Wetland (Willow and Herbaceous)	97.44	*85.33*	*64.39*	*59.90*	*53.62*	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	*51.80*	*53.18*	*54.41*	*54.64*	*43.57*	*27.19*
Percent change	0.0%	-12.4%	-33.9%	-38.5%	-45.0%	-54.7%	-61.7%	-64.2%	-66.3%	-67.9%	-68.2%	-65.5%	-61.7%	-58.2%	-55.0%	-51.5%	-48.9%	-51.1%	-46.8%	-45.4%	-44.2%	-43.9%	-55.3%	-72.1%
Open Water	128.78	**149.87**	**176.77**	**185.61**	**196.09**	**208.97**	**218.34**	**223.08**	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	0.0%	16.4%	37.3%	44.1%	52.3%	62.3%	69.5%	73.2%	76.6%	79.7%	82.7%	85.4%	88.1%	90.7%	93.5%	96.0%	99.1%	105.7%	106.7%	106.9%	108.6%	108.3%	118.2%	131.0%
Upland vegetation[c]	98.03	*89.07*	*83.12*	*78.79*	*74.61*	*71.21*	*68.70*	*66.41*	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	0.0%	-9.1%	-15.2%	-19.6%	-23.9%	-27.4%	-29.9%	-32.3%	-34.6%	-37.0%	-40.6%	-46.7%	-53.9%	-60.8%	-67.6%	-74.3%	-80.9%	-87.4%	-93.0%	-94.7%	-96.4%	-98.1%	-99.8%	-99.8%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -10 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-3: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -9 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																							
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	32.02	*27.15*	*24.11*	*21.80*	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	*24.45*	*26.07*	*24.95*	*21.54*	*17.03*	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	18.3%	0.0%	-15.2%	-24.7%	-31.9%	-37.1%	-39.7%	-41.2%	-42.7%	-44.5%	-42.6%	-33.9%	-23.6%	-18.6%	-22.1%	-32.7%	-46.8%	-60.7%	-63.0%	-73.6%	-80.8%	-86.7%	-91.0%	-100.0%
Bulrush Wetland	**49.12**	46.43	*31.72*	*30.60*	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	*28.15*	*32.57*	*38.18*	*44.74*	*48.97*	*40.05*	*26.81*
Percent change	5.8%	0.0%	-31.7%	-34.1%	-39.6%	-53.1%	-64.9%	-69.1%	-72.5%	-74.6%	-76.7%	-77.6%	-77.2%	-74.6%	-68.8%	-58.6%	-46.1%	-39.4%	-29.9%	-17.8%	-3.6%	5.5%	-13.7%	-42.3%
Giant Vetch Wetland	**0.38**	0.33	*0.27*	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	*0.29*	**0.38**	**0.43**	**0.42**	**0.35**	0.25	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	14.4%	0.0%	-19.5%	-39.7%	-47.1%	-48.3%	-48.7%	-49.2%	-49.6%	-50.1%	-40.5%	-12.3%	16.2%	30.9%	27.8%	5.6%	-24.9%	-49.7%	-49.7%	-51.3%	-61.4%	-75.4%	-84.2%	-92.4%
Knotweed Wetland	**9.56**	6.15	*4.94*	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	*5.63*	7.02	*6.42*	*6.89*	*6.13*	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	55.4%	0.0%	-19.7%	-22.8%	-44.5%	-68.9%	-77.2%	-77.6%	-77.4%	-77.1%	-76.8%	-76.4%	-75.6%	-68.0%	-43.8%	-8.5%	14.1%	4.4%	12.1%	-0.3%	-47.0%	-80.5%	-91.5%	-94.6%
Rush Meadow	**0.49**	0.40	*0.32*	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	**0.48**	**0.53**	**0.50**	0.40	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	22.7%	0.0%	-19.8%	-39.7%	-55.5%	-60.4%	-61.8%	-61.6%	-61.5%	-61.4%	-54.7%	-33.5%	-4.5%	20.2%	30.6%	23.5%	-0.7%	-28.8%	-22.4%	-35.5%	-64.7%	-68.0%	-83.5%	-95.3%
Cattail Wetland	**0.01**	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	**0.01**	**0.01**	**0.01**	**0.01**	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	28.8%	0.0%	-31.8%	-54.8%	-62.7%	-62.2%	-61.8%	-61.3%	-60.8%	-60.4%	-52.7%	-19.4%	37.1%	78.2%	76.8%	40.2%	-4.7%	-36.4%	-36.4%	-36.4%	-36.4%	-36.4%	-49.1%	-65.0%
Sum Herbaceous Wetland	**59.54**	53.31	*37.24*	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	*39.94*	*44.74*	*48.27*	*50.38*	*40.69*	*27.19*
Percent change	11.7%	0.0%	-30.1%	-32.9%	-40.3%	-55.0%	-66.2%	-69.9%	-72.8%	-74.7%	-76.3%	-76.7%	-75.9%	-72.5%	-64.6%	-51.8%	-38.6%	-34.3%	-25.1%	-16.1%	-9.5%	-5.5%	-23.7%	-49.0%
Total Wetland (Willow and Herbaceous)	**97.44**	85.33	*64.39*	*59.90*	*53.62*	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	*51.80*	*53.18*	*54.41*	*54.64*	*43.57*	*27.19*
Percent change	14.2%	0.0%	-24.5%	-29.8%	-37.2%	-48.2%	-56.3%	-59.1%	-61.5%	-63.3%	-63.7%	-60.6%	-56.3%	-52.2%	-48.6%	-44.6%	-41.7%	-44.2%	-39.3%	-37.7%	-36.2%	-36.0%	-48.9%	-68.1%
Open Water	*128.78*	149.87	**176.77**	**185.61**	**196.09**	**208.97**	**218.34**	**223.08**	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-14.1%	0.0%	17.9%	23.9%	30.8%	39.4%	45.7%	48.9%	51.8%	54.4%	57.0%	59.3%	61.6%	63.9%	66.2%	68.4%	71.1%	76.7%	77.6%	77.8%	79.2%	79.0%	87.5%	98.5%
Upland vegetation[c]	**98.03**	89.07	*83.12*	*78.79*	*74.61*	*71.21*	*68.70*	*66.41*	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	*12.37*	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	10.1%	0.0%	-6.7%	-11.5%	-16.2%	-20.1%	-22.9%	-25.4%	-28.0%	-30.7%	-34.6%	-41.4%	-49.3%	-56.9%	-64.3%	-71.7%	-79.0%	-86.1%	-92.3%	-94.2%	-96.1%	-97.9%	-99.8%	-99.8%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -9 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-4: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -8 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	27.15	*24.11*	*21.80*	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	*24.45*	*26.07*	*24.95*	*21.54*	*17.03*	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	39.6%	17.9%	0.0%	-11.2%	-19.7%	-25.8%	-28.9%	-30.7%	-32.4%	-34.5%	-32.4%	-22.1%	-9.9%	-4.0%	-8.1%	-20.7%	-37.3%	-53.6%	-56.3%	-68.9%	-77.4%	-84.3%	-89.4%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	31.72	*30.60*	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	*28.15*	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	54.9%	46.4%	0.0%	-3.5%	-11.5%	-31.4%	-48.7%	-54.7%	-59.7%	-62.8%	-65.9%	-67.1%	-66.6%	-62.8%	-54.3%	-39.4%	-21.0%	-11.2%	2.7%	20.4%	41.1%	54.4%	26.3%	-15.5%
Giant Vetch Wetland	**0.38**	**0.33**	0.27	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	0.25	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	42.1%	24.3%	0.0%	-25.0%	-34.2%	-35.7%	-36.3%	-36.8%	-37.4%	-38.0%	-26.1%	9.0%	44.5%	62.7%	58.8%	31.3%	-6.7%	-37.5%	-37.5%	-39.5%	-52.0%	-69.5%	-80.3%	-90.5%
Knotweed Wetland	**9.56**	**6.15**	4.94	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	93.4%	24.5%	0.0%	-3.9%	-31.0%	-61.3%	-71.6%	-72.2%	-71.8%	-71.5%	-71.1%	-70.6%	-69.6%	-60.1%	-30.0%	13.9%	42.0%	29.9%	39.5%	24.1%	-34.0%	-75.7%	-89.5%	-93.2%
Rush Meadow	**0.49**	**0.40**	0.32	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	53.0%	24.7%	0.0%	-24.8%	-44.5%	-50.6%	-52.3%	-52.2%	-52.0%	-51.9%	-43.5%	-17.1%	19.1%	49.9%	62.9%	54.0%	23.9%	-11.2%	-3.2%	-19.6%	-56.0%	-60.1%	-79.5%	-94.1%
Cattail Wetland	**0.01**	**0.01**	0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	88.8%	46.6%	0.0%	-33.7%	-45.3%	-44.6%	-44.0%	-43.3%	-42.6%	-41.9%	-30.7%	18.2%	101.0%	161.3%	159.2%	105.5%	39.6%	-6.8%	-6.8%	-6.8%	-6.8%	-6.8%	-25.4%	-48.7%
Sum Herbaceous Wetland	**59.54**	**53.31**	37.24	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	*27.19*
Percent change	59.9%	43.1%	0.0%	-3.9%	-14.5%	-35.5%	-51.6%	-56.9%	-61.1%	-63.7%	-66.1%	-66.6%	-65.5%	-60.6%	-49.3%	-31.0%	-12.2%	-6.0%	7.2%	20.1%	29.6%	35.3%	9.3%	-27.0%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	64.39	*59.90*	*53.62*	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	**51.80**	**53.18**	*54.41*	*54.64*	*43.57*	*27.19*
Percent change	51.3%	32.5%	0.0%	-7.0%	-16.7%	-31.4%	-42.1%	-45.8%	-49.0%	-51.4%	-51.9%	-47.9%	-42.1%	-36.7%	-31.9%	-26.6%	-22.7%	-26.1%	-19.6%	-17.4%	-15.5%	-15.1%	-32.3%	-57.8%
Open Water	*128.78*	*149.87*	176.77	**185.61**	**196.09**	**208.97**	**218.34**	**223.08**	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-27.1%	-15.2%	0.0%	5.0%	10.9%	18.2%	23.5%	26.2%	28.7%	30.9%	33.1%	35.1%	37.0%	38.9%	40.9%	42.8%	45.0%	49.8%	50.6%	50.7%	52.0%	51.8%	59.0%	68.3%
Upland vegetation [c]	**98.03**	**89.07**	83.12	*78.79*	*74.61*	*71.21*	*68.70*	*66.41*	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	17.9%	7.2%	0.0%	-5.2%	-10.2%	-14.3%	-17.3%	-20.1%	-22.9%	-25.7%	-29.9%	-37.2%	-45.6%	-53.8%	-61.8%	-69.7%	-77.5%	-85.1%	-91.7%	-93.7%	-95.8%	-97.7%	-99.7%	-99.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -8 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-5: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -7 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	24.11	*21.80*	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	*24.45*	*26.07*	*24.95*	*21.54*	*17.03*	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	57.2%	32.8%	12.6%	0.0%	-9.6%	-16.4%	-19.9%	-21.9%	-23.9%	-26.3%	-23.8%	-12.3%	1.4%	8.1%	3.5%	-10.7%	-29.4%	-47.8%	-50.8%	-65.0%	-74.5%	-82.3%	-88.1%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	30.60	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	*28.15*	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	60.5%	51.7%	3.6%	0.0%	-8.3%	-28.9%	-46.8%	-53.1%	-58.2%	-61.5%	-64.6%	-66.0%	-65.4%	-61.4%	-52.7%	-37.2%	-18.2%	-8.0%	6.4%	24.8%	46.2%	60.0%	30.9%	-12.4%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	0.20	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	89.6%	65.8%	33.4%	0.0%	-12.3%	-14.2%	-15.0%	-15.8%	-16.5%	-17.3%	-1.4%	45.4%	92.7%	117.0%	111.8%	75.1%	24.4%	-16.6%	-16.6%	-19.4%	-36.0%	-59.3%	-73.8%	-87.4%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	4.75	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	101.3%	29.5%	4.1%	0.0%	-28.1%	-59.7%	-70.5%	-71.0%	-70.7%	-70.3%	-69.9%	-69.4%	-68.4%	-58.5%	-27.2%	18.5%	47.8%	35.2%	45.2%	29.1%	-31.3%	-74.7%	-89.0%	-93.0%
Rush Meadow	**0.49**	**0.40**	**0.32**	0.24	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	103.5%	65.9%	33.0%	0.0%	-26.2%	-34.3%	-36.6%	-36.4%	-36.2%	-36.0%	-24.8%	10.3%	58.4%	99.4%	116.7%	104.8%	64.7%	18.1%	28.7%	6.9%	-41.4%	-46.9%	-72.7%	-92.2%
Cattail Wetland	**0.01**	**0.01**	**0.00**	0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.00*
Percent change	184.9%	121.2%	50.9%	0.0%	-17.5%	-16.5%	-15.4%	-14.4%	-13.4%	-12.3%	4.6%	78.4%	203.4%	294.3%	291.1%	210.2%	110.7%	40.6%	40.6%	40.6%	40.6%	40.6%	12.5%	-22.6%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	35.79	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	*27.19*
Percent change	66.4%	48.9%	4.1%	0.0%	-11.1%	-32.9%	-49.7%	-55.1%	-59.5%	-62.2%	-64.7%	-65.3%	-64.1%	-59.0%	-47.2%	-28.2%	-8.6%	-2.1%	11.6%	25.0%	34.9%	40.8%	13.7%	-24.0%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	59.90	*53.62*	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	*51.80*	*53.18*	*54.41*	*54.64*	*43.57*	*27.19*
Percent change	62.7%	42.5%	7.5%	0.0%	-10.5%	-26.3%	-37.7%	-41.8%	-45.2%	-47.8%	-48.3%	-43.9%	-37.7%	-32.0%	-26.8%	-21.1%	-16.9%	-20.5%	-13.5%	-11.2%	-9.2%	-8.8%	-27.3%	-54.6%
Open Water	*128.78*	*149.87*	*176.77*	185.61	**196.09**	**208.97**	**218.34**	**223.08**	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-30.6%	-19.3%	-4.8%	0.0%	5.6%	12.6%	17.6%	20.2%	22.5%	24.6%	26.7%	28.6%	30.5%	32.3%	34.2%	36.0%	38.1%	42.7%	43.4%	43.6%	44.7%	44.5%	51.4%	60.2%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	78.79	*74.61*	*71.21*	*68.70*	*66.41*	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	24.4%	13.0%	5.5%	0.0%	-5.3%	-9.6%	-12.8%	-15.7%	-18.6%	-21.6%	-26.1%	-33.7%	-42.6%	-51.2%	-59.6%	-68.0%	-76.3%	-84.3%	-91.3%	-93.4%	-95.5%	-97.6%	-99.7%	-99.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -7 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-6: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -6 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	21.80	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	**24.45**	**26.07**	**24.95**	*21.54*	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	73.9%	46.9%	24.6%	10.6%	0.0%	-7.5%	-11.4%	-13.6%	-15.8%	-18.5%	-15.7%	-3.0%	12.2%	19.6%	14.5%	-1.2%	-21.9%	-42.2%	-45.6%	-61.3%	-71.8%	-80.4%	-86.8%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	28.06	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	75.0%	65.5%	13.0%	9.1%	0.0%	-22.4%	-42.0%	-48.8%	-54.5%	-58.0%	-61.4%	-62.9%	-62.3%	-58.0%	-48.4%	-31.5%	-10.7%	0.3%	16.0%	36.1%	59.4%	74.5%	42.7%	-4.5%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	0.17	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	116.1%	88.9%	52.0%	14.0%	0.0%	-2.2%	-3.1%	-4.0%	-4.9%	-5.8%	12.4%	65.7%	119.6%	147.3%	141.4%	99.6%	41.8%	-4.9%	-4.9%	-8.1%	-27.0%	-53.6%	-70.1%	-85.6%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	3.41	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	180.2%	80.3%	44.9%	39.2%	0.0%	-43.9%	-58.9%	-59.7%	-59.2%	-58.7%	-58.1%	-57.5%	-56.0%	-42.2%	1.4%	65.0%	105.8%	88.2%	102.1%	79.7%	-4.4%	-64.8%	-84.7%	-90.2%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	0.18	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	**0.48**	**0.53**	**0.50**	**0.40**	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	175.9%	124.8%	80.2%	35.5%	0.0%	-10.9%	-14.0%	-13.8%	-13.5%	-13.2%	1.9%	49.5%	114.7%	170.2%	193.7%	177.6%	123.2%	60.0%	74.5%	44.9%	-20.6%	-28.0%	-63.0%	-89.4%
Cattail Wetland	**0.01**	**0.01**	**0.00**	**0.00**	0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	245.3%	168.1%	82.9%	21.2%	0.0%	1.3%	2.5%	3.7%	5.0%	6.3%	26.8%	116.2%	267.7%	377.9%	374.1%	275.9%	155.4%	70.4%	70.4%	70.4%	70.4%	70.4%	36.4%	-6.3%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	31.83	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	*27.19*
Percent change	87.1%	67.5%	17.0%	12.5%	0.0%	-24.6%	-43.4%	-49.6%	-54.5%	-57.5%	-60.3%	-61.0%	-59.6%	-53.9%	-40.6%	-19.3%	2.8%	10.0%	25.5%	40.6%	51.7%	58.3%	27.9%	-14.6%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	53.62	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	*51.80*	*53.18*	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	81.7%	59.1%	20.1%	11.7%	0.0%	-17.6%	-30.4%	-35.0%	-38.8%	-41.7%	-42.2%	-37.4%	-30.4%	-24.0%	-18.2%	-11.9%	-7.2%	-11.2%	-3.4%	-0.8%	1.5%	1.9%	-18.7%	-49.3%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	196.09	**208.97**	**218.34**	**223.08**	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-34.3%	-23.6%	-9.9%	-5.3%	0.0%	6.6%	11.3%	13.8%	16.0%	18.0%	20.0%	21.8%	23.5%	25.2%	27.1%	28.7%	30.8%	35.1%	35.7%	35.9%	37.0%	36.8%	43.3%	51.7%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	74.61	*71.21*	*68.70*	*66.41*	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	31.4%	19.4%	11.4%	5.6%	0.0%	-4.6%	-7.9%	-11.0%	-14.1%	-17.2%	-21.9%	-30.0%	-39.4%	-48.5%	-57.4%	-66.2%	-75.0%	-83.4%	-90.8%	-93.0%	-95.3%	-97.5%	-99.7%	-99.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -6 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-7: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -5 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	20.15	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	88.1%	58.9%	34.7%	19.6%	8.2%	0.0%	-4.2%	-6.6%	-9.0%	-11.8%	-8.9%	5.0%	21.4%	29.4%	23.8%	6.9%	-15.5%	-37.5%	-41.2%	-58.1%	-69.5%	-78.8%	-85.7%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	21.76	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	125.7%	113.3%	45.7%	40.6%	28.9%	0.0%	-25.2%	-34.0%	-41.3%	-45.9%	-50.3%	-52.1%	-51.4%	-45.8%	-33.4%	-11.7%	15.1%	29.3%	49.6%	75.4%	105.5%	125.0%	84.0%	23.2%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	0.17	*0.17*	*0.17*	*0.17*	*0.16*	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	121.0%	93.3%	55.5%	16.6%	2.3%	0.0%	-0.9%	-1.8%	-2.7%	-3.6%	15.0%	69.5%	124.7%	153.0%	146.9%	104.2%	45.1%	-2.8%	-2.8%	-6.0%	-25.4%	-52.5%	-69.4%	-85.3%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	1.91	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	399.2%	221.2%	158.1%	148.0%	78.2%	0.0%	-26.8%	-28.1%	-27.3%	-26.4%	-25.4%	-24.2%	-21.6%	2.9%	80.6%	193.9%	266.6%	235.3%	260.1%	220.2%	70.4%	-37.3%	-72.8%	-82.5%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	0.16	*0.15*	*0.15*	*0.15*	*0.16*	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	209.6%	152.4%	102.3%	52.1%	12.3%	0.0%	-3.5%	-3.2%	-2.9%	-2.6%	14.4%	67.8%	141.0%	203.3%	229.7%	211.6%	150.6%	79.6%	95.8%	62.7%	-10.9%	-19.2%	-58.5%	-88.1%
Cattail Wetland	**0.01**	**0.01**	**0.00**	**0.00**	*0.00*	0.00	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.00*
Percent change	241.0%	164.8%	80.6%	19.7%	-1.2%	0.0%	1.2%	2.5%	3.7%	5.0%	25.2%	113.5%	263.1%	371.9%	368.2%	271.2%	152.2%	68.3%	68.3%	68.3%	68.3%	68.3%	34.7%	-7.4%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	24.01	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	148.0%	122.0%	55.1%	49.1%	32.6%	0.0%	-25.0%	-33.1%	-39.6%	-43.7%	-47.4%	-48.2%	-46.5%	-38.8%	-21.3%	7.0%	36.3%	45.9%	66.4%	86.3%	101.1%	109.8%	69.5%	13.3%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	44.16	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	120.7%	93.2%	45.8%	35.6%	21.4%	0.0%	-15.5%	-21.0%	-25.6%	-29.2%	-29.8%	-24.0%	-15.5%	-7.7%	-0.7%	7.0%	12.7%	7.8%	17.3%	20.4%	23.2%	23.7%	-1.3%	-38.4%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	208.97	**218.34**	**223.08**	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-38.4%	-28.3%	-15.4%	-11.2%	-6.2%	0.0%	4.5%	6.8%	8.8%	10.7%	12.6%	14.3%	15.9%	17.5%	19.2%	20.8%	22.7%	26.7%	27.4%	27.5%	28.5%	28.4%	34.5%	42.3%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	71.21	*68.70*	*66.41*	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	37.7%	25.1%	16.7%	10.6%	4.8%	0.0%	-3.5%	-6.7%	-10.0%	-13.3%	-18.2%	-26.7%	-36.5%	-46.1%	-55.4%	-64.6%	-73.8%	-82.6%	-90.3%	-92.7%	-95.1%	-97.3%	-99.7%	-99.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -5 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-8: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -4 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	19.31	*18.82*	*18.35*	*17.77*	*18.36*	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	96.3%	65.9%	40.6%	24.9%	12.9%	4.4%	0.0%	-2.5%	-5.0%	-7.9%	-4.9%	9.6%	26.7%	35.0%	29.3%	11.6%	-11.8%	-34.8%	-38.6%	-56.3%	-68.2%	-77.9%	-85.1%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	16.28	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	201.6%	185.1%	94.8%	87.9%	72.3%	33.7%	0.0%	-11.8%	-21.5%	-27.6%	-33.6%	-36.0%	-35.0%	-27.5%	-11.0%	18.1%	53.8%	72.9%	100.0%	134.5%	174.7%	200.7%	145.9%	64.6%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	0.17	*0.17*	*0.17*	*0.16*	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	***0.25***	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	123.0%	95.0%	56.9%	17.6%	3.2%	0.9%	0.0%	-0.9%	-1.8%	-2.7%	16.0%	71.0%	126.7%	155.2%	149.1%	106.0%	46.4%	-1.9%	-1.9%	-5.1%	-24.7%	-52.1%	-69.2%	-85.2%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	1.40	*1.38*	*1.39*	**1.41**	**1.43**	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	582.3%	339.0%	252.7%	238.9%	143.5%	36.7%	0.0%	-1.8%	-0.6%	0.6%	1.9%	3.6%	7.1%	40.6%	146.8%	301.6%	401.0%	358.3%	392.1%	337.6%	132.9%	-14.3%	-62.9%	-76.1%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	0.15	**0.15**	**0.15**	**0.16**	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	220.9%	161.5%	109.7%	57.7%	16.3%	3.6%	0.0%	0.3%	0.6%	0.9%	18.6%	73.9%	149.8%	214.4%	241.7%	223.0%	159.7%	86.1%	103.0%	68.6%	-7.7%	-16.3%	-57.0%	-87.7%
Cattail Wetland	**0.01**	**0.01**	**0.00**	**0.00**	*0.00*	*0.00*	0.00	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.00*
Percent change	236.8%	161.6%	78.4%	18.2%	-2.4%	-1.2%	0.0%	1.2%	2.4%	3.7%	23.7%	110.9%	258.7%	366.2%	362.5%	266.7%	149.1%	66.3%	66.3%	66.3%	66.3%	66.3%	33.0%	-8.5%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	18.01	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	230.7%	196.0%	106.8%	98.8%	76.7%	33.3%	0.0%	-10.9%	-19.5%	-25.0%	-29.9%	-31.0%	-28.6%	-18.5%	4.9%	42.7%	81.7%	94.5%	121.8%	148.4%	168.1%	179.8%	126.0%	51.0%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	37.31	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	**37.31**	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	161.1%	128.7%	72.6%	60.5%	43.7%	18.3%	0.0%	-6.5%	-12.0%	-16.2%	-17.0%	-10.0%	0.0%	9.2%	17.5%	26.6%	33.3%	27.6%	38.8%	42.5%	45.8%	46.5%	16.8%	-27.1%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	218.34	**223.08**	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-41.0%	-31.4%	-19.0%	-15.0%	-10.2%	-4.3%	0.0%	2.2%	4.2%	6.0%	7.7%	9.4%	10.9%	12.5%	14.1%	15.6%	17.4%	21.3%	21.9%	22.0%	23.0%	22.9%	28.7%	36.2%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	68.70	*66.41*	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	42.7%	29.6%	21.0%	14.7%	8.6%	3.7%	0.0%	-3.3%	-6.7%	-10.1%	-15.2%	-24.0%	-34.2%	-44.1%	-53.7%	-63.3%	-72.8%	-82.0%	-90.0%	-92.4%	-94.9%	-97.2%	-99.7%	-99.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -4 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-9: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -3 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	18.82	*18.35*	*17.77*	*18.36*	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	101.3%	70.1%	44.2%	28.1%	15.8%	7.0%	2.6%	0.0%	-2.5%	-5.6%	-2.5%	12.4%	29.9%	38.5%	32.6%	14.4%	-9.5%	-33.1%	-37.0%	-55.1%	-67.4%	-77.3%	-84.7%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	14.36	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	**14.49**	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	242.2%	223.4%	120.9%	113.2%	95.5%	51.6%	13.4%	0.0%	-11.0%	-17.9%	-24.6%	-27.4%	-26.3%	-17.8%	0.9%	33.9%	74.5%	96.1%	126.9%	166.0%	211.6%	241.1%	179.0%	86.8%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	0.17	*0.17*	*0.16*	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	125.0%	96.8%	58.3%	18.7%	4.1%	1.8%	0.9%	0.0%	-0.9%	-1.9%	17.1%	72.6%	128.7%	157.6%	151.4%	107.9%	47.7%	-1.0%	-1.0%	-4.3%	-24.0%	-51.7%	-68.9%	-85.0%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	**1.40**	1.38	**1.39**	**1.41**	**1.43**	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	594.6%	346.9%	259.1%	245.0%	147.9%	39.1%	1.8%	0.0%	1.2%	2.5%	3.8%	5.4%	9.1%	43.2%	151.2%	308.9%	410.0%	366.6%	401.0%	345.5%	137.1%	-12.8%	-62.2%	-75.7%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	*0.15*	0.15	**0.15**	**0.16**	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	219.9%	160.7%	109.0%	57.2%	16.0%	3.3%	-0.3%	0.0%	0.3%	0.6%	18.2%	73.4%	149.0%	213.4%	240.6%	222.0%	158.9%	85.6%	102.4%	68.1%	-8.0%	-16.5%	-57.1%	-87.7%
Cattail Wetland	**0.01**	**0.01**	**0.00**	**0.00**	*0.00*	*0.00*	*0.00*	0.00	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.00*
Percent change	232.8%	158.4%	76.3%	16.8%	-3.6%	-2.4%	-1.2%	0.0%	1.2%	2.5%	22.2%	108.4%	254.4%	360.6%	356.9%	262.3%	146.1%	64.3%	64.3%	64.3%	64.3%	64.3%	31.4%	-9.6%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	**18.01**	16.05	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	270.9%	232.1%	132.0%	123.0%	98.3%	49.6%	12.2%	0.0%	-9.7%	-15.8%	-21.4%	-22.6%	-19.9%	-8.5%	17.7%	60.1%	103.8%	118.2%	148.8%	178.7%	200.7%	213.8%	153.5%	69.4%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	**37.31**	34.88	*32.84*	*31.29*	*30.99*	*33.58*	**37.31**	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	**43.57**	*27.19*
Percent change	179.4%	144.7%	84.6%	71.7%	53.7%	26.6%	7.0%	0.0%	-5.8%	-10.3%	-11.2%	-3.7%	7.0%	16.8%	25.7%	35.4%	42.6%	36.5%	48.5%	52.5%	56.0%	56.7%	24.9%	-22.0%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	223.08	**227.45**	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-42.3%	-32.8%	-20.8%	-16.8%	-12.1%	-6.3%	-2.1%	0.0%	2.0%	3.7%	5.4%	7.0%	8.6%	10.1%	11.7%	13.1%	14.9%	18.7%	19.3%	19.4%	20.4%	20.3%	26.0%	33.3%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	66.41	*64.10*	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	47.6%	34.1%	25.2%	18.6%	12.3%	7.2%	3.4%	0.0%	-3.5%	-7.0%	-12.3%	-21.4%	-32.0%	-42.2%	-52.1%	-62.0%	-71.9%	-81.4%	-89.6%	-92.2%	-94.7%	-97.1%	-99.7%	-99.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -3 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-10: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -2 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	18.35	***17.77***	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	106.6%	74.5%	48.0%	31.4%	18.8%	9.8%	5.2%	2.6%	0.0%	-3.1%	0.1%	15.3%	33.3%	42.1%	36.0%	17.4%	-7.2%	-31.4%	-35.4%	-54.0%	-66.5%	-76.8%	-84.3%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	**14.36**	12.78	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	**14.49**	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	284.3%	263.3%	148.1%	139.5%	119.6%	70.3%	27.4%	12.3%	0.0%	-7.8%	-15.4%	-18.5%	-17.2%	-7.7%	13.4%	50.4%	96.0%	120.2%	154.8%	198.8%	250.0%	283.1%	213.3%	109.8%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	0.17	*0.16*	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	127.1%	98.6%	59.8%	19.8%	5.1%	2.8%	1.9%	0.9%	0.0%	-0.9%	18.2%	74.2%	130.9%	160.0%	153.8%	109.8%	49.1%	-0.1%	-0.1%	-3.4%	-23.3%	-51.2%	-68.6%	-84.9%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	**1.40**	*1.38*	1.39	**1.41**	**1.43**	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	586.3%	341.6%	254.8%	240.9%	144.9%	37.5%	0.6%	-1.2%	0.0%	1.2%	2.5%	4.2%	7.8%	41.5%	148.2%	304.0%	403.9%	361.0%	395.0%	340.2%	134.2%	-13.8%	-62.6%	-76.0%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	*0.15*	*0.15*	0.15	**0.16**	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	219.0%	159.9%	108.4%	56.7%	15.6%	3.0%	-0.6%	-0.3%	0.0%	0.3%	17.8%	72.8%	148.3%	212.5%	239.6%	221.0%	158.1%	85.0%	101.7%	67.6%	-8.2%	-16.8%	-57.2%	-87.8%
Cattail Wetland	**0.01**	**0.01**	**0.00**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	0.00	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.00*
Percent change	228.8%	155.3%	74.2%	15.4%	-4.8%	-3.6%	-2.4%	-1.2%	0.0%	1.2%	20.7%	105.9%	250.2%	355.1%	351.5%	258.0%	143.2%	62.3%	62.3%	62.3%	62.3%	62.3%	29.9%	-10.7%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	**18.01**	**16.05**	14.49	*13.51*	*12.63*	*12.43*	*12.85*	**14.68**	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	310.8%	267.8%	157.0%	146.9%	119.6%	65.6%	24.2%	10.8%	0.0%	-6.8%	-12.9%	-14.3%	-11.3%	1.3%	30.3%	77.3%	125.7%	141.6%	175.6%	208.7%	233.0%	247.6%	180.7%	87.6%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	**37.31**	**34.88**	32.84	*31.29*	*30.99*	**33.58**	**37.31**	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	**43.57**	*27.19*
Percent change	196.7%	159.8%	96.1%	82.4%	63.3%	34.5%	13.6%	6.2%	0.0%	-4.7%	-5.6%	2.3%	13.6%	24.1%	33.5%	43.8%	51.5%	45.0%	57.7%	61.9%	65.7%	66.4%	32.7%	-17.2%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	227.45	**231.36**	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-43.4%	-34.1%	-22.3%	-18.4%	-13.8%	-8.1%	-4.0%	-1.9%	0.0%	1.7%	3.4%	5.0%	6.5%	8.0%	9.5%	10.9%	12.7%	16.4%	17.0%	17.1%	18.1%	18.0%	23.6%	30.8%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	64.10	*61.76*	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	52.9%	39.0%	29.7%	22.9%	16.4%	11.1%	7.2%	3.6%	0.0%	-3.6%	-9.1%	-18.5%	-29.5%	-40.1%	-50.4%	-60.7%	-70.9%	-80.7%	-89.3%	-91.9%	-94.5%	-97.0%	-99.7%	-99.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -2 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-11: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION -1 FOOT CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	17.77	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	113.2%	80.2%	52.8%	35.6%	22.6%	13.4%	8.6%	5.9%	3.2%	0.0%	3.3%	19.0%	37.6%	46.7%	40.4%	21.2%	-4.2%	-29.2%	-33.3%	-52.5%	-65.5%	-76.0%	-83.8%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	**14.36**	**12.78**	11.78	*10.82*	*10.42*	*10.58*	**11.80**	**14.49**	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	316.8%	294.0%	169.1%	159.7%	138.1%	84.7%	38.2%	21.8%	8.5%	0.0%	-8.2%	-11.6%	-10.2%	0.1%	23.0%	63.2%	112.5%	138.9%	176.3%	224.0%	279.6%	315.5%	239.8%	127.5%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	0.16	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	**0.17**	**0.17**	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	129.3%	100.5%	61.3%	21.0%	6.1%	3.7%	2.8%	1.9%	0.9%	0.0%	19.3%	75.8%	133.1%	162.4%	156.2%	111.8%	50.5%	0.9%	0.9%	-2.5%	-22.6%	-50.7%	-68.3%	-84.8%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	*1.40*	*1.38*	*1.39*	1.41	**1.43**	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	578.0%	336.2%	250.5%	236.7%	141.9%	35.8%	-0.6%	-2.4%	-1.2%	0.0%	1.3%	2.9%	6.5%	39.8%	145.2%	299.1%	397.8%	355.4%	389.0%	334.9%	131.4%	-14.9%	-63.1%	-76.3%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	*0.15*	*0.15*	*0.15*	0.16	*0.18*	*0.27*	*0.38*	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	218.0%	159.1%	107.8%	56.2%	15.3%	2.7%	-0.9%	-0.6%	-0.3%	0.0%	17.5%	72.3%	147.5%	211.5%	238.5%	220.0%	157.3%	84.4%	101.1%	67.0%	-8.5%	-17.0%	-57.4%	-87.8%
Cattail Wetland	**0.01**	**0.01**	**0.00**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.00*
Percent change	224.8%	152.2%	72.1%	14.0%	-5.9%	-4.7%	-3.6%	-2.4%	-1.2%	0.0%	19.2%	103.4%	245.9%	349.6%	346.0%	253.6%	140.2%	60.4%	60.4%	60.4%	60.4%	60.4%	28.3%	-11.8%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	**18.01**	**16.05**	**14.49**	13.51	*12.63*	*12.43*	*12.85*	**14.68**	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	340.6%	294.5%	175.6%	164.9%	135.5%	77.7%	33.3%	18.8%	7.3%	0.0%	-6.6%	-8.0%	-4.9%	8.7%	39.8%	90.2%	142.1%	159.2%	195.6%	231.1%	257.2%	272.8%	201.1%	101.2%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	**37.31**	**34.88**	**32.84**	31.29	*30.99*	**33.58**	**37.31**	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	211.4%	172.7%	105.8%	91.5%	71.4%	41.1%	19.3%	11.5%	5.0%	0.0%	-1.0%	7.3%	19.2%	30.3%	40.1%	51.0%	59.0%	52.2%	65.6%	70.0%	73.9%	74.7%	39.3%	-13.1%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	231.36	**235.23**	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-44.3%	-35.2%	-23.6%	-19.8%	-15.2%	-9.7%	-5.6%	-3.6%	-1.7%	0.0%	1.7%	3.2%	4.7%	6.1%	7.7%	9.1%	10.8%	14.5%	15.0%	15.2%	16.1%	16.0%	21.5%	28.6%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	61.76	*58.24*	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	58.7%	44.2%	34.6%	27.6%	20.8%	15.3%	11.2%	7.5%	3.8%	0.0%	-5.7%	-15.4%	-26.8%	-37.8%	-48.5%	-59.2%	-69.8%	-80.0%	-88.8%	-91.6%	-94.3%	-96.9%	-99.6%	-99.6%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at -1 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-12: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 0 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	18.36	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	*17.03*	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	106.4%	74.4%	47.8%	31.3%	18.7%	9.7%	5.1%	2.5%	-0.1%	-3.2%	0.0%	15.2%	33.2%	42.0%	35.9%	17.3%	-7.3%	-31.4%	-35.4%	-54.0%	-66.6%	-76.8%	-84.3%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	**14.36**	**12.78**	**11.78**	10.82	*10.42*	*10.58*	**11.80**	**14.49**	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	354.0%	329.1%	193.1%	182.9%	159.4%	101.2%	50.5%	32.7%	18.1%	8.9%	0.0%	-3.7%	-2.2%	9.1%	33.9%	77.7%	131.5%	160.2%	201.0%	252.9%	313.5%	352.6%	270.2%	147.8%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	0.20	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	92.2%	68.1%	35.2%	1.4%	-11.0%	-13.0%	-13.8%	-14.6%	-15.4%	-16.2%	0.0%	47.4%	95.4%	120.0%	114.8%	77.6%	26.2%	-15.4%	-15.4%	-18.2%	-35.1%	-58.7%	-73.4%	-87.2%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	*1.40*	*1.38*	*1.39*	*1.41*	1.43	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	569.4%	330.7%	246.1%	232.5%	138.9%	34.1%	-1.9%	-3.6%	-2.5%	-1.3%	0.0%	1.6%	5.1%	38.0%	142.1%	294.1%	391.6%	349.7%	382.9%	329.4%	128.5%	-15.9%	-63.6%	-76.6%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	0.18	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	170.7%	120.6%	76.9%	33.0%	-1.9%	-12.6%	-15.7%	-15.4%	-15.1%	-14.9%	0.0%	46.7%	110.7%	165.2%	188.2%	172.4%	119.1%	57.0%	71.2%	42.2%	-22.1%	-29.4%	-63.7%	-89.6%
Cattail Wetland	**0.01**	**0.01**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.00	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	*0.00*
Percent change	172.4%	111.5%	44.3%	-4.4%	-21.1%	-20.1%	-19.1%	-18.1%	-17.2%	-16.1%	0.0%	70.6%	190.1%	277.0%	274.0%	196.6%	101.5%	34.5%	34.5%	34.5%	34.5%	34.5%	7.6%	-26.0%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	**18.01**	**16.05**	**14.49**	**13.51**	12.63	*12.43*	**12.85**	**14.68**	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	371.6%	322.2%	195.0%	183.5%	152.1%	90.2%	42.6%	27.2%	14.8%	7.0%	0.0%	-1.6%	1.8%	16.3%	49.6%	103.6%	159.1%	177.4%	216.4%	254.4%	282.3%	299.1%	222.3%	115.4%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	**37.31**	**34.88**	**32.84**	**31.29**	30.99	**33.58**	**37.31**	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	214.4%	175.4%	107.8%	93.3%	73.0%	42.5%	20.4%	12.6%	6.0%	1.0%	0.0%	8.4%	20.4%	31.5%	41.5%	52.4%	60.5%	53.7%	67.1%	71.6%	75.6%	76.3%	40.6%	-12.3%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	235.23	**238.76**	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-45.3%	-36.3%	-24.9%	-21.1%	-16.6%	-11.2%	-7.2%	-5.2%	-3.3%	-1.6%	0.0%	1.5%	3.0%	4.4%	5.9%	7.3%	9.0%	12.6%	13.1%	13.3%	14.2%	14.1%	19.5%	26.4%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	58.24	*52.22*	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	68.3%	52.9%	42.7%	35.3%	28.1%	22.3%	18.0%	14.0%	10.1%	6.1%	0.0%	-10.3%	-22.4%	-34.0%	-45.4%	-56.7%	-67.9%	-78.8%	-88.2%	-91.1%	-94.0%	-96.7%	-99.6%	-99.6%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 0 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-13: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 1 FOOT CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	21.15	**24.45**	**26.07**	**24.95**	**21.54**	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	79.1%	51.4%	28.3%	14.0%	3.0%	-4.7%	-8.7%	-11.0%	-13.3%	-16.0%	-13.2%	0.0%	15.6%	23.2%	18.0%	1.8%	-19.5%	-40.5%	-43.9%	-60.1%	-71.0%	-79.8%	-86.4%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	**14.36**	**12.78**	**11.78**	**10.82**	10.42	**10.58**	**11.80**	**14.49**	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	371.4%	345.6%	204.4%	193.7%	169.3%	108.9%	56.3%	37.8%	22.7%	13.1%	3.8%	0.0%	1.6%	13.2%	39.0%	84.5%	140.4%	170.1%	212.5%	266.5%	329.3%	369.9%	284.3%	157.3%
Giant Vetch Wetland	**0.38**	**0.33**	*0.27*	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	0.29	**0.38**	**0.43**	**0.42**	**0.35**	*0.25*	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	30.4%	14.0%	-8.3%	-31.2%	-39.7%	-41.0%	-41.5%	-42.1%	-42.6%	-43.1%	-32.2%	0.0%	32.5%	49.2%	45.7%	20.4%	-14.4%	-42.6%	-42.6%	-44.5%	-56.0%	-72.0%	-82.0%	-91.3%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	1.45	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	558.8%	323.9%	240.6%	227.2%	135.1%	32.0%	-3.4%	-5.2%	-4.0%	-2.8%	-1.6%	0.0%	3.5%	35.8%	138.3%	287.8%	383.7%	342.5%	375.2%	322.6%	124.8%	-17.3%	-64.1%	-76.9%
Rush Meadow	**0.49**	**0.40**	**0.32**	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	0.27	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	84.5%	50.4%	20.6%	-9.3%	-33.1%	-40.4%	-42.5%	-42.3%	-42.1%	-42.0%	-31.8%	0.0%	43.7%	80.8%	96.5%	85.7%	49.3%	7.0%	16.7%	-3.1%	-46.9%	-51.8%	-75.3%	-92.9%
Cattail Wetland	**0.01**	**0.01**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	0.01	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	59.7%	24.0%	-15.4%	-43.9%	-53.7%	-53.2%	-52.6%	-52.0%	-51.4%	-50.8%	-41.4%	0.0%	70.1%	121.0%	119.3%	73.9%	18.1%	-21.2%	-21.2%	-21.2%	-21.2%	-21.2%	-36.9%	-56.6%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	**18.01**	**16.05**	**14.49**	**13.51**	**12.63**	12.43	**12.85**	**14.68**	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	379.1%	329.0%	199.7%	188.0%	156.1%	93.2%	44.9%	29.2%	16.6%	8.7%	1.6%	0.0%	3.4%	18.2%	52.0%	106.8%	163.3%	181.8%	221.4%	260.0%	288.4%	305.4%	227.4%	118.8%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	**37.31**	**34.88**	*32.84*	*31.29*	*30.99*	33.58	**37.31**	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	**43.57**	*27.19*
Percent change	190.2%	154.1%	91.8%	78.4%	59.7%	31.5%	11.1%	3.9%	-2.2%	-6.8%	-7.7%	0.0%	11.1%	21.4%	30.6%	40.7%	48.1%	41.8%	54.2%	58.4%	62.0%	62.7%	29.7%	-19.0%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	238.76	**242.17**	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-46.1%	-37.2%	-26.0%	-22.3%	-17.9%	-12.5%	-8.6%	-6.6%	-4.7%	-3.1%	-1.5%	0.0%	1.4%	2.9%	4.3%	5.7%	7.4%	10.9%	11.5%	11.6%	12.5%	12.4%	17.7%	24.6%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	52.22	*45.19*	*38.41*	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	87.7%	70.6%	59.2%	50.9%	42.9%	36.4%	31.6%	27.2%	22.7%	18.3%	11.5%	0.0%	-13.5%	-26.4%	-39.1%	-51.7%	-64.2%	-76.3%	-86.8%	-90.0%	-93.3%	-96.4%	-99.6%	-99.6%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 1 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-14: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 2 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	*24.11*	*21.80*	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	24.45	**26.07**	**24.95**	*21.54*	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	55.0%	30.9%	11.0%	-1.4%	-10.9%	-17.6%	-21.1%	-23.0%	-25.0%	-27.3%	-24.9%	-13.5%	0.0%	6.6%	2.0%	-11.9%	-30.4%	-48.5%	-51.5%	-65.5%	-74.9%	-82.6%	-88.2%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	**14.36**	**12.78**	**11.78**	**10.82**	*10.42*	*10.58*	**11.80**	**14.49**	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	364.1%	338.7%	199.7%	189.2%	165.2%	105.7%	53.9%	35.6%	20.8%	11.3%	2.2%	-1.5%	0.0%	11.5%	36.9%	81.7%	136.7%	166.0%	207.7%	260.8%	322.7%	362.7%	278.4%	153.3%
Giant Vetch Wetland	*0.38*	*0.33*	*0.27*	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	*0.29*	0.38	**0.43**	**0.42**	*0.35*	0.25	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	-1.6%	-14.0%	-30.8%	-48.1%	-54.5%	-55.5%	-55.9%	-56.3%	-56.7%	-57.1%	-48.8%	-24.6%	0.0%	12.6%	9.9%	-9.1%	-35.4%	-56.7%	-56.7%	-58.1%	-66.8%	-78.9%	-86.4%	-93.5%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	536.8%	309.7%	229.2%	216.3%	127.2%	27.6%	-6.7%	-8.3%	-7.2%	-6.1%	-4.9%	-3.3%	0.0%	31.3%	130.3%	274.9%	367.6%	327.7%	359.3%	308.5%	117.3%	-20.0%	-65.3%	-77.7%
Rush Meadow	**0.49**	**0.40**	*0.32*	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	**0.48**	**0.53**	**0.50**	***0.40***	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	28.5%	4.7%	-16.1%	-36.9%	-53.4%	-58.5%	-60.0%	-59.8%	-59.7%	-59.6%	-52.5%	-30.4%	0.0%	25.9%	36.8%	29.3%	4.0%	-25.5%	-18.7%	-32.5%	-63.0%	-66.5%	-82.8%	-95.1%
Cattail Wetland	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	0.01	**0.01**	**0.01**	**0.01**	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	-6.1%	-27.1%	-50.3%	-67.0%	-72.8%	-72.5%	-72.1%	-71.8%	-71.4%	-71.1%	-65.5%	-41.2%	0.0%	30.0%	28.9%	2.2%	-30.5%	-53.6%	-53.6%	-53.6%	-53.6%	-53.6%	-62.9%	-74.5%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	**18.01**	**16.05**	**14.49**	*13.51*	*12.63*	*12.43*	*12.85*	**14.68**	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	363.3%	314.8%	189.8%	178.5%	147.6%	86.8%	40.1%	24.9%	12.8%	5.2%	-1.8%	-3.3%	0.0%	14.3%	47.0%	100.0%	154.6%	172.5%	210.8%	248.1%	275.6%	292.0%	216.6%	111.6%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	**37.31**	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	**43.57**	*27.19*
Percent change	161.2%	128.7%	72.6%	60.6%	43.7%	18.4%	0.0%	-6.5%	-12.0%	-16.1%	-16.9%	-10.0%	0.0%	9.2%	17.5%	26.6%	33.4%	27.6%	38.8%	42.6%	45.8%	46.5%	16.8%	-27.1%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	**245.57**	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-46.8%	-38.1%	-27.0%	-23.4%	-19.0%	-13.7%	-9.8%	-7.9%	-6.1%	-4.5%	-2.9%	-1.4%	0.0%	1.4%	2.9%	4.2%	5.9%	9.4%	9.9%	10.0%	10.9%	10.8%	16.1%	22.8%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	45.19	38.41	31.79	25.22	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	116.9%	97.1%	84.0%	74.4%	65.1%	57.6%	52.0%	47.0%	41.9%	36.7%	28.9%	15.6%	0.0%	-15.0%	-29.6%	-44.2%	-58.7%	-72.6%	-84.8%	-88.5%	-92.2%	-95.8%	-99.5%	-99.5%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 2 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-15: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 3 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	*24.11*	*21.80*	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	*24.45*	26.07	*24.95*	*21.54*	*17.03*	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	45.4%	22.8%	4.1%	-7.5%	-16.4%	-22.7%	-25.9%	-27.8%	-29.6%	-31.8%	-29.6%	-18.9%	-6.2%	0.0%	-4.3%	-17.4%	-34.7%	-51.7%	-54.5%	-67.6%	-76.4%	-83.6%	-89.0%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	**14.36**	**12.78**	*11.78*	*10.82*	*10.42*	*10.58*	11.80	**14.49**	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	316.3%	293.5%	168.8%	159.4%	137.8%	84.5%	38.0%	21.7%	8.3%	-0.1%	-8.3%	-11.7%	-10.3%	0.0%	22.8%	63.0%	112.3%	138.6%	176.0%	223.6%	279.1%	315.0%	239.4%	127.2%
Giant Vetch Wetland	0.38	0.33	0.27	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	**0.29**	**0.38**	0.43	*0.42*	*0.35*	*0.25*	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	-12.6%	-23.6%	-38.5%	-53.9%	-59.6%	-60.5%	-60.8%	-61.2%	-61.5%	-61.9%	-54.5%	-33.0%	-11.2%	0.0%	-2.4%	-19.3%	-42.6%	-61.6%	-61.6%	-62.8%	-70.5%	-81.2%	-87.9%	-94.2%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	1.97	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	*1.20*	*0.52*	*0.33*
Percent change	385.1%	212.1%	150.8%	140.9%	73.1%	-2.8%	-28.9%	-30.2%	-29.3%	-28.4%	-27.5%	-26.4%	-23.8%	0.0%	75.5%	185.6%	256.2%	225.9%	249.9%	211.2%	65.6%	-39.1%	-73.6%	-83.0%
Rush Meadow	**0.49**	*0.40*	*0.32*	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	0.48	**0.53**	**0.50**	0.40	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	2.1%	-16.8%	-33.3%	-49.9%	-63.0%	-67.0%	-68.2%	-68.1%	-68.0%	-67.9%	-62.3%	-44.7%	-20.5%	0.0%	8.7%	2.7%	-17.4%	-40.8%	-35.4%	-46.4%	-70.6%	-73.4%	-86.3%	-96.1%
Cattail Wetland	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	0.01	**0.01**	**0.01**	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	-27.7%	-43.9%	-61.7%	-74.6%	-79.1%	-78.8%	-78.5%	-78.3%	-78.0%	-77.8%	-73.5%	-54.8%	-23.1%	0.0%	-0.8%	-21.3%	-46.6%	-64.3%	-64.3%	-64.3%	-64.3%	-64.3%	-71.5%	-80.4%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	**18.01**	**16.05**	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	14.68	**18.89**	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	305.5%	263.0%	153.6%	143.7%	116.7%	63.5%	22.6%	9.3%	-1.3%	-8.0%	-14.0%	-15.4%	-12.5%	0.0%	28.7%	75.0%	122.8%	138.5%	172.0%	204.7%	228.7%	243.1%	177.1%	85.2%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	40.75	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	**43.57**	*27.19*
Percent change	139.1%	109.4%	58.0%	47.0%	31.6%	8.4%	-8.4%	-14.4%	-19.4%	-23.2%	-24.0%	-17.6%	-8.5%	0.0%	7.6%	15.9%	22.1%	16.8%	27.1%	30.5%	33.5%	34.1%	6.9%	-33.3%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	245.57	**249.14**	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-47.6%	-39.0%	-28.0%	-24.4%	-20.2%	-14.9%	-11.1%	-9.2%	-7.4%	-5.8%	-4.2%	-2.8%	-1.4%	0.0%	1.5%	2.8%	4.4%	7.9%	8.4%	8.5%	9.4%	9.3%	14.4%	21.1%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	38.41	*31.79*	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	155.2%	131.9%	116.4%	105.1%	94.2%	85.4%	78.9%	72.9%	66.9%	60.8%	51.6%	36.0%	17.6%	0.0%	-17.2%	-34.3%	-51.4%	-67.8%	-82.1%	-86.4%	-90.9%	-95.1%	-99.4%	-99.4%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 3 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-16: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 4 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	*24.11*	*21.80*	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	*24.45*	**26.07**	24.95	*21.54*	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	51.9%	28.3%	8.8%	-3.4%	-12.7%	-19.2%	-22.6%	-24.6%	-26.5%	-28.8%	-26.4%	-15.2%	-2.0%	4.5%	0.0%	-13.7%	-31.7%	-49.5%	-52.5%	-66.2%	-75.4%	-82.9%	-88.5%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	**16.28**	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	14.49	**19.23**	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	239.0%	220.4%	118.9%	111.2%	93.7%	50.2%	12.4%	-0.9%	-11.8%	-18.7%	-25.3%	-28.1%	-27.0%	-18.6%	0.0%	32.7%	72.9%	94.3%	124.8%	163.5%	208.8%	238.0%	176.4%	85.0%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	*0.29*	*0.38*	**0.43**	0.42	*0.35*	*0.25*	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	-10.5%	-21.7%	-37.0%	-52.8%	-58.6%	-59.5%	-59.9%	-60.2%	-60.6%	-61.0%	-53.4%	-31.4%	-9.0%	2.4%	0.0%	-17.3%	-41.2%	-60.6%	-60.6%	-61.9%	-69.8%	-80.8%	-87.6%	-94.0%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	3.46	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	176.5%	77.9%	42.9%	37.3%	-1.3%	-44.6%	-59.5%	-60.2%	-59.7%	-59.2%	-58.7%	-58.0%	-56.6%	-43.0%	0.0%	62.8%	103.0%	85.7%	99.4%	77.3%	-5.6%	-65.3%	-85.0%	-90.3%
Rush Meadow	*0.49*	*0.40*	*0.32*	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	*0.48*	0.53	*0.50*	*0.40*	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	-6.1%	-23.5%	-38.6%	-53.9%	-66.0%	-69.7%	-70.7%	-70.6%	-70.6%	-70.5%	-65.3%	-49.1%	-26.9%	-8.0%	0.0%	-5.5%	-24.0%	-45.5%	-40.6%	-50.7%	-73.0%	-75.5%	-87.4%	-96.4%
Cattail Wetland	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	**0.01**	0.01	*0.01*	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	-27.2%	-43.4%	-61.4%	-74.4%	-78.9%	-78.6%	-78.4%	-78.1%	-77.8%	-77.6%	-73.3%	-54.4%	-22.4%	0.8%	0.0%	-20.7%	-46.1%	-64.0%	-64.0%	-64.0%	-64.0%	-64.0%	-71.2%	-80.2%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	**24.01**	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	18.89	**25.70**	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	**27.19**
Percent change	215.2%	182.2%	97.1%	89.4%	68.5%	27.1%	-4.7%	-15.0%	-23.3%	-28.5%	-33.2%	-34.2%	-32.0%	-22.3%	0.0%	36.0%	73.2%	85.4%	111.4%	136.8%	155.5%	166.7%	115.4%	43.9%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	43.85	*47.24*	49.75	*47.61*	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	122.2%	94.6%	46.9%	36.6%	22.3%	0.7%	-14.9%	-20.5%	-25.1%	-28.6%	-29.3%	-23.4%	-14.9%	-7.1%	0.0%	7.7%	13.5%	8.6%	18.1%	21.3%	24.1%	24.6%	-0.6%	-38.0%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	249.14	**252.35**	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-48.3%	-39.8%	-29.0%	-25.5%	-21.3%	-16.1%	-12.4%	-10.5%	-8.7%	-7.1%	-5.6%	-4.2%	-2.8%	-1.4%	0.0%	1.3%	2.9%	6.3%	6.8%	7.0%	7.8%	7.7%	12.8%	19.4%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	31.79	*25.22*	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	208.4%	180.2%	161.5%	147.8%	134.7%	124.0%	116.1%	108.9%	101.6%	94.3%	83.2%	64.3%	42.1%	20.8%	0.0%	-20.7%	-41.2%	-61.1%	-78.3%	-83.6%	-89.0%	-94.0%	-99.3%	-99.3%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 4 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-17: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 5 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	*20.15*	*19.31*	*18.82*	*18.35*	*17.77*	*18.36*	*21.15*	**24.45**	**26.07**	**24.95**	21.54	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	75.9%	48.7%	26.1%	11.9%	1.2%	-6.4%	-10.4%	-12.6%	-14.8%	-17.5%	-14.7%	-1.8%	13.5%	21.0%	15.9%	0.0%	-20.9%	-41.5%	-45.0%	-60.8%	-71.5%	-80.2%	-86.6%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	**21.76**	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	**25.05**	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	155.5%	141.5%	64.9%	59.2%	45.9%	13.2%	-15.3%	-25.3%	-33.5%	-38.7%	-43.7%	-45.8%	-45.0%	-38.6%	-24.6%	0.0%	30.3%	46.4%	69.4%	98.6%	132.7%	154.7%	108.3%	39.4%
Giant Vetch Wetland	**0.38**	*0.33*	*0.27*	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	*0.29*	**0.38**	**0.43**	**0.42**	0.35	*0.25*	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	8.2%	-5.3%	-23.8%	-42.9%	-49.9%	-51.0%	-51.5%	-51.9%	-52.3%	-52.8%	-43.7%	-17.0%	10.0%	23.9%	20.9%	0.0%	-28.9%	-52.4%	-52.4%	-53.9%	-63.4%	-76.7%	-85.0%	-92.8%
Knotweed Wetland	**9.56**	**6.15**	*4.94*	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	*5.63*	**7.02**	**6.42**	**6.89**	**6.13**	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	69.9%	9.3%	-12.2%	-15.6%	-39.4%	-66.0%	-75.1%	-75.5%	-75.2%	-74.9%	-74.6%	-74.2%	-73.3%	-65.0%	-38.6%	0.0%	24.7%	14.1%	22.5%	9.0%	-42.0%	-78.7%	-90.8%	-94.1%
Rush Meadow	*0.49*	*0.40*	*0.32*	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	*0.48*	**0.53**	0.50	0.40	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	-0.6%	-19.0%	-35.1%	-51.2%	-64.0%	-67.9%	-69.0%	-68.9%	-68.8%	-68.8%	-63.3%	-46.2%	-22.7%	-2.7%	5.8%	0.0%	-19.6%	-42.4%	-37.2%	-47.8%	-71.4%	-74.1%	-86.7%	-96.2%
Cattail Wetland	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	*0.01*	**0.01**	**0.01**	0.01	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	-8.1%	-28.7%	-51.3%	-67.8%	-73.4%	-73.1%	-72.7%	-72.4%	-72.1%	-71.7%	-66.3%	-42.5%	-2.2%	27.1%	26.1%	0.0%	-32.1%	-54.7%	-54.7%	-54.7%	-54.7%	-54.7%	-63.7%	-75.1%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	***27.19***
Percent change	131.7%	107.4%	44.9%	39.3%	23.8%	-6.6%	-29.9%	-37.5%	-43.6%	-47.4%	-50.9%	-51.6%	-50.0%	-42.9%	-26.5%	0.0%	27.3%	36.3%	55.4%	74.1%	87.8%	96.0%	58.3%	5.8%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	106.3%	80.6%	36.3%	26.8%	13.5%	-6.5%	-21.0%	-26.2%	-30.5%	-33.8%	-34.4%	-28.9%	-21.0%	-13.7%	-7.2%	0.0%	5.3%	0.8%	9.7%	12.6%	15.2%	15.7%	-7.8%	-42.4%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	**256.40**	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-49.0%	-40.6%	-30.0%	-26.4%	-22.3%	-17.2%	-13.5%	-11.6%	-9.9%	-8.3%	-6.8%	-5.4%	-4.0%	-2.7%	-1.3%	0.0%	1.6%	5.0%	5.5%	5.6%	6.5%	6.3%	11.4%	17.9%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	25.22	*18.68*	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	288.7%	253.2%	229.6%	212.4%	195.8%	182.4%	172.4%	163.3%	154.2%	144.9%	130.9%	107.1%	79.2%	52.3%	26.1%	0.0%	-25.9%	-51.0%	-72.7%	-79.3%	-86.1%	-92.5%	-99.1%	-99.1%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 5 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-18: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 6 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	17.03	*12.59*	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	122.5%	88.0%	59.4%	41.5%	28.0%	18.3%	13.4%	10.5%	7.7%	4.4%	7.8%	24.2%	43.6%	53.1%	46.5%	26.5%		-26.1%	-30.4%	-50.4%	-63.9%	-75.0%	-83.1%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	**26.81**
Percent change	96.1%	85.4%	26.6%	22.2%	12.0%	-13.1%	-35.0%	-42.7%	-49.0%	-53.0%	-56.8%	-58.4%	-57.7%	-52.9%	-42.2%	-23.2%		12.4%	30.0%	52.5%	78.6%	95.5%	59.9%	7.0%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	*0.20*	*0.17*	*0.17*	*0.17*	*0.17*	*0.17*	*0.16*	*0.20*	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	0.25	*0.17*	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	52.3%	33.2%	7.2%	-19.6%	-29.5%	-31.1%	-31.7%	-32.3%	-32.9%	-33.6%	-20.7%	16.8%	54.9%	74.4%	70.2%	40.7%		-33.0%	-33.0%	-35.2%	-48.5%	-67.3%	-78.9%	-89.9%
Knotweed Wetland	**9.56**	*6.15*	*4.94*	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	*5.63*	7.02	*6.42*	*6.89*	*6.13*	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	36.2%	-12.4%	-29.6%	-32.4%	-51.4%	-72.7%	-80.0%	-80.4%	-80.2%	-79.9%	-79.7%	-79.3%	-78.6%	-71.9%	-50.7%	-19.8%		-8.5%	-1.8%	-12.6%	-53.5%	-82.9%	-92.6%	-95.2%
Rush Meadow	**0.49**	**0.40**	*0.32*	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	*0.38*	**0.48**	**0.53**	**0.50**	0.40	*0.29*	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	23.6%	0.7%	-19.3%	-39.3%	-55.2%	-60.1%	-61.5%	-61.4%	-61.3%	-61.1%	-54.4%	-33.0%	-3.8%	21.1%	31.6%	24.4%		-28.3%	-21.8%	-35.1%	-64.5%	-67.8%	-83.4%	-95.3%
Cattail Wetland	**0.01**	**0.01**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.01*	**0.01**	**0.01**	**0.01**	**0.01**	0.01	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change	35.2%	5.0%	-28.4%	-52.5%	-60.8%	-60.4%	-59.9%	-59.4%	-58.9%	-58.4%	-50.4%	-15.3%	44.0%	87.1%	85.6%	47.2%		-33.3%	-33.3%	-33.3%	-33.3%	-33.3%	-46.6%	-63.3%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	*27.19*
Percent change	82.0%	63.0%	13.9%	9.4%	-2.7%	-26.6%	-45.0%	-50.9%	-55.7%	-58.7%	-61.4%	-62.0%	-60.7%	-55.1%	-42.2%	-21.4%		7.0%	22.1%	36.7%	47.5%	54.0%	24.4%	-16.9%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	95.9%	71.5%	29.4%	20.4%	7.8%	-11.2%	-25.0%	-29.9%	-34.0%	-37.1%	-37.7%	-32.5%	-25.0%	-18.1%	-11.9%	-5.0%		-4.3%	4.1%	6.9%	9.4%	9.8%	-12.4%	-45.3%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	256.40	**264.86**	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-51.5%	-43.6%	-33.5%	-30.2%	-26.2%	-21.4%	-17.8%	-16.1%	-14.4%	-12.9%	-11.5%	-10.2%	-8.9%	-7.6%	-6.2%	-5.0%		3.3%	3.8%	3.9%	4.8%	4.6%	9.6%	16.0%
Annual Grassland																	0.16	*0.08*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change																		-50.6%	-90.8%	-97.3%	-97.8%	-98.8%	-100.0%	-100.0%
Central Dune Scrub																	0.32	*0.17*	*0.16*	*0.14*	*0.11*	*0.06*	*0.00*	*0.00*
Percent change																		-48.2%	-51.9%	-55.7%	-65.9%	-80.7%	-100.0%	-100.0%
Coastal Scrub																	3.64	*2.31*	*1.77*	*1.34*	*0.90*	*0.43*	*0.00*	*0.00*
Percent change																		-36.5%	-51.3%	-63.1%	-75.4%	-88.1%	-100.0%	-100.0%
Non-native Forest																	12.66	*8.72*	*4.22*	*2.96*	*1.87*	*0.93*	*0.00*	*0.00*
Percent change																		-31.2%	-66.7%	-76.6%	-85.2%	-92.6%	-100.0%	-100.0%
Non-native Herbaceous																	1.55	*0.87*	*0.66*	*0.53*	*0.40*	*0.25*	*0.00*	*0.00*
Percent change																		-44.3%	-57.7%	-66.1%	-74.2%	-84.1%	-100.0%	-100.0%
Non-native Scrub																	0.32	*0.22*	*0.07*	*0.22*	*0.22*	*0.22*	*0.22*	*0.22*
Percent change																		-30.7%	-78.3%	-30.7%	-30.7%	-30.7%	-30.7%	-30.7%
Perennial Grassland																	0.02	*0.01*	*0.01*	*0.01*	*0.00*	*0.00*	*0.00*	*0.00*
Percent change																		-35.5%	-41.4%	-66.7%	-81.2%	-92.5%	-100.0%	-100.0%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	18.68	*12.37*	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	424.7%	376.7%	344.9%	321.7%	299.3%	281.2%	267.7%	255.5%	243.1%	230.6%	211.7%	179.5%	141.9%	105.6%	70.2%	35.0%		-33.7%	-63.1%	-72.1%	-81.2%	-89.8%	-98.8%	-98.8%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

All upland vegetation types combined for receding water level analysis

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 6 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-19: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 7 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	**17.03**	12.59	*11.86*	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	201.0%	154.3%	115.6%	91.5%	73.1%	60.0%	53.3%	49.5%	45.7%	41.2%	45.8%	68.0%	94.2%	107.0%	98.2%	71.1%	35.3%		-5.8%	-32.9%	-51.2%	-66.1%	-77.1%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	*25.05*	28.15	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	74.5%	64.9%	12.7%	8.7%	-0.3%	-22.7%	-42.1%	-49.0%	-54.6%	-58.1%	-61.6%	-63.0%	-62.4%	-58.1%	-48.5%	-31.7%	-11.0%	0.0%	15.7%	35.7%	58.9%	74.0%	42.3%	-4.8%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	*0.16*	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	0.17	*0.17*	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	127.3%	98.7%	59.9%	19.9%	5.2%	2.8%	1.9%	1.0%	0.1%	-0.9%	18.2%	74.3%	131.0%	160.1%	153.9%	110.0%	49.2%	0.0%	0.0%	-3.3%	-23.2%	-51.2%	-68.6%	-84.9%
Knotweed Wetland	**9.56**	*6.15*	*4.94*	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	*5.63*	**7.02**	6.42	*6.89*	*6.13*	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	48.9%	-4.2%	-23.0%	-26.1%	-46.9%	-70.2%	-78.2%	-78.6%	-78.3%	-78.0%	-77.8%	-77.4%	-76.6%	-69.3%	-46.2%	-12.4%	9.3%	0.0%	7.4%	-4.5%	-49.2%	-81.3%	-91.9%	-94.8%
Rush Meadow	**0.49**	**0.40**	**0.32**	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	0.29	*0.31*	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	72.4%	40.5%	12.7%	-15.3%	-37.5%	-44.3%	-46.3%	-46.1%	-45.9%	-45.8%	-36.3%	-6.6%	34.2%	68.9%	83.6%	73.5%	39.5%	0.0%	9.0%	-9.4%	-50.4%	-55.0%	-76.9%	-93.4%
Cattail Wetland	**0.01**	**0.01**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	0.00	0.00	0.00	0.00	0.00	*0.00*	*0.00*
Percent change	102.6%	57.3%	7.3%	-28.9%	-41.3%	-40.6%	-39.9%	-39.1%	-38.4%	-37.6%	-25.6%	26.8%	115.7%	180.4%	178.1%	120.5%	49.8%	0.0%	0.0%	0.0%	0.0%	0.0%	-20.0%	-45.0%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	35.02	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	*27.19*
Percent change	70.0%	52.2%	6.3%	2.2%	-9.1%	-31.4%	-48.6%	-54.2%	-58.6%	-61.4%	-64.0%	-64.5%	-63.3%	-58.1%	-46.1%	-26.6%	-6.6%	0.0%	14.0%	27.7%	37.8%	43.8%	16.2%	-22.4%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	**49.75**	47.61	**51.80**	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	104.6%	79.2%	35.2%	25.8%	12.6%	-7.3%	-21.6%	-26.8%	-31.0%	-34.3%	-34.9%	-29.5%	-21.6%	-14.4%	-7.9%	-0.8%	4.5%	0.0%	8.8%	11.7%	14.3%	14.8%	-8.5%	-42.9%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	*256.40*	264.86	**266.15**	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-51.4%	-43.4%	-33.3%	-29.9%	-26.0%	-21.1%	-17.6%	-15.8%	-14.1%	-12.6%	-11.2%	-9.9%	-8.6%	-7.3%	-5.9%	-4.7%	-3.2%	0.0%	0.5%	0.6%	1.4%	1.3%	6.1%	12.3%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	**18.68**	12.37	*6.89*	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	692.5%	620.0%	572.0%	536.9%	503.1%	475.7%	455.4%	436.9%	418.2%	399.3%	370.8%	322.2%	265.3%	210.5%	157.0%	103.9%	51.0%	0.0%	-44.3%	-57.9%	-71.6%	-84.6%	-98.2%	-98.2%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 7 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-20: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 8 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	**17.03**	**12.59**	11.86	*8.44*	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	219.6%	170.1%	129.0%	103.3%	83.8%	70.0%	62.8%	58.8%	54.7%	49.9%	54.9%	78.4%	106.3%	119.9%	110.5%	81.7%	43.7%	49.1%	0.0%	-28.8%	-48.2%	-64.0%	-75.7%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	*31.72*	*30.60*	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	*28.15*	32.57	**38.18**	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	50.8%	42.6%	-2.6%	-6.0%	-13.8%	-33.2%	-50.0%	-55.9%	-60.8%	-63.8%	-66.8%	-68.0%	-67.5%	-63.8%	-55.5%	-41.0%	-23.1%	-13.6%	0.0%	17.3%	37.4%	50.4%	23.0%	-17.7%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	*0.16*	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	**0.17**	0.17	*0.16*	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	127.3%	98.7%	59.9%	19.9%	5.2%	2.8%	1.9%	1.0%	0.1%	-0.9%	18.2%	74.3%	131.0%	160.1%	153.9%	110.0%	49.2%	0.0%	0.0%	-3.3%	-23.2%	-51.2%	-68.6%	-84.9%
Knotweed Wetland	**9.56**	*6.15*	*4.94*	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	*5.63*	**7.02**	*6.42*	6.89	*6.13*	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	38.6%	-10.8%	-28.3%	-31.1%	-50.5%	-72.2%	-79.7%	-80.0%	-79.8%	-79.6%	-79.3%	-79.0%	-78.2%	-71.4%	-49.9%	-18.4%	1.8%	-6.9%	0.0%	-11.1%	-52.7%	-82.6%	-92.5%	-95.1%
Rush Meadow	**0.49**	**0.40**	**0.32**	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	*0.27*	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	*0.29*	0.31	*0.26*	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	58.1%	28.9%	3.3%	-22.3%	-42.7%	-48.9%	-50.7%	-50.6%	-50.4%	-50.3%	-41.6%	-14.3%	23.1%	54.9%	68.3%	59.1%	28.0%	-8.3%	0.0%	-16.9%	-54.5%	-58.7%	-78.8%	-93.9%
Cattail Wetland	**0.01**	**0.01**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	0.00	0.00	0.00	0.00	0.00	*0.00*	*0.00*
Percent change	102.6%	57.3%	7.3%	-28.9%	-41.3%	-40.6%	-39.9%	-39.1%	-38.4%	-37.6%	-25.6%	26.8%	115.7%	180.4%	178.1%	120.5%	49.8%	0.0%	0.0%	0.0%	0.0%	0.0%	-20.0%	-45.0%
Sum Herbaceous Wetland	**59.54**	**53.31**	*37.24*	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	39.94	**44.74**	**48.27**	**50.38**	**40.69**	*27.19*
Percent change	49.1%	33.5%	-6.8%	-10.4%	-20.3%	-39.9%	-54.9%	-59.8%	-63.7%	-66.2%	-68.4%	-68.9%	-67.8%	-63.2%	-52.7%	-35.7%	-18.1%	-12.3%	0.0%	12.0%	20.9%	26.1%	1.9%	-31.9%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	51.80	**53.18**	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	88.1%	64.7%	24.3%	15.6%	3.5%	-14.7%	-28.0%	-32.7%	-36.6%	-39.6%	-40.2%	-35.2%	-28.0%	-21.3%	-15.4%	-8.8%	-4.0%	-8.1%	0.0%	2.7%	5.0%	5.5%	-15.9%	-47.5%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	256.40	*264.86*	266.15	**266.46**	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-51.6%	-43.7%	-33.6%	-30.3%	-26.3%	-21.5%	-18.0%	-16.2%	-14.5%	-13.1%	-11.6%	-10.3%	-9.0%	-7.7%	-6.4%	-5.2%	-3.7%	-0.5%	0.0%	0.1%	0.9%	0.8%	5.6%	11.8%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	**18.68**	**12.37**	6.89	*5.21*	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	1322.8%	1192.7%	1106.4%	1043.5%	982.8%	933.5%	897.1%	863.9%	830.3%	796.4%	745.2%	658.0%	555.8%	457.5%	361.4%	266.0%	171.1%	79.5%	0.0%	-24.4%	-49.1%	-72.4%	-96.8%	-96.8%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 8 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-21: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 9 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	**17.03**	**12.59**	**11.86**	8.44	*6.14*	*4.26*	*2.88*	*0.00*
Percent change[b]	348.8%	279.2%	221.5%	185.5%	158.1%	138.7%	128.6%	123.0%	117.3%	110.5%	117.5%	150.5%	189.6%	208.8%	195.5%	155.1%	101.7%	49.1%	40.4%	0.0%	-27.3%	-49.5%	-65.9%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	*31.72*	*30.60*	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	*28.15*	*32.57*	38.18	**44.74**	**48.97**	**40.05**	*26.81*
Percent change	28.6%	21.6%	-16.9%	-19.9%	-26.5%	-43.0%	-57.4%	-62.4%	-66.5%	-69.1%	-71.7%	-72.7%	-72.3%	-69.1%	-62.1%	-49.6%	-34.4%	-26.3%	-14.7%	0.0%	17.2%	28.2%	4.9%	-29.8%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.16**	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	**0.17**	**0.17**	0.16	*0.13*	*0.08*	*0.05*	*0.03*
Percent change	135.1%	105.5%	65.4%	24.0%	8.8%	6.3%	5.4%	4.5%	3.5%	2.5%	22.3%	80.3%	138.9%	169.1%	162.6%	117.1%	54.3%	3.4%	3.4%	0.0%	-20.6%	-49.5%	-67.5%	-84.4%
Knotweed Wetland	**9.56**	**6.15**	*4.94*	*4.75*	*3.41*	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	*3.46*	*5.63*	**7.02**	**6.42**	**6.89**	6.13	*3.26*	*1.20*	*0.52*	*0.33*
Percent change	55.9%	0.3%	-19.4%	-22.6%	-44.4%	-68.8%	-77.2%	-77.6%	-77.3%	-77.0%	-76.7%	-76.3%	-75.5%	-67.9%	-43.6%	-8.2%	14.5%	4.7%	12.4%	0.0%	-46.8%	-80.4%	-91.5%	-94.5%
Rush Meadow	**0.49**	**0.40**	**0.32**	*0.24*	*0.18*	*0.16*	*0.15*	*0.15*	*0.15*	*0.16*	*0.18*	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	0.26	*0.14*	*0.13*	*0.07*	*0.02*
Percent change	90.4%	55.1%	24.4%	-6.5%	-31.0%	-38.5%	-40.7%	-40.5%	-40.3%	-40.1%	-29.7%	3.2%	48.2%	86.5%	102.7%	91.6%	54.1%	10.4%	20.4%	0.0%	-45.2%	-50.3%	-74.5%	-92.7%
Cattail Wetland	**0.01**	**0.01**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	0.00	0.00	0.00	0.00	0.00	*0.00*	*0.00*
Percent change	102.6%	57.3%	7.3%	-28.9%	-41.3%	-40.6%	-39.9%	-39.1%	-38.4%	-37.6%	-25.6%	26.8%	115.7%	180.4%	178.1%	120.5%	49.8%	0.0%	0.0%	0.0%	0.0%	0.0%	-20.0%	-45.0%
Sum Herbaceous Wetland	**59.54**	**53.31**	*37.24*	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	*39.94*	44.74	**48.27**	**50.38**	*40.69*	*27.19*
Percent change	33.1%	19.2%	-16.8%	-20.0%	-28.9%	-46.3%	-59.7%	-64.1%	-67.6%	-69.8%	-71.8%	-72.2%	-71.3%	-67.2%	-57.8%	-42.6%	-26.9%	-21.7%	-10.7%	0.0%	7.9%	12.6%	-9.1%	-39.2%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	*51.80*	53.18	**54.41**	**54.64**	*43.57*	*27.19*
Percent change	83.2%	60.4%	21.1%	12.6%	0.8%	-17.0%	-29.8%	-34.4%	-38.3%	-41.2%	-41.7%	-36.9%	-29.9%	-23.4%	-17.6%	-11.2%	-6.5%	-10.5%	-2.6%	0.0%	2.3%	2.8%	-18.1%	-48.9%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	256.40	*264.86*	*266.15*	266.46	**268.62**	**268.30**	**281.06**	**297.43**
Percent change	-51.7%	-43.8%	-33.7%	-30.3%	-26.4%	-21.6%	-18.1%	-16.3%	-14.6%	-13.2%	-11.7%	-10.4%	-9.1%	-7.8%	-6.5%	-5.3%	-3.8%	-0.6%	-0.1%	0.0%	0.8%	0.7%	5.5%	11.6%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	**18.68**	**12.37**	**6.89**	5.21	*3.51*	*1.90*	*0.22*	*0.22*
Percent change	1781.6%	1609.6%	1495.5%	1412.2%	1332.0%	1266.8%	1218.7%	1174.7%	1130.3%	1085.5%	1017.8%	902.4%	767.3%	637.3%	510.2%	384.1%	258.5%	137.4%	32.2%	0.0%	-32.6%	-63.5%	-95.8%	-95.8%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 9 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-22: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 10 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	**17.03**	**12.59**	**11.86**	**8.44**	*6.14*	*4.26*	*2.88*	*0.00*
Percent change [b]	517.1%	421.5%	342.2%	292.6%	255.0%	228.2%	214.4%	206.6%	198.8%	189.5%	199.1%	244.5%	298.3%	324.6%	306.4%	250.8%	177.4%	105.1%	93.1%	37.5%	0.0%	-30.6%	-53.1%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	*28.15*	*32.57*	*38.18*	44.74	**48.97**	*40.05*	*26.81*
Percent change	9.8%	3.8%	-29.1%	-31.6%	-37.3%	-51.3%	-63.6%	-67.9%	-71.4%	-73.7%	-75.8%	-76.7%	-76.3%	-73.6%	-67.6%	-57.0%	-44.0%	-37.1%	-27.2%	-14.6%	0.0%	9.5%	-10.5%	-40.1%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.16**	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	**0.17**	**0.17**	**0.16**	0.13	*0.08*	*0.05*	*0.03*
Percent change	196.1%	158.9%	108.3%	56.2%	37.0%	34.0%	32.8%	31.6%	30.4%	29.1%	54.0%	127.1%	201.0%	238.9%	230.8%	173.5%	94.4%	30.3%	30.3%	26.0%	0.0%	-36.4%	-59.1%	-80.3%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	*1.91*	*1.40*	*1.38*	*1.39*	*1.41*	*1.43*	*1.45*	*1.50*	*1.97*	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	3.26	*1.20*	*0.52*	*0.33*
Percent change	193.0%	88.5%	51.5%	45.5%	4.6%	-41.3%	-57.1%	-57.8%	-57.3%	-56.8%	-56.2%	-55.5%	-54.0%	-39.6%	6.0%	72.5%	115.1%	96.8%	111.3%	87.9%	0.0%	-63.2%	-84.1%	-89.7%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	**0.15**	**0.15**	**0.15**	**0.16**	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	0.14	*0.13*	*0.07*	*0.02*
Percent change	247.6%	183.3%	127.1%	70.8%	26.0%	12.3%	8.3%	8.7%	9.0%	9.3%	28.4%	88.4%	170.6%	240.5%	270.1%	249.8%	181.3%	101.6%	119.9%	82.6%	0.0%	-9.3%	-53.4%	-86.7%
Cattail Wetland	**0.01**	**0.01**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	0.00	0.00	0.00	0.00	0.00	*0.00*	*0.00*
Percent change	102.6%	57.3%	7.3%	-28.9%	-41.3%	-40.6%	-39.9%	-39.1%	-38.4%	-37.6%	-25.6%	26.8%	115.7%	180.4%	178.1%	120.5%	49.8%	0.0%	0.0%	0.0%	0.0%	0.0%	-20.0%	-45.0%
Sum Herbaceous Wetland	**59.54**	**53.31**	*37.24*	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	**35.02**	**39.94**	**44.74**	48.27	**50.38**	*40.69*	*27.19*
Percent change	23.4%	10.4%	-22.8%	-25.9%	-34.1%	-50.3%	-62.7%	-66.7%	-70.0%	-72.0%	-73.8%	-74.3%	-73.4%	-69.6%	-60.9%	-46.8%	-32.2%	-27.4%	-17.3%	-7.3%	0.0%	4.4%	-15.7%	-43.7%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	*53.62*	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	*51.80*	*53.18*	54.41	**54.64**	*43.57*	*27.19*
Percent change	79.1%	56.8%	18.3%	10.1%	-1.5%	-18.8%	-31.4%	-35.9%	-39.6%	-42.5%	-43.0%	-38.3%	-31.4%	-25.1%	-19.4%	-13.2%	-8.6%	-12.5%	-4.8%	-2.3%	0.0%	0.4%	-19.9%	-50.0%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	256.40	*264.86*	*266.15*	*266.46*	268.62	*268.30*	**281.06**	**297.43**
Percent change	-52.1%	-44.2%	-34.2%	-30.9%	-27.0%	-22.2%	-18.7%	-17.0%	-15.3%	-13.9%	-12.4%	-11.1%	-9.8%	-8.6%	-7.3%	-6.1%	-4.6%	-1.4%	-0.9%	-0.8%	0.0%	-0.1%	4.6%	10.7%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	**18.68**	**12.37**	**6.89**	**5.21**	3.51	*1.90*	*0.22*	*0.22*
Percent change	2693.0%	2437.6%	2268.2%	2144.6%	2025.6%	1928.8%	1857.3%	1792.1%	1726.2%	1659.6%	1559.2%	1387.9%	1187.4%	994.4%	805.8%	618.5%	432.2%	252.4%	96.3%	48.4%	0.0%	-45.9%	-93.7%	-93.7%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 10 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-23: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 11 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	**17.03**	**12.59**	**11.86**	**8.44**	**6.14**	4.26	*2.88*	*0.00*
Percent change[b]	788.7%	650.9%	536.7%	465.4%	411.2%	372.6%	352.8%	341.5%	330.3%	316.8%	330.7%	396.1%	473.5%	511.4%	485.2%	405.1%	299.4%	195.3%	178.1%	98.0%	44.0%	0.0%	-32.5%	-100.0%
Bulrush Wetland	**49.12**	*46.43*	*31.72*	*30.60*	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	*25.05*	*28.15*	*32.57*	*38.18*	*44.74*	48.97	*40.05*	*26.81*
Percent change	0.3%	-5.2%	-35.2%	-37.5%	-42.7%	-55.6%	-66.7%	-70.7%	-73.9%	-75.9%	-77.9%	-78.7%	-78.4%	-75.9%	-70.4%	-60.7%	-48.9%	-42.5%	-33.5%	-22.0%	-8.6%	0.0%	-18.2%	-45.3%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.16**	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	**0.17**	**0.17**	**0.16**	**0.13**	0.08	*0.05*	*0.03*
Percent change	365.5%	307.0%	227.5%	145.6%	115.4%	110.6%	108.8%	106.9%	104.9%	103.0%	142.2%	257.0%	373.2%	432.8%	420.1%	330.0%	205.6%	104.8%	104.8%	98.0%	57.2%	0.0%	-35.6%	-69.1%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	**1.40**	**1.38**	**1.39**	**1.41**	**1.43**	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	1.20	*0.52*	*0.33*
Percent change	696.5%	412.5%	311.7%	295.6%	184.2%	59.5%	16.7%	14.7%	16.1%	17.5%	19.0%	20.9%	25.1%	64.2%	188.1%	368.9%	484.8%	435.0%	474.5%	410.9%	171.8%	0.0%	-56.6%	-72.1%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	**0.15**	**0.15**	**0.15**	**0.16**	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	**0.14**	0.13	*0.07*	*0.02*
Percent change	283.2%	212.3%	150.4%	88.3%	38.9%	23.8%	19.4%	19.8%	20.2%	20.5%	41.6%	107.7%	198.3%	275.4%	308.0%	285.7%	210.1%	122.3%	142.4%	101.3%	10.2%	0.0%	-48.6%	-85.3%
Cattail Wetland	**0.01**	**0.01**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	0.00	0.00	0.00	0.00	0.00	*0.00*	*0.00*
Percent change	102.6%	57.3%	7.3%	-28.9%	-41.3%	-40.6%	-39.9%	-39.1%	-38.4%	-37.6%	-25.6%	26.8%	115.7%	180.4%	178.1%	120.5%	49.8%	0.0%	0.0%	0.0%	0.0%	0.0%	-20.0%	-45.0%
Sum Herbaceous Wetland	**59.54**	**53.31**	*37.24*	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	*39.94*	*44.74*	*48.27*	50.38	*40.69*	*27.19*
Percent change	18.2%	5.8%	-26.1%	-29.0%	-36.8%	-52.3%	-64.3%	-68.1%	-71.2%	-73.2%	-74.9%	-75.3%	-74.5%	-70.9%	-62.5%	-49.0%	-35.1%	-30.5%	-20.7%	-11.2%	-4.2%	0.0%	-19.2%	-46.0%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	*53.62*	*44.16*	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	*43.85*	*47.24*	49.75	*47.61*	*51.80*	*53.18*	*54.41*	54.64	*43.57*	*27.19*
Percent change	78.3%	56.2%	17.8%	9.6%	-1.9%	-19.2%	-31.7%	-36.2%	-39.9%	-42.7%	-43.3%	-38.5%	-31.7%	-25.4%	-19.8%	-13.6%	-9.0%	-12.9%	-5.2%	-2.7%	-0.4%	0.0%	-20.3%	-50.2%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	256.40	*264.86*	*266.15*	*266.46*	**268.62**	268.30	**281.06**	**297.43**
Percent change	-52.0%	-44.1%	-34.1%	-30.8%	-26.9%	-22.1%	-18.6%	-16.9%	-15.2%	-13.8%	-12.3%	-11.0%	-9.7%	-8.5%	-7.1%	-5.9%	-4.4%	-1.3%	-0.8%	-0.7%	0.1%	0.0%	4.8%	10.9%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	**18.68**	**12.37**	**6.89**	**5.21**	**3.51**	1.90	*0.22*	*0.22*
Percent change	5059.6%	4587.8%	4274.9%	4046.7%	3826.7%	3647.9%	3515.9%	3395.3%	3273.7%	3150.6%	2965.1%	2648.6%	2278.3%	1921.7%	1573.3%	1227.4%	883.2%	551.1%	262.6%	174.2%	84.7%	0.0%	-88.4%	-88.4%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 11 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-24: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 12 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																							
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	**17.03**	**12.59**	**11.86**	**8.44**	**6.14**	**4.26**	2.88	*0.00*
Percent change [b]	1216.5%	1012.4%	843.2%	737.5%	657.2%	600.1%	570.7%	554.0%	537.4%	517.5%	538.0%	634.9%	749.6%	805.7%	766.9%	648.3%	491.7%	337.4%	311.9%	193.3%	113.3%	48.1%	0.0%	-100.0%
Bulrush Wetland	**49.12**	**46.43**	*31.72*	*30.60*	*28.06*	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	25.05	*28.15*	*32.57*	*38.18*	**44.74**	**48.97**	40.05	*26.81*
Percent change	22.6%	15.9%	-20.8%	-23.6%	-29.9%	-45.7%	-59.3%	-64.2%	-68.1%	-70.6%	-73.0%	-74.0%	-73.6%	-70.5%	-63.8%	-52.0%	-37.5%	-29.7%	-18.7%	-4.7%	11.7%	22.3%	0.0%	-33.1%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.16**	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	**0.17**	**0.17**	**0.16**	**0.13**	**0.08**	0.05	*0.03*
Percent change	623.2%	532.4%	408.8%	281.5%	234.7%	227.2%	224.3%	221.4%	218.4%	215.4%	276.2%	454.7%	635.1%	727.8%	708.0%	568.1%	374.7%	218.2%	218.2%	207.7%	144.3%	55.4%	0.0%	-51.9%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	**1.40**	**1.38**	**1.39**	**1.41**	**1.43**	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	**1.20**	0.52	*0.33*
Percent change	1737.1%	1082.0%	849.7%	812.5%	555.6%	268.0%	169.3%	164.5%	167.7%	171.0%	174.4%	178.9%	188.5%	278.7%	564.5%	981.5%	1249.0%	1134.0%	1225.1%	1078.4%	527.0%	130.7%	0.0%	-35.7%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	**0.15**	**0.15**	**0.15**	**0.16**	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	**0.14**	**0.13**	0.07	*0.02*
Percent change	645.6%	507.7%	387.2%	266.3%	170.3%	140.8%	132.3%	133.1%	133.8%	134.5%	175.5%	304.0%	480.4%	630.5%	693.9%	650.4%	503.4%	332.5%	371.6%	291.7%	114.5%	94.6%	0.0%	-71.5%
Cattail Wetland	**0.01**	**0.01**	**0.00**	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	*0.00*	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	0.00	*0.00*
Percent change	153.2%	96.6%	34.1%	-11.1%	-26.7%	-25.7%	-24.8%	-23.9%	-23.0%	-22.0%	-7.0%	58.6%	169.6%	250.4%	247.7%	175.7%	87.3%	25.0%	25.0%	25.0%	25.0%	25.0%	0.0%	-31.3%
Sum Herbaceous Wetland	**59.54**	**53.31**	*37.24*	*35.79*	*31.83*	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	32.72	*35.02*	*39.94*	**44.74**	**48.27**	**50.38**	40.69	*27.19*
Percent change	46.3%	31.0%	-8.5%	-12.0%	-21.8%	-41.0%	-55.7%	-60.5%	-64.4%	-66.8%	-69.0%	-69.5%	-68.4%	-63.9%	-53.6%	-36.8%	-19.6%	-13.9%	-1.8%	10.0%	18.6%	23.8%	0.0%	-33.2%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	*37.31*	*34.88*	*32.84*	*31.29*	*30.99*	*33.58*	*37.31*	*40.75*	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	43.57	*27.19*
Percent change	123.6%	95.9%	47.8%	37.5%	23.1%	1.4%	-14.4%	-19.9%	-24.6%	-28.2%	-28.9%	-22.9%	-14.4%	-6.5%	0.6%	8.4%	14.2%	9.3%	18.9%	22.1%	24.9%	25.4%	0.0%	-37.6%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	256.40	*264.86*	*266.15*	*266.46*	*268.62*	*268.30*	281.06	**297.43**
Percent change	-54.2%	-46.7%	-37.1%	-34.0%	-30.2%	-25.6%	-22.3%	-20.6%	-19.1%	-17.7%	-16.3%	-15.1%	-13.8%	-12.6%	-11.4%	-10.2%	-8.8%	-5.8%	-5.3%	-5.2%	-4.4%	-4.5%	0.0%	5.8%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	**18.68**	**12.37**	**6.89**	**5.21**	**3.51**	**1.90**	0.22	*0.22*
Percent change	44460.5%	40385.8%	37683.3%	35712.3%	33812.5%	32268.2%	31128.1%	30086.9%	29036.9%	27973.7%	26371.2%	23638.2%	20439.8%	17359.9%	14351.1%	11363.7%	8390.9%	5522.7%	3031.8%	2268.2%	1495.5%	763.6%	0.0%	0.0%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 12 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

TABLE C-25: PREDICTED VEGETATION CHANGE AND PERCENT CHANGE RELATIVE TO WATER SURFACE ELEVATION 13 FEET CITY DATUM[a]

	Mean Annual Water Surface Elevation (City Datum)																						
Cover Type	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**-2**	**-1**	**0**	**1**	**2**	**3**	**4**	**5**	**6 ft**	**7 ft**	**8 ft**	**9 ft**	**10 ft**	**11 ft**	**12 ft**	**13 ft**
Arroyo Willow Riparian Scrub	**37.89**	**32.02**	**27.15**	**24.11**	**21.80**	**20.15**	**19.31**	**18.82**	**18.35**	**17.77**	**18.36**	**21.15**	**24.45**	**26.07**	**24.95**	**21.54**	**17.03**	**12.59**	**11.86**	**8.44**	**6.14**	**4.26**	**2.88**	0.00
Percent change[b]	All values represent an increase from the value at 13 feet, which is 0. Percent change cannot be calculated.																							0.0%
Bulrush Wetland	**49.12**	**46.43**	**31.72**	**30.60**	**28.06**	*21.76*	*16.28*	*14.36*	*12.78*	*11.78*	*10.82*	*10.42*	*10.58*	*11.80*	*14.49*	*19.23*	*25.05*	**28.15**	**32.57**	**38.18**	**44.74**	**48.97**	**40.05**	26.81
Percent change	83.2%	73.2%	18.3%	14.2%	4.7%	-18.8%	-39.3%	-46.5%	-52.3%	-56.0%	-59.6%	-61.1%	-60.5%	-56.0%	-46.0%	-28.3%	-6.6%	5.0%	21.5%	42.4%	66.9%	82.6%	49.4%	0.0%
Giant Vetch Wetland	**0.38**	**0.33**	**0.27**	**0.20**	**0.17**	**0.17**	**0.17**	**0.17**	**0.17**	**0.16**	**0.20**	**0.29**	**0.38**	**0.43**	**0.42**	**0.35**	**0.25**	**0.17**	**0.17**	**0.16**	**0.13**	**0.08**	**0.05**	0.03
Percent change	1404.0%	1215.2%	958.1%	693.4%	596.1%	580.5%	574.5%	568.4%	562.2%	556.0%	682.4%	1053.5%	1428.8%	1621.5%	1580.4%	1289.4%	887.3%	561.8%	561.8%	539.8%	408.0%	223.1%	108.0%	0.0%
Knotweed Wetland	**9.56**	**6.15**	**4.94**	**4.75**	**3.41**	**1.91**	**1.40**	**1.38**	**1.39**	**1.41**	**1.43**	**1.45**	**1.50**	**1.97**	**3.46**	**5.63**	**7.02**	**6.42**	**6.89**	**6.13**	**3.26**	**1.20**	**0.52**	0.33
Percent change	2756.2%	1737.7%	1376.5%	1318.6%	919.3%	472.1%	318.6%	311.2%	316.2%	321.3%	326.7%	333.6%	348.5%	488.8%	933.1%	1581.4%	1997.3%	1818.6%	1960.1%	1732.1%	874.8%	258.6%	55.5%	0.0%
Rush Meadow	**0.49**	**0.40**	**0.32**	**0.24**	**0.18**	**0.16**	**0.15**	**0.15**	**0.15**	**0.16**	**0.18**	**0.27**	**0.38**	**0.48**	**0.53**	**0.50**	**0.40**	**0.29**	**0.31**	**0.26**	**0.14**	**0.13**	**0.07**	0.02
Percent change	2511.7%	2028.5%	1606.5%	1183.1%	846.8%	743.4%	713.8%	716.3%	718.8%	721.4%	864.9%	1315.2%	1933.0%	2458.6%	2680.6%	2528.4%	2013.6%	1414.8%	1551.9%	1272.0%	651.3%	581.5%	250.3%	0.0%
Cattail Wetland	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.01**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	0.00
Percent change	268.3%	186.0%	95.1%	29.3%	6.7%	8.0%	9.3%	10.7%	12.0%	13.4%	35.2%	130.6%	292.2%	409.7%	405.7%	301.0%	172.4%	81.8%	81.8%	81.8%	81.8%	81.8%	45.5%	0.0%
Sum Herbaceous Wetland	**59.54**	**53.31**	**37.24**	**35.79**	**31.83**	*24.01*	*18.01*	*16.05*	*14.49*	*13.51*	*12.63*	*12.43*	*12.85*	*14.68*	*18.89*	*25.70*	**32.72**	**35.02**	**39.94**	**44.74**	**48.27**	**50.38**	**40.69**	27.19
Percent change	119.0%	96.1%	37.0%	31.6%	17.0%	-11.7%	-33.8%	-41.0%	-46.7%	-50.3%	-53.6%	-54.3%	-52.7%	-46.0%	-30.5%	-5.5%	20.3%	28.8%	46.9%	64.5%	77.5%	85.3%	49.6%	0.0%
Total Wetland (Willow and Herbaceous)	**97.44**	**85.33**	**64.39**	**59.90**	**53.62**	**44.16**	**37.31**	**34.88**	**32.84**	**31.29**	**30.99**	**33.58**	**37.31**	**40.75**	**43.85**	**47.24**	**49.75**	**47.61**	**51.80**	**53.18**	**54.41**	**54.64**	**43.57**	27.19
Percent change	258.4%	213.8%	136.8%	120.3%	97.2%	62.4%	37.2%	28.3%	20.8%	15.1%	14.0%	23.5%	37.2%	49.9%	61.3%	73.7%	83.0%	75.1%	90.5%	95.6%	100.1%	101.0%	60.2%	0.0%
Open Water	*128.78*	*149.87*	*176.77*	*185.61*	*196.09*	*208.97*	*218.34*	*223.08*	*227.45*	*231.36*	*235.23*	*238.76*	*242.17*	*245.57*	*249.14*	*252.35*	256.40	*264.86*	*266.15*	*266.46*	*268.62*	*268.30*	*281.06*	297.43
Percent change	-56.7%	-49.6%	-40.6%	-37.6%	-34.1%	-29.7%	-26.6%	-25.0%	-23.5%	-22.2%	-20.9%	-19.7%	-18.6%	-17.4%	-16.2%	-15.2%	-13.8%	-11.0%	-10.5%	-10.4%	-9.7%	-9.8%	-5.5%	0.0%
Upland vegetation[c]	**98.03**	**89.07**	**83.12**	**78.79**	**74.61**	**71.21**	**68.70**	**66.41**	**64.10**	**61.76**	**58.24**	**52.22**	**45.19**	**38.41**	**31.79**	**25.22**	**18.68**	**12.37**	**6.89**	**5.21**	**3.51**	**1.90**	**0.22**	0.22
Percent change	44460.5%	40385.8%	37683.3%	35712.3%	33812.5%	32268.2%	31128.1%	30086.9%	29036.9%	27973.7%	26371.2%	23638.2%	20439.8%	17359.9%	14351.1%	11363.7%	8390.9%	5522.7%	3031.8%	2268.2%	1495.5%	763.6%	0.0%	0.0%
Developed	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17	1.17
Percent change	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

[a] Acreages in the table are for vegetation at and below 13 feet City Datum; for most upland vegetation types there is additional acreage above an elevation of 13 feet.
[b] Percent change is relative to vegetation predicted to occur at 13 feet City Datum
[c] All upland vegetation types were combined for the analysis of receding lake levels
Values in **bold** indicate an increase in cover type
Values in *italic* indicate a decrease in cover type

APPENDIX D

Hydrology and Water Quality Supporting Material

This appendix includes historic water level and water quality information, as well as information from technical reports prepared for the San Francisco Groundwater Supply Project to support the analysis of impacts related to Hydrology and Water Quality (**Section 5.16**).

Appendix D-1, Historic Groundwater Levels, includes hydrographs of historic groundwater levels measures in wells in the North Westside Groundwater Basin taken from the San Francisco Public Utilities Commission, *Final- 2011 Annual Groundwater Monitoring Report, Westside Basin, San Francisco and San Mateo Counties, California.* September, 2012.

Appendix D-2, Groundwater Quality Data, includes a tabulation of historic groundwater quality data for wells in the North Westside Groundwater Basin taken from the San Francisco Public Utilities Commission, *Final- 2011 Annual Groundwater Monitoring Report, Westside Basin, San Francisco and San Mateo Counties, California.* September, 2012.

Appendix D-3, Lake Merced Water Quality Data, includes a tabulation of historic Lake Merced water quality data.

Appendix D-4, Lake Merced Water Quality Graphs, includes graphs of Lake Merced water quality at various lake levels over time, prepared by ESA for this environmental impact report.

Appendix D-5, Task 10.1 Technical Memorandum, Groundwater Modeling Analysis for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project.. This appendix consists of the Kennedy/Jenks Consultants, *Task 10.1 Technical Memorandum, Groundwater Modeling Analysis for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project*. The hydrographs referenced in Section 5.16, Hydrology and Water Quality, are the hydrographs showing simulated groundwater levels by model layer, included in Attachment 10.1-B. These hydrographs show groundwater levels predicted by the Westside Basin Groundwater Model at representative locations under the Modeled Existing Conditions, Regional Groundwater Storage and Recovery Project, San Francisco Groundwater Supply Project, and cumulative conditions.

Appendix D-6, Task 10.3 Technical Memorandum, Assessment of Potential Seawater Intrusion for the Regional Groundwater Storage and Recovery Project and the San Francisco Groundwater Supply Project. This appendix consists of the Kennedy/Jenks

Consultants, *Task 10.3 Technical Memorandum, Assessment of Potential Seawater Intrusion for the Regional Groundwater Storage and Recovery Project and the San Francisco Groundwater Supply Project.* The hydrographs referenced in Section 5.16, Hydrology and Water Quality, are Figures 10.3-4 through 10.3-12c. These hydrographs show groundwater levels predicted by the Westside Basin Groundwater Model at locations used in the analysis of the potential for seawater intrusion. Groundwater levels at wells in the North Westside Groundwater Basin under the Modeled Existing Conditions, Regional Groundwater Storage and Recovery Project, San Francisco Groundwater Supply Project, and cumulative conditions are included.

Appendix D-7, Task 10.2 Technical Memorandum, Assessment of Groundwater-Surface Water Interactions for the Regional Groundwater Storage and Recovery Project and the San Francisco Groundwater Supply Project., This appendix consists of the Kennedy/Jenks Consultants, *Task 10.2 Technical Memorandum, Assessment of Groundwater-Surface Water Interactions for the Regional Groundwater Storage and Recovery Project and the San Francisco Groundwater Supply Project*. The hydrographs referenced in Section 5.16, Hydrology and Water Quality, are Figures 10.2-11a through 10.2-14b. These hydrographs show groundwater levels predicted by the Westside Basin Groundwater Model at locations used in the analysis of the potential effects on Lake Merced water levels. Groundwater levels at wells in the North Westside Groundwater Basin under the Modeled Existing Conditions, Regional Groundwater Storage and Recovery Project, San Francisco Groundwater Supply Project, and cumulative conditions are included.

In appendices D-5, D-6, and D-7, the modeling scenarios are keyed to each project as follows:

- Scenario 1 = Modeled Existing Conditions
- Scenario 2 = Regional Groundwater Storage and Recovery Project
- Scenario 3a = San Francisco Groundwater Supply Project, Phase 1
- Scenario 3b = San Francisco Groundwater Supply Project, Phase 2
- Scenario 4 = Cumulative conditions

Model layers used in the titles correspond to specific aquifers in the Westside Groundwater Basin. Model Layer 1 corresponds to the Shallow Aquifer, Model Layer 4 corresponds to the Primary Production Aquifer, and Model Layer 5 corresponds to the Deep Aquifer.

APPENDIX D-1
Historic Groundwater Levels

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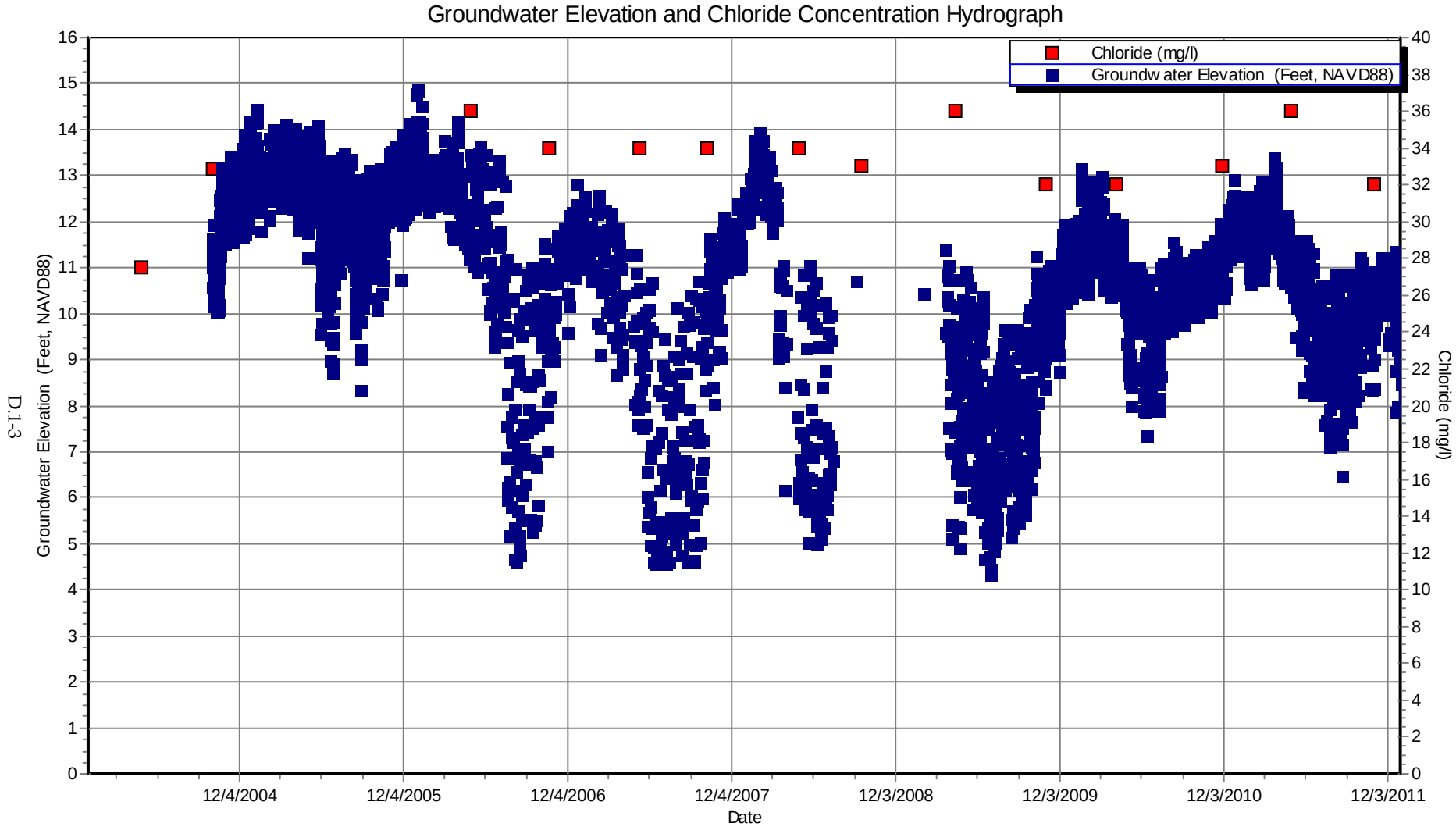
Figure 6a Kirkham 130

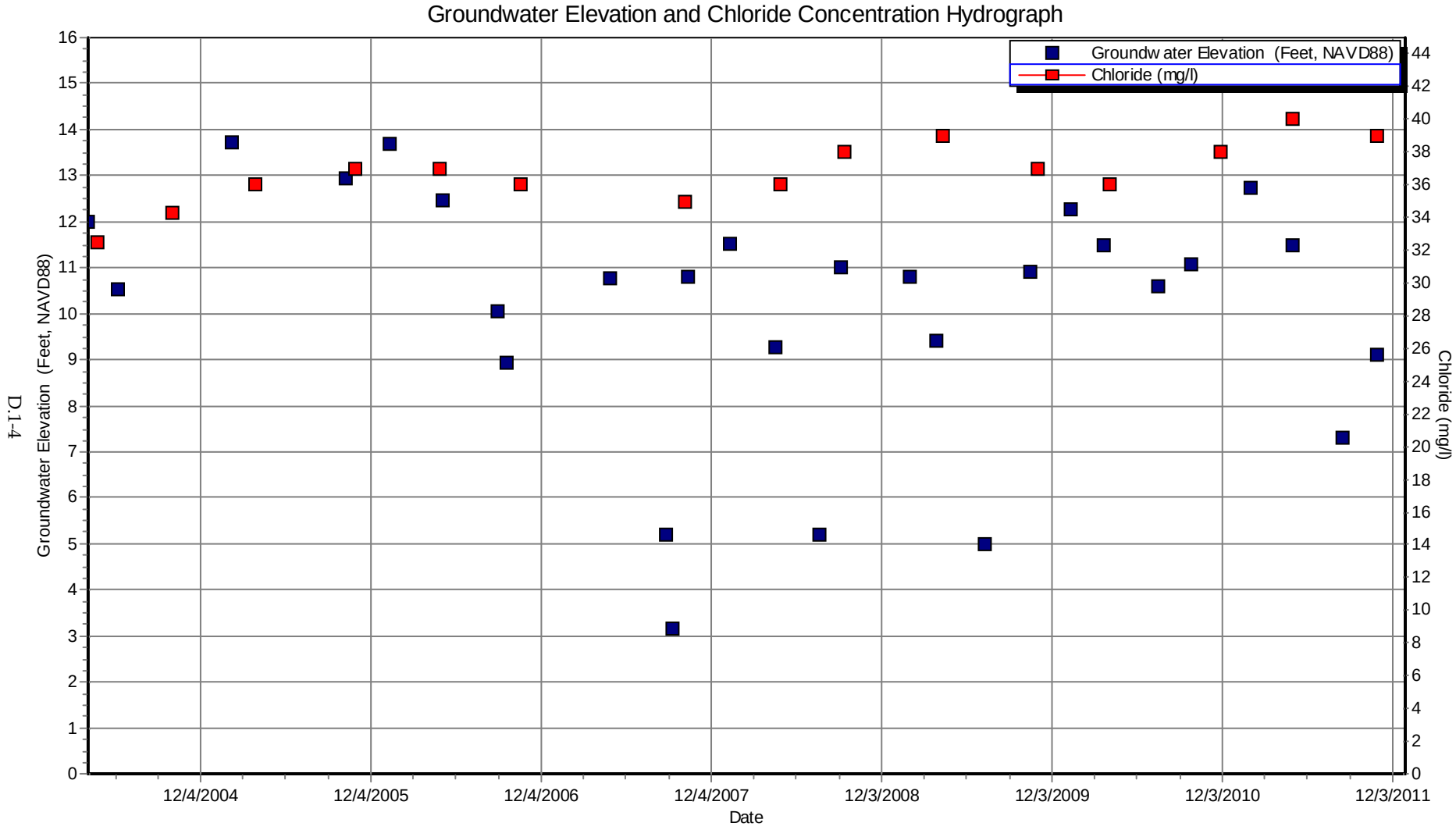
Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "KIRKHAM MW130"



D.1-3

Figure 6b Kirkham 255

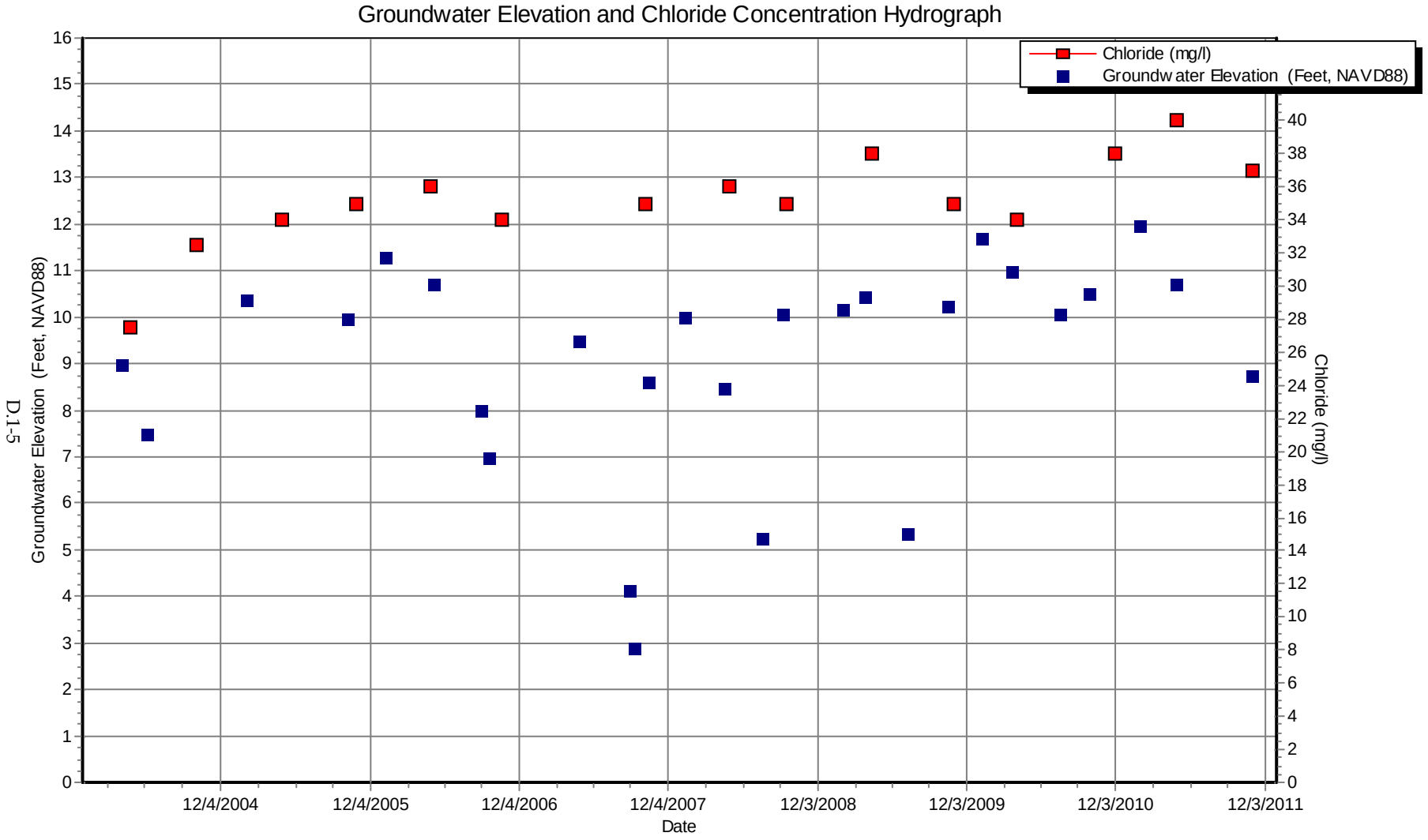
Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is equal to KIRKHAM MW255



D.1-4

Figure 6c Kirkham 385

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "KIRKHAM MW385"



D.1-5

Figure 6d Kirkham 435

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "KIRKHAM MW435"

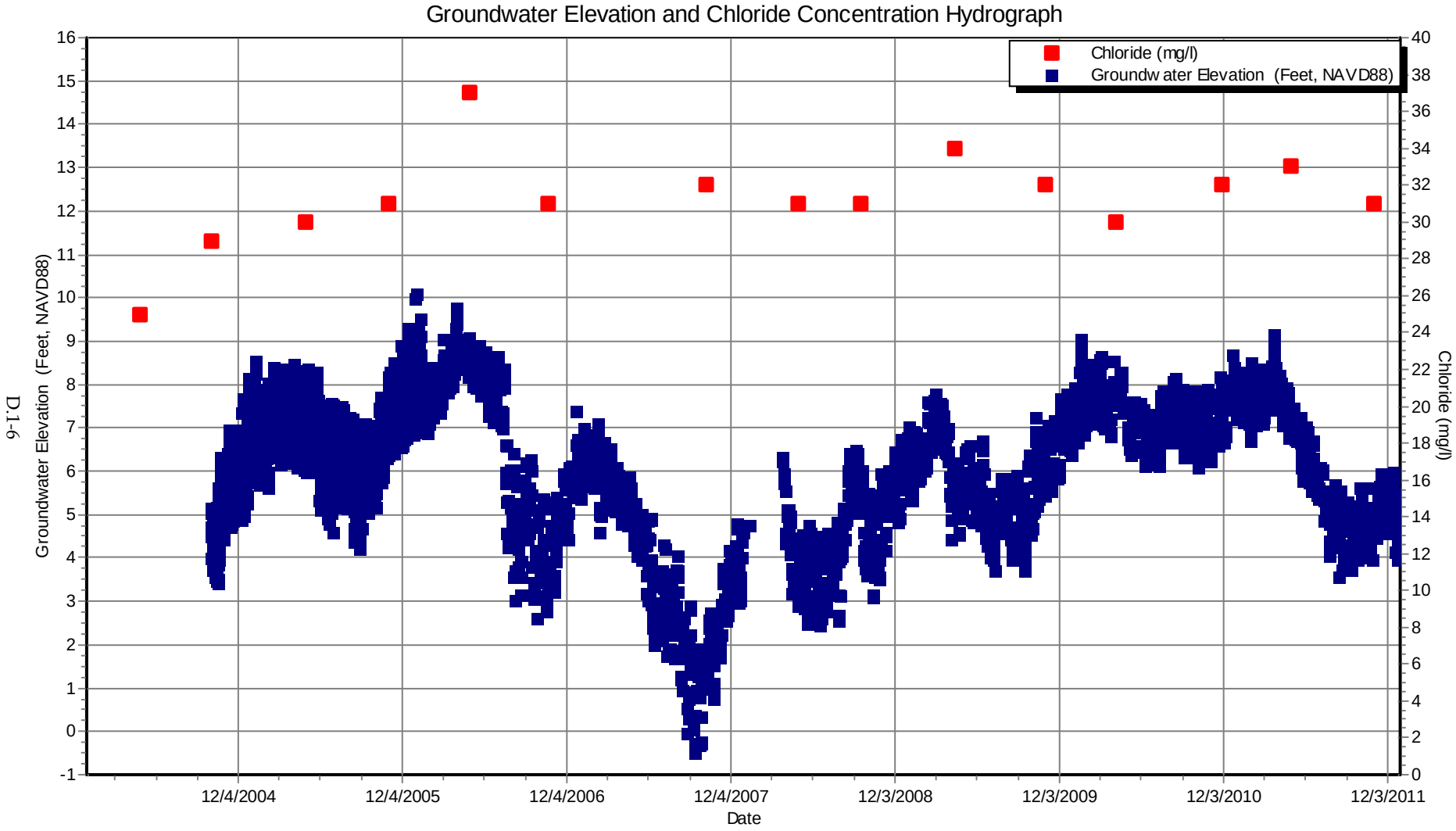
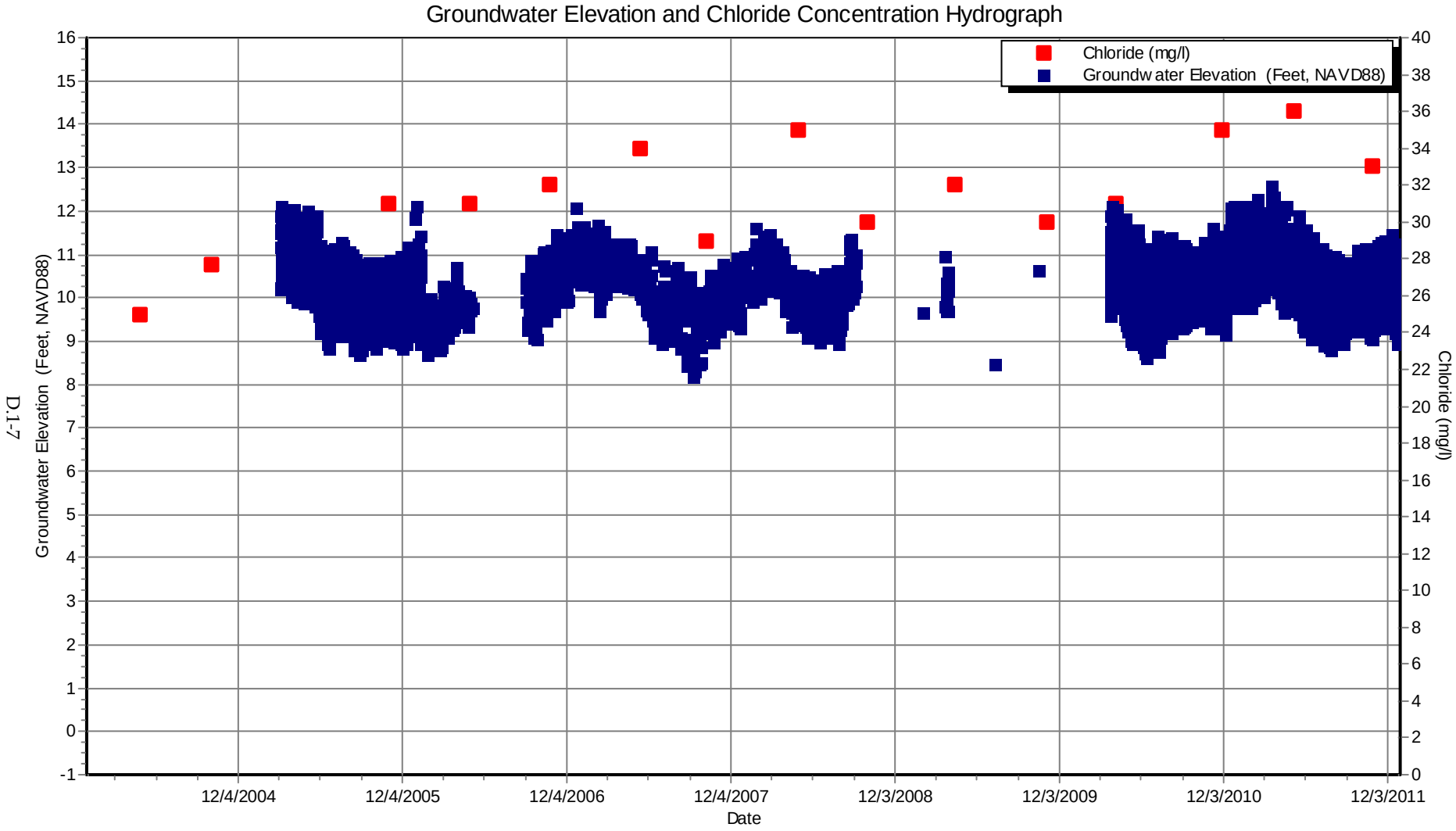


Figure 7a Ortega 125

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "ORTEGA MW120"



D.1.7

Figure 7b Ortega 265

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "ORTEGA MW265"

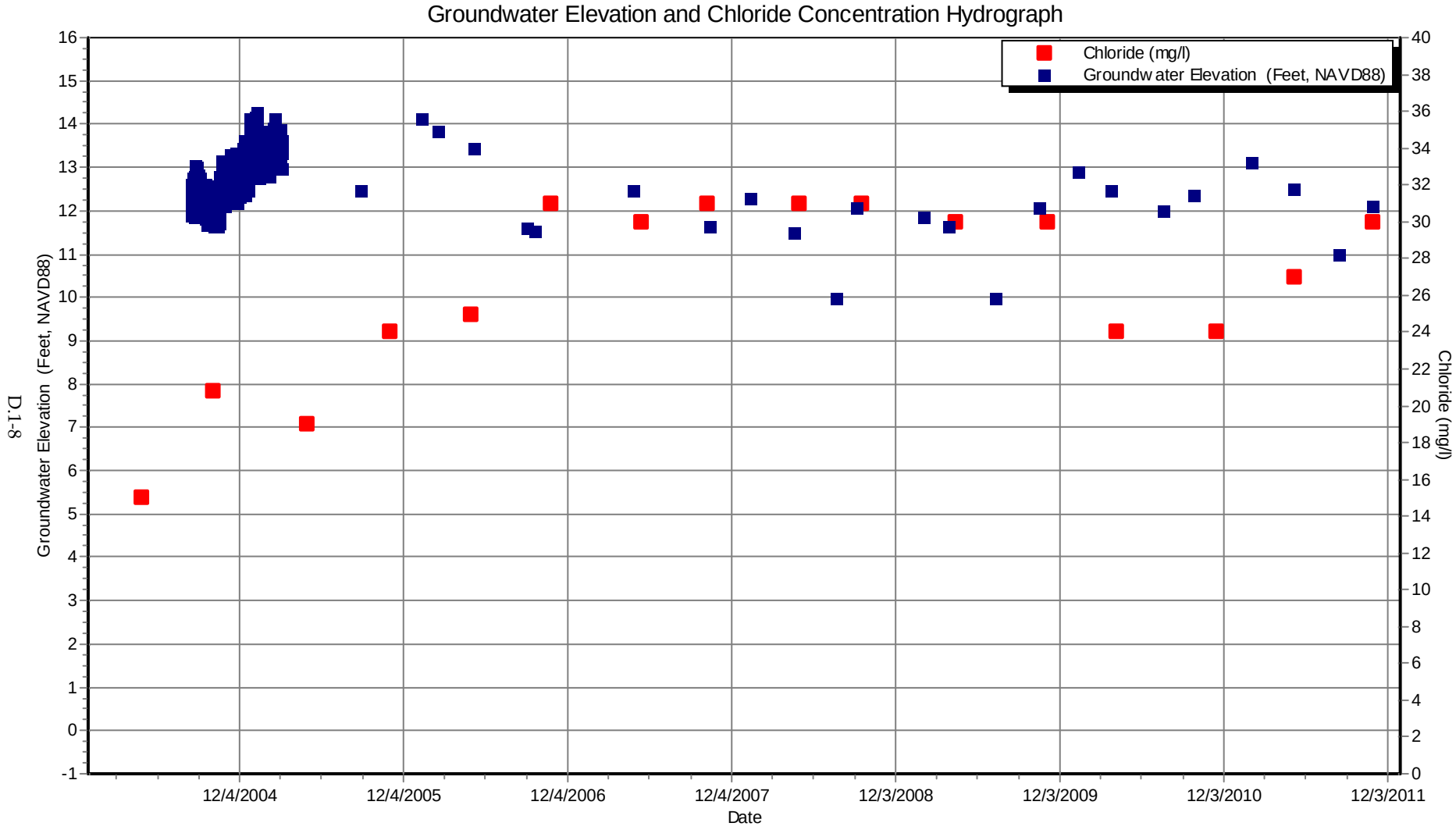


Figure 7c Ortega 400

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "ORTEGA MW400"

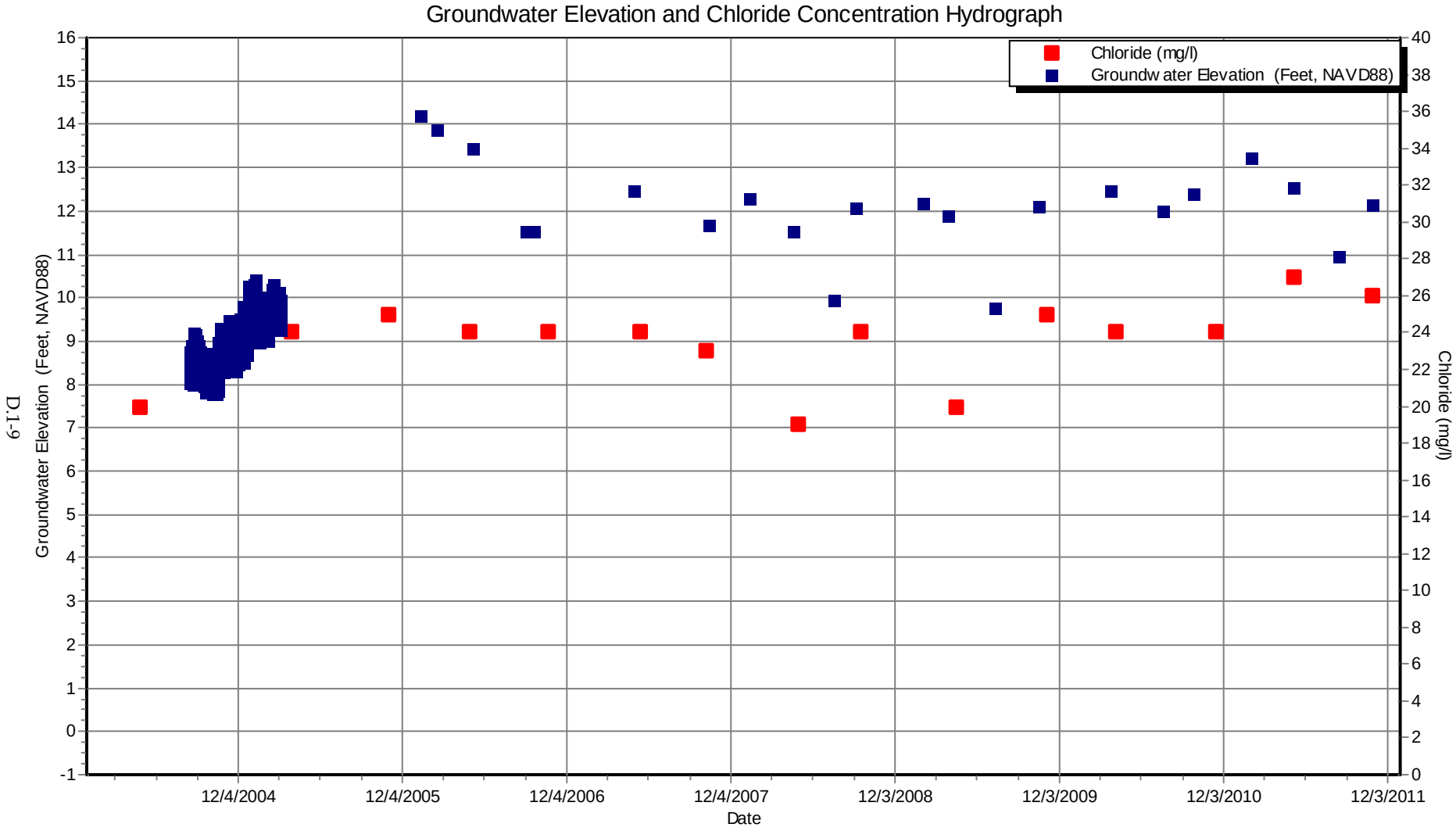


Figure 7d Ortega 475

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "ORTEGA MW475"

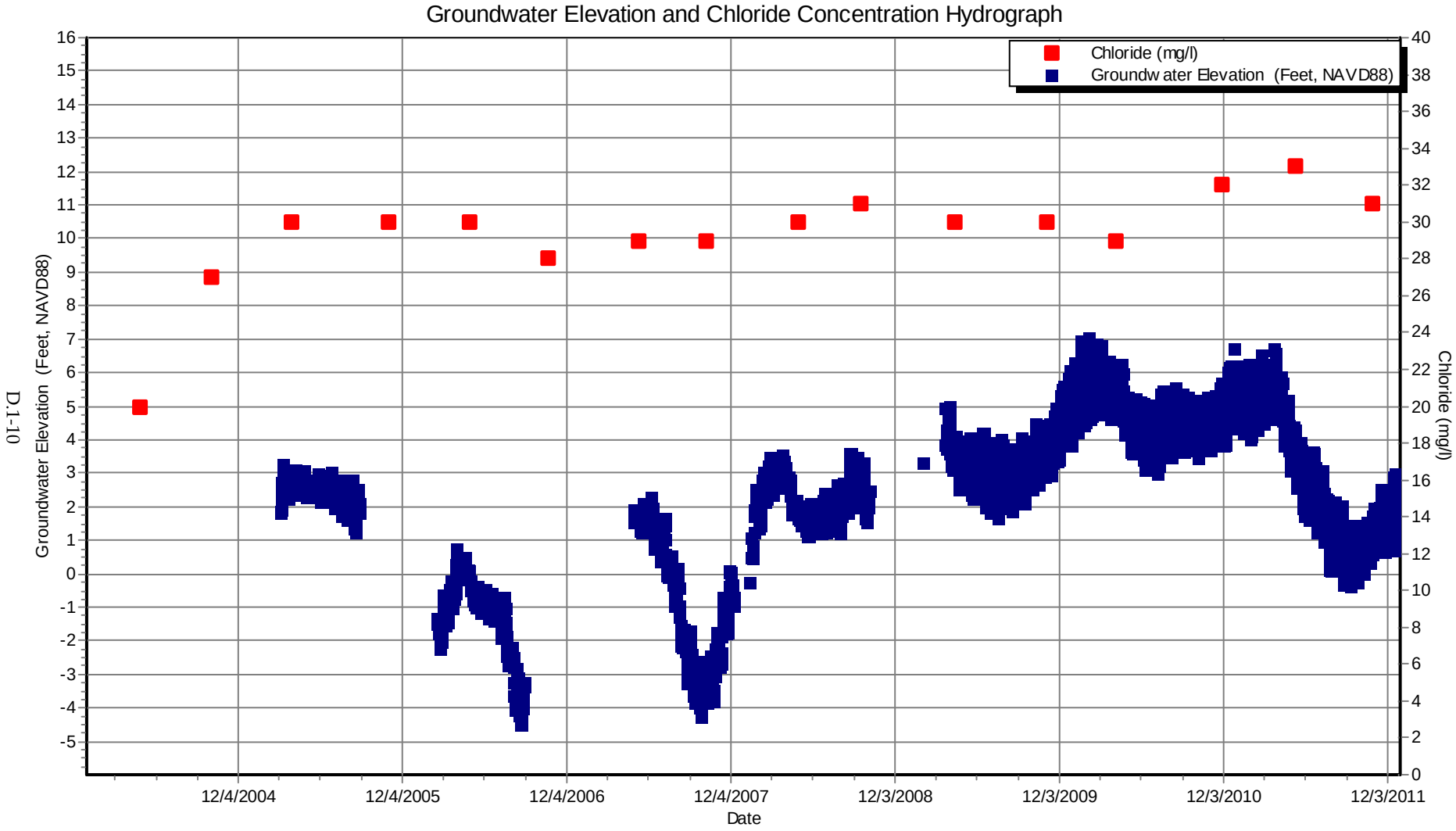


Figure 8a Taraval 145

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "TARAVAL MW145"

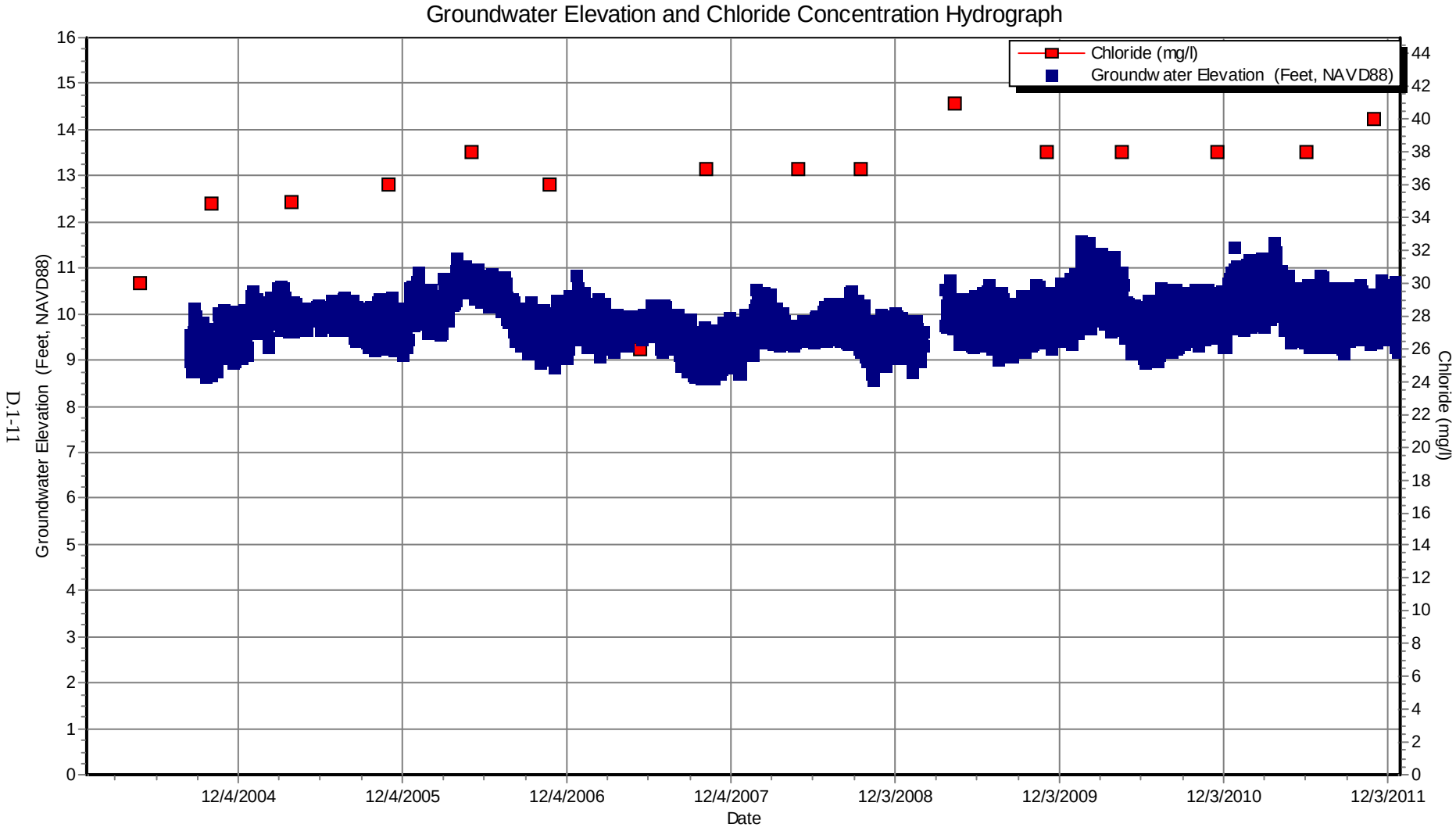


Figure 8b Taraval 240

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "TARAVAL MW240"

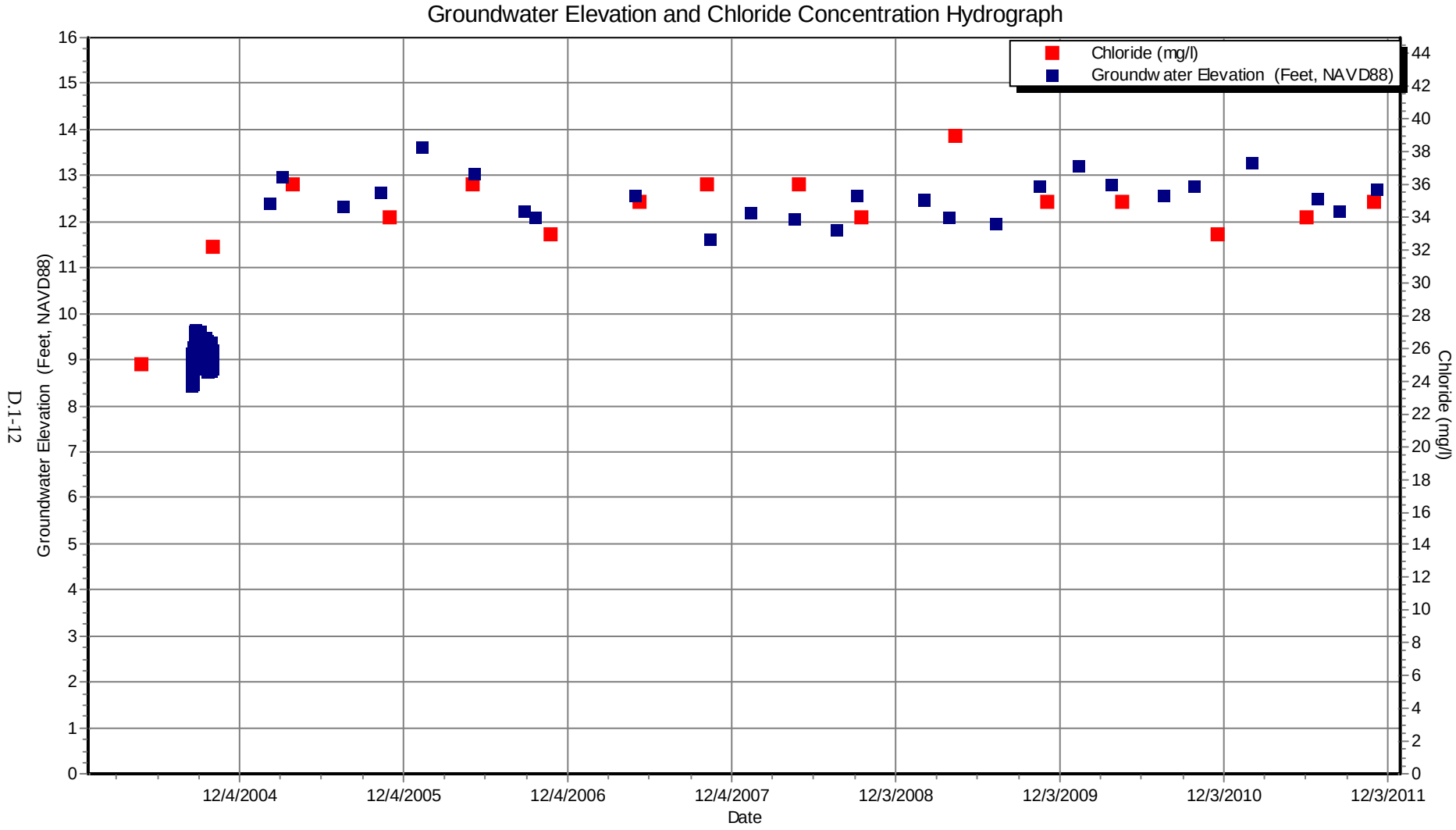


Figure 8c Taraval 400

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "TARAVAL MW400"

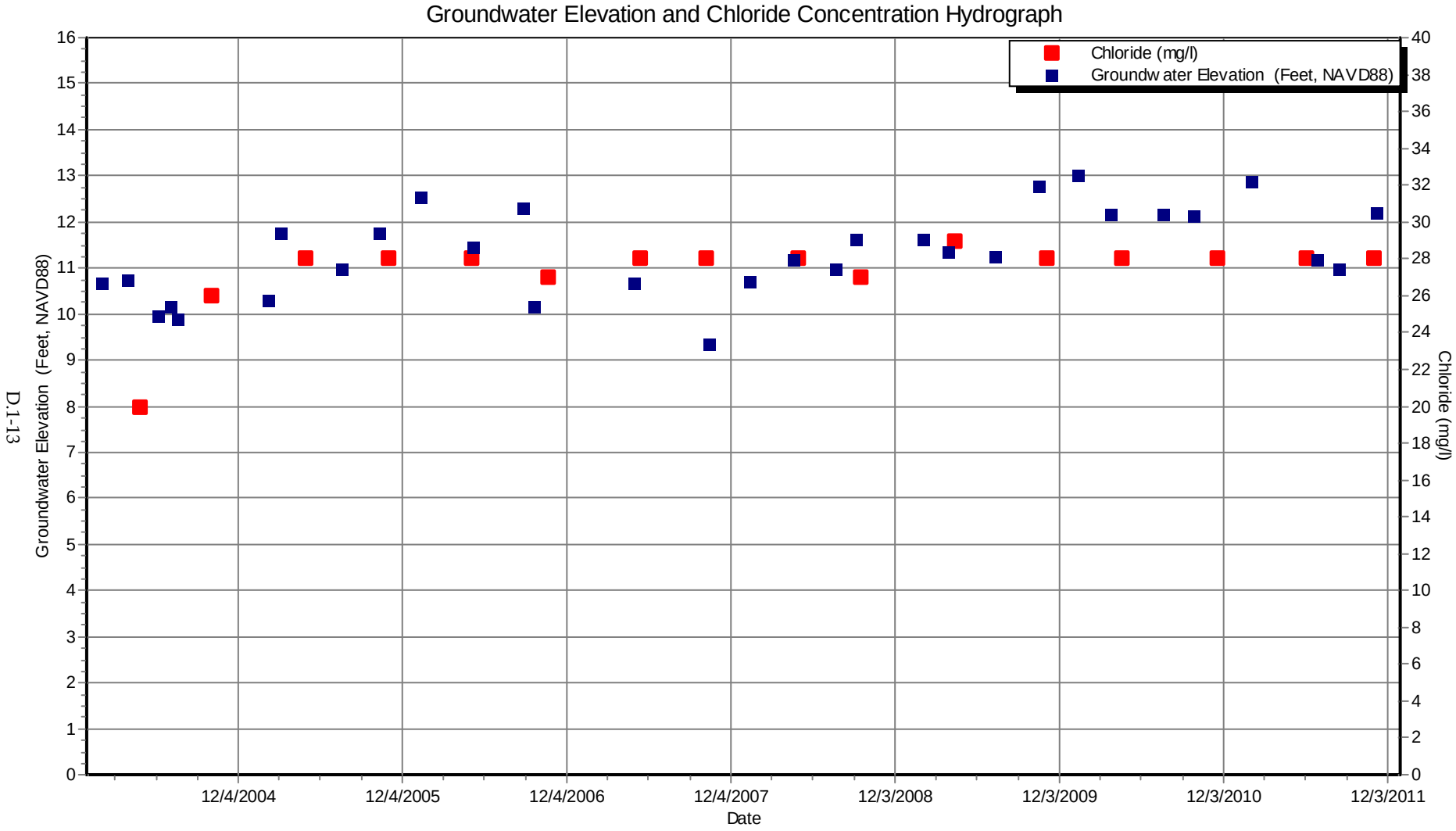


Figure 8d Taraval 530

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "TARAVAL MW530"

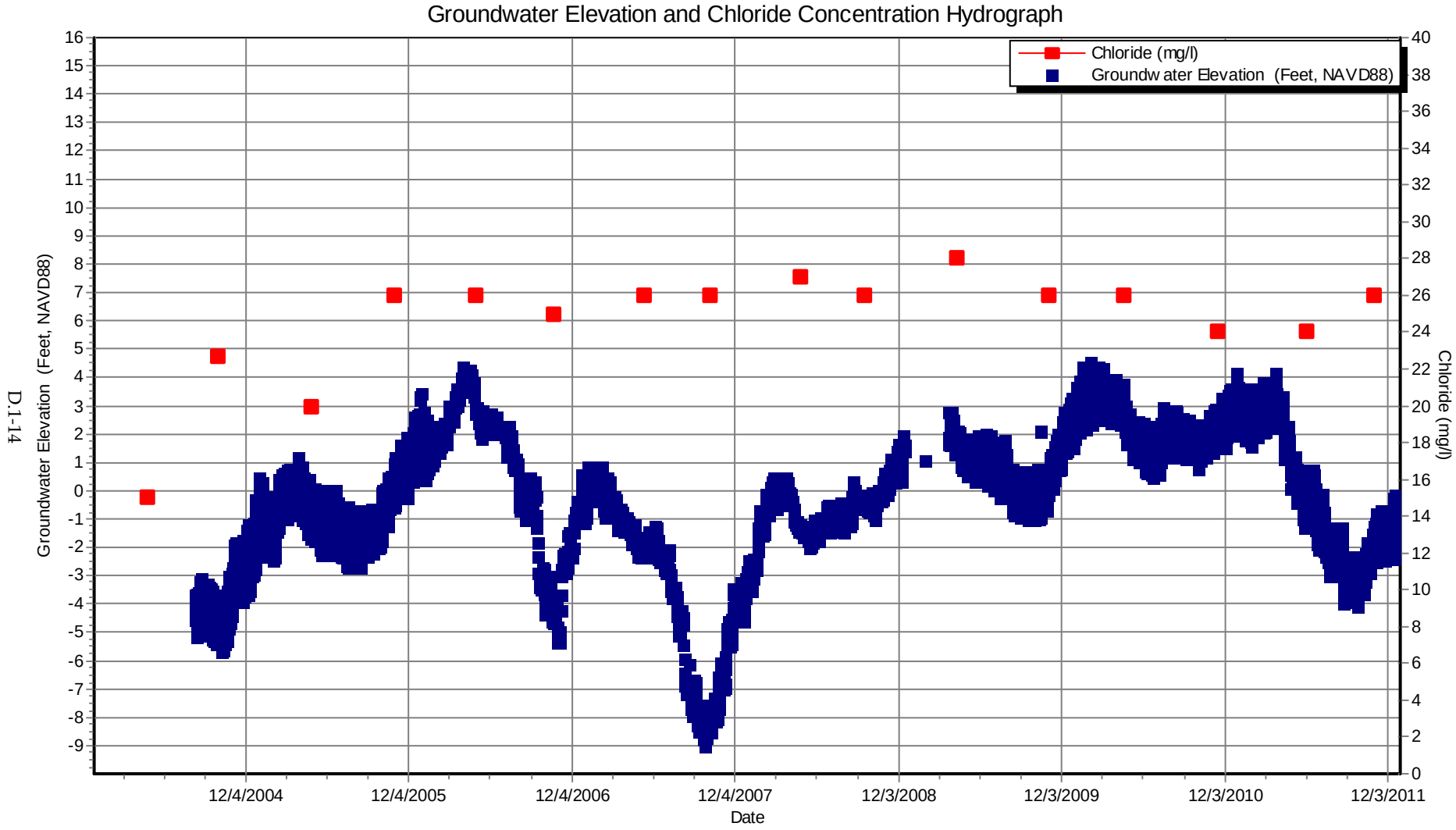


Figure 9a Zoo 275

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "ZOO MW275"

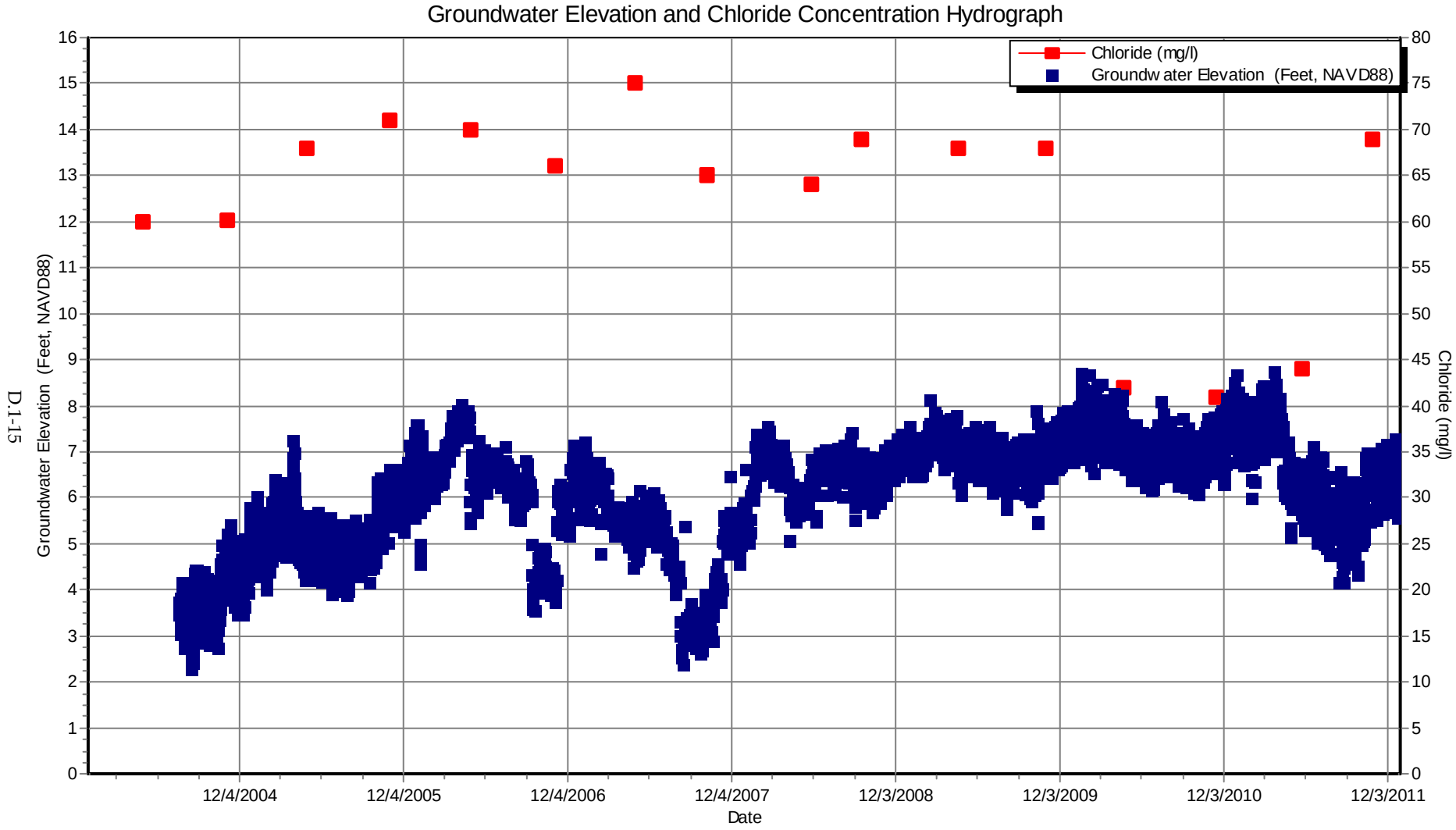


Figure 9b Zoo 450

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "ZOO MW450"

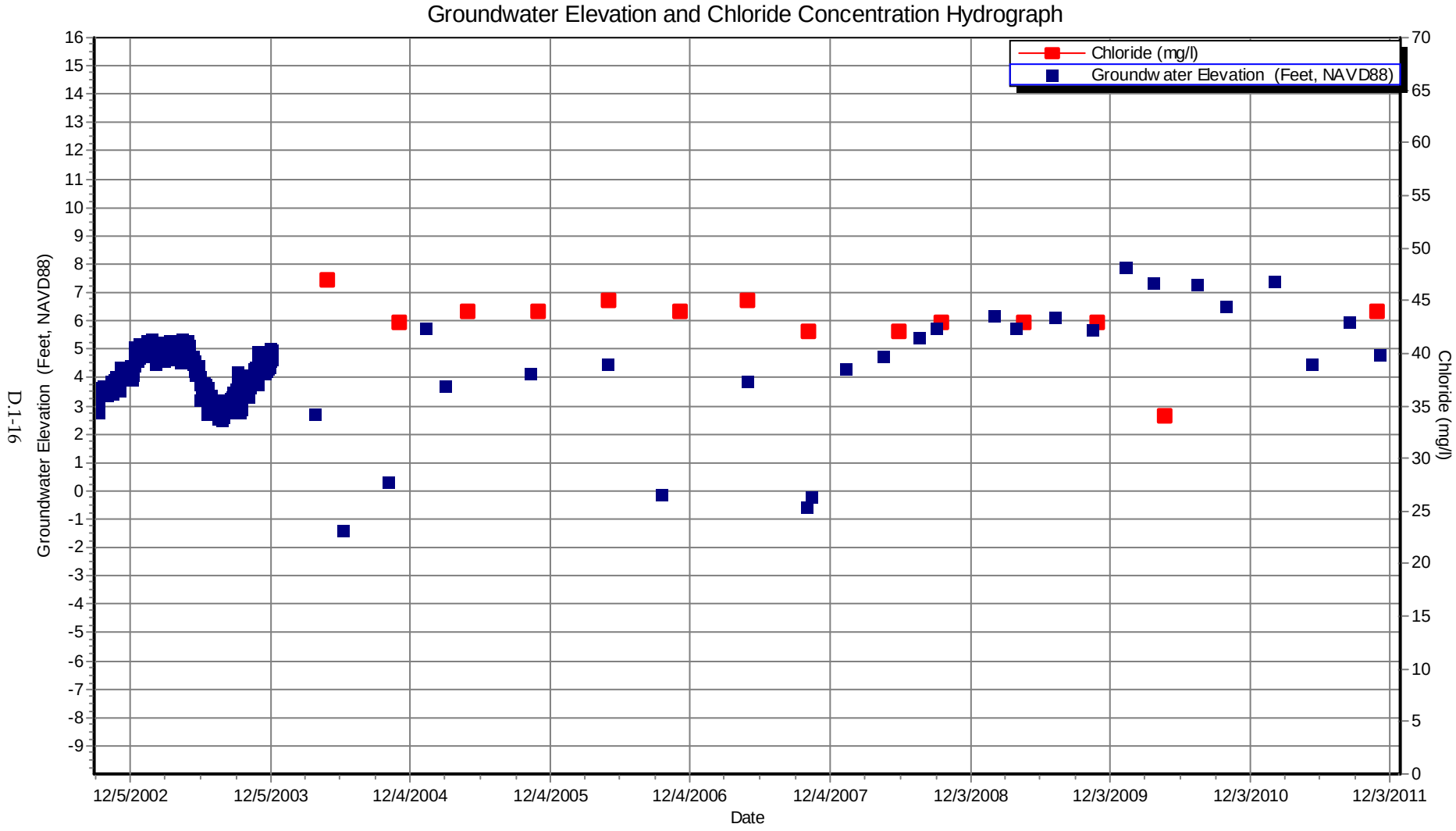
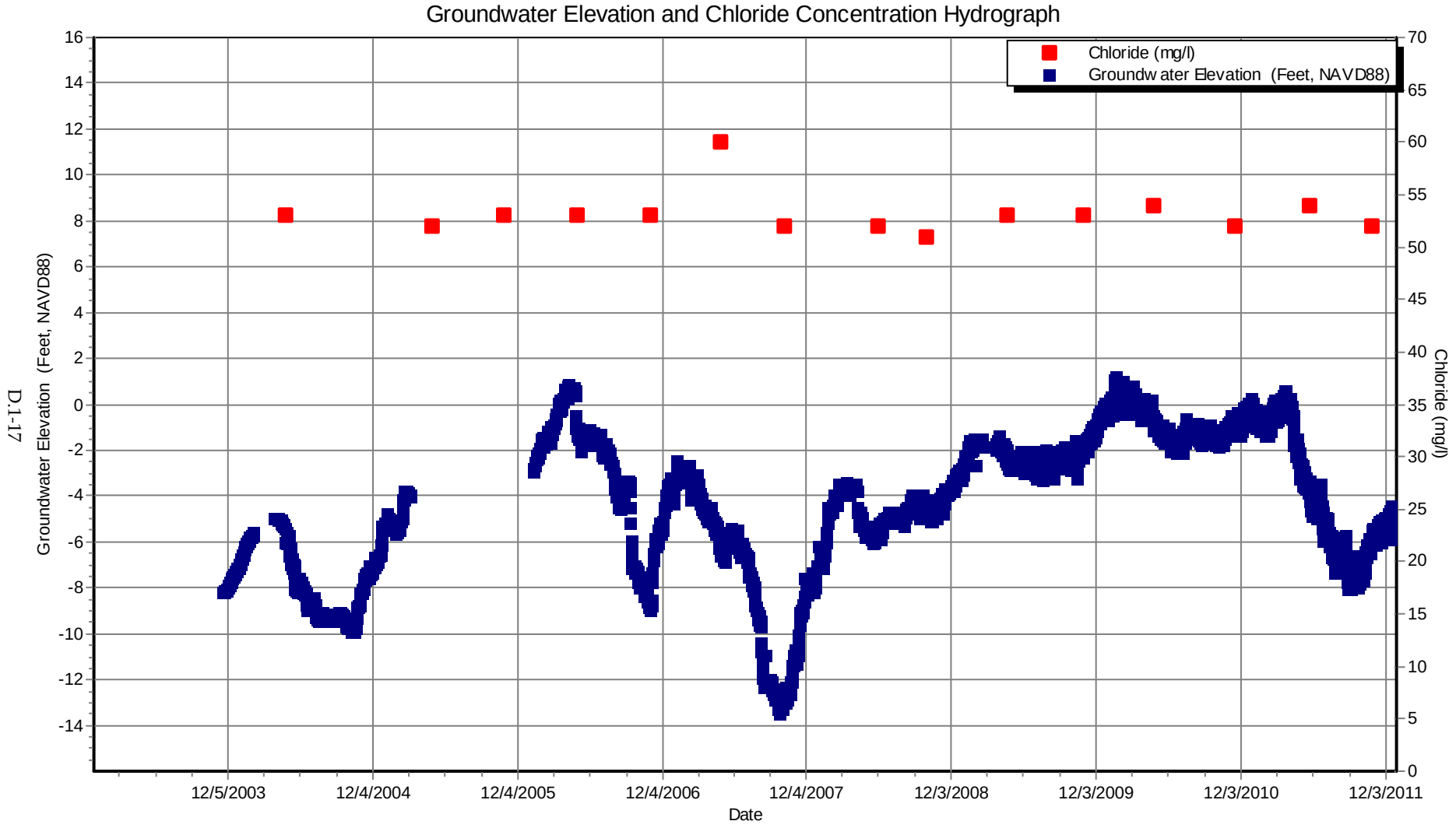


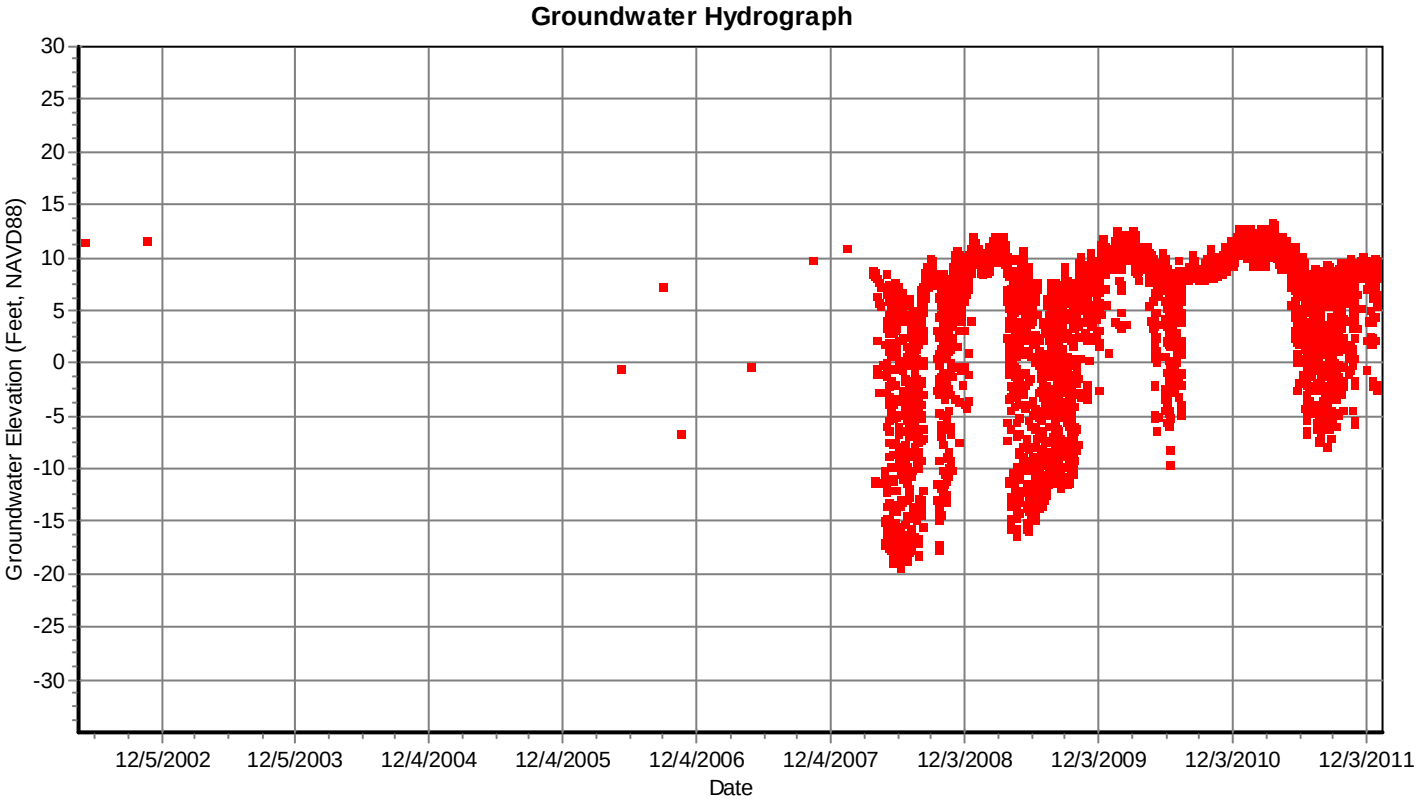
Figure 9c Zoo 565

Level 1 is equal to Monitoring Wells
Level 2 is equal to North Westside Basin
Level 3 is in list "ZOO MW565"

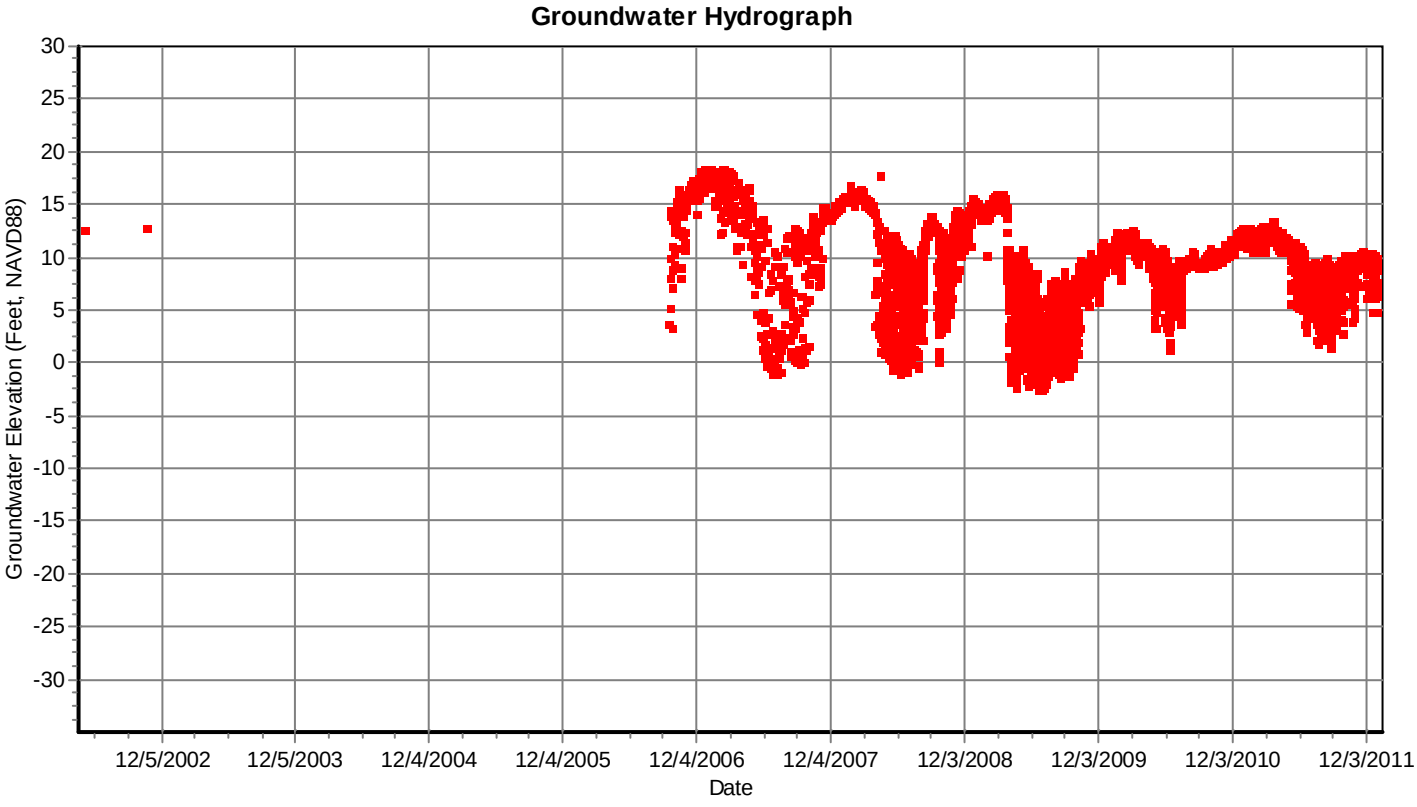


D.1-17

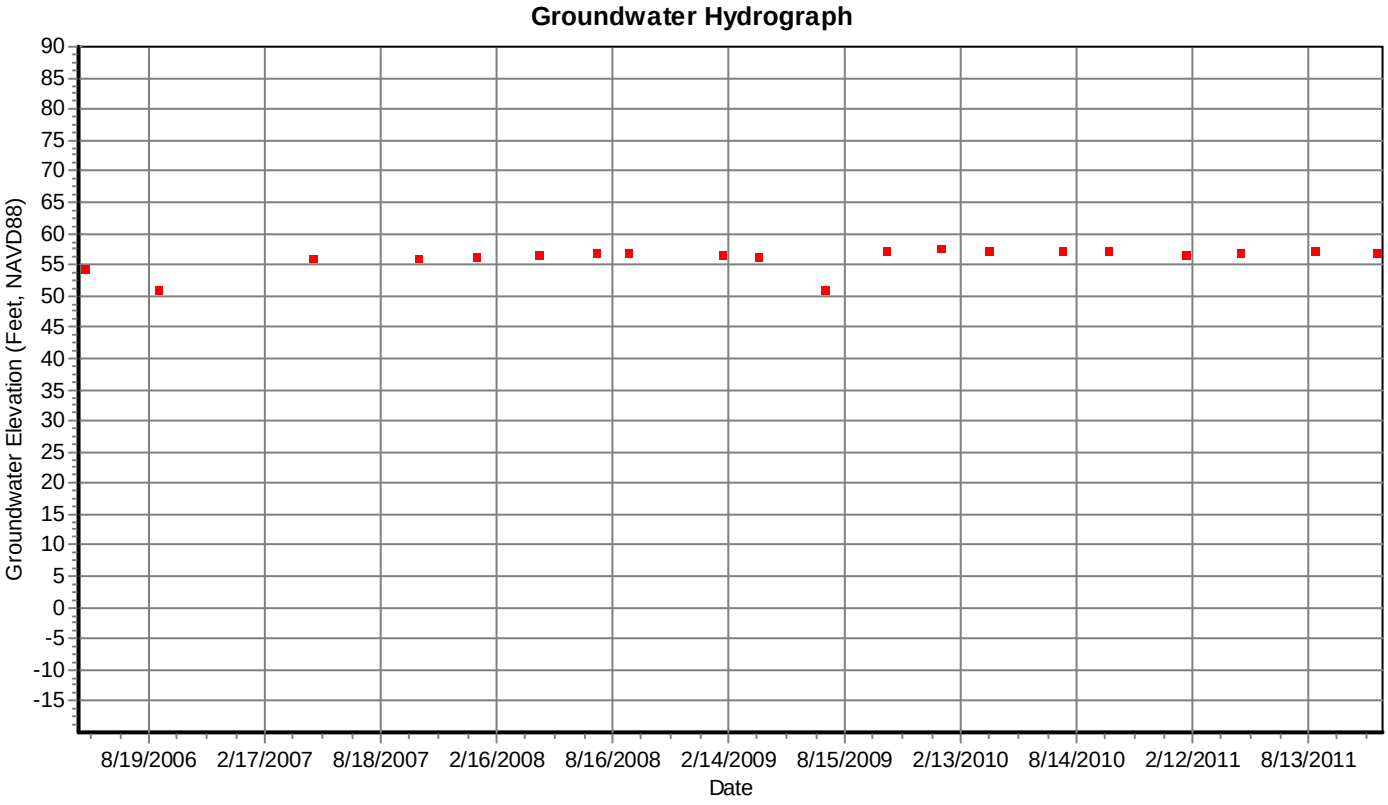
Station Name South Windmill 140



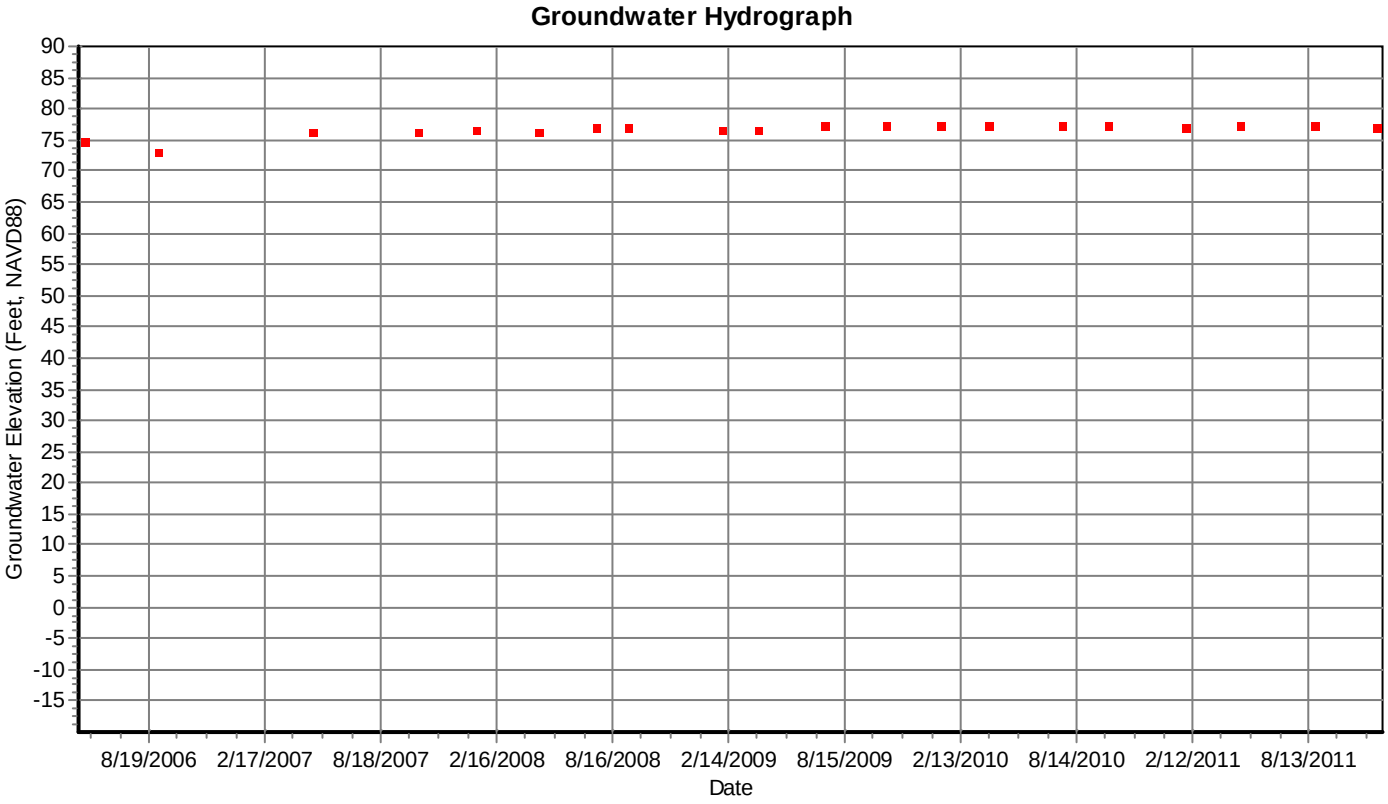
Station Name South Windmill 57



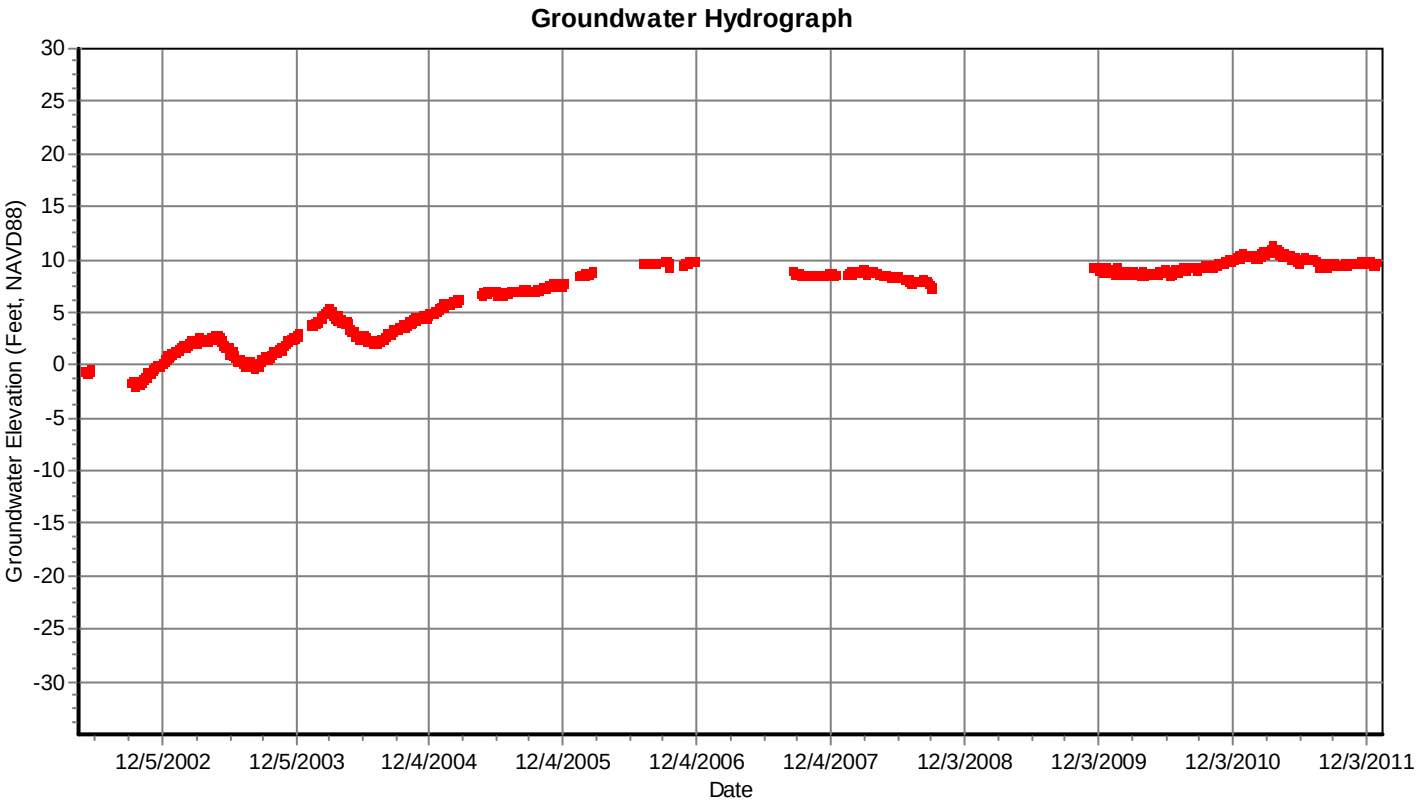
Station Name CENTRAL PUMP 190



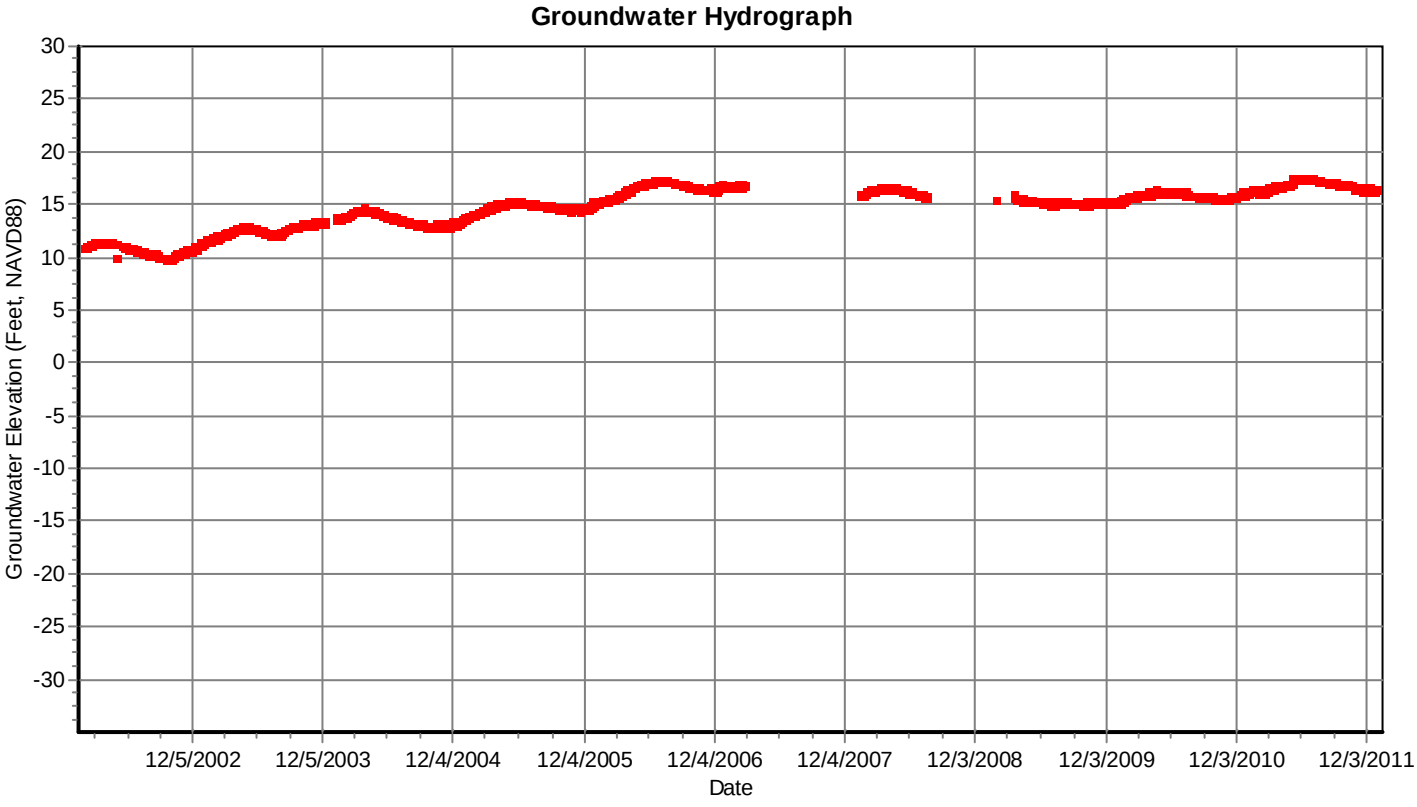
Station Name CENTRAL PUMP 270



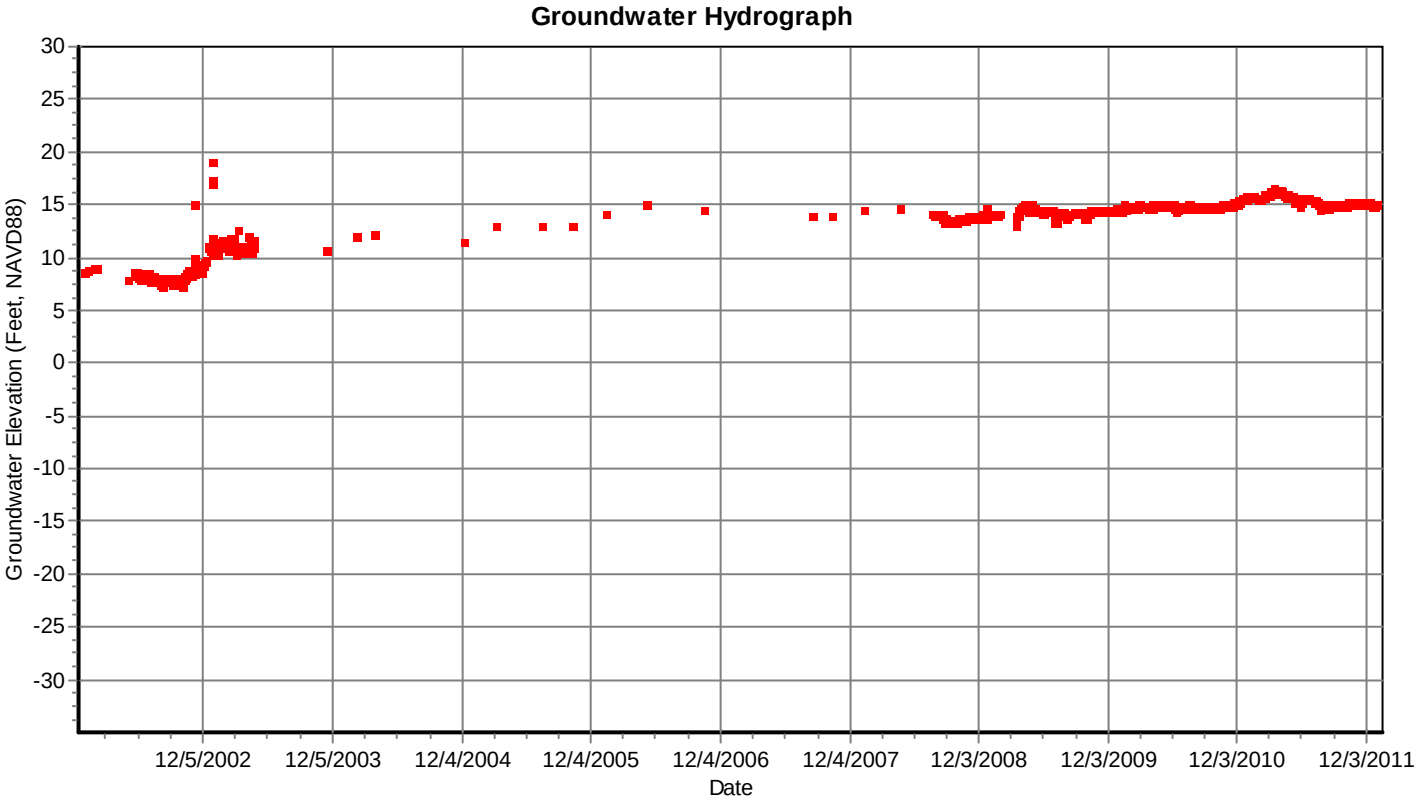
Station Name LMMW-1D



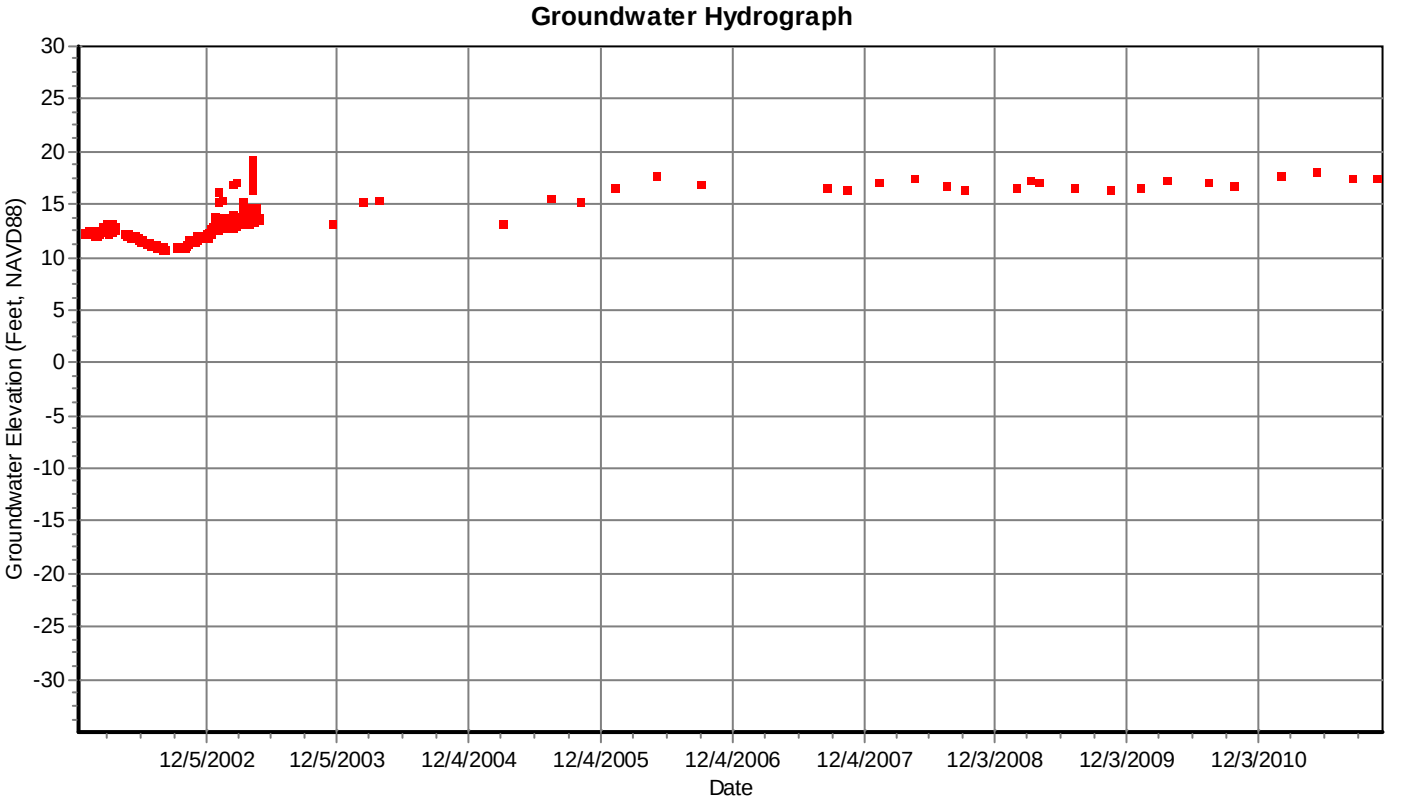
Station Name LMMW-1S



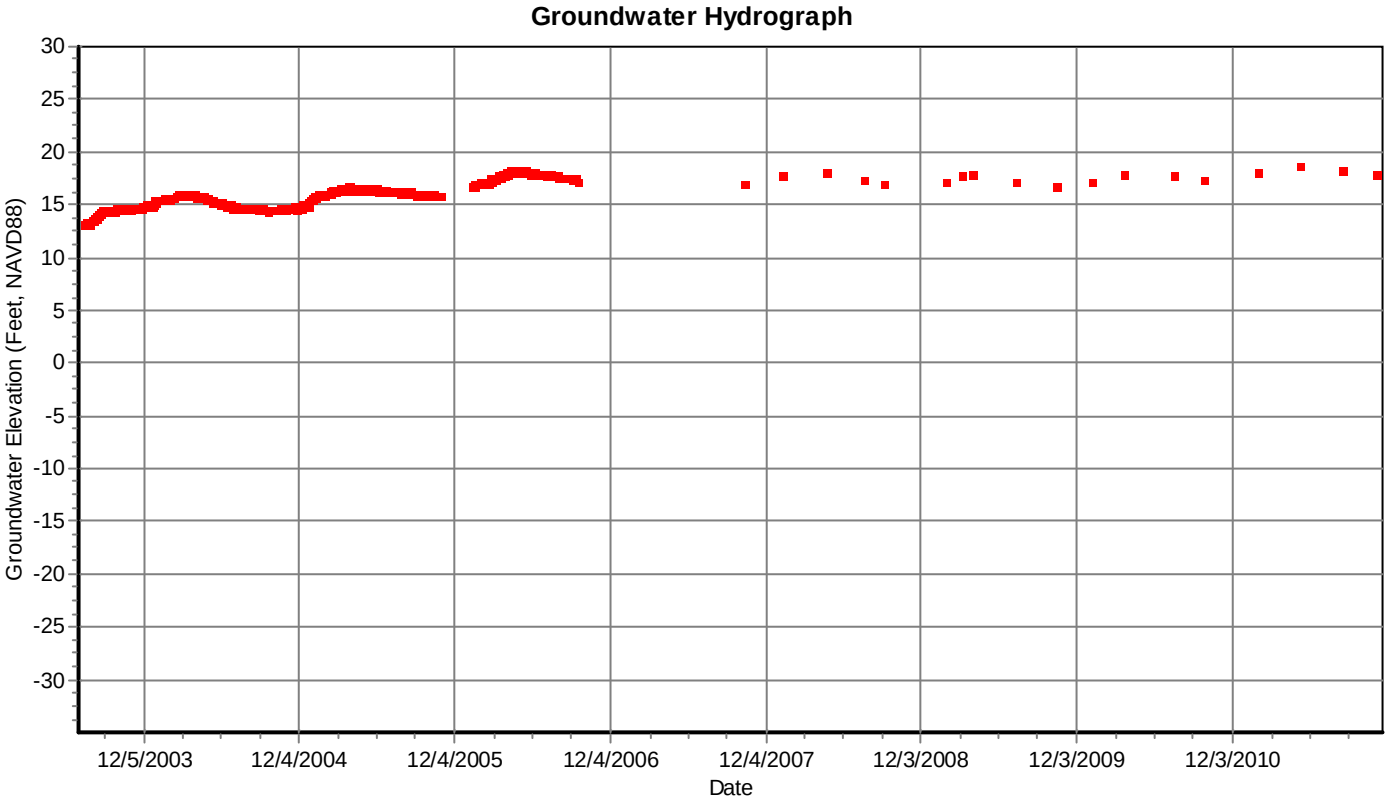
Station Name LMMW-2D



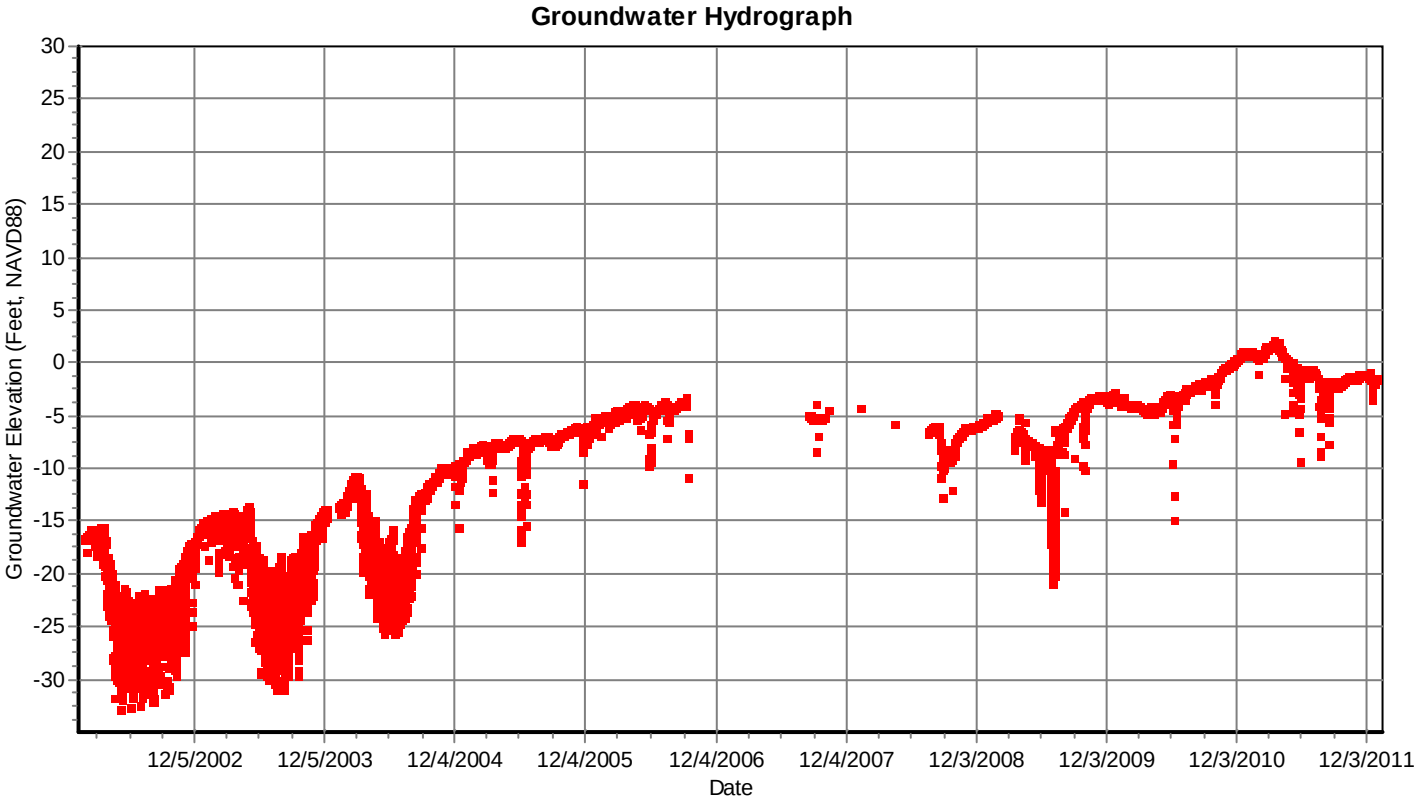
Station Name LMMW-2S



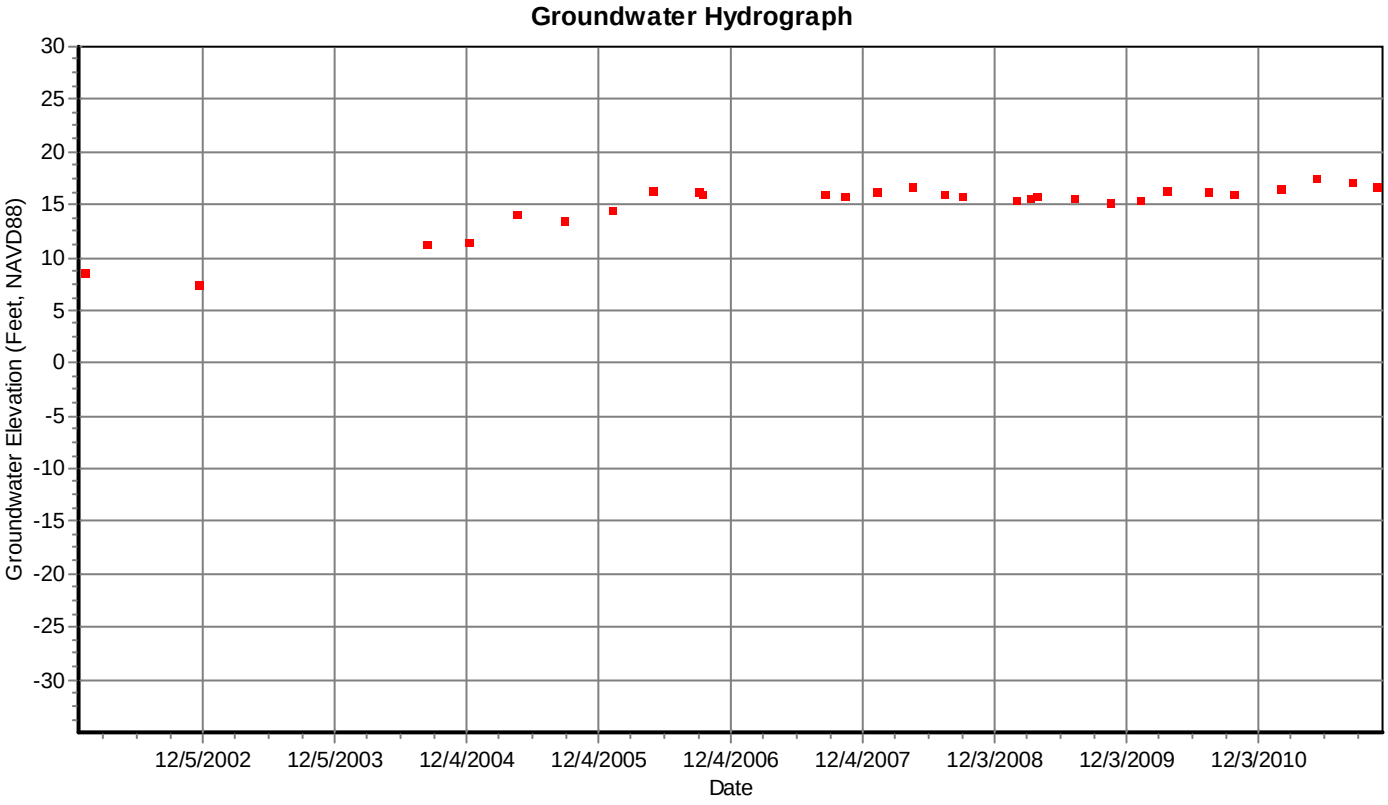
Station Name LMMW-2SS



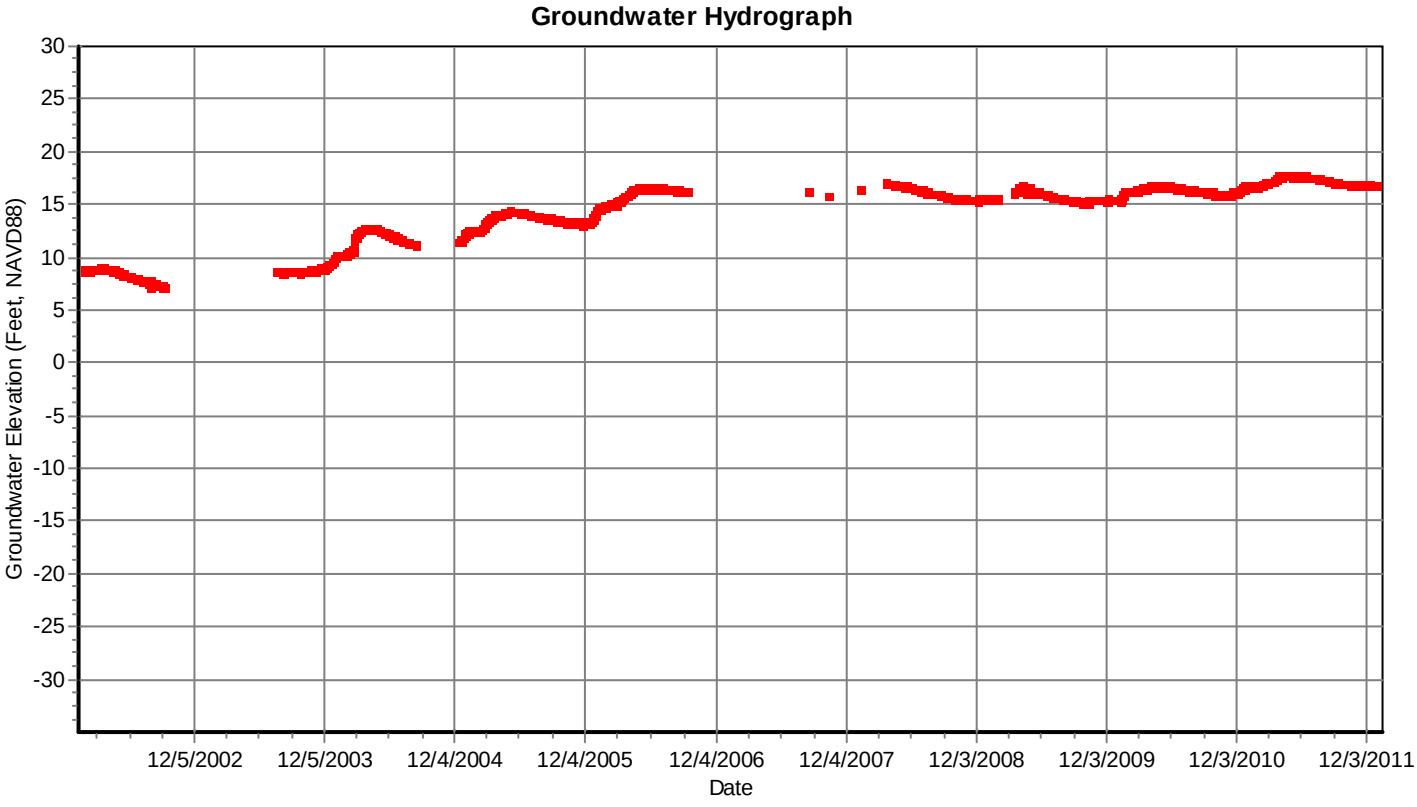
Station Name LMMW-3D



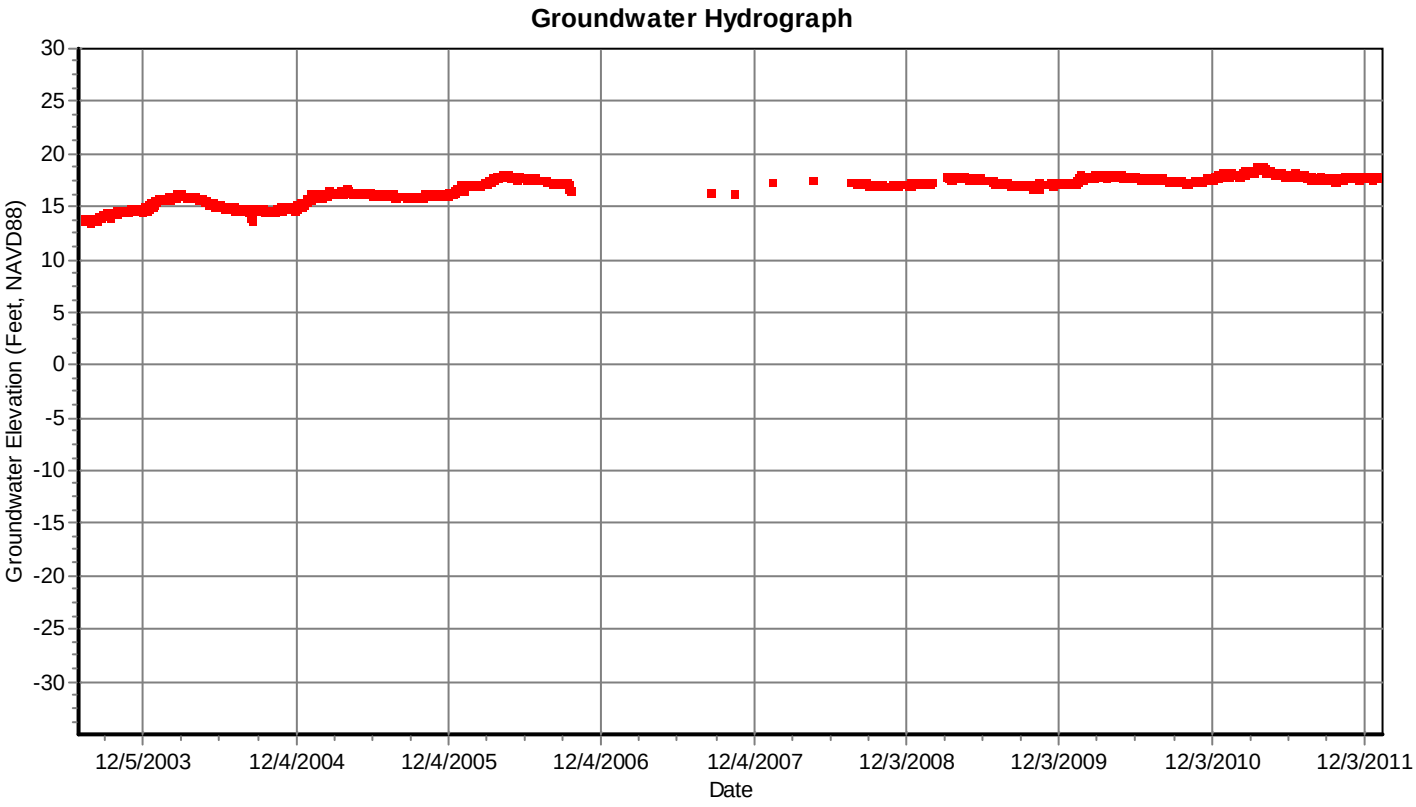
Station Name LMMW-3S



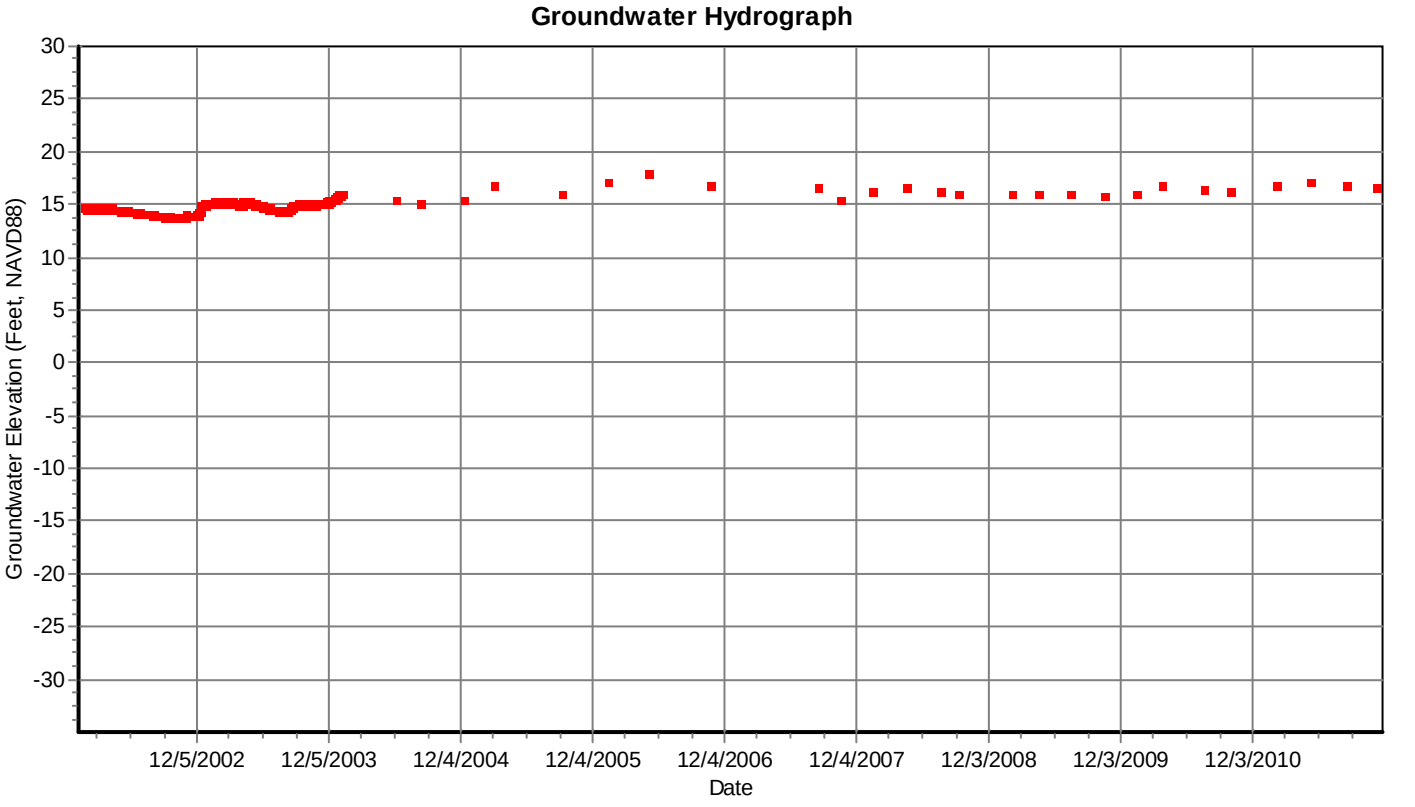
Station Name LMMW-3SS



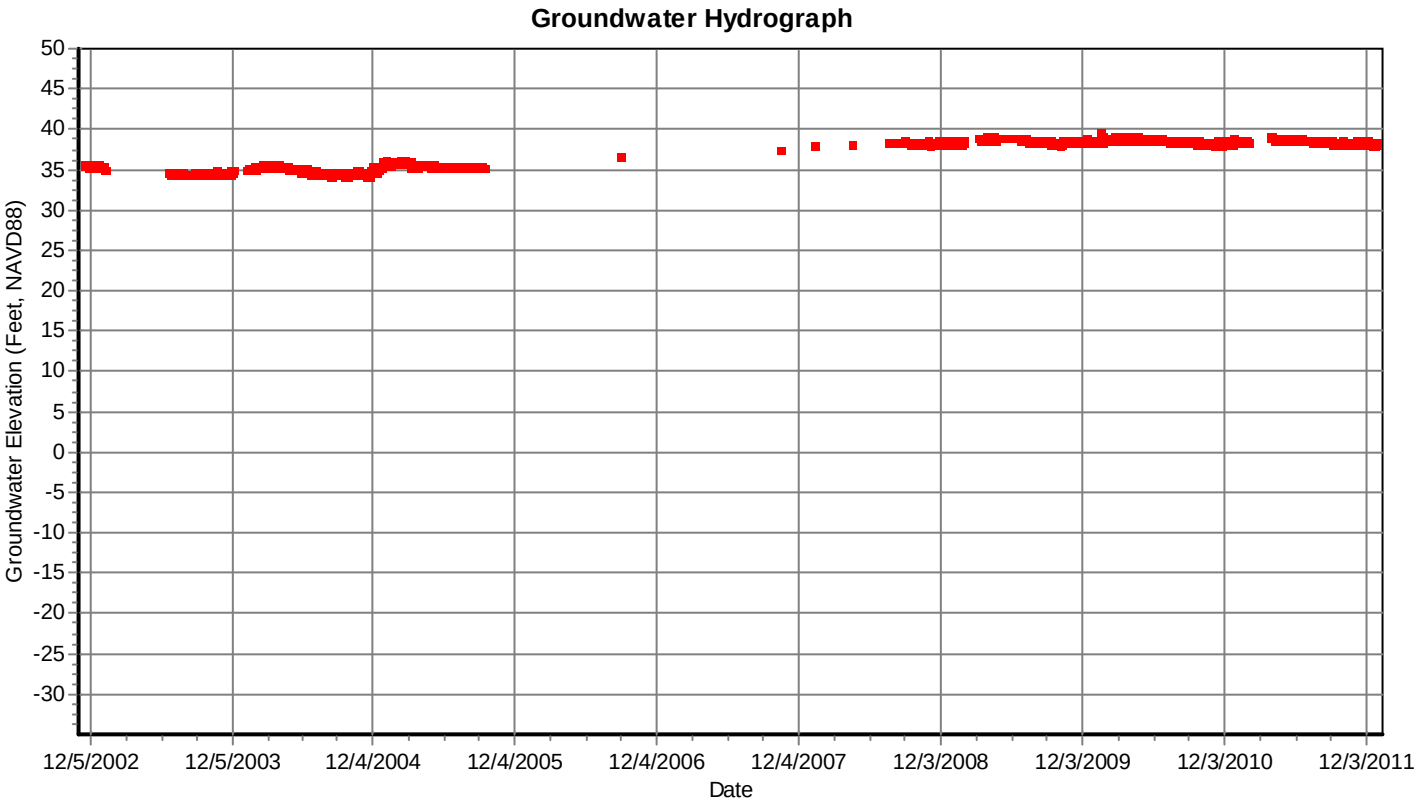
Station Name LMMW-4S



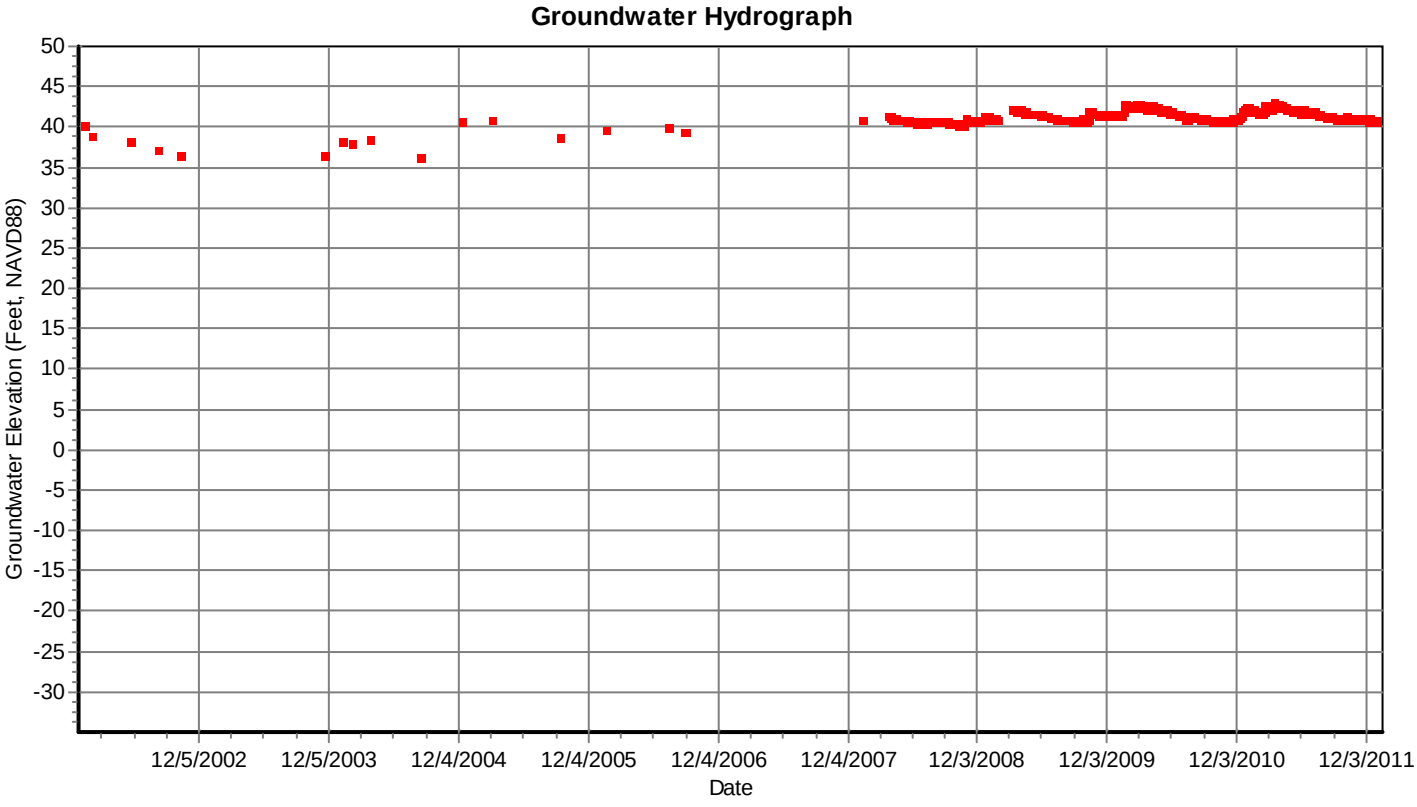
Station Name LMMW-4SS



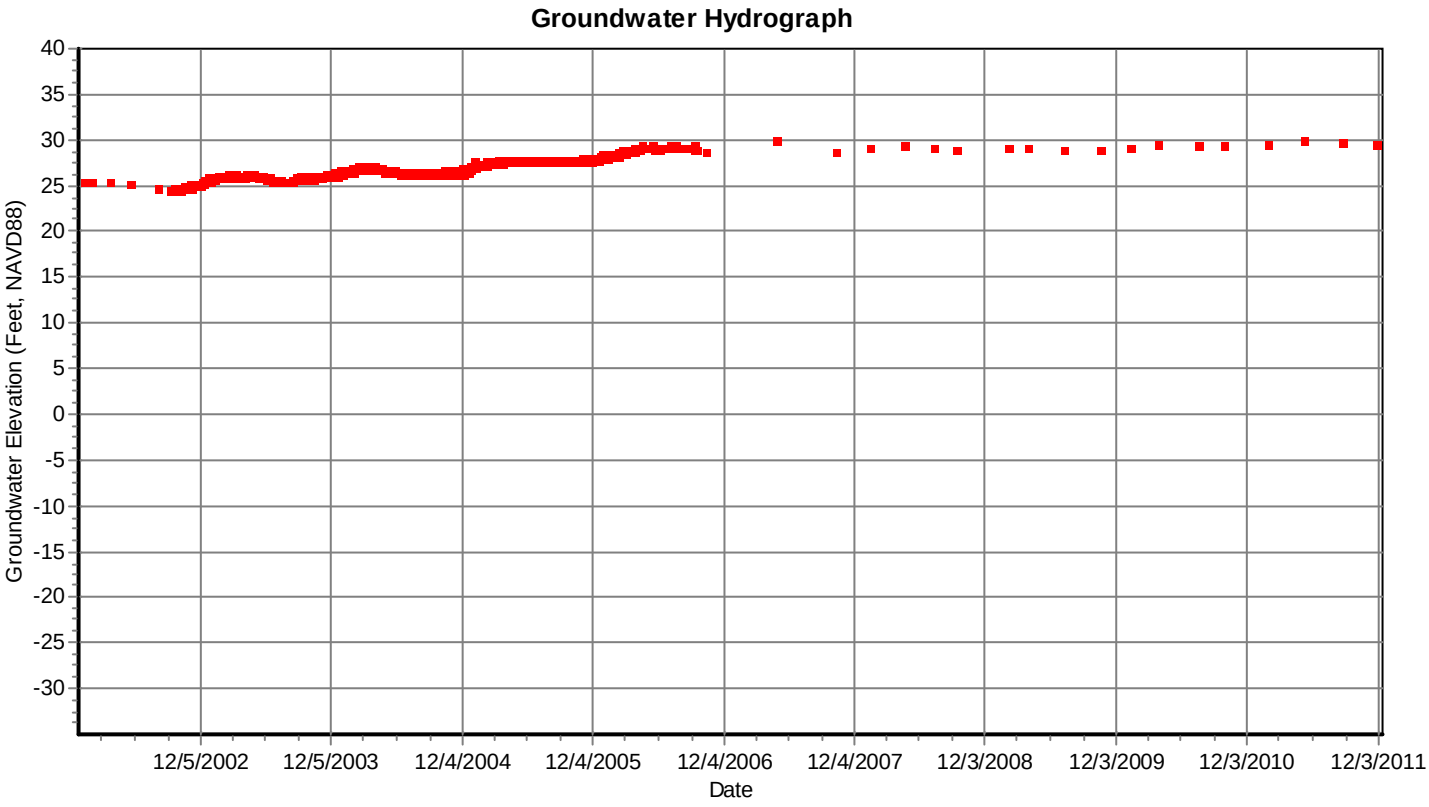
Station Name LMMW-5S



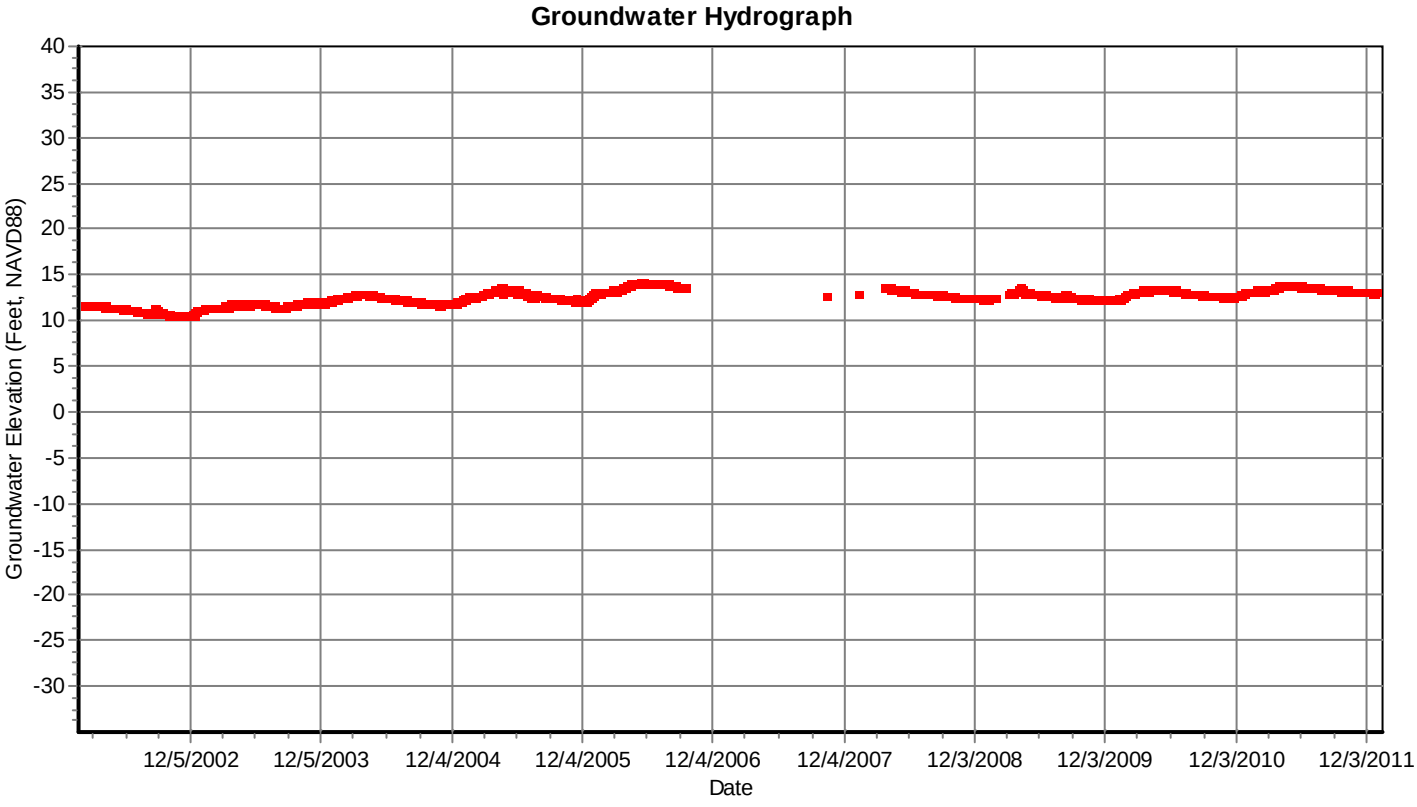
Station Name LMMW-5SS



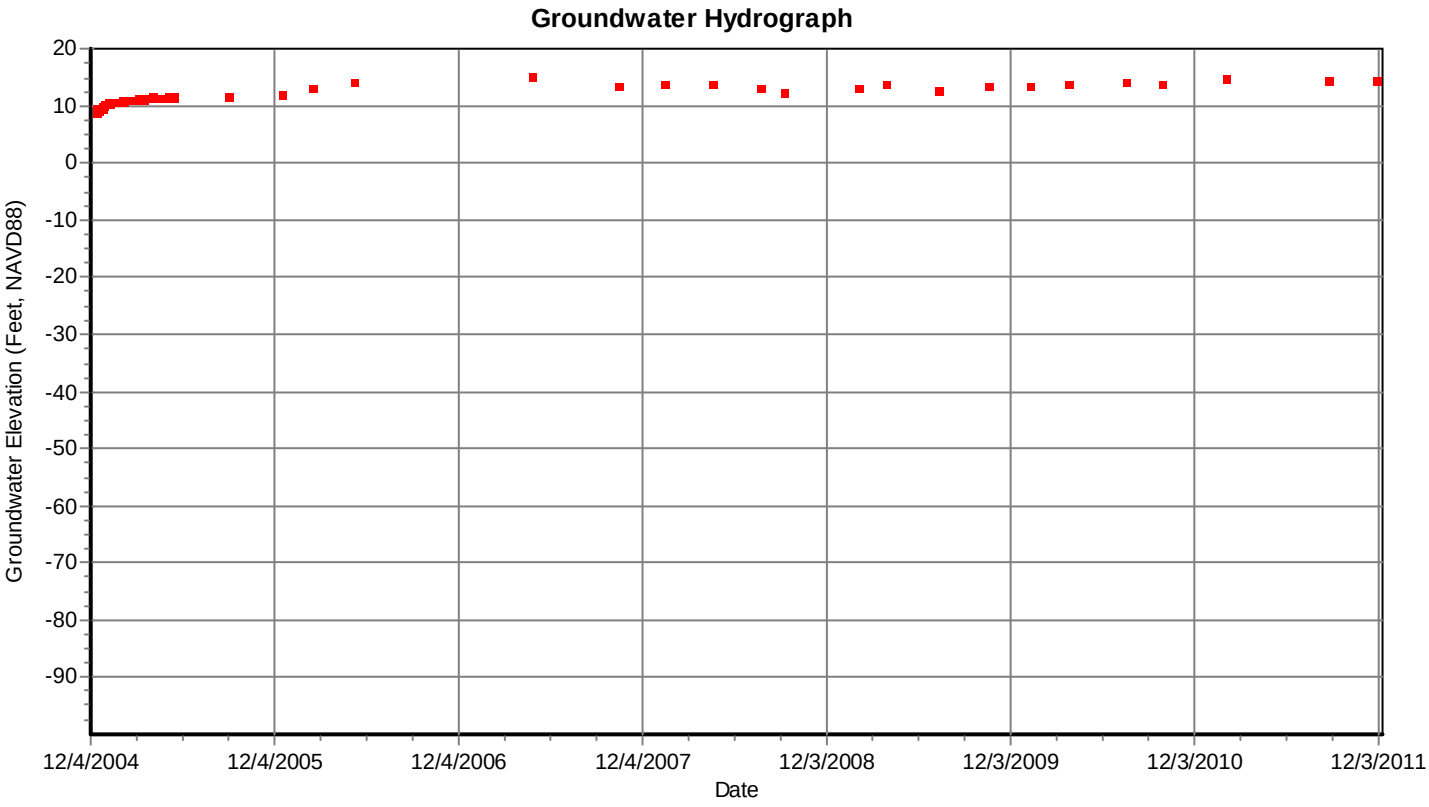
Station Name LMMW-7SS



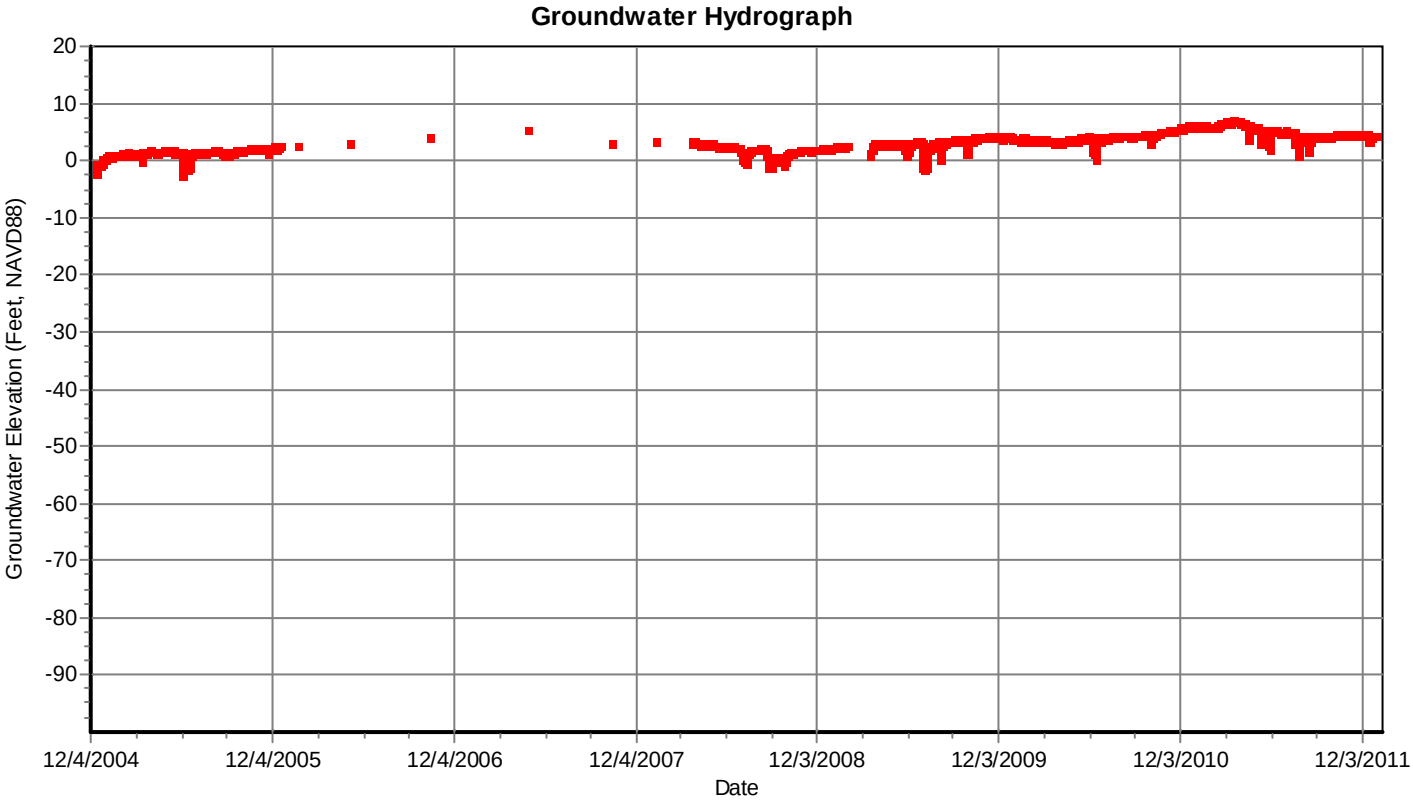
Station Name LMMW-9SS



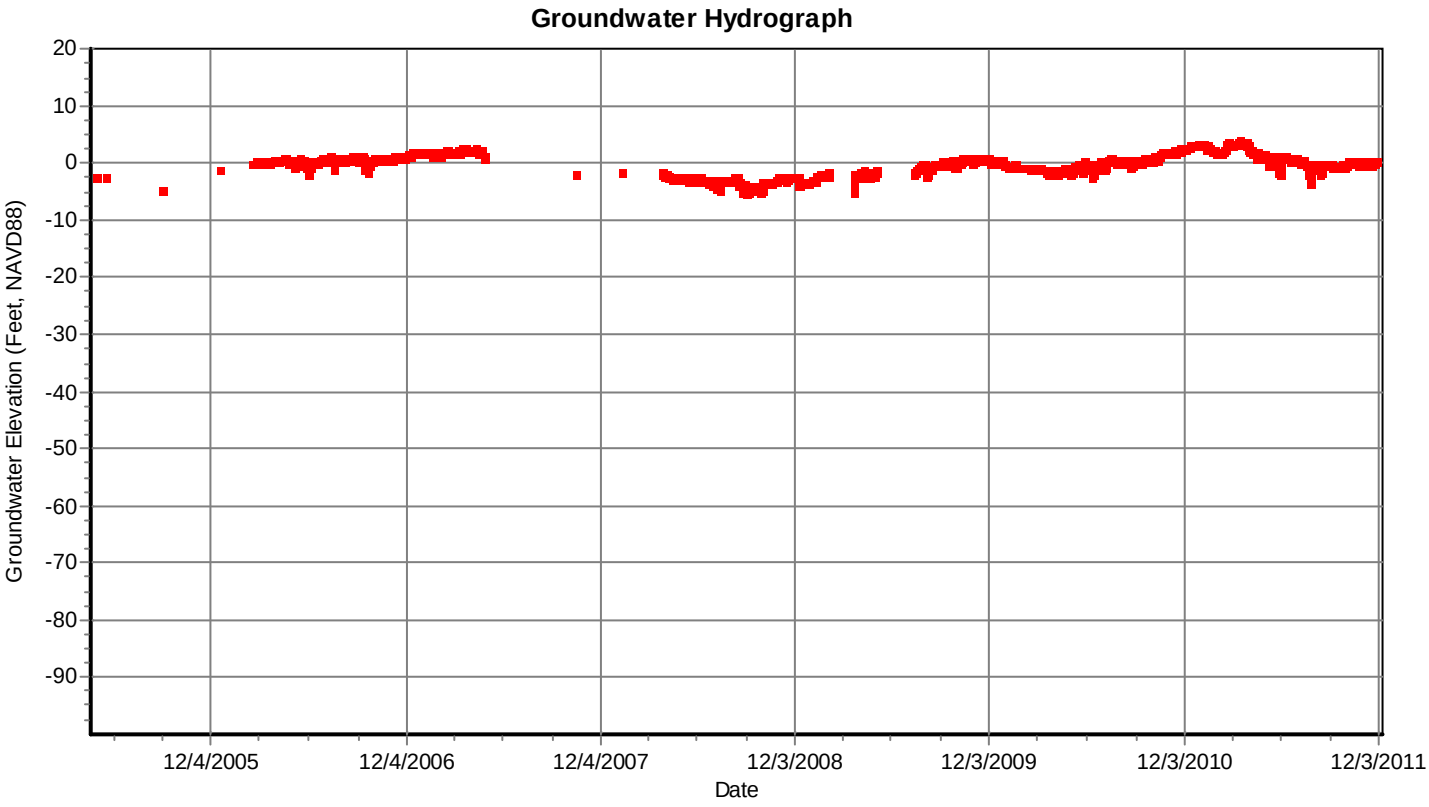
Station Name LMPS 155



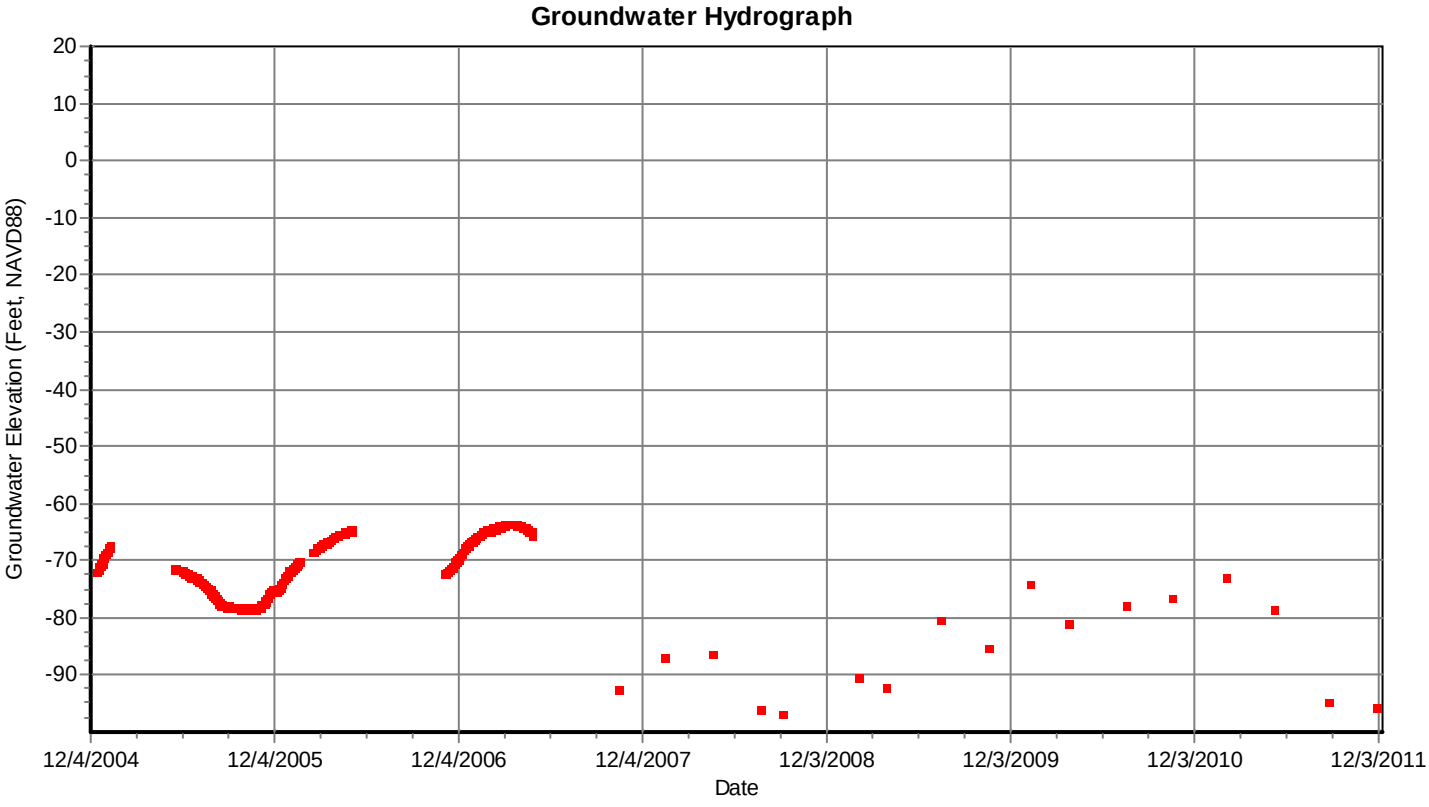
Station Name LMPS 270



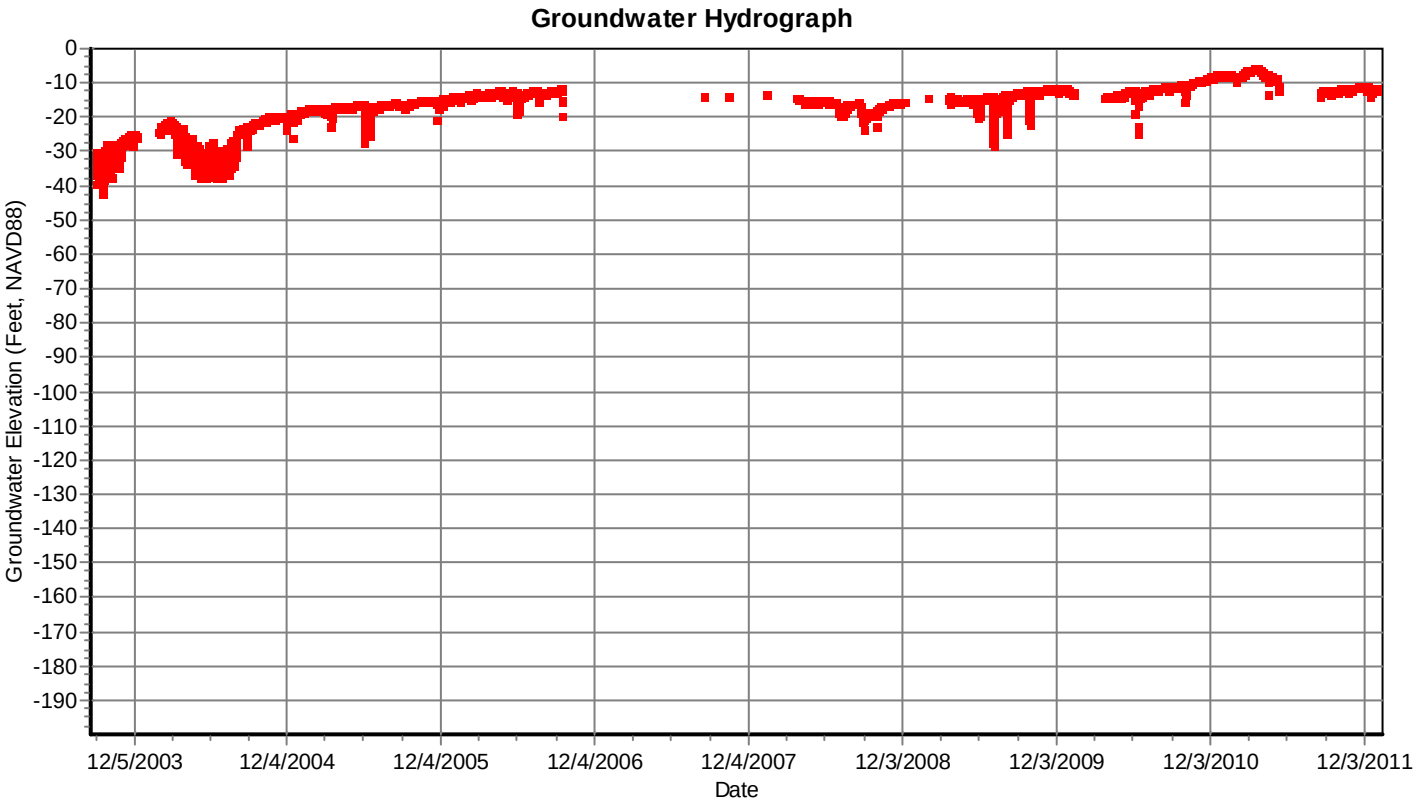
Station Name LMPS 440



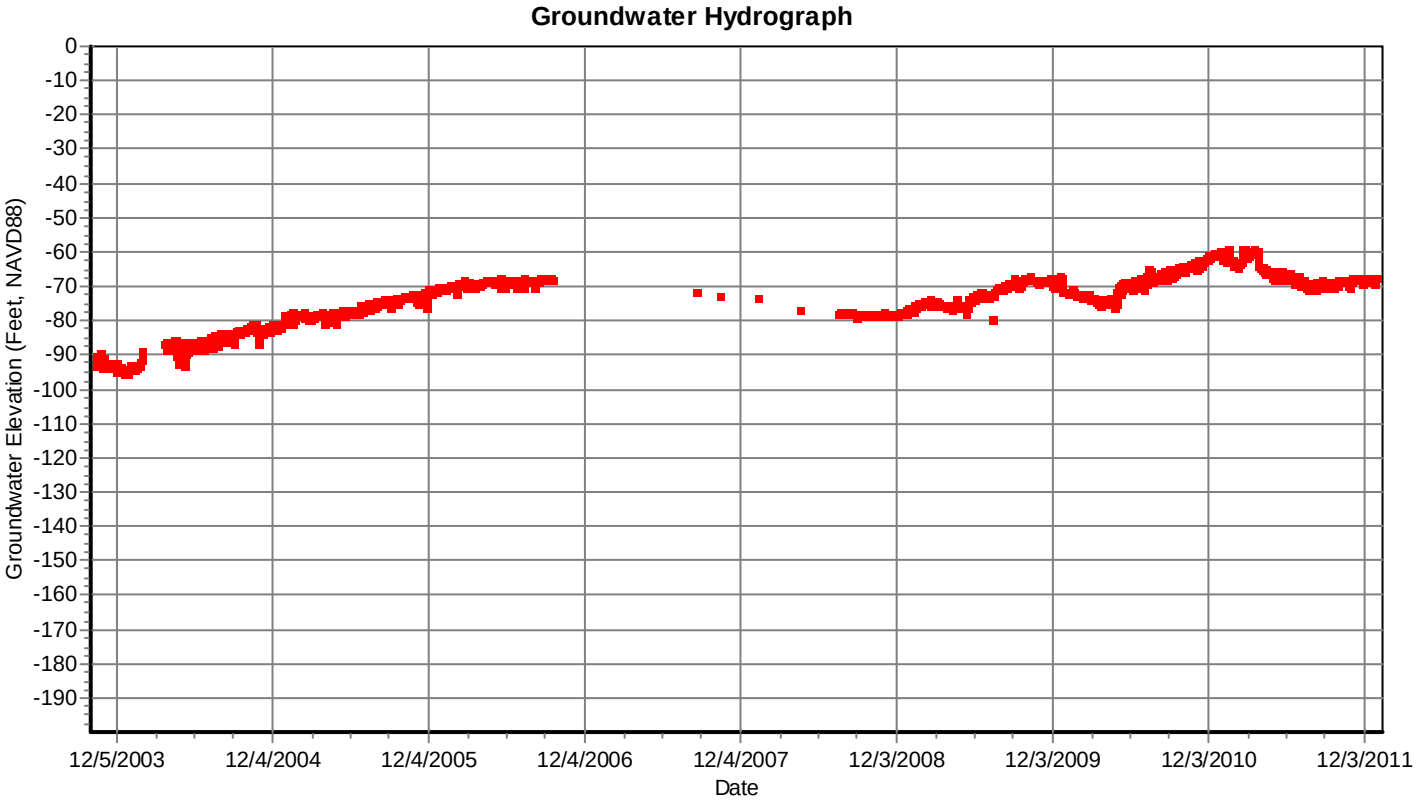
Station Name LMPS 575



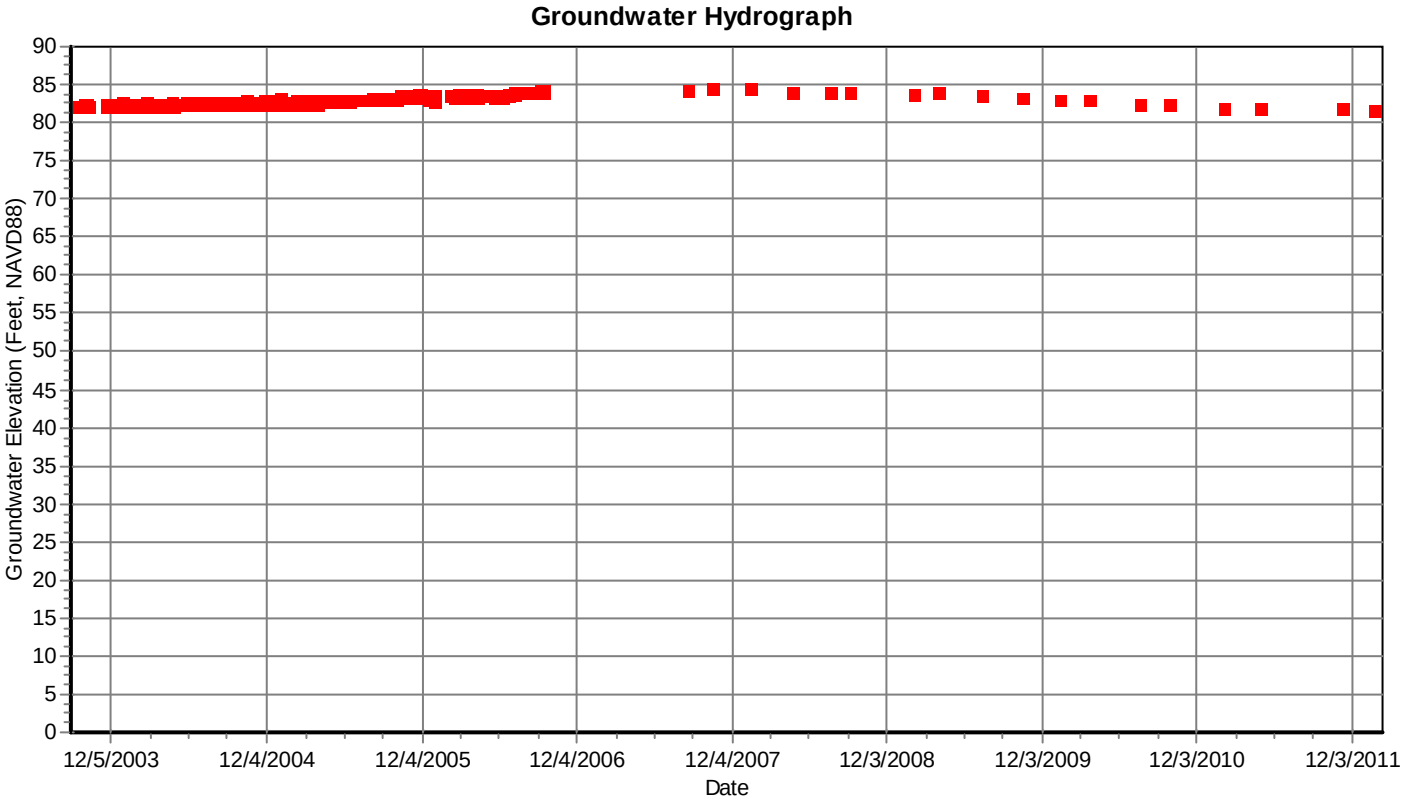
Station Name LMMW-6D



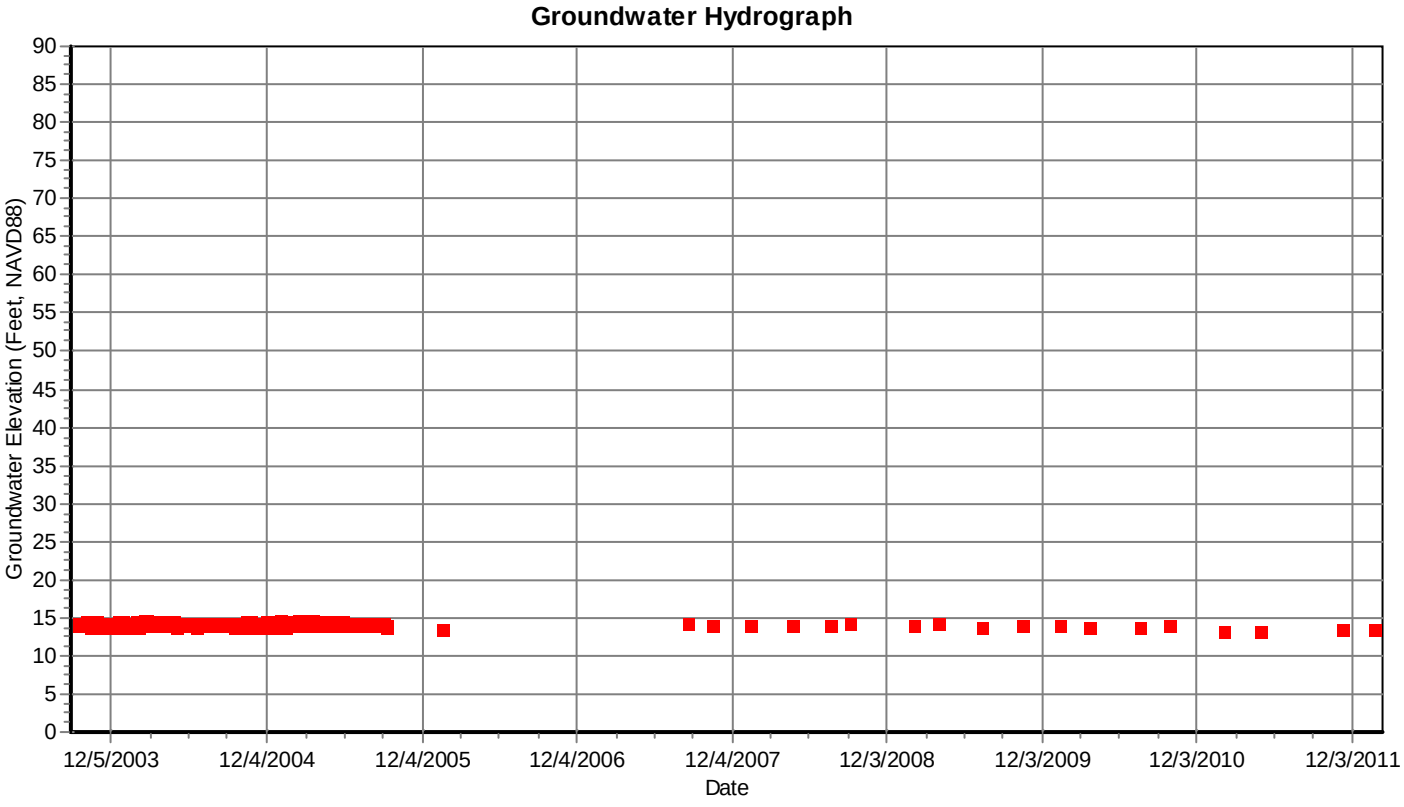
Station Name PARK PLAZA MW460



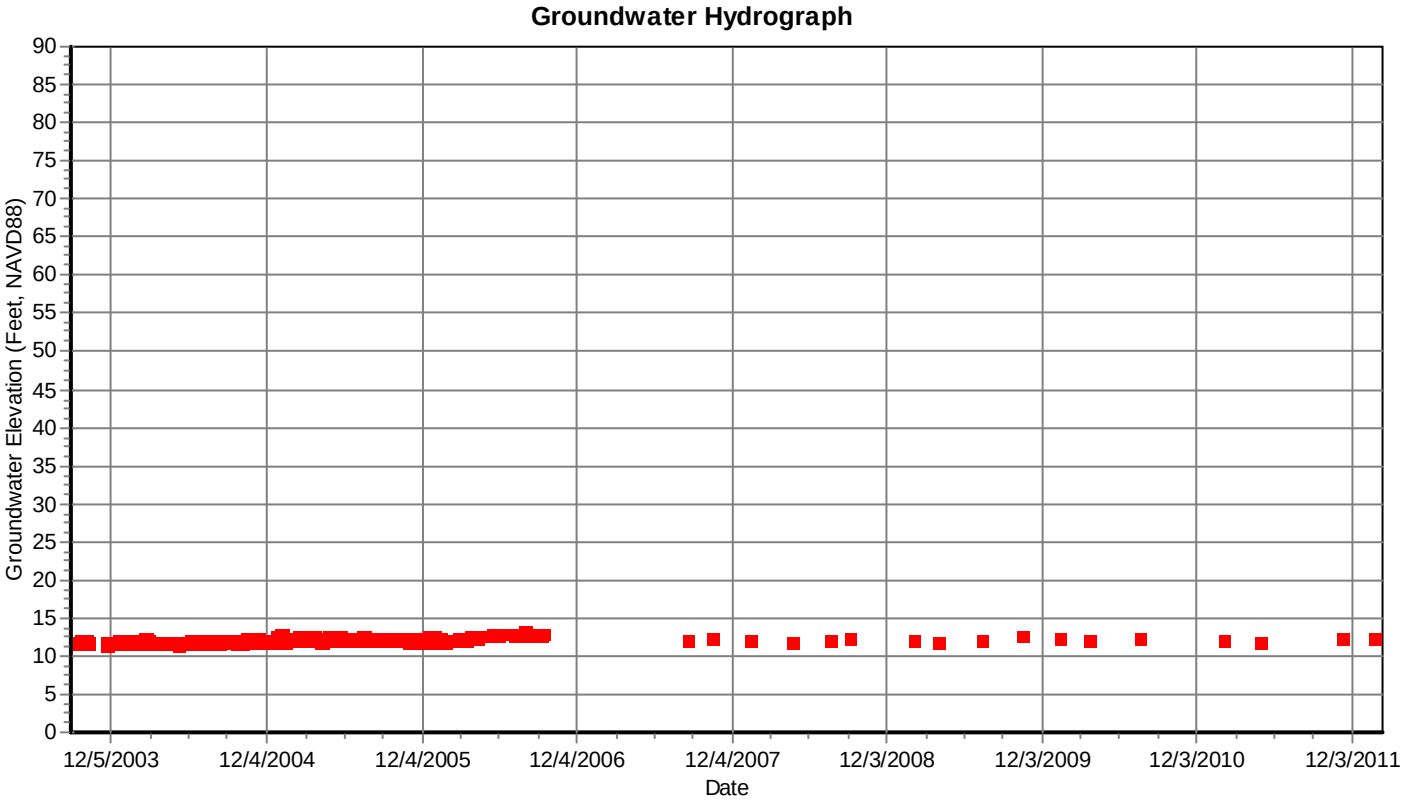
Station Name THORNTON BEACH MW225



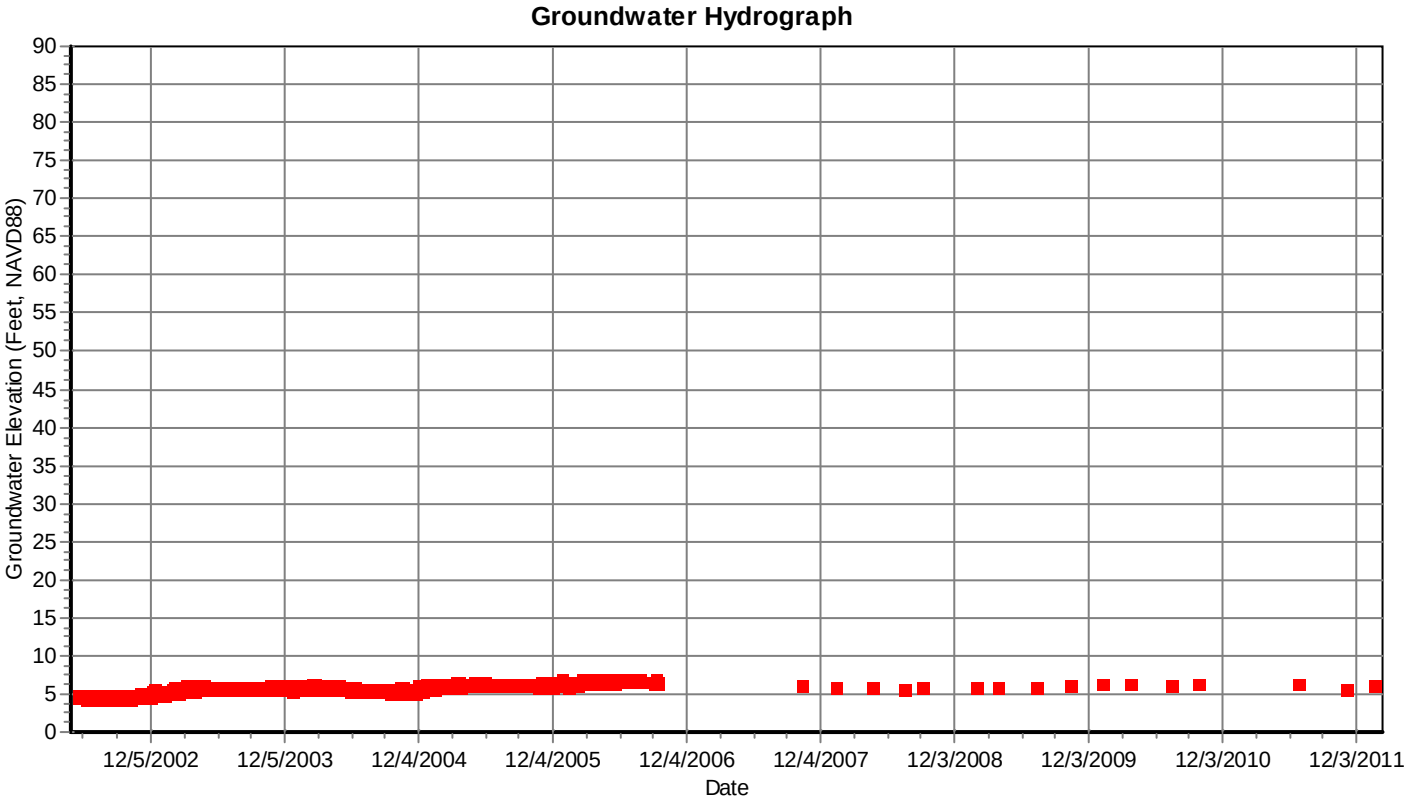
Station Name THORNTON BEACH MW360



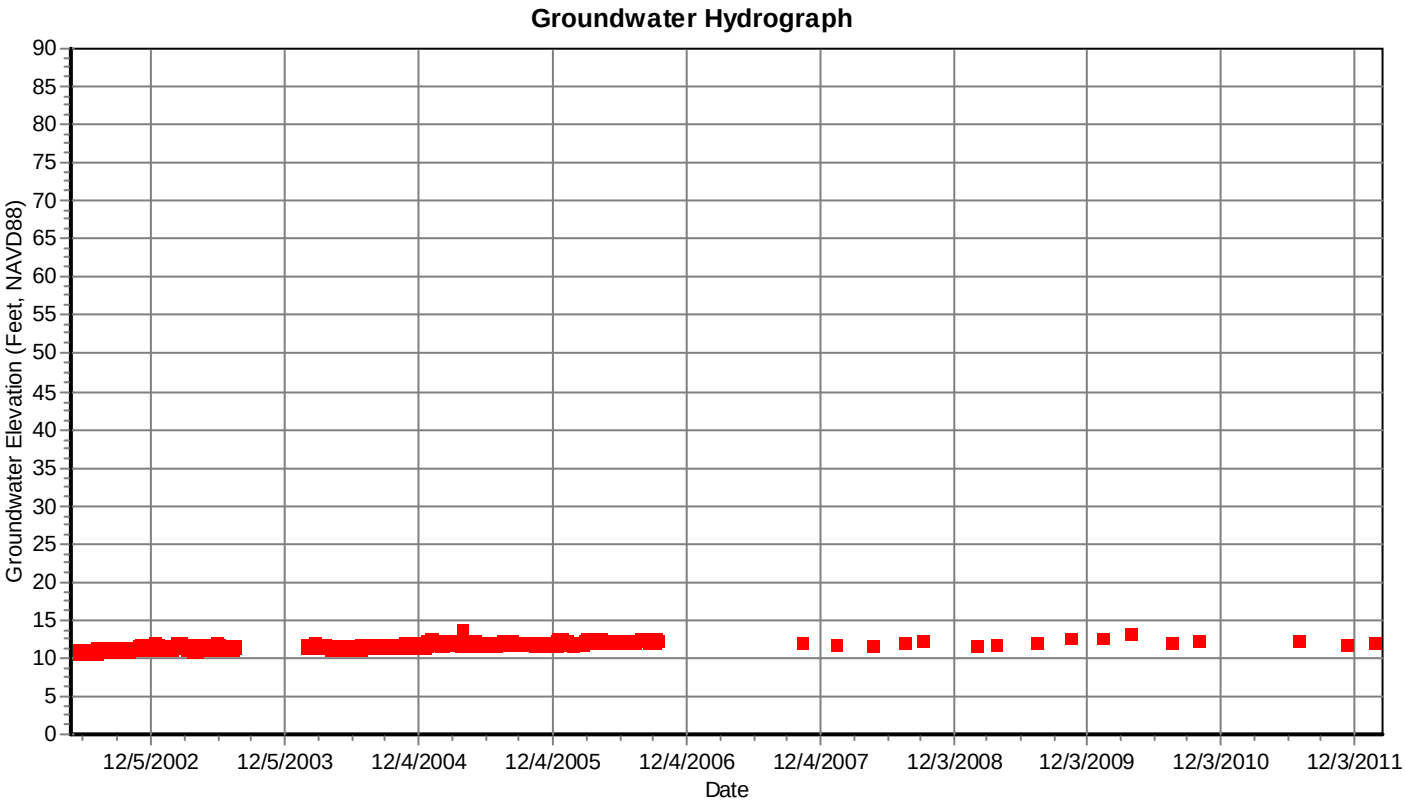
Station Name THORNTON BEACH MW670



Station Name FORT FUNSTON S



Station Name FORT FUNSTON M



APPENDIX D-2
Groundwater Quality Data

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Table 6
Coastal Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45	NE	NE	NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200	NE	500/1,000/1,500	NE	NE	
SF#34 - GRT HWY/KIRKHAM MW130	Apr-04	28.52	23.27	27.44	1.92		27.5	32.0	6.3**	445	--	308	160	8.04	--
	Oct-04	30.82	27.45	26.76	1.51	128	32.9	34.6	28.9	465	--	233	180	7.90	--
	Apr-05	26.10	26.56	24.71	1.20	120	35	34.0	31.0	457	439	284	168	7.99	7.78
	Nov-05	--	--	--	--	122		--	--	469	--	218	180	8.01	--
	May-06	--	--	--	--	--	36	--	--	466	--	240	--	--	--
	Oct-06	--	--	--	--	--	34	--	--	468	--	260	--	--	--
	May-07	--	--	--	--	--	34	--	--	478	--	278	--	--	--
	Oct-07	--	--	--	--	--	34	--	--	413	--	255	--	--	--
	Apr-08	--	--	--	--	--	34	--	--	459	--	278	--	--	--
	Sep-08	--	--	--	--	--	33	--	--	437	--	257	--	--	--
	Apr-09	--	--	--	--	--	36	--	--	444	--	257	--	--	--
	Nov-09	--	--	--	--	--	32	--	--	416	--	260	--	--	--
	Apr-10	--	--	--	--	--	32	--	--	423	--	248	--	--	--
	Nov-10	--	--	--	--	--	33	--	--	420	--	238	--	--	--
	May-11	--	--	--	--		36	--	--	407	--	241	--	--	--
	Nov-11	--	--	--	--	98	32	--	--	386	--	250	142	8.06	--
SF#35 - GRT HWY/KIRKHAM MW255	Apr-04	26.32	29.21	21.30	1.33		32.5	29.0	6**	476	--	316	200	7.95	7.7
	Oct-04	29.44	30.21	23.63	1.43	132	34.3	29.1	26.1	460	--	241	184	7.90	--
	Apr-05	28.54	31.47	22.21	1.37	134	36	32.0	28.0	477	452	297	192	7.89	7.7
	Nov-05	--	--	--	--	132	37	--	--	471	--	217	206	7.95	--
	May-06	--	--	--	--	--	37	--	--	462	--	320	--	--	--
	Oct-06	--	--	--	--	--	36	--	--	472	--	270	--	--	--
	May-07	--	--	--	--	--		--	--	473	--	280	--	--	--
	Oct-07	--	--	--	--	--	35	--	--	425	--	249	--	--	--
	Apr-08	--	--	--	--	--	36	--	--	444	--	260	--	--	--
	Sep-08	--	--	--	--	--	38	--	--	441	--	261	--	--	--
	Apr-09	--	--	--	--	--	39	--	--	455	--	284	--	--	--
	Nov-09	--	--	--	--	--	37	--	--	443	--	254	--	--	--
	Apr-10	--	--	--	--	--	36	--	--	462	--	299	--	--	--
	Nov-10	--	--	--	--	--	38	--	--	476	--	287	--	--	--
	May-11	--	--	--	--	--	40	--	--	482	--	268	--	--	--
	Nov-11	--	--	--	--	124	39	--	--	467	--	260	180	7.86	--
SF#36 - GRT HWY/KIRKHAM MW385	Apr-04	53.43	7.21	24.65	4.83		27.5	72.0	<0.3**	466		362	175	8.05	--
	Oct-04	60.43	7.38	28.05	4.94	116	32.5	63.7	1.3	454		257	168	8.10	--
	May-05	54.37	7.54	24.79	5.04	124	34	57.0	<0.3	451	430	303	160	8.16	7.91
	Nov-05	--	--	--	--	116	35	--	--	446	--	229	160	8.16	--
	May-06	--	--	--	--	--	36	--	--	450	--	290	--	--	--
	Oct-06	--	--	--	--	--	34	--	--	451	--	290	--	--	--
	May-07	--	--	--	--	--		--	--	452	--	286	--	--	--
	Oct-07	--	--	--	--	--	35	--	--	437	--	277	--	--	--
	Apr-08	--	--	--	--	--	36	--	--	450	--	288	--	--	--
	Sep-08	--	--	--	--	--	35	--	--	441	--	280	--	--	--
	Apr-09	--	--	--	--	--	38	--	--	464	--	262	--	--	--
	Nov-09	--	--	--	--	--	35	--	--	462	--	284	--	--	--
	Apr-10	--	--	--	--	--	34	--	--	457	--	282	--	--	--
	Nov-10	--	--	--	--	--	38	--	--	482	--	298	--	--	--
	May-11	--	--	--	--	--	40	--	--	467	--	302	--	--	--
	Nov-11	--	--	--	--	120	37	--	--	458	--	300	164	8.09	--

Table 6
Coastal Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45	NE	NE	NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200	NE	500/1,000/1,500	NE	NE	
SF#37 - GRT HWY/KIRKHAM MW435	Apr-04	44.65	4.08	32.92	7.20		25	60.0	<0.3**	445	--	322	130	8.12	--
	Oct-04	49.52	4.03	37.56	7.50	116	29	60.8	<0.2	449	--	253	131	8.20	--
	May-05	46.66	3.90	35.04	7.43	112	30	60.0	<0.3	447	424	294	132	8.18	7.96
	Nov-05	--	--	--	--	110	31	--	--	441	--	229	134	8.21	--
	May-06	--	--	--	--	--	37	--	--	442	--	280	--	--	--
	Oct-06	--	--	--	--	--	31	--	--	446	--	270	--	--	--
	May-07	--	--	--	--	--		--	--	444	--	296	--	--	--
	Oct-07	--	--	--	--	--	32	--	--	425	--	265	--	--	--
	Apr-08	--	--	--	--	--	31	--	--	442	--	280	--	--	--
	Sep-08	--	--	--	--	--	31	--	--	434	--	268	--	--	--
	Apr-09	--	--	--	--	--	34	--	--	452	--	266	--	--	--
	Nov-09	--	--	--	--	--	32	--	--	447	--	277	--	--	--
	Apr-10	--	--	--	--	--	30	--	--	446	--	288	--	--	--
	Nov-10	--	--	--	--	--	32	--	--	466	--	288	--	--	--
	May-11	--	--	--	--	--	33	--	--	450	--	281	--	--	--
	Nov-11	--	--	--	--	114	31	--	--	442	--	280	126	8.05	--
SF#30 - GRT HWY/ORTEGA MW125	Apr-04	26.54	21.18	28.03	1.45	--	25	38.0	5.4**	426	--	344	145	7.93	--
	Oct-04	27.30	22.73	25.82	1.15	108	27.7	34.6	22.0	405	--	216	146	7.90	--
	May-05	26.51	22.51	25.19	1.24	108	29.0	--	--	412	392	245	146	7.89	7.67
	Nov-05	--	--	--	--	102	31	--	--	416	--	220	150	7.84	--
	May-06	--	--	--	--	--	31	--	--	417	--	250	--	--	--
	Oct-06	--	--	--	--	--	32	--	--	446	--	260	--	--	--
	May-07	--	--	--	--	--	34	--	--	459	--	269	--	--	--
	Oct-07	--	--	--	--	--	29	--	--	438	--	255	--	--	--
	Apr-08	--	--	--	--	--	35	--	--	447	--	383*	--	--	--
	Oct-08	--	--	--	--	--	30	--	--	450	--	252	--	--	--
	Apr-09	--	--	--	--	--	32	--	--	458	--	274	--	--	--
	Nov-09	--	--	--	--	--	30	--	--	430	--	251	--	--	--
	Apr-10	--	--	--	--	--	31	--	--	438	--	251	--	--	--
	Nov-10	--	--	--	--	--	35	--	--	463	--	260	--	--	--
	May-11	--	--	--	--	--	36	--	--	456	--	260	--	--	--
	Oct-11	--	--	--	--	112	33	--	--	464	--	260	172	7.82	--
SF#31 - GRT HWY/ORTEGA MW265	Apr-04	14.00	11.98	19.95	1.04	--	15	15.0	1.3**	269	--	216	90	8.13	--
	Oct-04	15.80	12.84	22.72	1.14	82	20.8	9.4	5.5	260	--	131	86	8.10	--
	May-05	13.53	12.43	19.91	0.89	80	19.0	--	--	1392*	259		82	8.03	7.84
	Nov-05	--	--	--	--	--	24	--	--	257	--	177	--	--	--
	May-06	--	--	--	--	--	25	--	--	257	--	160	--	--	--
	Oct-06	--	--	--	--	--	31	--	--	429	--	250	--	--	--
	May-07	--	--	--	--	--	30	--	--	418	--	240	--	--	--
	Oct-07	--	--	--	--	--	31		--	448	--	262	--	--	--
	Apr-08	--	--	--	--	--	31	--	--	439	--	332*	--	--	--
	Sep-08	--	--	--	--	--	31	--	--	439	--	282	--	--	--
	Apr-09	--	--	--	--	--	30	--	--	388	--	232	--	--	--
	Nov-09						30			430		243			
	Apr-10	--	--	--	--	--	24	--	--	282	--	169	--	--	--
	Nov-10	--	--	--	--	--	24	--	--	270	--	158	--	--	--
	May-11	--	--	--	--	--	27	--	--	271	--	284	--	--	--
	Oct-11	--	--	--	--	102	30	--	--	410	--	240	142	7.90	--

Table 6
Coastal Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45	NE	NE	NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200	NE	500/1,000/1,500	NE	NE	
SF#32 - GRT HWY/ORTEGA MW400	Apr-04	15.20	11.80	23.11	1.47	--	20	10.0	1.2**	277	--	230	100	8.11	--
	Oct-04	17.00	12.69	23.27	1.31	92	22.1	13.5	5.8	277	--	146	88	8.20	--
	Apr-05	16.36	13.54	21.77	1.28	88	24.0	8.7	6.4	272	--	156	88	8.22	--
	Nov-05	--	--	--	--	--	25	--	--	273	--	176	--	--	--
	May-06	--	--	--	--	--	24	--	--	272	--	180	--	--	--
	Oct-06	--	--	--	--	--	24	--	--	272	--	160	--	--	--
	May-07	--	--	--	--	--	24	--	--	276	--	171	--	--	--
	Oct-07	--	--	--	--	--	23	--	--	271	--	170	--	--	--
	Apr-08	--	--	--	--	--	19	--	--	273	--	174	--	--	--
	Sep-08	--	--	--	--	--	24	--	--	268	--	216	--	--	--
	Apr-09	--	--	--	--	--	20	--	--	272	--	168	--	--	--
	Nov-09	--	--	--	--	--	25	--	--	275	--	166	--	--	--
	Apr-10	--	--	--	--	--	24	--	--	274	--	164	--	--	--
	Nov-10	--	--	--	--	--	24	--	--	278	--	208	--	--	--
	May-11	--	--	--	--	--	27	--	--	279	--	220	--	--	--
	Oct-11	--	--	--	--	84	26	--	--	272	--	160	86	8.04	--
SF#33 - GRT HWY/ORTEGA MW475	Apr-04	12.69	2.29	40.89	2.89		20	15.0	<0.3**	283	--	240	45	8.33	--
	Oct-04	13.69	1.75	45.57	3.43	80	27	14.2	<0.2	276	--	129	37	8.70	--
	Apr-05	13.45	1.80	43.07	2.87	78	30	13.0	<0.3	280	277	159	44	8.39	8.11
	Nov-05	--	--	--	--	76	30	--	--	280	--	136	42	7.67	--
	May-06	--	--	--	--	--	30	--	--	278	--	180	--		--
	Oct-06	--	--	--	--	--	28	--	--	283	--	160	--		--
	May-07	--	--	--	--	--	29	--	--	285	--	172	--	--	--
	Oct-07	--	--	--	--	--	29	--	--	279	--	184	--	--	--
	Apr-08	--	--	--	--	--	30	--	--	286	--	178	--	--	--
	Sep-08	--	--	--	--	--	31	--	--	283	--	168	--	--	--
	Apr-09	--	--	--	--	--	30	--	--	289	--	170	--	--	--
	Nov-09	--	--	--	--	--	30	--	--	292	--	168	--		--
	Apr-10	--	--	--	--	--	29	--	--	289	--	181	--	--	--
	Nov-10	--	--	--	--	--	32	--	--	304	--	203	--	--	--
	May-11	--	--	--	--	--	33	--	--	297	--	172	--	--	--
	Oct-11	--	--	--	--	82	31	--	--	289	--	160	42	8.23	--
SF#26 - GRT HWY/TARAVAL MW145	Apr-04	27.98	25.24	29.45	2.02	--	30	23.0	8.4**	473	--	360	170	7.96	--
	Oct-04	30.59	25.93	30.30	1.78	132	34.9	25.2	35.8	478	--	277	171	7.90	--
	Apr-05	29.61	26.08	29.03	1.62	132	35	25.0	36.0	478	--	294.5	172	7.88	--
	Nov-05	--	--	--	--	--	36	--	--	486	--	317	--	--	--
	May-06	--	--	--	--	--	38	--	--	502	--	320	--	--	--
	Oct-06	--	--	--	--	--	36	--	--	489	--	300	--	--	--
	May-07	--	--	--	--	--	26*	--	--	507	--	302	--	--	--
	Oct-07	--	--	--	--	--	37	--	--	497	--	305	--	--	--
	Apr-08	--	--	--	--	--	37	--	--	495	--	306	--	--	--
	Sep-08	--	--	--	--	--	37	--	--	481	--	281	--	--	--
	Apr-09	--	--	--	--	--	41	--	--	477	--	271	--	--	--
	Nov-09	--	--	--	--	--	38	--	--	464	--	274	--	--	--
	Apr-10	--	--	--	--	--	38	--	--	460	--	277	--	--	--
	Nov-10	--	--	--	--	--	38	--	--	471	--	263	--	--	--
	Jun-11	--	--	--	--	--	38	--	--	483	--	310	--	--	--
	Nov-11	--	--	--	--	116	40	--	--	470	--	280	162	7.38	--

Table 6
Coastal Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45	NE	NE	NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200	NE	500/1,000/1,500	NE	NE	
SF#27 - GRT HWY/TARAVAL MW240	Apr-04	21.63	19.49	22.20	1.88		25	17.0	2.5**	371	--	276	150	7.95	--
	Oct-04	21.63	19.84	23.87	1.67	104	32.2	19.6	11.3	367	--	196	130	7.70	--
	Apr-05	22.14	21.01	23.13	1.68	104	36	20.0	13.0	369	--	243	132	7.80	--
	Nov-05	--	--	--	--	--	34	--	--	380	--	230	--	--	--
	May-06	--	--	--	--	--	36	--	--	368	--	240	--	--	--
	Oct-06	--	--	--	--	--	33	--	--	366	--	230	--	--	--
	May-07	--	--	--	--	--	35	--	--	373	--	214	--	--	--
	Oct-07	--	--	--	--	--	36	--	--	370	--	229	--	--	--
	Apr-08	--	--	--	--	--	36	--	--	374	--	226	--	--	--
	Sep-08	--	--	--	--	--	34	--	--	375	--	207	--	--	--
	Apr-09	--	--	--	--	--	39	--	--	388	--	229	--	--	--
	Nov-09	--	--	--	--	--	35	--	--	386	--	217	--	--	--
	Apr-10	--	--	--	--	--	35	--	--	386	--	235	--	--	--
	Nov-10	--	--	--	--	--	33	--	--	389	--	225	--	--	--
	Jun-11	--	--	--	--	--	34	--	--	385	--	249	--	--	--
	Nov-11	--	--	--	--	108	35	--	--	379	--	200	138	7.45	--
SF#28 - GRT HWY/TARAVAL MW400	Apr-04	17.62	14.73	20.44	1.72		20	28.0	<0.3**	313	--	248	140	8.16	
	Oct-04	18.63	15.13	23.06	1.62	88	26	24.6	<0.2	310	--	162	104	8.10	
	May-05	18.89	16.34	22.28	1.47	92	28	--	--	308	--	--	104	8.28	
	Nov-05	--	--	--	--	--	28	--	--	311	--	193	--	--	--
	May-06	--	--	--	--	--	28	--	--	304	--	200	--	--	--
	Oct-06	--	--	--	--	--	27	--	--	309	--	180	--	--	--
	May-07	--	--	--	--	--	28	--	--	311	--	376*	--	--	--
	Oct-07	--	--	--	--	--	28	--	--	306	--	172	--	--	--
	Apr-08	--	--	--	--	--	28	--	--	306	--	213	--	--	--
	Sep-08	--	--	--	--	--	27	--	--	297	--	173	--	--	--
	Apr-09	--	--	--	--	--	29	--	--	311	--	183	--	--	--
	Nov-09	--	--	--	--	--	28	--	--	309	--	172	--	--	--
	Apr-10	--	--	--	--	--	28	--	--	309	--	188	--	--	--
	Nov-10	--	--	--	--	--	28	--	--	310	--	179	--	--	--
	Jun-11	--	--	--	--	--	28	--	--	319	--	206	--	--	--
	Nov-11	--	--	--	--	88	28	--	--	311	--	190	104	7.49	--
SF#29 - GRT HWY/TARAVAL MW530	Apr-04	11.13	5.33	48.75	2.45	--	15	9.0	<0.3**	321	--	254	60	8.35	
	Oct-04	0.08*	<0.02*	<0.01*	<0.35*	119	22.7	8.5	<0.2	323	--	188	48	8.30	
	May-05	12.27	5.54	53.49	2.29	120	20	--	--	322	307	207.5	60	8.43	8.05
	Nov-05	--	--	--	--	--	26	--	--	322	--	207	--	--	--
	May-06	--	--	--	--	--	26	--	--	324	--	190	--	--	--
	Oct-06	--	--	--	--	--	25	--	--	321	--	200	--	--	--
	May-07	--	--	--	--	--	26	--	--	330	--	197	--	--	--
	Oct-07	--	--	--	--	--	26	--	--	324	--	192	--	--	--
	Apr-08	--	--	--	--	--	27	--	--	329	--	205	--	--	--
	Sep-08	--	--	--	--	--	26	--	--	319	--	186	--	--	--
	Apr-09	--	--	--	--	--	28	--	--	330	--	192	--	--	--
	Nov-09	--	--	--	--	--	26	--	--	331	--	178	--	--	--
	Apr-10	--	--	--	--	--	26	--	--	330	--	209	--	--	--
	Nov-10	--	--	--	--	--	24	--	--	332	--	185	--	--	--
	Jun-11	--	--	--	--	--	24	--	--	336	--	192	--	--	--
	Nov-11	--	--	--	--	132	26	--	--	340	--	220	56	7.62	--

Table 6
Coastal Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45	NE	NE	NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200	NE	500/1,000/1,500	NE	NE	
SF#42 - ZOO MW275	Apr-04	17.89	0.77*	97.6*	3.06		60	45*	0.82**	530	--	360	44	10.20	
	Nov-04	24.14	14.99	45.51	5.07	110	60.2	12.2	<0.2	431	--	250	114	8.90	
	May-05	21.08	18.80	35.88	4.89	118	68	7.0	<0.3	446	425	526*	158	8.32	8.15
	Nov-05	--	--	--	--	--	71	--	--	463	438	309	--	--	7.91
	May-06	--	--	--	--	--	70	--	--	459	--	260	--	--	--
	Nov-06	20.2	20.9	34.1	4.5	116	66	5.3	<0.3	453	--	240	132	7.95	--
	May-07	--	--	--	--	--	75	--	--	455	--	242	--	--	--
	Oct-07	18.8	20.3	33.9	4.5	116	65	4.6	<0.3	453	--	246	130	7.86	--
	May-08	--	--	--	--	--	64	--	--	456	--	245	--	--	--
	Sep-08	--	--	--	--	--	69	--	--	467	--	248	--	--	--
	Apr-09	--	--	--	--	--	68	--	--	461	--	246	--	--	--
	Nov-09	--	--	--	--	--	68	--	--	475	--	260	--	--	--
	Apr-10	--	--	--	--	--	42*	--	--	486	--	237	--	--	--
	Nov-10	--	--	--	--	--	41*	--	--	493	--	290	--	--	--
	May-11	--	--	--	--	--	44	--	--	486	--	314	--	--	--
	Oct-11	--	--	--	--	120	69	--	--	458	--	240	140	7.46	--
SF#43 - ZOO MW450	Apr-04	23.90	24.76	43.09	2.75		47	19.0	7.4**	469	--	360	138	8.63	
	Nov-04	24.60	24.87	44.98	2.82	132	43	18.6	39.5	495	--	298	164	8.40	
	May-05	23.20	26.10	41.70	2.86	122	44	19.0	41.0	491	482	295	138	8.44	8.24
	Nov-05	--	--	--	--	--	44	--	--	504	494	293	--	--	8.23
	May-06	--	--	--	--	--	45	--	--	488	--	300	--	--	--
	Nov-06	21.9	27.0	41.6	2.7	154	44	19.6	37.8	488	--	280	128	8.32	--
	May-07	--	--	--	--	--	45	--	--	483	--	280	--	--	--
	Oct-07	18.9	24.1	37.2	2.1	126	42	17.8	30.0	472	--	290	140	8.22	--
	May-08	--	--	--	--	--	42	--	--	474	--	301	--	--	--
	Sep-08	--	--	--	--	--	43	--	--	478	--	283	--	--	--
	Apr-09	--	--	--	--	--	43	--	--	479	--	274	--	--	--
	Nov-09	--	--	--	--	--	43	--	--	486	--	293	--	--	--
	Apr-10	--	--	--	--	--	34*	--	--	474	--	211	--	--	--
	Nov-10	--	--	--	--	--	67*	--	--	478	--	261	--	--	--
	May-11	--	--	--	--	--	72	--	--	478	--	277	--	--	--
	Oct-11	--	--	--	--	132	44	--	--	479	--	270	154	7.01	--
SF#45 - ZOO MW565	Apr-04	30.51	10.29	71.56	4.09	--	53	82*	<0.3**	510	--	380	100	8.31	
	May-05	27.65	10.01	63.28	3.56	170	52	7.6	<0.3	505	507	313	104	8.25	8.12
	Nov-05	--	--	--	--	--	53	--	--	507	512	323	--	--	8.02
	May-06	--	--	--	--	--	53	--	--	498	--	300	--	--	--
	Nov-06	27.3	10.4	69.7	3.3	162	53	7.4	<0.3	503	--	280	104	8.21	--
	May-07	--	--	--	--	--	60	--	--	503	--	281	--	--	--
	Oct-07	25.1	9.9	65.6	2.6	170	52	6.9	<0.3	502	--	295	102	8.25	--
	May-08	--	--	--	--	--	52	--	--	494	--	272	--	--	--
	Oct-08	--	--	--	--	--	51	--	--	494	--	262	--	--	--
	Apr-09	--	--	--	--	--	53		--	504		282	--	--	--
	Nov-09	--	--	--	--	--	53		--	506		304	--	--	--
	Apr-10	--	--	--	--	--	54	--	--	503	--	232	--	--	--
	Nov-10	--	--	--	--	--	52	--	--	510	--	283	--	--	--
	May-11	--	--	--	--	--	54	--	--	517	--	330	--	--	--
	Oct-11	--	--	--	--	150	52	--	--	449	--	240	76	8.04	--

Table 6
Coastal Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45	NE	NE	NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200	NE	500/1,000/1,500	NE	NE	
SF#57 - USGS South Windmill MW57	May-06	--	--	--	--	--	115	--	--	963	--	--	--		--
	Oct-07	--	--	--	--	--	140	53	41	1104	--	600	--	--	--
	May-08	--	--	--	--	--	150	--	--	1183	--	653	--	--	--
	Sep-08	--	--	--	--	--	178	--	--	1228	--	701	--	--	--
	Apr-09	--	--	--	--	--	178		--	1253		684	--	--	--
	Nov-09	--	--	--	--	--	193		--	1277		666	--	--	--
	Apr-10	--	--	--	--	--	176	--	--	1281	--	705	--	--	--
	Nov-10	--	--	--	--	--	151	--	--	1240	--	663	--	--	--
	May-11	--	--	--	--		157	--	--	1201	--	667	--		--
	Nov-11	--	--	--	--	284	154	--	--	1217	--	690	408	7.0	--
SF#58 - USGS South Windmill MW140	May-06	--	--	--	--	--	57	--	--	605	--	--	--		--
	Oct-07	--	--	--	--	--	48	39	31	596	--	330	--	--	--
	May-08	--	--	--	--	--	57	--	--	636	--	350	--	--	--
	Sep-08	--	--	--	--	--	61	--	--	658	--	359	--	--	--
	Apr-09	--	--	--	--	--	67		--	703	--	382	--	--	--
	Nov-09	--	--	--	--	--	70		--	744	--	431	--	--	--
	Apr-10	--	--	--	--	--	65	--	--	720	--	400	--	--	--
	Nov-10	--	--	--	--	--	61	--	--	739	--	412	--	--	--
	May-11	--	--	--	--		60	--	--	693	--	490	--		--
	Nov-11	--	--	--	--	202	59	--	--	704	--	410	176	7.72	--

Notes

* = Potentially anomalous or questionable result

** = April 2004 data represents Nitrate as Nitrogen reported by laboratory, rather than Nitrate as Nitrate concentration.

-- = Not tested

mg/l = Milligrams per liter

Shaded cell indicates data collected in 2011

MCL Maximum Contaminant Level

Secondary MCL[1] 250/500/ 600: Recommended/ Upper/Short Term

NE Not Established

Table 7
General Basin Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO_3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45.0	NE		NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200		500/1,000/1,500	NE	NE	
SF#02 - EDGEWOOD SCHOOL	May-02	--	--	--	--	103	30.0	36.0	46.0	445	--	--	169	7.50	--
	Nov-02	--	--	--	--	144	30.0	36.0	49.0	452	--	227	164	7.30	--
	Jul-03	24.8	25.6	24.5	1.4	110	33.0	37.0	51.0	450		235	180	7.20	--
	Apr-04	24.5	25.0	24.5	1.4	--	--	--	--	--	--	--	--	--	--
	Nov-04	11.12*	0.254*	26.5	0.28*	108	29.1	34.5	47.9	446	--	312	166	7.50	--
SF#03 - ELK GLEN 2	Apr-00	30.4	32.8	24.2	ND	138	38.4	48.8	49.2	526	--	364	211	7.65	--
	Apr-01	--	--	--	--	140	41.0	52.0	55.0	580	--	330	236	7.62	--
	Dec-01	34.9	37.3	27.6	1.1	140	40.4	50.8	48.9	580	--	360	230	7.74	--
	Apr-04	34.4	38.5	26.9	1.1		43.0	52.0	12**	583	--	412	240	7.61	--
	Nov-04	38.9	39.5	30.9	1.2	143	39.5	56.0	51.2	590	--	374	235	7.80	--
	May-05	34.4	37.2	26.1	0.8	150	39.0	55.0	51.0	590	560	362	210	7.63	7.5
	Nov-05	--	--	--	--	--	--	--	--	--	516	--	--	--	--
SF#07 - LMMW1S	Apr-09	58.4	89.7	90.6	2.7	340	235	114.0	10.7	1488	--	859	590	7.09	--
	Nov-09	73.0	110.0	130.0	2.8	310	393	122.0	41.0	1936	--	1035	700	6.74	--
	Apr-10	52.9	78.4	76.2	2.3	342	129	77.0	<0.3	1170	--	657	454	6.88	--
	Nov-10	57.2	83.6	111.4	3.2	276	253	120.0	39.0	1584		860	528	6.61	--
	May-11	51.9	81.5	84.2	3.1	296	172	82.5	19.1	1274	--	696	464	6.92	--
	Oct-11	51.5	80.5	146.2	2.6	264	260	73.1	56.4	1558	--	870	448	6.68	--
SF#63-LMMW1D	Apr-10	32.3	47.7	50.8	3.3	160	104	28.0	48.7	780	--	438	266	7.93	--
	Nov-10	27.6	42.2	44.1	3.1	162	106	27.0	48.0	781		431	264	7.85	--
	May-11	30.0	47.4	48.2	3.2	158	109	28.9	48.3	778	--	512	272	7.94	--
	Oct-11	33.8	46.8	48.7	3.2	160	105	28.1	45.5	771	--	440	270	7.88	--
SF#09 - LMMW-2S	Apr-09	38.3	33.7	45.2	2.9	170	105	25.0	7.5	710	--	377	250	7.38	--
	Nov-09	36.0	36.0	44.0	2.5	170	111	34.0	7.6	756	--	375	258	7.45	--
	Apr-10	42.8	29.7	77.3	2.8	252	75	30.0	5.3	806	--	446	260	7.43	--
	Nov-10	42.9	31.4	71.5	3.2	262	89	33.0	6.9	836		468	272	7.57	--
	May-11	44.0	35.0	78.1	3.3	248	93	33.6	5.1	834	--	507	262	7.54	--
	Oct-11	45.6	35.8	76.9	2.9	262	90	31.9	4.0	839	--	460	262	7.47	--
SF#08 - LMMW-2D	Apr-09	46.3	30.1	72.2	3.4	280	78	26.0	4.9	811	--	433	258	7.50	--
	Nov-09	45.0	31.0	70.0	3.0	262	80	32.0	5.1	814	--	456	250	7.50	--
	Apr-10	37.3	36.4	49.0	3.0	162	109	31.5	6.9	760	--	397	260	7.43	--
	Nov-10	35.8	36.9	44.3	3.5	182	114	32.0	2.1	773		440	262	7.45	--
	May-11	39.4	43.0	51.0	3.5	178	112	33.2	7.5	784	--	460	266	7.57	--
	Oct-11	42.8	46.6	52.7	3.6	190	116	32.8	6.9	791	--	430	270	7.57	--
SF#11 - LMMW3S	Apr-04	45.5	53.3	59.1	1.9	--	--	--	--	--	--	--	--	--	--
	Nov-04	42.8	45.4	61.2	2.1	264	66	55.7	<0.2	769	--	403	276	7.20	--
	Apr-05	41.1	46.0	54.2	1.5	282	51	61.0	0.3	773	--	469	294	7.23	--
	Nov-05	48.8	2.16*	45.2	60.5*	243	52	90.0	0.3	770	--	499	294	7.27	--
	May-06	28.7	34.2	46.2	1.5	192	44	57.0	<0.3	622	--	380	222	7.34	--
	May-07	31.3	36.0	52.4	1.8	270	30	12.9	<0.3	612	--	342	270	7.20	--
	May-08	49.5	57.2	49.5	2.3	368	54	3.8	<0.3	850	--	494	186	7.13	--
	Apr-09	57.3	63.6	38.3	1.8	434	56	0.8	<0.3	917	--	518	232	7.27	--
	Nov-09	48.0	55.0	33.0	1.9	340	55	1.2	<0.3	798	--	444	400*	7.13	--
	Apr-10	53.5	57.6	35.8	1.2	300	45	0.8	<0.3	847	--	465	400	7.07	--
	Nov-10	54.4	57.3	32.0	1.8	402	66	1.2	<0.88	899		518	406	7.10	--
	May-11	56.8	65.2	32.0	2.4	372	64	3.5	<0.3	892	--	479	428	7.20	--
	Oct-11	51.2	56.2	32.1	2.1	332	50	8.5	<0.3	761	--	420	340	7.15	--
SF#10 - LMMW3D	Apr-04	32.9	36.2	43.5	2.0		70	14.0	<0.3**	591	--	340	210	7.58	--
	Nov-04	31.2	32.9	44.5	2.1	176	76	14.0	<0.2	601	--	287	200	7.60	--
	Apr-05	29.6	32.9	43.2	1.9	184	82	15.0	<0.3	605	--	355	206	7.63	--
	Nov-05	35.9	35.9	31.5	47.2*	182	82	14.4	<0.3	612	--	383	--	7.62	--
	May-06	29.4	30.6	43.2	2.0	178	75	14.0	<0.3	598	--	340	208	7.62	--
	May-07	30.3	33.7	45.7	2.0	190	80	13.3	<0.3	608	--	333	220	7.55	--
	May-08	29.5	32.0	42.9	2.2	180	76	11.9	<0.3	597	--	331	210	7.60	--
	Apr-09	27.7	30.6	44.3	1.7	162	75	11.8	<0.3	594	--	355	190	7.69	--
	Nov-09	28.0	31.0	42.0	1.9	180	80	13.0	<0.3	589	--	353	210	7.67	--
	Apr-10	27.8	29.1	42.3	0.7	180	70	12.3	<0.3	598	--	332	180	7.52	--
	Nov-10	25.7	28.5	39.4	2.2	186	75	13.0	<0.88	602		319	202	7.70	
	May-11	27.6	31.4	43.8	2.0	180	73	12.8	<0.3	595	--	343	224	7.60	--
	Oct-11	31.7	31.9	44.9	2.0	178	71	12.4	<0.3	592	--	310	196	7.52	--
SF#13 - LMMW4SS	Apr-04	36.1	42.8	30.9	1.6	--	--	--	--	--	--	--	--	--	--
	Oct-04	38.1	40.2	35.1	1.8	194	55.5	44.5	<0.2	624	--	464	244	7.30	--

Table 7
General Basin Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO_3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45.0	NE		NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200		500/1,000/1,500	NE	NE	
SF#15 - LMMW6D	Apr-04	31.8	34.1	42.9	1.6		50	31.0	7.9**	564	--	380	200	7.89	--
	Nov-04	26.5	27.6	28.3	1.4	130	45	35.5	43.0	521	--	321	160	8.10	--
	Apr-05	30.2	30.4	40.4	1.6	140	55	30.0	32.0	560	--	349.5	194	7.95	--
	Nov-05	32.1	2.02*	29.2	42.5*	126	56	36.0	44.0	561	--	384	--	8.03	--
	May-06	27.8	27.8	38.7	1.7	130	54	37.0	45.0	560	--	350	212	8.06	7.35
	May-07	26.4	26.9	39.0	1.2	112	50	32.0	55.0	535	--	312	176	8.12	--
	May-08	27.7	28.4	39.1	1.7	118	55	33.0	49.0	549	--	310	178	7.95	--
	Apr-09	24.9	26.8	39.2	1.5	134	57	29.9	36.0	562	--	323	192	8.06	--
	Nov-09	27.0	27.0	37.0	1.7	120	53	34.0	43.8	558	--	301	180	7.95	--
	Apr-10	28.3	29.4	40.5	0.1	134	53	31.7	41.9	572	--	317	186	7.96	--
	Nov-10	23.6	25.2	31.2	1.6	122	52	28.0	47.0	578	--	331	182	8.10	
	May-11	26.3	29.1	38.5	1.7	104	54	29.5	45.0	569	--	303	182	7.98	--
	Oct-11	29.9	30.4	40.8	1.7	136	55	29.3	40.8	572	--	320	192	--	--
SF#16 - LMMW7SS	Apr-04	44.0	48.5	54.9	1.2	--	--	--	--	--	--	--	--	--	--
	Oct-04	43.7	42.6	59.1	1.5	240	45.7	45.7	50.9	737	--	456	260	7.70	--
	Nov-09	42.0	42.0	53.0	1.5	240	43.0	47.0	52.0	769	--	496	282	7.58	--
SF#17 - (NE) WINDMILL	Nov-02	--	--	--	--	168	48.0	39.0	28.0	574	--	265	212	7.50	--
	Jul-03	28.6	36.2	30.6	1.7	180	48.0	33.0	28.0	575	--	273	230	7.40	--
SF#18 - NEW GG PARK (N) LAKE	Nov-04	28.6	35.1	35.1	1.4	158	41.8	31.1	21.4	530	--	337	198	7.50	--
	May-05	24.9	30.4	26.6	0.7	146	41.0	27.0	25.0	500	--	289	178	7.69	--
	Nov-07	27.4	32.2	24.7	1.1	128	44	28.0	31.0	496	--	290	200	7.52	--
	Apr-09	23.1	28.6	24.8	1.1	140	44	24.0	28.0	494	--	298	194	7.79	--
SF#19 - NEW GG PARK (S) WINDMILL	Nov-04	35.2	40.3	31.8	1.7	162	42.1	49.0	37.4	598	--	373	240	7.80	--
	May-05	25.5	34.5	25.5	1.2	146	42.0	42.0	20.0	525	507	311	230	8.04	7.94
	Nov-05	--	--	--	--	140	41.0	--	--	565	--	358	240	7.76	--
	Dec-05	28.9	35.8	27.0	1.5	--	--	--	--	--	--	--	--	--	--
	Jun-07	--	--	--	--	148	--	--	--	--	521	--	--	--	7.5
	Apr-09	28.4	32.5	27.6	1.4	150	46	40.0	31.0	558	--	316	224	7.87	--
SF#20 - (NW) WINDMILL	May-02	--	--	--	--	171	44.0	37.0	28.0	573	--	--	219	7.50	--
	Nov-02	--	--	--	--	120	41.0	12.0	20.0	415	--	181	144	8.00	--
	Jul-03	20.0	24.3	24.6	1.3	130	43.0	11.0	18.0	414	--	164	160	7.90	--
SF#22 - OLYMPIC CLUB #8	May-02	--	--	--	--	189	84.0	30.5	16.1	685	--	--	--	8.10	--
	Apr-04	38.5	39.7	46.0	2.0	--	--	--	--	--	--	--	--		--
SF#23 - PINE LAKE PROD WELL	Oct-04	32.7	33.4	36.4	1.1	144	35.3	37.0	65.0	565		336	244	7.20	--
SF#25 - (S) WINDMILL	May-02	--	--	--	--	133	41.0	28.0	36.0	476	--	--	185	7.70	--
	Nov-02	--	--	--	--	120	40.0	28.0	38.0	474	--	202	184	7.70	--
	Jul-03	25.5	28.6	24.5	1.5	150	43.0	22.0	36.0	486	--	202	190	7.80	--
	Apr-04	24.4	27.7	23.9	1.1	--	40	24.0	8.6**	455	--	330	180	7.70	--
	Nov-04	29.6	31.0	29.9	1.7	128	37.4	31.4	36.7	489	--	312	185	7.70	--
SF#41 - WEST SUNSET PLAYGROUND	May-04	15.2	16.4	21.7	0.9	--	20.0	24.0	3.2**	317	--	266	130	8.70	--
	May-05	16.3	17.0	22.9	1.0	80	26.0	27.0	16.0	326	284	205	112	8.59	8.51
	May-06	15.0	16.6	21.2	0.7	76	29	28.0	17.0	322	--	210	110	8.57	--
	May-07	17.3	16.5	22.2	0.9	75	30	26.7	17.5	317	--	184.8	107	8.52	--
	May-08	18.9	20.2	24.8	1.1	88	29	29.3	22.4	355	--	210	122	8.37	--
	Apr-09	18.5	19.3	24.9	1.1	96	32	29.7	22.4	382	--	241	140	8.50	--
	Nov-09	19.0	19.0	23.0	1.0	94	31	31.6	21.1	380	--	230	128	8.30	--
	Apr-10	20.6	20.2	24.5	1.1	96	26	31.3	23.5	397	--	226	136	8.27	--
	Nov-10	17.2	18.1	21.5	1.1	100	30	31.0	20.0	382		228	134	8.54	
	Jun-11	16.6	18.3	22.2	1.1	92	28	30.7	19.6	385	--	213	128	--	--
	Oct-11	14.4	12.7	21.6	1.0	66	26	22.4	0.6	264	--	150	84	7.90	--
SF#24 - (S) SUNSET PLAYGROUND	Apr-04	31.1	33.1	36.9	1.3	--	50.0	27.0	2.9**	576	--	394	200	7.34	--
	May-05	30.8	33.0	37.8	1.4	164	21.0	34.0	21.0	560	502	343	204	7.41	7.21
	May-06	28.8	31.6	35.6	1.2	154	54	38.0	30.0	584	--	360	212	7.39	--
	WELL DECOMMISSIONED														
SF#52 - CENTRAL PUMP ST MW190	May-05	44.2	43.2	46.9	1.8	270	47	47.0	19.0	750	--	433	300	7.59	--
	Oct-07	42.9	45.1	43.2	1.3	270	40	40.0	19.4	719	--	425	290	7.57	--
	Sep-08	45.4	45.9	43.2	1.4	260	40	45.0	22.0	707	--	382	294	7.56	--
SF#53 - CENTRAL PUMP ST MW270	May-05	29.0	21.9	48.2	1.5	168	72	8.7	<0.3	548	--	296	160	7.96	--
	Oct-07	28.5	23.1	44.0	1.3	170	70	8.6	<0.3	555	--	282	170	7.85	--
	Sep-08	32.2	24.0	45.9	1.6	174	69	10.7	<0.3	554	--	314	174	7.89	--
SF#46 -LK MERCED PUMP ST MW155	May-05	26.9	24.1	36.2	1.79	108	--	--	--	480	438	297	164	7.84	7.68
	Nov-05	26.4	25.0	35.9	1.8	102	39	47.0	49.0	--	438.5	353	7.83	7.51	--
	May-06	26.1	24.8	69.7*	3.3	100	39	47.0	48.0	503	--	310	182	7.81	--
	May-07	27.6	26.0	37.3	1.8	113	37.9	43.4	49.0	--	484	309	180	7.70	7.5

Table 7
General Basin Groundwater Quality

Well	Sample Date	Calcium (mg/L)	Magnesium (mg/L)	Sodium (mg/L)	Potassium (mg/L)	Total Alkalinity (mg/L)	Chloride (mg/L)	Sulfate (mg/L)	Nitrate as NO_3 (mg/L)	Specific Conductance (EC) (µmhos/cm)	Field EC (µmhos/cm)	Total Dissolved Solids (mg/L)	Hardness as CaCO3 (mg/L)	pH	Field pH
	Primary MCL	NE	NE	NE	NE	NE	NE	NE	45.0	NE		NE	NE	NE	
	Secondary MCL[1]	NE	NE	NE	NE	NE	250/500/ 600	250/500/600	NA	900/1,600/2,200		500/1,000/1,500	NE	NE	
SF#47 -LK MERCED PUMP ST MW270	May-05	22.1	15.7	74.6	1.92	140	--	--	--	550	492	353	114	7.58	7.41
	Dec-05	22.6	16.2	55.6	0.69	114	41	35.0	27.0	510	461	335	132		7.16
	May-06	25.0	18.0	51.3	1.4	134	50	35.0	24.0	505	--	310	140	7.54	--
	May-07	27.2	20.3	42.1	1.9	118	40	34.1	37.0	--	454	293	150	7.60	7.4
SF#48 -LK MERCED PUMP ST MW440	May-05	19.5	20.8	32.6	1.90	112	--	--	--	400	385	242	132	8.14	8.00
	Dec-05	18.3	20.2	28.7	0.51	100	50	7.5	18.0	416	399	264	130	8.23	7.85
	May-06	19.4	21.8	30.7	1.2	110	52	7.6	19.9	421	--	250	138	8.18	--
	May-07	20.1	22.1	31.3	1.7	115	49	8.0	21.0	--	427	232	140	8.10	8.0
SF#49 -LK MERCED PUMP ST MW575	May-05	48.2	29.2	88.6	3.90	214	102.0	102.0	<0.3	860	828	531	240	7.75	7.58
	Nov-05	48.5	30.1	88.6	4.01	208	104.0	83.0	<0.3	--	859	1120*	NS	7.80	7.46
	May-06	49.2	29.9	87.0	3.5	200	106	85.0	<0.3	861		490	238	7.80	--
	May-07	50.7	28.5	90.4	4.0	211	105	81.5	<0.3	--	823	517	250	7.80	7.6

Table 8
General Basin Iron and Manganese Groundwater Quality

Well	Sample Date	Total Iron (mg/L)	Dissolved Iron (mg/L)	Total Manganese (mg/L)	Dissolved Manganese (mg/L)
	Primary MCL	NE	NE	NE	NE
	Secondary MCL	0.30	NE	0.05	NE
SF#01 - ARBORETUM 5	May-00	ND	--	ND	--
SF#02 - EDGEWOOD SCHOOL	Nov-93	0.13	--	ND	--
	May-00	1.36	--	0.09	--
SF#03 - ELK GLEN 2	Nov-93	ND	--	ND	--
	May-00	ND	--	ND	--
	May-05	0.02	--	<0.002	--
SF#05 - FORT FUNSTON M	Apr-03	0.045	--	0.025	--
SF#17 - (NE) WINDMILL	May-00	ND	--	0.020	--
SF#18 - NEW GG PARK (N) LAKE	May-05	0.340	--	0.019	--
	Nov-07	0.021	0.007	0.010	0.009
	Apr-09	--	0.005	--	0.009
SF#19 - NEW GG PARK (S) WIND.	May-05	5.067	--	0.086	--
	Dec-05	0.028	--	<0.002	--
	Apr-09		0.003		0.002
SF#20 - (NW) WINDMILL	Nov-93	ND	--	ND	--
SF#24 - (S) SUNSET PLAYGROUND	Jun-05	0.253	--	0.120	--
	May-06	0.330	0.095	0.120	0.12
SF#38 - USGS (S) WINDMILL (D)	Nov-93	ND		ND	
SF#41 - WEST SUNSET PLAYGROUND	Dec-93	0.40	--	0.019	--
	Jun-05	0.17	--	0.016	--
	May-06	0.160	0.004	0.013	0.006
	Apr-10	0.233	--	0.014	0.005
ZOO 04	May-00	0.030	--	ND	--
SF#44 - ZOO 5	Dec-05	0.011	--	0.021	--
SF#46 -LK MERCED PUMP ST MW155	May-07		0.004		0.001
SF#47 -LK MERCED PUMP ST MW270	Dec-05	0.014	--	0.570	--
	Dec-05	0.257	--	0.586	--
	May-06	0.232	--	0.626	--
	May-07	--	0.056	--	0.590
SF#48 -LK MERCED PUMP ST MW440	Dec-05	0.002	--	0.070	--
	May-06	<0.003	<0.003	0.072	0.069
	May-07	--	0.006	--	0.064
SF#49 -LK MERCED PUMP ST MW575	May-07	(0.20)	0.02	--	0.24

Table 8
General Basin Iron and Manganese Groundwater Quality

Well	Sample Date	Total Iron (mg/L)	Dissolved Iron (mg/L)	Total Manganese (mg/L)	Dissolved Manganese (mg/L)
	Primary MCL	**NE**	**NE**	**NE**	**NE**
	Secondary MCL	**0.30**	**NE**	**0.05**	**NE**
SF#52 - CENTRAL PUMP ST MW190	May-05	0.101	--	0.055	--
	Oct-07	0.150	<0.003	0.022	0.010
	Sep-08	0.016	--	0.002	--
SF#53 - CENTRAL PUMP ST MW270	May-05	0.136	--	0.127	--
	Oct-07	0.200	0.090	0.120	0.112
	Sep-08	0.140	--	0.110	--

APPENDIX D-3
Lake Merced Water Quality Data

The following is a list of abbreviations used in Appendix D-3:

Alk = alkalinity

Br = bromide

°C = degrees Centigrade

Cl^- = chloride

Cond = electrical conductivity

DO = dissolved oxygen

Fe = iron

Fl^- = fluoride

Ft = feet

Hard = hardness

mg/L = milligrams per liter

mmho/cm = micromhos per centimeter

Mn = manganese

MPN = most probable number

MTBE = methyl tertiary-butyl ether

mv = millivolts

NH_3-N = ammonium

NO_3-N = nitrate as nitrogen

No./m^3 = number per cubic meter

No./mL = number per milliliter

ntu = nephelometric turbidity unit

ORP = oxidation reduction potential

Orth P = orthophosphate

Pb = lead

SO_4 = sulfate

TDS = total dissolved solids

Temp = temperature

TKN = total kjeldahl nitrogen

TOC = total organic carbon

Tot P = total phosphate

Turb = turbidity

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	22.7	22.1	13.7	15.5	18.3	19.6	13.2		18.4	12.5	14.8	20.6	19.3	11.8	13.2	22.4	19.8	11.6	15.1	17.2
5	20.9	22.1	13.7	15.5	18.3	18.9	13.1		18.2	12.3	14.5	20.3	18.7	11.6	13.0	21.5	18.5	11.2	14.9	16.7
10	17.9	21.6	13.7	14.2	18.2	18.8	12.9		18.2	12.2	14.4	20.2	18.6	11.6	12.2	18.9	17.6	11.1	13.7	16.2
14									18.2	12.2				11.6			17.2			
15	17.8	21.4	13.7	12.9	18.0	18.8	12.7				14.4	19.8	18.5		12.1	18.4		11.0	13.3	16.1
16	17.8	21.1		12.9											12.1				13.2	16.1
17																				
17.4																				
17.5																				
18			13.7								14.4									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	21.0		13.2	15.1	17.5	19.3	12.8		17.8	11.5	15.1	19.94	18.3	11.1	12.7	22.1	18.3	10.8	13.9	16.5
5	19.9		13.2	14.9	17.4	18.7	12.7		17.8	11.5	14.6	19.8	17.9	10.9	12.4	20.5	17.5	10.6	13.8	16.3
9																	17.3			
10	17.7		13.2	13.9	17.3	18.6	12.5		17.8	11.3	14.5	19.7	17.8	10.9	12.0	18.4		10.4	13.3	16.0
11																			13.3	16.0
12				13.5																
13											14.5									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	########	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	19.4	17.2	15.8	12.3	17.4	20.4	19.1	13.2	19.9	19.5	16.5	12.8	12.5	17.2	21.1	18.3	18.9	17.0	13.7	13.1
5	19.2	17.2	15.8	12.0	17.4	19.7	18.9	12.4	19.8	19.5	16.4	12.0	12.3	17.1	21.1	18.2	18.5	16.1	13.7	13.1
10	19.1	17.2	15.8	11.9	17.4	18.9	18.8	12.3	19.7	19.4	16.3	11.9	12.1	16.9	21.1	18.2	17.8	16.1	13.7	13.1
14																				
15	18.4	17.2	15.7	11.9	17.3	18.5	18.8	12.3	19.5	19.2	16.3	11.7	11.9	16.8	19.4	18.2	17.3	16.0	13.7	13.0
16	18.4				17.0			12.3								18.2				
17							18.8		19.3	19.1	16.3		11.9				17.2			
17.4																				
17.5																				
18												11.7		16.7				16.0	13.7	12.9
18.8																				
19															19.1					
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	########	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	18.7	16.4	15.2	11.8	17.0	19.9	18.4	12.6	19.2	19.2	16.2	12.2	12.5	16.9	20.9	17.7	18.5	n/a	13.0	12.7
5	18.6	16.4	15.1	11.5	17.0	19.2	18.3	11.8	19.1	19.1	16.0	11.0	12.0	16.7	20.7	17.7	18.1	n/a	12.9	12.6
9																				
10	18.0	16.4	15.1	11.3	17.0	18.3	18.2	11.7	18.8	18.8	15.9	10.8	11.8	16.3	20.0	17.5	17.4	n/a	12.9	12.5
11					17.0	18.1														
12				11.3			18.2		18.7		15.8							n/a		
13								11.7		18.7		11.3	11.6		19.3	17.5	17.1		12.9	
13.8																				
14														16.2						12.3
14.1																				
14.7																				
15																				
15.8																				

D.3-4

Lake Merced
North

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	12.3	13.1	16.1	20.2	18.5	17.0	10.9	16.5	19.4	22.1	10.1	14.7	20.4	19.9	14.4	14.4	19.1	19.6	10.9
5	11.9	12.9	16.0	19.6	18.5	17.0	10.8	14.1	19.3	20.0	10.2	14.5	19.3	18.9	13.9	14.2	18.5	19.3	10.4
10	11.9	12.9	15.9	18.5	18.5	17.0	10.8	13.9	18.8	18.8	10.1	14.3	17.3	18.2	13.9	13.4	16.8	19.2	10.3
14																			
15	11.8	12.7	15.8	18.2	18.5	16.9	10.8	13.7	18.6	18.5	9.9	14.3	17.2	18.0	13.8	13.4	16.5	18.6	10.3
16																			
17																			
17.4														17.8					
17.5															13.8				
18	11.8					16.8				18.4									
18.8													17.1						10.4
19		12.6	14.7	17.5	18.5		10.8	13.5	17.2		9.9								
19.3																		18.5	
19.9																	16.4		
20												13.6				13.3			
20.6												13.5							

Lake Merced
North East

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	11.6	12.8	16.1	19.5	18.1	16.7	10.2	15.4	19.4	20.7	9.29	14.8	20.1	19.3	13.6	14.0	18.1	19.3	10.4
5	11.2	12.5	16.0	18.8	18.1	16.7	10.2	14.3	19.3	20.1	9.29	14.6	19.0	18.9	13.3	13.5	17.3	19.2	9.9
9																			
10	11.2	12.3	16.0	18.1	18.0	16.6	10.1	14.2	19.0	18.7	9.17	14.4	17.3	18.0	13.2	13.3	16.8	19.1	9.9
11																			
12																			
13	11.2					16.6							17.1	17.8					
13.8																		18.6	
14		12.2		18.0	18.0					18.2									
14.1															13.2				
14.7																13.3			9.9
15			15.9				10.1	13.9	18.7		9.21	14.2					**16.3**		
15.8												14.2							

Lake Merced
South - Pistol
Range

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Ft	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C
Surf	20.5	21.9	13.6	15.1	17.9	19.5	12.6	17.7	18.0	12.2	14.8	19.9	18.7	11.6	12.7	21.1	19.6	11.3	14.3	16.1
5	18.8	21.9	13.6		17.9	18.6	12.3	17.5	18.0	12.2	14.4	19.8	18.3	11.5	12.2	20.5	18.5	10.6	14.2	16.0
6				14.1																
10	17.3	21.2	13.6		17.9	18.6	12.3	17.3	18.0	12.2	14.1	19.8	18.2	11.5	12.0	18.5	17.6	10.6	13.5	15.9
12				14.0																
15	17.0	20.8	13.6		17.6	18.6	12.3	16.8	18.0	12.0	13.9	18.3	18.1	11.5	11.8	17.8	17.1	10.6	13.3	15.2
16	17.0	20.7												11.5		17.8	17.0	10.7		
17	17.0									12.0									13.3	
18				13.3	17.6				18.0			18.3	18.2		11.8					15.1
18.2																				
18.9																				
19				13.3			12.2													
20								16.5			14.0									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Ft	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C	Temp °C
Surf	20.8	21.8	13.5	15.6	18.5	19.6	12.8	18.2	18.5	12.2	14.5	20.3	19.0	11.7	13.2	21.6	19.5	11.5	14.7	16.4
5	20.5	21.6	13.5	15.1	18.5	18.7	12.7	17.9	18.4	12.2	14.2	20.3	18.6	11.6	12.8	20.8	19.0	10.9	14.5	16.4
10	17.9	21.1	13.5		18.4	18.7	12.6	17.8	18.4	12.2	14.1	19.7	18.6	11.5	12.6	18.9	17.8	10.9	13.3	15.4
12				14.9																
15	17.2	20.8	13.5		17.7	18.7	12.5	17.1	18.3	12.1	13.9	19.1	18.6	11.5	11.9	17.8	17.1	10.9	13.2	15.4
16	17.1	20.8															17.1	11.1		
17														11.5						
18				13.8	17.6				18.3	12.1		18.2			11.8	17.7			13.1	15.6
19							12.5	16.8					18.5							
19.2																				
20											14.0									
20.4																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	########	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	18.6	17.3	15.6	12.1	16.6	19.3	18.5	12.8	19.1	19.0	16.1	12.5	12.1	15.8	20.5	18.2	18.3	16.5	13.5	13.0
5	18.5	17.3	15.6	12.1	16.6	19.2	18.5	12.3	19.1	19.0	16.1	11.8	11.7	15.6	20.5	18.2	18.3	16.0	13.5	13.0
6																				
10	18.5	17.2	15.5	12.0	16.4	18.4	18.4	12.2	18.9	18.8	16.0	11.7	11.5	15.5	19.7	18.2	18.0	15.8	13.5	13.0
12																				
15	18.5	17.0	15.5	11.8	16.1	18.1	18.4	12.2	18.0	18.8	16.0	11.7	11.4	15.4	19.0	18.2	17.1	15.7	13.5	13.0
16	18.5	17.0		11.8																
17			15.6			18.1					16.0	11.8	11.3							
18					16.0					18.7							16.9		13.4	
18.2																				
18.9																				
19							18.4	12.2	17.8											12.9
20														15.4	18.5	18.1		15.6		
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	########	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	19.1	17.3	15.6	11.9	17.2	20.1	18.8	13.1	19.6	19.6	16.3	12.4	12.1	16.0	20.5	18.5	18.7	16.6	13.6	13.1
5	19.1	17.3	15.6	11.9	17.2	20.0	18.7	12.2	19.5	19.6	16.3	11.7	11.6	15.6	20.5	18.5	18.3	16.2	13.6	13.1
10	18.9	17.3	15.6	11.8	17.2	19.3	18.6	12.2	18.9	19.4	16.2	11.6	11.5	15.5	20.3	18.5	17.3	16.1	13.6	13.1
12																				
15	18.9	17.2	15.6	11.8	16.8	18.4	18.5	12.2	18.1	18.8	16.2	11.6	11.4	15.5	19.0	18.1	16.9	16.0	13.6	13.0
16		17.2																		
17	18.8		15.6			18.1					16.1		11.4							
18					16.1															
19				11.8			18.5			18.7		11.6						16.0		
19.2																				
20								12.2	17.8					15.5	18.6	18.1	16.9		13.6	12.9
20.4																				
21														15.5						
21.5																				
22																				
22.8																				
23.2																				

D.3-7

Lake Merced
South - Pistol
Range

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	11.7	12.7	15.3	19.1	18.5	16.9	11.0	14.5	18.6	20.3	10.1	13.82	18.8	19.5	13.82	13.6	18.1	19.2	10.5
5	11.6	12.6	15.3	19.0	18.5	16.9	11.0	14.0	18.6	19.9	9.8	13.7	18.1	19.1	13.71	12.8	17.5	19.1	10.4
6																12.8			
10	11.6	12.6	15.2	18.9	18.4	16.9	11.0	13.9	18.4	18.8	9.8	13.57	17.3	18.1	13.68		16.7	19.0	10.4
12																			
15	11.5	12.5	15.1	18.3	18.4	16.9	10.9	13.8	18.4	18.4	9.7	13.56	16.7	17.9	13.61	12.7	16.3	18.6	10.3
16																			
17																			
18	11.5																		
18.2																			10.4
18.9																		18.4	
19						16.8									13.6				
20		12.5	15.1	18.0	18.4		10.9	13.6	18.1	18.1	9.7	13.45	16.5			12.7	16.3		
20.1														17.8					
20.6																12.7			
20.8																	16.3		
21				18.0				13.6		18.1	9.7								
21.5												13.45							
22									18.0										

Lake Merced
South - Pump
Station

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**	**Temp**
Ft	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C	°C
Surf	11.9	12.5	15.7	19.5	18.6	16.9	10.9	14.5	19.2	20.9	10.0	13.9	19.5	19.2	14.0	13.6	18.7	19.6	10.6
5	11.8	12.4	15.6	19.3	18.6	16.9	10.9	13.9	19.0	20.6	9.9	13.9	18.2	19.1	13.9	12.8	18.0	19.6	10.4
10	11.8	12.3	15.6	18.5	18.6	16.9	10.9	13.7	18.3	18.9	9.8	13.9	17.6	18.2	13.9	12.8	16.8	19.0	10.4
12																			
15	11.8	12.3	15.6	18.1	18.6	16.7	10.9	13.6	18.3	18.6	9.8	13.9	16.5	18.0	13.8	12.8	16.3	18.7	10.4
16																			
17																			
18						16.7													
19																			
19.2																		18.5	
20	11.7	12.3	15.3	18.0			10.9	13.6	18.2	18.3	9.8	13.9	16.4	17.8		12.8	16.3		
20.4																			10.4
21		12.3		18.0	18.5					18.3	9.8		16.5	17.8	13.8				
21.5																	16.3		
22			15.3				10.9	13.6	18.1										
22.8																12.8			
23.2												13.9							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.79	9.07	8.42	8.50	8.79	8.75	8.49		8.37	8.29	8.31	8.73	8.36	8.51	8.45	9.02	8.68	8.08	8.72	8.32	8.75
5	8.67	8.96	8.33	8.49	8.77	8.59	8.47		8.27	8.24	8.34	8.72	8.33	8.47	8.37	9.03	8.46	7.95	8.68	8.27	8.69
10	8.12	8.59	8.27	8.05	8.73	8.40	8.36		8.26	8.19	8.36	8.72	8.34	8.47	8.12	8.02	7.99	7.90	8.38	7.98	8.67
14									8.21	8.17				8.37			7.76				
15	8.00	8.42	8.29	7.73	8.22	8.21	8.23				8.37	8.15	8.24		7.92	7.94		7.85	8.07	7.88	8.26
16	7.96	8.24		7.73											7.91				8.07	7.84	8.24
17																					
17.4																					
17.5																					
18			8.29								8.04										
18.8																					
19																					
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.37		7.96	8.00	8.16	8.31	8.35		8.12	8.18	8.26	8.19	7.89	8.48	8.28	8.74	8.12	7.96	8.36	7.97	8.39
5	8.14		7.95	7.91	8.12	8.16	8.33		8.11	8.18	8.25	8.22	7.88	8.44	8.16	8.50	7.69	7.90	8.26	7.90	8.35
9																	7.61				
10	7.81		7.93	7.61	8.03	8.13	8.24		8.07	8.13	8.25	8.12	7.86	8.43	7.88	7.80		7.82	7.97	7.74	7.84
11																			7.96	7.66	
12				7.52																	
13											7.99										
13.8																					
14																					
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.08	8.29	8.23	8.47	8.51	7.81	7.47	8.26	8.42	7.79	8.17	8.53	8.69	8.28	8.29	8.51	8.10	7.89	8.17	8.07	8.26
5	8.07	8.26	8.13	8.46	8.42	7.75	7.39	8.24	8.39	7.75	8.15	8.52	8.68	8.26	8.27	8.45	8.04	7.88	8.10	8.03	8.24
10	8.07	8.26	8.10	8.47	7.99	7.71	7.35	8.21	8.38	7.76	8.13	8.49	8.66	8.23	8.26	8.08	8.23	7.87	8.08	8.04	8.23
14																					
15	8.08	8.24	8.08	8.31	7.76	7.68	7.34	8.07	8.07	7.73	8.10	8.44	8.64	7.59	8.25	7.78	8.41	7.91	8.05	8.04	8.18
16				7.94			7.33								8.25						
17						7.68		8.03	7.65	7.73		8.44				7.7					
17.4																					
17.5																					
18											8.08		8.62				8.63	7.95	7.80	8.03	
18.8																					
19														7.51							8.04
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.03	8.20	7.99	7.91	8.19	7.70	7.41	8.39	8.16	7.65	8.11	8.40	8.81	8.00	8.22	8.25	n/a	7.80	8.11	7.91	8.29
5	8.04	8.12	7.95	7.85	8.03	7.63	7.31	8.35	8.14	7.64	8.06	8.44	8.78	7.94	8.21	8.15	n/a	7.81	7.92	7.86	8.22
9																					
10	8.05	8.10	7.80	7.85	7.55	7.57	7.29	8.15	7.98	7.63	8.03	8.43	8.60	7.55	8.17	7.72	n/a	7.86	7.79	7.85	8.03
11				7.87	7.53																
12			7.80			7.60		8.09		7.61							n/a				
13							7.29		7.73		8.00	8.36		7.46	8.13	7.65		7.95		7.84	
13.8																					
14													8.52						7.67		7.92
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.37	8.89	8.15	8.37	8.40	8.96	8.66	9.09	7.75	8.36	8.83	8.79	7.97	8.30	8.66	8.84	8.20
5	8.31	8.75	8.13	8.36	8.31	8.77	8.62	8.72	7.75	8.32	8.67	8.39	7.92	8.30	8.62	8.84	8.13
10	8.25	8.20	8.11	8.34	8.30	8.34	8.26	8.44	7.72	8.31	8.09	8.13	7.90	8.21	8.30	8.91	8.07
14																	
15	8.04	8.10	8.08	8.31	8.30	8.22	8.03	8.08	7.64	8.32	7.99	8.02	7.86	8.19	8.19	8.99	8.07
16																	
17																	
17.4												7.77					
17.5													7.85	7.85			
18				8.10				7.96									
18.8											7.72						8.03
19	7.84	7.97	8.03		8.29	8.00	7.66		7.64								
19.3																8.94	
19.9															8.15		
20										8.12				8.17			
20.6										8.18							

Lake Merced
North East

	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.08	8.35	8.05	8.23	8.13	8.87	8.36	8.83	7.49	8.15	8.59	8.55	7.66	8.26	8.44	8.62	8.09
5	8.08	7.97	8.02	8.24	8.07	8.61	8.28	8.69	7.48	8.16	8.38	8.44	7.60	8.27	8.28	8.64	8.05
9																	
10	8.06	7.88	7.93	8.24	8.05	8.20	7.99	8.01	7.42	8.10	7.72	7.82	7.60	8.25	8.23	8.59	8.09
11																	
12																	
13				8.23							7.71	7.63					
13.8																8.64	
14		7.88	7.91					8.00									
14.1													7.57				
14.7														8.35			8.06
15	7.95				8.06	7.98	7.72		7.43	8.01					7.92		
15.8										8.01							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.70	8.72	8.03	8.16	8.44	8.41	8.21	8.63	8.17	8.29	8.25	8.54	8.39	8.19	8.14	8.61	8.44	8.17	8.52	8.03	8.30
5	8.41	8.67	8.03		8.42	8.22	8.16	8.63	8.13	8.33	8.46	8.47	8.18	8.16	8.10	8.60	8.39	8.16	8.49	8.03	8.26
6				8.02																	
10	8.02	7.91	8.03		8.41	8.16	8.11	8.58	8.12	8.31	8.53	8.20	8.11	8.15	8.05	8.01	7.96	8.11	8.35	8.03	8.24
12				7.97																	
15	7.66	7.77	8.00		7.78	8.00	8.09	8.32	8.12	8.18	8.49	7.56	8.22	8.14	7.94	7.61	7.53	8.06	8.18	7.93	8.24
16	7.66	7.78												8.08		7.55	7.48	7.60			8.09
17	7.72									8.17									8.01		
18				7.74	7.73				8.11			7.62	7.70		7.82					7.44	
18.2																					
18.9																					
19				7.75			8.06														
20								8.14			8.10										
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.70	8.62	7.99	8.29	8.70	8.46	8.28	8.70	8.53	8.33	8.29	8.66	8.33	8.17	8.19	8.63	8.40	8.18	8.55	8.04	8.41
5	8.68	8.40	7.96	8.26	8.63	8.38	8.27	8.69	8.40	8.34	8.24	8.65	8.25	8.14	8.14	8.60	8.36	8.15	8.49	8.04	8.37
10	8.22	7.85	7.94		8.57	8.33	8.20	8.68	8.37	8.28	8.24	7.86	8.30	8.13	8.03	8.17	8.10	8.14	8.08	7.89	8.36
12				8.16																	
15	7.92	7.73	7.93		7.85	8.32	8.18	8.46	8.37	8.19	8.18	7.52	8.48	8.13	7.89	7.66	7.52	8.10	7.92	7.91	8.36
16	7.87	7.76															7.42	7.50			
17														8.10							8.35
18				7.68	7.68				8.34	8.14		7.50			7.71	7.61			7.85	7.42	
19							8.13	8.29					7.93								
19.2																					
20											7.84										
20.4																					
21																					
21.5																					
22																					
22.8																					
23.2																					

D.3-12

Lake Merced
South - Pistol
Range

Depth	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06
	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.23	8.08	7.92	8.03	8.27	7.49	7.66	8.54	8.15	7.70	7.87	8.31	8.81	8.53	7.97	8.34	6.89	7.77	7.97	8.03	8.23
5	8.21	8.06	7.91	8.01	8.21	7.48	7.63	8.51	8.08	7.69	7.83	8.21	8.78	8.50	7.95	8.32	6.85	7.77	7.95	8.01	8.21
6																					
10	8.16	7.94	7.90	7.92	7.74	7.44	7.63	8.40	8.01	7.68	7.82	8.13	8.73	7.95	7.92	8.18	6.79	7.79	7.94	7.98	8.20
12																					
15	8.14	7.94	7.84	7.71	7.47	7.44	7.62	7.90	7.84	7.67	7.82	8.19	8.73	7.53	7.88	7.68	6.78	7.81	7.92	7.95	8.19
16	8.11		7.82																		
17		7.96			7.42					7.63	7.79	8.12									
18				7.57					7.75							7.54		7.81		7.93	
18.2																					
18.9																					
19						7.47	7.61	7.76											7.75		
20													8.67	7.40	7.75		6.83				8.18
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

Depth	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06
	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH	pH
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.24	8.16	7.89	8.19	8.34	7.58	7.52	8.61	8.37	7.62	7.90	8.24	8.84	8.53	8.09	8.44	8.19	7.86	8.09	8.03	8.22
5	8.22	8.15	7.86	8.18	8.32	7.48	7.47	8.60	8.36	7.61	7.88	8.17	8.81	8.49	8.07	8.24	8.15	7.84	8.03	8.00	8.19
10	8.24	8.15	7.86	8.18	8.15	7.36	7.46	8.29	8.13	7.58	7.87	8.12	8.79	8.42	7.99	7.81	8.14	7.84	8.01	7.98	8.17
12																					
15	8.24	8.14	7.87	8.00	7.74	7.31	7.46	8.02	7.66	7.52	7.85	7.93	8.77	7.49	7.78	7.58	6.83	7.86	7.91	7.97	8.16
16	8.19																				
17		8.14			7.45					7.52		7.93									
18				7.61																	
19			7.83			7.31			7.56		7.84						6.90				
19.2																					
20							7.43	7.91					8.75	7.41	7.84	7.49		7.89	7.82	7.95	8.13
20.4																					
21													8.74								8.12
21.5																					
22																					
22.8																					
23.2																					

Lake Merced
South - Pistol
Range

	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.19	8.53	7.97	8.20	8.26	8.67	8.24	8.60	7.91	8.14	8.32	8.70	7.85	8.07	8.40	8.56	8.01
5	8.15	8.49	7.94	8.18	8.17	8.66	8.20	8.48	7.85	8.13	8.24	8.64	7.83	8.08	8.36	8.54	7.97
6																	
10	8.10	8.32	7.90	8.16	8.06	8.53	8.05	8.17	7.84	8.12	8.10	8.03	7.82	8.04	8.18	8.54	7.94
12																	
15	8.06	7.90	7.88	8.13	8.04	8.27	7.99	7.88	7.83	8.13	8.02	7.90	7.81	8.04	8.03	8.29	7.90
16																	
17																	
18																	
18.2																	7.85
18.9																8.37	
19				7.96									7.80				
20	7.90	7.79	7.83		8.08	8.20	7.62	7.59	7.78	8.13	7.49			8.03	8.05		
20.1												7.53					
20.6														7.58			
20.8															7.95		
21		7.78				8.20		7.59	7.69								
21.5										8.17							
22							7.60										

Lake Merced
South - Pump
Station

	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**	**pH**
Ft	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units	pH units
Surf	8.49	8.57	8.06	8.19	8.23	8.60	8.33	8.66	7.84	8.13	8.39	8.63	7.86	8.43	8.49	8.57	8.06
5	8.44	8.52	8.04	8.16	8.18	8.57	8.27	8.64	7.84	8.13	8.28	8.60	7.82	8.43	8.49	8.56	8.05
10	8.42	8.05	8.04	8.09	8.10	8.38	7.94	8.15	7.78	8.14	8.19	7.93	7.79	8.44	8.20	8.15	8.05
12																	
15	8.35	7.93	8.01	7.87	8.04	8.11	7.80	7.92	7.79	8.14	7.70	7.88	7.78	8.52	7.99	8.10	8.05
16																	
17																	
18				7.89													
19																	
19.2																8.16	
20	8.11	7.81			8.04	8.07	7.72	7.77	7.79	8.17	7.65	7.81		8.61	7.90		
20.4																	8.05
21		7.77	7.86					7.71	7.83		7.49	7.56	7.74				
21.5															7.89		
22	8.02				8.05	8.11	7.70										
22.8														8.57			
23.2										8.19							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	742	842	888	864	728	774	726		793	851	711	729	755	780	738	808	861	811	757	755
5	744	844	902	883	728	757	726		795	850	712	734	760	781	736	807	866	812	757	757
10	754	855	917	974	728	761	727		795	862	714	737	762	781	740	826	874	814	760	766
14									796	864				778			881			
15	758	871	919	1020	737	764	729				724	753	764		743	834		812	763	769
16	757	882		1070											742				766	769
17																				
17.4																				
17.5																				
18			949								716									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	716		818	736	706	762	689		784	822	664	724	749	745	686	787	832	753	693	722
5	718		821	741	706	763	689		784	824	667	728	756	745	687	792	835	753	695	724
9																	843			
10	720		822	742	706	763	690		784	834	670	731	764	746	689	803		754	697	727
11																			697	726
12				747																
13											684									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

Depth	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Ft	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm
Surf	755	802	820	753	747	778	674	633	717	342	752	717	673	676	703	745	794	781	806	678
5	757	803	821	753	748	779	638	647	717	613	755	717	675	676	703	746	795	730	806	680
10	759	803	821	754	748	787	639	642	717	613	759	718	677	675	703	745	799	734	807	681
14																				
15	769	804	822	754	752	792	640	644	718	620	760	724	679	675	704	745	801	734	806	682
16	769				759			646								745				
17							640		724	627	760		679				806			
17.4																				
17.5																				
18												723		675				732	807	692
18.8																				
19															716					
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

Depth	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Ft	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm	Cond mmho/cm
Surf	740	775	785	696	711	754	650	640	709	613	750	716	667	666	702	742	794	n/a	795	664
5	741	775	786	697	712	756	651	644	709	612	750	724	668	665	702	742	796	n/a	795	668
9																				
10	748	776	787	697	712	761	651	645	712	614	750	731	672	665	703	743	800	n/a	795	672
11					712	765														
12				697			651		714		752							n/a		
13								646		609		726	670		710	744	806		796	
13.8																				
14														667						683
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	658	700	634	666	717	733	596	563	724	717	731	696	713	774	809	751	774	692	697
5	660	699	634	669	717	733	593	565	726	724	731	696	718	786	810	751	774	697	697
10	661	699	635	675	718	734	594	567	734	732	731	697	730	790	810	752	780	704	698
14																			
15	662	698	638	677	718	735	594	569	738	736	732	697	731	792	811	753	781	717	698
16																			
17																			
17.4														798					
17.5															811				
18	662					744				740									
18.8													736						698
19		699	656	696	720		593	576	753		732								
19.3																		726	
19.9																	782		
20												702				753			
20.6												703							

Lake Merced
North East

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	649	690	646	678	725	739	598	565	735	730	724.3	697	726	780	796	738	770	692	679
5	651	690	645	678	726	740	600	568	738	732	724.5	696	731	782	796	738	773	695	679
9																			
10	652	692	645	679	727	740	597	569	743	740	724.9	697	738	792	796	739	773	703	678
11																			
12																			
13	652					740							744	799					
13.8																		718	
14		696		682	727					749									
14.1															796				
14.7																739			679
15			647				597	573	749		726.8	697					777		
15.8												697							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	490	573	639	590	547	585	560	565	597	635	557	580	599	620	600	673	707	667	639	648
5	492	573	664		547	585	558	565	597	643	563	584	603	620	600	673	707	667	626	649
6				603																
10	492	576	674		547	585	558	565	597	646	562	588	605	619	599	671	710	668	627	650
12				613																
15	494	578	689		550	584	555	567	597	650	562	598	606	619	600	674	713	668	629	652
16	494	580												619		675	714	665		
17	494									650									630	
18				621	552				596			599	605		601					660
18.2																				
18.9																				
19				629			557													
20								568			560									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	490	574	594	555	544	585	561	565	595	637	588	579	598	619	601	674	708	668	639	646
5	490	575	595	554	545	584	561	565	597	639	587	580	601	620	601	673	707	666	639	647
10	492	577	594		546	585	561	566	597	642	587	595	600	620	601	671	709	666	641	648
12				560																
15	493	578	594		548	585	561	566	597	646	588	591	605	620	601	674	712	666	641	649
16	493	579															715	673		
17														620						
18				563	552				597	647		668			602	678			643	651
19							561	567					601							
19.2																				
20											599									
20.4																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	659	683	630	602	594	622	437	434	411	454	538	490	532	517	533	535	616	522	625	536
5	659	684	632	602	594	624	522	455	461	455	538	490	532	517	533	536	592	524	624	537
6																				
10	660	684	645	602	595	627	522	441	463	452	538	466	535	516	534	537	593	528	625	538
12																				
15	660	684	646	603	596	628	522	441	465	454	539	461	535	517	534	538	595	526	626	539
16	659	684		603																
17			647			629					540	453	536							
18					597					450							601		627	
18.2																				
18.9																				
19							522	440	470											540
20														517	538	539		528		
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**	**Cond**
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	659	684	620	598	592	621	436	431	469	525	538	449	532	515	533	536	611	546	619	537
5	659	684	621	598	593	622	437	444	467	525	538	443	531	515	533	536	612	529	620	538
10	660	684	621	598	593	623	436	453	466	527	538	444	531	515	533	537	613	535	620	539
12																				
15	660	685	621	598	594	624	438	451	468	529	539	443	532	515	532	540	614	533	621	540
16		685																		
17	660		621			627					539		533							
18					595															
19				598			438			532		444						533		
19.2																				
20								450	468					515	534	527	616		621	541
20.4																				
21														515						
21.5																				
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

Depth	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	529	569	542	562	600	564	520	473	610	611	612	597.6	623	662	685.2	656	682	611	610
5	530	569	542	562	600	564	524	474	613	613	613	597.4	623	663	685.4	655	681	613	610
6																			
10	531	569	542	562	609	564	525	474	615	613	613	597.3	623	669	685.3	656	682	614	610
12																			
15	532	569	543	563	607	564	528	479	616	614	614	597.2	622	670	685.5	656	683	620	610
16																			
17																			
18	533																		
18.2																			610
18.9																		625	
19						566									685.3				
20		567	544	564	609		522	481	618	616	614	597.2	624			656	683		
20.1														702					
20.6																652			
20.8																	683		
21				564				482		617	613								
21.5												597							
22									619										

Lake Merced
South - Pump
Station

Depth	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond	Cond
Ft	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm	mmho/cm
Surf	531	569	538	562	594	566	498	475	610	612	613	597	624	662	684	656	682	610	611
5	531	569	539	562	595	566	500	476	612	611	613	598	623	662	684	655	681	610	610
10	532	568	539	564	595	566	500	476	615	614	613	597	623	669	685	655	683	618	611
12																			
15	533	568	540	563	596	568	502	479	616	614	613	597	625	670	685	656	684	618	610
16																			
17																			
18						570													
19																			
19.2																		623	
20	533	567	541	564			501	481	617	614	614	597	625	670		655	684		
20.4																			611
21		566		564	598					615	613		625	684	686				
21.5																	685		
22			542				500	481	621										
22.8																656			
23.2												598							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf			569	518	466	495	465		508	544	455	466	484	499	472	517	551	519	485	483
5			578	530	466	484	465		509	544	456	470	486	500	471	517	554	520	485	484
10			587	584	466	487	465		509	551	457	471	488	500	474	529	560	521	486	490
14									509	553				498			564			
15			588	612	472	489	466				463	482	489		475	534		520	488	492
16				642											475				490	492
17																				
17.4																				
17.5																				
18			608								459									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf			524	442	452	488	441		502	526	426	464	479	477	439	503	533	482	444	462
5			525	445	452	488	441		502	527	427	466	484	477	440	507	534	482	445	463
9																	539			
10			526	445	452	488	442		502	533	429	468	489	478	441	514		482	446	465
11																			446	464
12				448																
13											438									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	483	514	525	482	478	498	431	405	459	219	482	459	431	432	450	477	508	500	516	434	421
5	485	514	525	482	479	499	408	414	459	393	483	459	432	432	450	477	509	467	516	435	422
10	486	514	525	482	479	504	409	411	459	392	485	459	433	432	450	477	511	470	516	436	423
14																					
15	492	514	526	483	481	507	410	412	460	397	486	463	435	432	451	477	513	469	516	436	423
16	492				485			414								477					
17							410		463	401	487		435				516				
17.4																					
17.5																					
18												462		432				469	516	443	424
18.8																					
19															458						
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	474	496	502	446	455	483	416	409	454	392		458	426	426	449	475	508	n/a	509	425	415
5	474	496	503	446	456	484	417	412	454	392		463	427	426	449	475	509	n/a	509	427	416
9																					
10	479	497	504	446	456	487	417	413	455	393		468	429	426	450	475	512	n/a	509	430	417
11					456	490															
12				446			417		457									n/a			
13								413		390		465	429		454	476	516		509		418
13.8																					
14														427						437	
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	448	406	426	459	469	382	360	463	459	468	446	456	495	518	481	495	443	446
5	448	406	428	459	469	380	362	465	463	468	446	460	503	518	481	495	446	446
10	448	406	432	459	470	380	363	470	468	468	446	467	505	518	481	499	451	447
14																		
15	447	409	433	459	470	380	364	472	470	468	446	468	507	519	482	500	459	447
16																		
17																		
17.4													511					
17.5														519				
18					476				473									
18.8												471						447
19	448	420	445	461		379	369	482		468								
19.3																	465	
19.9																501		
20											449				482			
20.6											450							

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	442	413	434	464	473	383	362	470	467	464	446	465	499	510	472	493	443	434
5	442	413	434	465	474	384	363	472	468	464	446	468	501	510	472	495	445	434
9																		
10	443	413	434	465	473	382	364	476	474	464	446	472	507	510	473	495	450	434
11																		
12																		
13					474							476	511					
13.8																	459	
14	445		436	465					479									
14.1														510				
14.7															473			434
15		414				382	366	479		465	446					497		
15.8											446							

Lake Merced
South - Pistol
Range

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf			409	354	350	375	358	361	382	406	357	371	383	397	384	431	452	427	409	415
5			425		350	374	358	361	382	412	360	374	386	397	384	431	452	427	400	415
6				362																
10			431		350	374	357	362	382	413	360	377	387	396	384	430	454	427	401	416
12				368																
15			441		352	374	355	363	382	416	360	383	388	396	384	432	456	427	402	417
16														396		432	457	425		
17										416									403	
18				373	353				381			384	388		384					422
18.2																				
18.9																				
19				377			356													
20								363			358									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS	TDS
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf			380	333	348	374	359	362	381	408	376	370	383	396	385	431	453	427	409	414
5			381	332	349	374	359	362	382	409	376	371	384	397	384	431	453	426	409	414
10			380		349	374	359	362	382	411	376	381	384	397	384	429	454	426	410	415
12				336																
15			380		351	374	359	362	382	414	376	377	387	397	385	431	456	426	410	416
16																	458	431		
17														397						
18				338	353				382	414		427			385	434			412	417
19							359	363					385							
19.2																				
20											383									
20.4																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	422	437	403	385	380	398	280	278	265	291	344	314	340	331	341	342	394	334	400	343	338
5	422	438	405	385	380	399	334	291	295	291	344	313	340	331	341	343	379	335	400	344	339
6																					
10	422	438	413	385	381	401	334	282	296	289	345	298	343	330	342	344	380	338	400	345	340
12																					
15	422	438	413	386	381	402	334	282	297	290	345	295	343	331	342	344	381	336	401	345	341
16	422	438		386																	
17			414			402					346	290	343								
18					382					288							384		401		341
18.2																					
18.9																					
19							334	282	301											346	
20														331	344	345		338			
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	422	438	397	383	379	397	279	276	300	336	344	287	340	330	341	342	391	350	396	344	340
5	422	438	397	383	379	398	279	284	299	336	344	284	340	330	341	343	392	339	397	344	340
10	422	438	397	383	379	398	279	290	298	337	344	284	340	330	341	344	393	342	397	345	341
12																					
15	422	438	397	383	380	399	280	289	300	339	345	284	341	330	341	346	393	341	397	346	341
16		438																			
17	422		398			401					345		341								
18					381																
19				383			280			340		284						341			
19.2																					
20								288	299					330	342	342	394		397	346	341
20.4																					
21														330							
21.5																					
22																					
22.8																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	364	347	360	384	361	333	303	391	391	392	382	399	423	439	420	436	391	390
5	364	347	359	384	361	335	304	392	392	393	382	399	424	439	419	436	392	390
6																		
10	364	347	360	389	361	336	304	393	392	393	382	399	428	439	420	437	393	390
12																		
15	364	347	361	389	361	338	307	394	393	393	382	398	429	439	420	437	397	390
16																		
17																		
18																		
18.2																		391
18.9																	400	
19					362									439				
20	363	348	361	390		334	308	396	394	393	382	399			420	437		
20.1													449					
20.6															418			
20.8																437		
21			361				309		394	392								
21.5											382							
22								396										

Lake Merced
South - Pump
Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**	**TDS**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	364	345	359	380	362	319	304	391	391	392	382	399	424	438	420	436	390	391
5	364	345	359	381	362	320	305	392	391	392	382	399	424	438	419	436	390	391
10	364	345	361	381	362	321	305	393	393	392	382	399	428	438	419	437	396	391
12																		
15	364	345	361	381	364	321	307	394	393	393	382	400	429	438	420	437	396	391
16																		
17																		
18					365													
19																		
19.2																	398	
20	363	346	361			321	308	395	393	393	382	400	429		419	438		
20.4																		391
21	362		361	383					394	393		400	438	439				
21.5																438		
22		347				320	308	398										
22.8															420			
23.2											383							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth Ft	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L
Surf	14.5	10.2	6.7	9.6	9.3	8.6	9.1		7.6	7.9	7.7	10.8	7.3	7.9	9.9	13.1	13.0	9.4	10.6	11.0	10.8
5	10.0	9.8	5.2	9.5	9.1	6.4	9.0		6.2	7.1	7.3	9.2	6.4	7.5	9.0	12.5	8.8	8.0	10.3	10.2	9.3
10	2.0	2.4	4.7	4.9	8.5	4.2	7.6		6.2	6.6	7.1	8.9	5.9	7.3	6.4	0.4	3.1	8.2	6.3	4.4	8.2
14									5.7	6.6				4.4			0.7				
15	0.5	0.2	4.7	0.37	3.4	1.1	6.2				6.7	1.0	4.6		3.8	0.6		8.6	1.5	2.5	1.2
16	0.2	0.2		0.27											3.9				0.6	1.2	1.1
17																					
17.4																					
17.5																					
18			4.5								0.1										
18.8																					
19																					
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth Ft	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L	**DO** mg/L
Surf	11.5		5.9	8.0	6.9	7.6	9.5		6.8	9.5	8.7	7.6	6.0	9.7	9.5	11.1	8.1	9.6	8.8	9.1	10.0
5	9.1		5.7	7.3	6.5	6.1	9.3		6.6	9.0	8.1	7.3	5.2	9.3	8.5	7.0	2.7	9.3	8.2	8.1	9.1
9																	1.2				
10	3.0		5.4	3.2	5.6	5.7	8.5		6.1	8.1	7.2	5.9	4.7	9.0	6.4	0.4		8.9	3.6	5.5	3.2
11																			3.3	2.0	
12				0.86																	
13											0.1										
13.8																					
14																					
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Depth	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	6.3	6.6	9.6	9.7	10.8	6.7	8.7	5.8	9.4	8.1	8.2	7.9	7.0	7.1	11.3	8.6	7.4	8.5	8.1	8.1	8.5
5	6.1	6.3	8.4	9.4	9.4	5.7	5.9	5.4	9.0	6.4	7.6	7.8	6.8	7.0	10.5	6.6	7.0	7.8	7.5	7.8	8.0
10	5.9	6.2	8.0	9.2	3.2	5.1	4.1	5.1	8.9	6.6	6.9	7.6	6.8	6.8	6.5	6.1	6.8	7.5	7.5	7.8	7.5
14																					
15	5.8	5.8	7.4	7.2	0.3	4.7	3.5	2.4	5.2	5.9	5.3	6.9	6.6	0.2	2.6	5.9	6.9	6.9	7.6	7.3	5.0
16				3.8			3.5														
17						4.6		0.9	0.2	5.7		6.8									
17.4																					
17.5																					
18											4.1		6.5					3.5	7.5		
18.8																					
19														0.2						4.9	0.3
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Depth	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	8.5	8.7	10.1	7.4	9.6	7.4	9.1	7.6	8.3	8.1	9.5	9.1	8.0	6.6	9.9		7.8	9.4	7.9	9.6	7.9
5	8.4	7.6	9.6	6.9	7.7	6.5	5.9	7.2	7.9	7.7	7.6	9.3	7.8	5.9	8.7		7.6	7.5	7.3	9.2	8.0
9																					
10	7.7	7.5	7.7	6.6	1.4	5.4	4.1	4.7	5.7	7.6	5.6	9.1	6.4	1.2	3.1		7.3	5.6	6.9	6.6	7.7
11				6.7	0.8																
12			6.7			5.7		3.4		5.8											
13							4.1		0.2		0.3	8.2		0.2					6.7		
13.8																					
14													4.9					3.3		3.8	
14.1																					
14.7																					
15																					5.6
15.8																					

Lake Merced
North

	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	12.3	6.5	5.5	8.2	9.8	10.2	17.9	8.2	8.9	17.9	13.4	5.9	9.3	13.5	10.5	8.9
5	10.5	6.4	5.3	8.0	8.1	9.4	9.4	8.1	8.5	14.1	6.1	4.9	9.2	12.5	6.5	7.7
10	3.7	6.1	5.1	7.9	5.8	4.8	6.6	7.7	8.3	4.4	2.5	4.5	7.3	6.6	1.3	7.1
14																
15	2.2	6.0	5.1	7.9	4.8	2.5	2.7	6.2	8.0	3.2	0.1	3.7	7.0	4.9	0.3	6.8
16																
17																
17.4											0.1					
17.5												3.7	3.7			
18			0.8				0.5									
18.8										0.9						6.7
19	0.3	5.7		7.7	1.1	0.5		6.3								
19.3															0.3	
19.9														2.4		
20									0.6				5.5			
20.6									0.4							

Lake Merced
North East

	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	8.9	7.5	6.5	7.0	10.5	9.6	14.0	6.37	8.7	14.3	12.7	4.9	8.6	11.5	9.7	9.8
5	4.8	7.1	6.5	6.9	8.0	8.2	10.9	6.20	8.8	10.4	10.6	4.0	8.2	9.1	7.2	8.9
9																
10	3.3	6.0	6.5	6.7	5.7	5.2	3.9	5.38	7.9	2.8	1.8	4.0	6.7	8.1	1.0	8.9
11																
12																
13			6.4							0.7	0.1					
13.8															0.4	
14	1.1	4.8					0.3									
14.1												3.9				
14.7													0.8			6.0
15				6.6	1.4	1.6		0.58	6.5					3.0		
15.8									6.2							

Lake Merced
South - Pistol

Depth Ft	15-May-97 DO mg/L	10-Sep-97 DO mg/L	3-Dec-97 DO mg/L	16-Mar-98 DO mg/L	8-Jul-98 DO mg/L	23-Sep-98 DO mg/L	17-Mar-99 DO mg/L	21-Jun-99 DO mg/L	15-Sep-99 DO mg/L	8-Dec-99 DO mg/L	21-Mar-00 DO mg/L	21-Jun-00 DO mg/L	9-Aug-00 DO mg/L	19-Dec-00 DO mg/L	7-Mar-01 DO mg/L	20-Jun-01 DO mg/L	1-Oct-01 DO mg/L	18-Dec-01 DO mg/L	5-Mar-02 DO mg/L	30-Apr-02 DO mg/L	18-Jun-02 DO mg/L
0	12.4	8.5	7.4	8.6	8.7	7.9	8.9	8.0	6.6	9.8	9.2	9.4	7.9	7.4	9.0	9.5	11.2	9.5	9.8	9.9	8.0
5	9.2	7.9	7.3		8.5	6.6	8.6	7.9	6.4	9.7	8.8	8.2	6.2	7.3	8.5	9.3	10.4	9.2	9.7	9.8	7.7
6				7.9																	
10	6.7	1.6	7.3		8.4	6.1	8.3	7.5	6.2	9.5	8.4	6.0	5.6	7.2	8.1	5.2	6.5	8.7	8.7	9.3	7.5
12				7.5																	
15	3.5	0.2	6.6		4.6	4.9	8.2	5.9	6.2	8.5	7.7	0.1	5.5	7.0	7.2	1.3	1.9	8.3	6.7	8.3	7.0
16	3.3	0.2												6.8		1.2	1.4	0.4			1.7
17	3.4									8.7									1.6		
18				5.5	4.5				6.3			0.1	***0.05***		6.2					0.2	
18.2																					
18.9																					
19				5.4			8.1														
20								4.7			0.2										
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South -

Depth Ft	15-May-97 DO mg/L	10-Sep-97 DO mg/L	3-Dec-97 DO mg/L	16-Mar-98 DO mg/L	8-Jul-98 DO mg/L	23-Sep-98 DO mg/L	17-Mar-99 DO mg/L	21-Jun-99 DO mg/L	15-Sep-99 DO mg/L	8-Dec-99 DO mg/L	21-Mar-00 DO mg/L	21-Jun-00 DO mg/L	9-Aug-00 DO mg/L	19-Dec-00 DO mg/L	7-Mar-01 DO mg/L	20-Jun-01 DO mg/L	1-Oct-01 DO mg/L	18-Dec-01 DO mg/L	5-Mar-02 DO mg/L	30-Apr-02 DO mg/L	18-Jun-02 DO mg/L
Surf	12.2	7.6	6.8	9.2	10.1	8.0	9.5	8.3	9.0	10.2	8.8	10.5	8.9	6.8	9.2	9.7	10.7	10.1	10.0	9.8	8.7
5	12.1	5.0	6.6	9.2	9.7	7.4	9.4	8.2	7.7	9.8	8.6	10.0	7.7	6.7	8.8	9.3	10.2	9.7	9.9	9.8	8.6
10	7.8	1.9	6.3		9.1	7.0	8.9	7.9	7.6	9.6	8.4	3.3	7.4	6.6	8.2	6.3	7.7	9.6	6.0	8.1	8.2
12				8.7																	
15	5.5	0.2	6.2		4.9	6.9	8.8	6.6	7.7	8.9	7.8	0.1	7.1	6.3	6.5	1.6	2.0	9.2	3.0	7.9	8.0
16	4.5	0.2															1.1	0.6			
17														6.1							7.5
18				4.4	3.2				7.4	8.7		0.1			4.6	0.7			0.5	0.1	
19							8.3	5.2					0.1								
19.2																					
20											0.1										
20.4																					
21																					
21.5																					
22																					
22.8																					
23.2																					

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Depth	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	8.0	6.5	10.1	8.5	9.8	6.7	9.1	8.3	7.5	7.4	8.1	9.5	8.0	8.1	9.9	8.6	8.3	8.9	9.1	8.8	8.1
5	7.8	6.2	10.0	8.4	9.1	6.7	8.4	8.0	6.9	7.1	7.3	8.8	7.9	8.1	9.6	8.1	8.3	8.7	8.9	8.8	7.9
6																					
10	7.4	5.2	10.0	7.7	5.5	6.3	8.1	7.5	6.4	6.7	6.8	8.2	7.6	5.3	8.6	7.0	8.2	8.7	8.7	8.8	7.7
12																					
15	6.7	4.9	9.6	5.9	2.6	6.2	7.9	3.2	4.9	6.5	6.5	8.6	7.6	2.2	4.2	6.6	8.2	8.6	8.6	8.7	7.4
16	5.8		9.3																		
17		3.2			2.0					3.8	3.7	7.8									
18				4.5					3.5										8.6		
18.2																					
18.9																					
19						5.8	7.8	0.3										7.4			
20													7.2							8.6	5.9
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South -

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Depth	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**	**DO**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	7.9	7.3	9.4	9.5	9.9	7.6	9.0	8.8	9.6	6.5	7.9	9.5	8.1	8.3	10.5	8.8	8.5	9.0	9.2	8.8	9.7
5	7.6	7.2	9.2	9.4	9.4	6.5	8.0	8.6	9.3	6.1	7.5	9.0	7.9	8.1	8.6	8.2	8.2	8.7	8.8	8.6	9.5
10	7.7	7.2	9.1	9.3	8.0	4.8	7.7	6.6	7.2	5.5	6.5	9.0	7.8	7.7	6.0	7.2	8.1	8.5	8.6	8.4	9.4
12																					
15	7.6	7.1	9.2	7.8	4.6	3.9	7.6	4.4	3.0	3.6	6.1	7.0	7.8	1.9	2.6	5.0	8.1	7.8	8.7	8.3	8.9
16	7.0																				
17		6.9			1.2					3.5		6.9									
18				4.7																	
19			8.5			3.9			0.3		5.3										
19.2																					
20							7.0	2.0					7.6					7.6	8.7	8.0	7.3
20.4																					
21													7.6							7.9	
21.5																					
22																					6.4
22.8																					
23.2																					

Lake Merced
South - Pistol

Depth	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Ft	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L
0	9.4	6.5	7.1	8.4	9.1	8.4	11.5	10.9	8.9	11.5	11.9	7.1	10.0	10.5	9.8	9.8
5	9.1	6.2	7.0	8.4	8.9	7.7	10.1	10.2	9.0	10.9	10.9	6.7	9.9	9.9	8.0	9.5
6																
10	8.2	5.9	7.0	7.7	8.8	6.8	8.0	10.1	8.6	10.2	4.5	6.6	9.2	8.0	6.7	9.3
12																
15	5.0	5.9	6.7	7.4	8.5	6.7	5.2	10.0	8.5	9.5	3.0	6.4	9.1	6.6	0.3	8.7
16																
17																
18																
18.2																7.8
18.9															0.4	
19			4.1									6.3				
20	3.6	5.9		4.4	7.2	3.2	1.5	9.7	8.2	0.6			8.3	6.5		
20.1											0.2					
20.6													2.8			
20.8														0.7		
21	3.3				6.9		1.4	9.3								
21.5									7.9							
22						1.9										

Lake Merced
South -

Depth	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Ft	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L	DO mg/L
Surf	9.7	6.2	6.6	7.8	8.6	8.9	11.8	10.9	9.2	11.7	11.2	8.4	10.2	10.9	11.0	9.22
5	9.4	6.0	6.4	7.6	8.5	8.0	11.5	10.9	9.3	11.0	10.6	8.0	9.7	10.8	9.8	9.12
10	5.9	6.0	5.5	7.3	6.7	6.0	7.4	10.2	9.3	10.3	3.7	7.7	9.6	7.8	2.3	8.86
12																
15	4.7	5.9	0.7	7.2	6.2	4.5	5.3	10.0	9.2	6.3	3.3	7.6	9.5	5.2	0.3	8.65
16																
17																
18			0.5													
19																
19.2															0.4	
20	3.3			7.2	6.1	3.7	3.4	9.9	9.2	5.4	2.6		9.4	3.6		
20.4																8.59
21	2.4	4.0					3.2	9.9		0.5	0.2	7.2				
21.5														0.4		
22				7.1	5.7	2.1										
22.8													0.5			
23.2									9.0							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	295	186	305	274	290	264	395		352	328	191	202	269	302	366	166	232	319	261	215
5	302	173	305	262	286	251	394		353	328	178	192	271	293	366	159	233	318	253	205
10	319	138	305	231	280	232	393		352	329	168	168	269	276	364	47	236	315	234	176
14									353	330				240			231			
15	328	9	305	206	271	202	393				141	128	267		359	25		308	188	136
16	329	13		205											354				94	40
17																				
17.4																				
17.5																				
18			309								54									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	338		281	262	315	299	423		344	278	186	346	253	296	351	169	223	272	268	218
5	347		276	253	315	297	424		343	265	166	341	252	284	349	143	223	264	264	203
9																	214			
10	361		271	244	315	297	426		343	236	110	335	249	265	343	44		246	241	168
11																			207	62
12				237																
13											-48									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	457	451	528	547	540	470	498	473	437	299	373	330	328	323	173	378	265	427	319	298	228
5	455	451	528	547	540	471	498	474	436	294	372	330	323	309	169	378	258	419	316	297	229
10	451	450	527	547	538	473	498	475	435	287	371	331	313	304	151	377	248	391	309	296	229
14																					
15	443	446	525	544	537	471	497	475	429	268	370	332	303	298	102	376	233	367	297	293	229
16	332				530			475								373					
17							497		409	69	368		293				219				
17.4																					
17.5																					
18												334		290				338	281	295	228
18.8																					
19															-3						
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	416	438	529	542	538	469	494	474	442	205	339	276	319	275	147	374	264	n/a	289	239	216
5	376	433	529	541	538	469	493	475	441	186	333	269	313	259	132	374	257	n/a	276	228	211
9																					
10	323	397	529	540	537	468	491	474	442	143	325	256	304	244	71	374	236	n/a	255	214	202
11					535	448															
12				533			485		441		314							n/a			
13								471		55		213	290		-21	374	218		227		184
13.8																					
14														198						190	
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	285	213	278	315	369	356	230	185	304	296	278	280	227	447	324	305	255	381
5	285	209	259	314	368	359	231	175	296	294	269	274	191	448	322	298	226	382
10	285	203	232	313	367	358	242	139	295	293	260	240	152	448	322	274	140	382
14																		
15	285	186	208	309	364	355	242	76	269	288	242	211	88	448	319	255	89	381
16																		
17																		
17.4													-4					
17.5														448				
18					368				268									
18.8												93						381
19	287	130	161	305		350	239	-31		287								
19.3																	79	
19.9																199		
20											77				317			
20.6											58							

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	268	244	328	310	379	360	204	243	295	251	316	276	263	515	273	333	292	347
5	268	238	328	308	378	361	204	234	277	239	312	260	249	518	263	331	260	343
9																		
10	267	232	323	303	377	360	210	227	251	202	294	187	136	519	248	323	186	331
11																		
12																		
13					376							31	10					
13.8																	133	
14	266		318	296					74									
14.1														521				
14.7															199			318
15		215				357	203	220		103	278					319		
15.8											260							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	311	276	233	292	286	287	404	349	340	301	225	174	184	429	431	216	262	280	266	224
5	325	276	228		282	287	403	347	340	294	207	148	175	429	432	215	264	276	259	211
6				291																
10	336	290	214		275	283	402	344	339	288	196	119	164	429	431	219	274	266	248	200
12				289																
15	346	287	197		273	274	400	343	339	283	181	-56	136	429	431	217	284	254	221	183
16	346	288												431		206	283	175		
17	344									277									139	
18				287	265				339			-57	56		430					61
18.2																				
18.9																				
19				287			398													
20								346			172									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	303	242	269	297	289	287	366	313	336	316	176	203	198	421	410	225	243	264	268	232
5	305	241	264	299	286	284	361	309	337	313	173	193	190	421	411	226	243	262	263	225
10	318	244	258		278	265	350	298	337	312	159	159	170	421	411	227	246	256	249	212
12				285																
15	326	241	257		273	252	337	280	336	311	140	105	132	418	412	231	255	239	214	181
16	324	246															259	138		
17														418						
18				286	269				335	309		30			411	228			114	66
19							320	258					29							
19.2																				
20											63									
20.4																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	348	453	526	547	542	482	502	431	414	318	341	315	319	321	221	355	284	309	315	318	235
5	336	453	523	547	542	481	497	431	407	314	338	316	312	310	214	353	277	307	312	316	232
6																					
10	315	453	518	547	541	481	486	430	385	305	322	315	305	291	203	349	267	302	306	315	228
12																					
15	286	451	507	544	537	477	466	430	358	298	315	313	293	275	190	344	255	295	298	313	223
16	208	445		540																	
17			423			467					311	316	252								
18					526					232							210		289		212
18.2																					
18.9																					
19							430	429	159											313	
20														258	157	341		278			
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	414	449	518	543	533	468	506	402	445	260	341	338	335	321	260	376	279	349	323	318	231
5	401	449	516	543	532	466	506	401	445	251	342	338	332	312	254	377	275	345	322	318	231
10	374	448	513	542	529	464	506	400	446	236	342	339	325	303	238	378	263	321	318	318	230
12																					
15	334	445	505	537	524	457	503	398	446	207	344	340	317	297	222	383	251	294	312	318	230
16		438																			
17	260		491			447					345		295								
18					510																
19				530			502			155		340						278			
19.2																					
20								398	446					293	193	386	237		301	318	229
20.4																					
21														290							
21.5																					
22																					
22.8																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	276	303	417	254	428	343	357	356	364	304	356	283	240	472	350	322	337	374
5	276	301	416	250	428	346	356	358	360	305	352	277	230	472	346	315	316	374
6																		
10	275	299	412	243	428	350	361	361	357	303	345	255	214	471	342	305	296	372
12																		
15	274	294	411	235	428	349	373	364	343	299	337	234	152	470	338	298	254	368
16																		
17																		
18																		
18.2																		366
18.9																	237	
19					430									468				
20	272	290	409	220		344	370	372	317	296	324	128			328	273		
20.1													19					
20.6															326			
20.8																198		
21			404				368		290	295								
21.5											299							
22								373										

Lake Merced
South - Pump
Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**	**ORP**
Ft	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV	mV
Surf	281	289	396	284	416	364	331	326	339	415	472	272	260	82	284	306	344	385
5	282	288	396	283	416	366	332	327	337	415	472	266	254	77	282	296	332	384
10	282	287	399	282	417	370	333	334	339	417	471	256	242	74	278	286	320	383
12																		
15	282	286	399	279	419	372	343	335	331	417	469	243	217	73	263	265	301	380
16																		
17																		
18					419													
19																		
19.2																	294	
20	281	288	399			371	344	336	314	416	464	217	185		244	241		
20.4																		377
21	281		398	277					292	414		91	35	70				
21.5																195		
22		287				369	339	335										
22.8															170			
23.2											455							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	10.0	25	28	10	32.6		20.0		32.0	26.1	19.0	28.8	28.2	26.7	21.1	30.3	27.0	3.7	11.0	31.9
5	10.0	24	25	11	31.1		20.5		32.0	25.0	19.0	27.3	25.0	26.6	21.6	34.8	30.0	3.2	9.2	33.7
10	7.4	26	29	11	25.6		20.8		33.0	24.6	19.1	28.0	28.5	27.6	23.7	32.0	30.0	3.9	13.6	33.3
14									30.0	27.9				27.8			30.0			
15	7.4	28	24	13	28.5		22.1					28.2	28.7		21.9	21.8		4.6	13.4	23.9
16																				
17																				
17.4																				
17.5																				
18											20.0									
18.8																				
19																				
19.3																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	8.2		7.0	6.7	19.4		32.3		23.0	24.1	25.4	22.7	21.7	36.4	33.1	30.0	20.0	3.9	16.1	24.1
5	7.5		5.2	8.3	20.3		29.6		22.0	26.6	25.4	27.4	20.4	32.8	32.7	30.0	21.0	3.0	17.2	24.1
9																	20.0			
10	8.1		7.1	10	18.3		31.1		23.0	24.9		26.1	48.7	32.3	32.9	33.3		3.5	17.0	24.9
12																				
13											32.6									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	23.0	23.0	14.9	20.4	22.0	32.5	24.3	29.6	1.6	14.0	11.0	3.4	3.7	1.2	8.2	11.3	11.0	13.6	10.0	9.4
5	23.0	28.0	4.5	18.5	25.1	34.7	22.1	28.2	1.9	14.0	13.0	3.5	4.1	1.4	8.6	11.0	12.0	13.5	12.0	7.7
10	23.0	23.0	9.7	22.4	25.0	32.6	22.9	25.8	1.2	13.0	13.0	5.6	3.9	1.6	8.3	11.9	11.0	13.5	11.0	8.4
14																				
15	16.0	25.0	19.6	21.8	24.0	28.1	25.5	24.8	1.5	14.0	11.0	7.5	4.4	1.5	8.2	13.1	11.0	13.4	10.0	6.5
16																12.6				
17										14.0			5.0				8.0			
17.4																				
17.5																				
18												7.6		1.5				12.8	10.0	7.3
18.8																				
19															8.8					
19.3																				
20																				
20.6																				

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	29.0	20.0	19.0	19.6	17.0	23.4	28.1	29.8	12.2	14.0	11.0	6.1	8.2	7.6	10.8	15.1	12.0	12.6	9.5	10.0
5	26.0	19.0	16.3	20.7	16.8	21.2	31.4	24.7	11.3	15.0	11.0	6.6	4.6	9.1	11.0	16.0	12.0	13.6	10.0	8.5
9																				
10	25.0	21.0	25.8	20.2	17.4	20.6	22.7	18.4	10.5	15.0	11.0	5.5	8.7	9.5	9.2	16.8	12.0	12.6	9.0	6.5
12																				
13										14.0		5.5	4.8		10.3	15.5	11.0	11.0	10.0	
13.8																				
14														9.7						5.3
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	11.0	8.2	10.5	23.5	23.0	27.0	25.0	19.0	21.0	32.0	15.2	7.2	32.0			14.7	15.4
5	10.0	6.7	9.6	23.5	23.0	24.0	24.0	18.0	22.0	36.1	15.0	7.3	30.0			14	18.1
10	8.9	7.5	11.0	18.2	21.5	20.0	23.0	18.0	18.0	33.4	14.2	7.6	22.0			13.8	
14																	
15	11.0	6.8	11.0	14.9	22.2	21.0	21.0	21.0	18.0	36.1	14.5	7.5	25.0			14.7	
16																	
17																	
17.4																	
17.5																	
18	10.0					21.0				24.3							
18.8													20.0				
19		8.4	7.3	13.4	22.0		23.0	20.0	18.0		14.2						
19.3																	
20																15.2	
20.6												10.3					

Lake Merced
North East

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	11.0	13.0	2.1	20.8	18.0	23.0	17.0	17.0	21.0	27.0	8.2	9.2	22.0			**13.4**	19.3
5	11.0	13.0	1.9	20.5	18.0	23.0	16.0	18.0	21.0	28.0	8.8	10.0	23.0			**14.7**	18.4
9																	
10	11.0	13.0	1.9	17.2	18.0	25.0	16.0	17.0	19.0	26.0	8.6	9.5	22.0			**14**	
12																	
13	11.0					24.0							19.0				
13.8																	
14		12.0		14.4	20.0					27.0							
14.1																	
14.7																**14.8**	
15			2.0				17.0	16.0	19.0		8.7						
15.8												9.4					

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	20.0	32	22	8.4	13.2		12.1	16.1	25.0	23.9	20.6	16.6	19.1	10.7	9.4	14.0	13.0	2.2	9.0	13.0
5	20.0	28	22		12.3		12.0	17.1	23.0	27.1	17.0	15.4	19.1	11.8	10.9	14.4	13.0	2.7	8.8	12.5
6				9.9																
10	20.0	26	22		10.5		12.2	16.0	22.0	28.5	18.0	15.8	19.0	10.6	10.3	13.5	13.0	3.6	8.8	12.3
12				11																
15	18.0	25	24		9.7		11.3	16.3	22.0	28.6				12.0	13.1	16.5	13.0	3.0	8.8	13.6
16	18.0	28																		
17																				
18				11								12.1	16.8							
18.9																				
19																				
20											17.0									
20.6																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	20.0	28	22	9.8	10.8		10.2	16.0	30.0	28.2	18.2	17.7	21.2	9.8	10.1	12.8	13.0	2.5	7.9	13.2
5	18.0	30	19	10	12.5		10.4	15.4	26.0	28.9	18.0	15.1	19.2	10.1	9.7	12.2	14.0	3.2	10.1	12.4
10	18.0	24	20		10.2		11.7	15.1	24.0	33.3	16.8	14.5	19.1	10.7	9.6	12.3	15.0	2.5	10.0	12.7
12				8.6																
15	17.0	26	19		9.1		11.8	16.3	25.0	31.6				11.9	10.1	14.4	13.0	3.0	10.3	13.0
16																				
17																				
18				12								15.3								
19													19.1							
19.2																				
20											17.1									
21																				
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	17.0	20.0	12.6	14.3	12.8	15.6	16.2	19.5	11.8	22.0	19.0	15.0	11.3	7.8	10.2	9.1	7.0	12.8	10.0	9.4
5	14.0	20.0	13.0	14.5	12.0	17.4	14.1	17.9	12.3	21.0	18.0	15.0	10.7	8.2	11.4	9.9	7.0	11.0	11.0	9.4
6																				
10	13.0	17.0	12.1	14.9	9.5	18.8	15.2	16.2	11.8	20.0	18.0	17.0	12.3	8.2	10.6	9.6	7.0	9.7	10.0	8.7
12																				
15	13.0	20.0	6.9	13.4	12.3	15.3	15.1	19.2	12.5	20.0	18.0	14.0	17.2	7.6	11.2	8.3	7.0	9.7	11.0	9.0
16																				
17												16.0	11.5							
18										18.0							7.0		11.0	
18.9																				
19																				10.0
20														9.2	9.1	8.3		9.6		
20.6																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	13.0	22.0	8.0	15.0	11.2	16.3	14.4	17.3	11.4	20.0	18.0	14.0	2.5	8.1	10.2	10.4	7.0	10.7	11.0	11.0
5	12.0	16.0	7.6	14.6	9.8	17.5	18.2	19.5	11.3	20.0	18.0	12.0	11.4	7.5	11.0	11.1	7.0	10.4	10.0	9.6
10	12.0	17.0	8.0	13.7	11.0	17.1	11.9	18.6	11.1	23.0	18.0	13.0	12.7	7.8	9.7	11.7	7.8	9.9	10.0	8.6
12																				
15	12.0	17.0	7.3	13.3	10.8	18.0	13.3	15.7	12.7	17.0	19.0	12.0	10.4	7.6	11.1	9.5	7.5	8.8	10.0	9.2
16																				
17													12.3							
18																				
19										16.0		13.0						8.8		
19.2																				
20															10.1	10.2	7.5		9.6	9.2
21														7.6						
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	9.9	11.0	11.0	11.8	22.5	24.0	10.0	7.0	12.5	10.5	14.3	7.2	8.7			8.6	10.4
5	9.6	10.0	11.8	14.1	21.0	20.0	11.0	6.7	12.0	11.0	15.3	7.3	9.3			8.9	9.6
6																	
10	11.0	10.0	11.0	14.2	21.0	20.0	10.0	7.3	12.0		15.1	7.6	9.0			7.5	
12																	
15	11.0	11.0	10.5	13.8	23.0	18.0	11.0	7.0	11.0	11.0	14.1	7.5	9.2			7.8	
16																	
17																	
18	11.0																
18.9																	
19						22.0											
20		10.0	9.8		21.0		11.0						8.7				
20.6																8.5	
21				15.4				6.8			14.2						
21.5												10.3					
22									11.0								

Lake Merced
South - Pump
Station

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09
Depth	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**	**Turb**
Ft	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu	ntu
Surf	10.0	10.0	10.3	12.0	20.5	21.0	10.0	7.2	12.0	11.0	14.1	8.5	8.5			9.1	9.52
5	9.8	10.0	10.5	14.5	22.0	21.0	10.0	7.1	12.8	11.0	14.1	7.2	8.7			9.8	9.08
10	11.0	9.4	10.3	12.8	21.5	22.0	10.0	6.9	11.0	7.0	14.0	7.0	8.5			9.5	
12																	
15	11.0	9.1	11.5	11.8	21.0	17.0	11.0	6.7	11.0	9.5	14.2	7.2	9.0			10.3	
16																	
17																	
18						12.0											
19																	
19.2																	
20	11.0																
21		9.4		12.2	21.0					12.0	14.9		8.9				
22			11.4				11.0	6.8	10.0								
22.8																10.3	
23.2												7.2					

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	274	304	300	233	244		232		276	264	248	228	210	264	220	256	280	---	230	260
5	274	304	300	236	234		234		272	276	240	228	220	264	244	248	280	---	225	250
10	272	304	300	231	236		240		268	272	240	236	225	268	252	248	280	---	220	245
14									260	272				268			280			
15	272	304	300	240	242		236					236	220		244	248		---	235	245
16																				
17																				
17.4																				
17.5																				
18											240									
18.8																				
19																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	262		285	214	224		220		268	244	216	224	210	236	216	240	260	---	225	230
5	260		288	202	232		220		268	240	220	232	220	252	224	244	260	---	240	235
9																	264			
10	260		286	205	234		232		272	240		228	220	252	224	252		---	245	240
12																				
13											228									
13.8																				
14																				
14.1																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	235	232	235	225	210	235	255	260	204	264	220	255	204	200	220	220	240	248	232	230	225
5	240	240	240	230	220	260	270	265	204	264	224	255	200	200	252	225	244	244	232	235	235
10	250	248	250	240	230	270	275	270	204	264	224	250	200	205	248	230	252	240	234	235	230
14																					
15	255	252	260	240	230	270	275	270	204	266	226	250	204	205	244	235	248	240	236	235	225
16																235					
17										266			204				244				
17.4																					
17.5																					
18												250		210				244	236	230	225
18.8																					
19															216						
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	255	256	255	230	230	270	280	280	208	262	226	235	204	195	236	240	244	240	234	215	215
5	250	256	255	230	225	270	280	285	208	264	226	235	204	190	240	225	244	240	234	215	215
9																					
10	250	256	260	235	225	270	280	285	210	266	228	235	208	190	244	200	248	240	236	225	210
12																					
13										266		235	208		244	235	256	240	238		210
13.8																					
14														185						235	
14.1																					
15																					
15.8																					

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	210	194	195	240	228	224	230	250	248	244	208	220		
5	208	194	200	220	228	224	230	250	248	244	228	232		
10	206	194	200	205	232	224	225	248	244	244	208	240		
14														
15	204	195	205	225	228	212	225	248	244	248	208	240		
16														
17														
17.4														
17.5														
18					220				244					
18.8												240		
19	206	196	210	235		204	225	246		264				
20														
20.6											228			

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	180	196	200	215	228	220	235	248	256	252	212	244		
5	152	196	200	225	228	220	235	248	264	248	200	232		
9														
10	114	195	205	240	224	216	235	250	268	244	224	232		
12														
13					216							228		
13.8														
14	88		210	210					268					
14.1														
15		194				216	215	250		236				
15.8											220			

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	172	190	204	162	170		170	176	180	196	188	180	160	188	184	180	196	---	190	190
5	172	190	198		170		168	172	178	180	184	172	165	180	172	184	196	---	190	190
6				155																
10	172	190	198		170		166	168	180	204	184	176	160	184	188	184	200	---	195	195
12				158																
15	172	190	197		170		166	176	180	184				196	180	188	200	---	195	195
16	172	190																		
17																				
18				161								172	170							
19																				
20											172									
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	172	192	196	155	166		166	168	178	200	178	176	170	196	176	196	204	---	200	200
5	172	190	198	160	166		170	180	186	184	184	180	175	188	184	188	204	---	200	190
10	172	190	200		170		170	176	182	180	176	180	160	200	184	192	208	---	195	180
12				158																
15	172	190	196		170		170	172	182	200				200	180	176	208	---	190	180
16																				
17																				
18				157								168								
19													165							
20											176									
21																				
22																				
23.2																				

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	200	208	190	190	170	195	155	150	132	170	150	160	152	150	170	150	176	160	162	155	170
5	205	208	190	190	170	190	150	155	132	170	150	165	152	135	164	175	172	160	162	155	170
6																					
10	215	208	200	185	175	180	150	160	132	168	150	170	148	125	156	170	164	170	160	158	168
12																					
15	220	208	200	185	175	190	145	165	132	168	150	170	144	135	158	165	168	168	160	158	166
16																					
17												170	136								
18										166							172		160		163
19																				162	
20														155	158	150		164			
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	210	200	190	170	165	200	175	150	144	168	152	160	136	145	158	165	168	166	160	162	155
5	210	200	190	180	165	200	180	155	144	168	152	165	136	140	158	145	164	168	160	165	155
10	205	208	195	185	170	200	180	150	144	168	152	170	140	140	160	160	160	176	158	168	155
12																					
15	205	212	195	185	170	200	180	145	144	168	152	160	140	145	160	170	164	170	158	168	162
16																					
17													140								
18																					
19										168		155						160			
20															158	140	168		158	165	162
21														145							
22																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	146	148	170	170	156	168	160	178	180	184	168	160		
5	146	150	165	165	164	168	160	178	180	184	156	164		
6														
10	148	146	160	160	172	168	160	178		182	152	168		
12														
15	148	144	155	170	164	160	160	178	192	182	156	172		
16														
17														
18														
19					156									
20	154	142		175		156						184		
21			150				160			186				
21.5											172			
22								178						

Lake Merced
South - Pump
Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**	**Alk**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	154	142	170	225	172	172	162	180	180	184	168	156		
5	152	140	145	210	160	168	162	180	180	184	160	172		
10	150	140	150	210	148	164	162	182	180	184	164	184		
12														
15	148	138	155	230	156	160	162	182	188	184	168	188		
16														
17														
18					164									
19														
20														
21	146		160	210					196	182		160		
22		142				152	162	182						
23.2											152			

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	272	290	277	231	240		240		266	280	256	248	270	252	232	260	276	---	245	250
5	272	290	280	227	244		240		276	272	252	244	260	256	252	264	280	---	260	250
10	272	290	280	229	244		246		270	260	248	244	245	268	260	272	284	---	250	255
14									260	256				268			284			
15	272	290	280	232	244		246					244	245		252	272		---	260	260
16																				
17																				
17.4																				
17.5																				
18											244									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	268		272	218	235		228		240	252	220	244	255	240	236	272	280	---	260	260
5	268		273	214	245		250		256	280	232	236	245	260	240	272	284	---	250	260
9																	284			
10	268		273	212	255		252		274	280		240	265	256	244	272		---	250	265
12																				
13											228									
13.8																				
14																				
14.1																				
14.4																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	260	260	285	265	240	255	265	250	236	262	256	255	240	245	252	220	240	244	248	240	220
5	260	264	280	255	255	250	245	255	238	264	256	255	232	230	244	225	244	240	248	245	215
10	255	264	280	250	250	280	225	250	242	265	258	255	228	220	220	230	248	240	248	240	235
14																					
15	255	268	275	250	250	280	225	240	244	264	258	255	224	220	220	235	252	244	246	235	235
16																235					
17										262			224				260				
17.4																					
17.5																					
18												255		220				256	244	220	210
18.8																					
19															220						
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	280	276	280	260	255	255	240	265	246	262	266	260	236	250	256	260	248	276	250	240	235
5	275	276	260	245	255	270	240	275	246	264	266	260	236	245	252	245	252	260	250	245	235
9																					
10	270	280	265	245	255	280	245	280	248	267	266	265	236	235	230	275	264	248	250	235	220
12																					
13										264		270	236		224	275	256	254	250		215
13.8																					
14														220						215	
14.1																					
14.4																					
14.7																					
15																					
15.8																					

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	222	200	205	235	236	224	230	244	248	244	240	232	244	240	232	250	272	264
5	218	202	215	240	240	224	230	244	248	244	240	232	260	268	264	246	278	256
10	218	202	225	245	248	228	226	244	244	244	240	256	260	268	260	258	266	268
14																		
15	220	204	225	235	244	232	228	244	244	248	240	252		272	224	252	272	276
16																		
17																		
17.4													272					
17.5														280				
18					240				244									
18.8												244						284
19	220	204	220	230		236	232	244		264								
19.3																	276	
19.9																252		
20															228			
20.6											228							

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	218	206	215	230	236	236	235	246	246	248	220	260	252	256	232	256	274	264
5	220	206	220	235	236	236	235	246	246	240	232	264	260	208	228	250	270	256
9																		
10	222	206	230	240	232	232	235	244	246	244	236	260	256	272	224	256	272	256
12																		
13					228							232	256					
13.8																	274	
14	222		235	240					250									
14.1														252				
14.4																		
14.7															240			272
15		206				232	225	242		244						254		
15.8											244							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	172	185	185	157	185		176	168	188	196	184	180	200	200	200	212	228	---	200	205
5	170	186	182		185		174	188	188	204	188	172	195	188	188	212	228	---	200	205
6				156																
10	170	186	182		195		180	192	190	200	192	176	180	192	192	216	224	---	200	210
12				163																
15	170	186	182		195		176	192	188	180				208	200	216	220	---	200	210
16	170	186																		
17																				
18				158								172	200							
18.2																				
18.5																				
18.9																				
19																				
20											188									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	172	186	182	156	185		176	184	184	192	192	180	185	204	196	216	220	---	215	210
5	170	186	182	161	185		176	180	186	204	188	184	195	188	192	208	220	---	210	210
10	170	186	184		185		180	168	184	192	184	180	185	184	200	208	224	---	210	210
12				154																
15	170	186	178		190		182	184	188	180				200	188	204	224	---	210	205
16																				
17																				
18				157								180								
19													200							
19.2																				
20											176									
20.4																				
20.9																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	205	224	200	195	210	205	175	170	162	168	175	175	164	160	174	220	176	176	178	167	170
5	210	224	200	180	190	205	160	170	162	168	175	175	164	160	170	195	180	176	178	172	175
6																					
10	215	220	205	180	180	210	150	175	162	168	174	175	160	160	168	170	188	184	178	170	180
12																					
15	215	216	205	180	170	210	145	175	162	168	174	170	160	165	166	190	180	190	180	170	175
16																					
17												170	160								
18										168							172		180		165
18.2																					
18.5																					
18.9																					
19																				172	
20														175	164	210		188			
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	230	220	195	210	180	205	175	170	162	162	170	180	156	145	156	175	160	180	176	168	168
5	220	220	195	195	190	210	165	175	162	164	170	180	160	150	156	195	164	176	176	168	172
10	210	228	200	200	165	210	160	175	160	166	170	180	160	155	156	175	172	172	176	168	175
12																					
15	210	230	200	200	165	210	155	170	160	165	170	175	164	150	156	200	172	168	176	170	175
16																					
17													164								
18																					
19										164		170						196			
19.2																					
20															158	175	192		176	172	178
20.4																					
20.9																					
21														140							
21.5																					
22																					
22.8																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	165	160	165	175	192	180	180	188	188	194	168	164	208	220	196	200	220	220
5	166	160	175	170	184	172	180	188	188	194	168	184	208	212	196	202	220	208
6																		
10	168	160	185	170	176	168	178	188		194	168	200	208	200	196	204	214	216
12																		
15	168	160	190	175	180	176	178	186	188	194	188	192	192	200	200	204	218	220
16																		
17																		
18																		
18.2																		208
18.5														196				
18.9																	218	
19					184													
20	168	160		190		180						200						
20.1													200					
20.6															188			
20.8																200		
21			165				180			192								
21.5											200							
22								186										

Lake Merced
South - Pump
Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**	**Hard**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	170	157	165	170	176	184	180	192	188	192	168	172	192	228	196	200	218	216
5	168	160	165	170	180	176	180	192	188	192	172	204	208		196	206	220	228
10	168	162	170	180	184	172	180	190	188	194	188	200	208	196	196	204	224	208
12																		
15	166	162	175	190	176	172	178	186	188	192	192	176	208	196	196	204	224	220
16																		
17																		
18					168													
19																		
19.2																	232	
20																		
20.4																		228
20.9														196				
21	162		170	180					188	190		200						
21.5																204		
22		162				168	178	184										
22.8															196			
23.2											180							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	93	100	110	82	83	101	84		91	93	90	87	90	91	89	94	101	98	89	91
5	92	98	110	82	81	100	84		91	93	88	87	90	91	89	94	100	91	95	91
10	93	97	110	82	81	101	84		91	93	85	87	90	91	89	93	101	91	96	91
14									91	93				91			100			
15	94	97	100	82	81	100	84					87	90		89	93		92	96	91
16																				
17																				
17.4																				
17.5																				
18											85									
18.8																				
19																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	84		87	66	73	88	76		86	85	86	80	83	82	78	83	88	74	80	82
5	84		88	66	73	88	76		86	86	80	80	83	82	77	83	88	75	77	81
9																	87			
10	84		88	66	73	87	76		86	86		80	83	82	77	83		78	78	80
12																				
13											76									
14																				
14.1																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	95	96	100	86	83	94	102	103	87	87	87	98	93	83	85	91	91	89	89	78
5	93	98	100	86	83	94	102	105	86	87	89	98	93	82	86	91	90	89	89	78
10	93	100	100	87	83	94	102	105	86	89	90	98	92	82	87	90	89	90	88	78
14																				
15	93	100	100	87	83	94	102	105	85	92	91	98	92	81	86	90	89	90	89	78
16																90				
17										93			91				89			
17.4																				
17.5																				
18												98		80				90	90	78
18.8																				
19															86					
20																				
20.6																				

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**	**Cl⁻**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	83	86	86	74	70	88	96	104	88	88	85	100	86	75	83	85	87	86	90	74
5	82	88	86	74	70	87	96	106	88	88	84	100	86	75	83	84	87	86	90	74
9																				
10	82	88	86	74	70	87	96	106	88	88	84	100	86	76	82	83	88	86	89	73
12																				
13										88		100	86		82	83	88	86	89	
14														76						72
14.1																				
15																				
15.8																				

Lake Merced
North

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	84	84	78	83	84	86	95	83	91	90	96	100	100		
5	84	84	78	83	85	86	95	84	91	90	96	100	100		
10	84	84	78	83	86	87	95	86	90	89	94	100	100		
14															
15	83	84	78	82	86	87	96	87	89	89	93	100	100		
16															
17															
17.4															
17.5															
18	83					87				90					
18.8													100		
19		84	78	82	86		96	88	89		92				
20															
20.6												100			

Lake Merced
North East

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	90	82	75	80	82	93	92	86	90	90	91	100	100		
5	88	82	75	80	82	93	94	87	90	89	91	100	100		
9															
10	88	80	76	80	82	93	95	87	88	89	90	98	100		
12															
13	86					93							100		
14		80		80	82					88					
14.1															
15			76				95	87	87		90				
15.8												98			

Lake Merced
South - Pistol
Range

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	61	63	70	58	59	83	65	64	69	71	75	70	71	74	74	78	83	75	83	80
5	61	63	69		58	83	65	64	69	71	75	69	71	74	73	78	83	76	82	80
6				58																
10	60	63	69		58	83	65	64	69	71	75	69	71	74	73	78	83	77	83	82
12				58																
15	61	63	69		58	83	65	64	69	71				73	73	78	83	78	82	82
16	60	63																		
17																				
18				58								69	71							
19																				
20											77									
21																				
21.5																				
22																				

Lake Merced
South -
Pump Station

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	61	63	69	58	60	83	66	64	69	71	76	70	71	73	73	77	83	79	80	83
5	61	63	69	58	59	83	66	64	69	71	76	69	71	73	73	77	83	81	81	83
10	61	63	69		58	83	65	64	69	71	77	69	71	73	73	77	83	79	83	82
12				58																
15	61	63	69		58	83	66	64	69	71				73	73	77	83	80	82	82
16																				
17																				
18				58								69								
19													70							
20											72									
21																				
22																				
23.2																				

Lake Merced
South - Pistol
Range

Depth	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	83	88	78	73	68	75	80	75	56	67	68	84	67	65	71	72	72	72	78	68
5	83	88	78	73	68	75	80	75	56	66	67	84	67	65	71	73	72	72	78	66
6																				
10	82	88	78	72	68	76	80	76	57	65	65	85	67	64	71	74	72	73	77	65
12																				
15	82	88	78	72	68	76	80	76	58	63	65	85	67	64	71	72	72	73	77	66
16																				
17												85	67							
18										62							72		76	
19																				69
20														64	71	71		72		
21																				
21.5																				
22																				

Lake Merced
South -
Pump Station

Depth	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-	Cl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	82	87	76	73	68	76	78	74	61	65	63	82	63	65	71	72	73	73	77	73
5	82	84	76	73	68	76	78	74	60	65	63	82	63	65	71	72	73	73	77	72
10	81	84	75	73	68	77	78	75	60	65	64	84	64	65	71	71	73	73	77	72
12																				
15	81	82	75	73	68	77	78	75	59	64	65	84	64	65	70	71	73	72	76	82
16																				
17													64							
18																				
19										64		85						72		
20															70	72	73		76	84
21														65						
22																				
23.2																				

Lake Merced
South - Pistol
Range

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	73	74	70	70	75	88	87	84	82	84	87	94	98		
5	73	74	70	70	75	88	88	84	82	84	87	94	97		
6															
10	73	74	70	71	75	88	88	83	82		88	94	96		
12															
15	73	74	70	71	75	90	88	83	81	83	88	94	98		
16															
17															
18	73														
19						90									
20		74	70		75		88						98		
21				71				82			88				
21.5												94			
22									81						

Lake Merced
South -
Pump Station

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**	**Cl^-**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	74	74	70	71	75	90	89	83	81	83	86	93	98		
5	74	74	70	71	75	90	88	80	81	83	86	93	98		
10	73	74	70	72	74	90	88	76	81	83	86	94	96		
12															
15	73	74	72	72	74	90	88	76	80	83	86	94	98		
16															
17															
18						90									
19															
20	73														
21		74		72	74					83	86		98		
22			72				88	76	80						
23.2												94			

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.025***		***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	0.05	***0.005***
5	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.025***		***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	0.06	***0.005***
10	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.025***		***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
14									***0.025***	***0.025***				***0.005***			***0.005***				
15	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.025***					***0.025***	***0.025***		***0.025***	***0.025***		***0.005***	***0.01***	***0.005***	***0.005***
16																					
17																					
17.4																					
17.5																					
18											***0.025***										
18.8																					
19																					
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.045***		0.16	***0.045***	***0.045***	***0.045***	***0.025***		***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	0.005	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
5	***0.045***		0.16	***0.045***	***0.045***	***0.045***	***0.025***		***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	0.005	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
9																	***0.005***				
10	***0.045***		0.16	***0.045***	***0.045***	***0.045***	***0.025***		***0.025***	***0.025***		***0.025***	***0.025***	0.005	***0.025***	***0.025***		***0.005***	***0.01***	***0.005***	***0.005***
11																					
12																					
13											***0.025***										
13.8																					
14																					
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	0.34	0.02	***0.005***	1.42	1.10	0.86	0.32	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.11	***0.005***	***0.005***	***0.005***
5	***0.005***	1.06	0.02	***0.005***	1.48	1.10	0.90	0.50	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.42	***0.005***	***0.005***	***0.005***
10	***0.005***	0.48	***0.005***	***0.005***	1.54	1.20	0.90	0.66	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.24	***0.005***	0.02	***0.005***
14																						
15	***0.005***	0.46	***0.005***	***0.005***	1.48	1.20	0.78	0.48	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.14	***0.005***	0.09	***0.005***
16															***0.005***							
17									***0.005***			***0.005***				***0.005***						
17.4																						
17.5																						
18											***0.005***		***0.005***				***0.005***	***0.005***	***0.005***	***0.005***		
18.8																						
19														***0.005***							0.13	***0.005***
19.3																						
19.9																						
20																						
20.6																						

Lake Merced
North East

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	***0.005***	1.00	0.82	1.50	0.32	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.31	***0.005***	***0.005***	***0.005***
5	***0.005***	***0.005***	***0.005***	***0.005***	1.00	0.64	0.90	0.48	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.24	***0.005***	***0.005***	***0.005***
9																						
10	***0.005***	***0.005***	0.02	***0.005***	0.64	0.66	0.86	0.48	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
11																						
12																						
13									***0.005***		***0.005***	***0.005***		***0.005***	***0.005***	***0.005***	***0.005***	***0.005***		***0.005***		
13.8																						
14													***0.005***						0.48		***0.005***	
14.1																						
14.7																						
15																						***0.005***
15.8																						

Lake Merced
North

	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.05	***0.005***	***0.005***	***0.005***	0.93	***0.005***	***0.005***	***0.005***	0.07
5	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.03	***0.005***	***0.005***	***0.005***	1.10	***0.005***	***0.005***	***0.005***	0.08
10	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.05	***0.005***	***0.005***	***0.005***	0.96	***0.005***	***0.005***	***0.005***	0.07
14																
15	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.04	***0.005***	***0.005***		0.93	***0.005***	***0.005***	***0.005***	0.10
16																
17																
17.4											***0.005***					
17.5												0.96				
18			***0.005***				***0.005***									
18.8										***0.005***						0.12
19	***0.005***	***0.005***		***0.005***	***0.005***	***0.005***		0.04								
19.3															***0.005***	
19.9														***0.005***		
20													***0.005***			
20.6									***0.005***							

Lake Merced
North East

	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	0.06	***0.005***	***0.005***	***0.005***	0.11	***0.005***	***0.005***	***0.005***	0.37	***0.005***	***0.005***	***0.005***	0.09
5	***0.005***	***0.005***	***0.005***	0.06	***0.005***	***0.005***	***0.005***	0.10	***0.005***	***0.005***	***0.005***	0.17	***0.005***	***0.005***	***0.005***	0.11
9																
10	***0.005***	***0.005***	***0.005***	0.05	***0.005***	***0.005***	***0.005***	0.12	***0.005***	***0.005***	0.02	0.63	***0.005***	***0.005***	***0.005***	0.12
11																
12																
13			***0.005***							***0.005***	0.01					
13.8															***0.005***	
14	***0.005***	***0.005***					***0.005***									
14.1												0.78				
14.7													***0.005***			0.12
15				0.05	***0.005***	***0.005***		0.10						***0.005***		
15.8									***0.005***							

D.3-65

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
5	***0.045***	***0.045***	***0.045***		***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
6				***0.045***																	
10	***0.045***	***0.045***	***0.045***		***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
12				***0.045***																	
15	***0.045***	***0.045***	***0.045***		***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***				***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
16	***0.045***	***0.045***																			
17																					
18				***0.045***								***0.025***	***0.025***								
18.2																					
18.5																					
18.9																					
19																					
20											***0.025***										
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
5	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	0.01	***0.01***	***0.005***	***0.005***
10	***0.045***	***0.045***	***0.045***		***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.025***	***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
12				***0.045***																	
15	***0.045***	***0.045***	***0.045***		***0.045***	***0.045***	***0.025***	***0.025***	***0.025***	***0.025***				***0.005***	***0.025***	***0.025***	***0.005***	***0.005***	***0.01***	***0.005***	***0.005***
16																					
17																					
18				***0.045***								***0.025***									
19													***0.025***								
19.2																					
20											***0.025***										
20.4																					
20.9																					
21																					
21.5																					
22																					
22.8																					
23.2																					

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

Depth	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Ft	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L
Surf	***0.005***	0.04	0.02	***0.005***	0.05	0.54	0.14	0.05	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
5	***0.005***	0.06	***0.005***	***0.005***	0.20	0.55	0.15	0.09	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
6																						
10	***0.005***	0.04	0.01	***0.005***	0.35	0.52	0.08	0.11	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
12																						
15	***0.005***	0.23	***0.005***	***0.005***	0.40	0.49	0.07	0.32	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
16																						
17											***0.005***	***0.005***										
18									***0.005***							***0.005***		***0.005***		***0.005***		
18.2																						
18.5																						
18.9																						
19																			***0.005***			
20													***0.005***	***0.005***	***0.005***		***0.005***				***0.005***	***0.005***
20.1																						
20.6																						
20.8																						
21																						
21.5																						
22																						

Lake Merced
South - Pump
Station

Depth	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06
Ft	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L	NO_3-N mg/L
Surf	***0.005***	0.01	0.02	***0.005***	***0.005***	0.49	0.03	0.23	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
5	***0.005***	***0.005***	0.01	***0.005***	0.62	0.48	0.35	0.11	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
10	***0.005***	***0.005***	***0.005***	***0.005***	0.44	0.46	0.05	0.31	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
12																						
15	***0.005***	0.01	***0.005***	***0.005***	0.40	0.45	0.10	0.50	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***
16																						
17												***0.005***										
18																						
19									***0.005***		***0.005***						***0.005***					
19.2																						
20														***0.005***	***0.005***	***0.005***		***0.005***	***0.005***	***0.005***		
20.4																						
20.9																						
21													***0.005***								***0.005***	
21.5																						
22																						***0.005***
22.8																						
23.2																						

Lake Merced
South - Pistol
Range

	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.06	***0.005***	***0.005***	***0.005***	***0.005***
5	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.06	***0.005***	***0.005***	***0.005***	***0.005***
6																
10	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***		***0.005***	***0.005***	***0.005***	***0.005***	0.11	***0.005***	***0.005***	***0.005***	***0.005***
12																
15	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.08	0.21	***0.005***	***0.005***	***0.005***	***0.005***
16																
17																
18																
18.2																***0.005***
18.5												0.31				
18.9															***0.005***	
19			***0.005***													
20		***0.005***		***0.005***						***0.005***						
20.1											0.15					
20.6													***0.005***			
20.8														***0.005***		
21	***0.005***				0.01			***0.005***								
21.5									***0.005***							
22						***0.005***										

Lake Merced
South - Pump
Station

	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**	**NO_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.03	***0.005***	***0.005***	***0.005***	***0.005***
5	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***		***0.005***	***0.005***	***0.005***	***0.005***
10	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.04	***0.005***	***0.005***	***0.005***	***0.005***
12																
15	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.06	***0.005***	***0.005***	***0.005***	***0.005***
16																
17																
18			***0.005***													
19																
19.2															***0.005***	
20																
20.4																***0.005***
20.9												0.14				
21	***0.005***	***0.005***					***0.005***	***0.005***		***0.005***						
21.5														***0.005***		
22				***0.005***	***0.005***	***0.005***										
22.8													***0.005***			
23.2									***0.005***							

Lake
Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf														5.30	2.13	0.90	4.26	1.70	---	2.6
5															9.64	***0.25***	0.95	1.50	---	2.9
10															4.09	0.50	1.68	1.20	---	3.0
14														3.40			2.35			
15															2.58	5.80		1.40	---	1.9
16																				
17																				
17.4																				
17.5																				
18																				
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake
Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf														9.40	5.66	0.25	2.35	1.00	---	1.9
5															3.42	0.25	1.56	1.60	---	1.6
9																	3.08			
10														6.60	3.70	1.10		1.40	---	1.8
11																				
12																				
13																				
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake
Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	23.0	10.0	2.2	1.5	8.0	4.1	11.30	5.7	10.2	6.4	6.3	4.1	4.7	5.2	1.13	7.90	1.85	3.50	6.6	NA
5	21.3	7.3	2.2	1.5	4.4	2.8	9.50	5.3	8.3	3.5	5.9	1.3	6.3	4.4	0.98	5.70	2.27	2.97	3.5	NA
10	9.0	7.8	2.4	1.6	2.9	2.0	5.50	4.4	8.1	9.1	11.4	0.6	6.9	3.8	0.84	3.80	2.07	4.48	4.5	NA
14																				
15	11.0	12.2	2.9	1.8	1.5	1.9	4.30	2.9	7.4	7.6	6.8	3.2	7.8	3.3	0.47	5.50	2.13	4.48	2.5	NA
16																3.00				
17										10.5			9.2				4.03			
17.4																				
17.5																				
18												1.1		2.4				5.88	2.8	NA
18.8																				
19															0.59					
19.3																				
19.9																				
20																				
20.6																				

Lake
Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	24.0	9.4	1.9	1.6	5.9	3.4	9.80	6.6	5.8	7.5	4.4	5.6	5.7	7.5	1.04	8.40	5.74	5.94	0.9	NA
5	10.2	6.2	2.0	1.6	4.2	2.3	3.20	5.2	1.5	18.0	13.3	3.4					3.72	7.00	6.0	NA
9																				
10	6.5	6.8	1.8	1.4	7.7	1.2	1.90	3.0	4.8	5.2	12.1	6.0	6.7	7.0	0.93	8.80	5.57	3.78	7.7	NA
11																				
12																				
13										6.3		3.5	9.9		0.71	5.3	2.80	4.59	2.8	
13.8																				
14														6.6						NA
14.1																				
14.7																				
15																				
15.8																				

Lake
Merced
North

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	3.42	1.13		1.82	3.96	4.60	2.53	1.74	2.33	2.70	2.2	0.78	2.49	2.9	4.0		3.22	3.95	1.26
5	1.51	1.15		1.86	2.86	2.62	2.65	1.81	2.73	1.50	2.1	0.93	2.69	2.8	2.6		3.16	3.95	1.32
10	2.52	0.99		1.92	4.56	2.81	2.72	1.68	2.35	1.50	2.6	0.52	2.27	2.7	2.9		2.72	6.92	2.49
14																			
15	3.36	0.99		1.85	3.19	5.94	2.62	1.27	2.41	2.20	1.8	0.56	2.18		2.3		2.91	7.48	2.58
16																			
17																			
17.4														2.1					
17.5															2.9				
18	4.54					2.42													
18.8													3.02						2.63
19		***0.45***		1.95	2.80		2.38	1.39	1.95		2.0								
19.3																		4.20	
19.9																	2.74		
20																			
20.6												1.0							

Lake
Merced
North East

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	1.06	0.45		2.25	3.56	4.62	2.02	2.1	1.57	1.50	1.4	0.36	1.79	2.6	2.7		2.97	3.92	2.91
5		0.45		1.37	3.18	3.86	2.10	1.7	2.00	2.00	1.6	0.36	2.55	2.4	2.5		2.44	4.00	0.98
9																			
10	2.02	0.45		1.43	3.05	5.85	3.40	1.7	1.89	1.60	1.6	0.57	2.07	2.4	2.2		2.32	3.42	2.55
11																			
12																			
13	1.57					4.66							1.54	2.4					
13.8																		4.06	
14		1.21		1.32	3.57					1.50									
14.1															2.7				
14.7																			2.94
15							2.21	1.2	1.99		1.5						2.27		
15.8												0.80							

Lake Merced South - Pistol Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0														3.60	7.45	***0.25***	2.91	0.97	---	1.3
5															5.36	***0.25***	0.73	1.00	---	1.3
6																				
10															5.99	0.40	1.62	1.10	---	1.4
12																				
15															4.93	1.50	1.23	0.98	---	1.3
16														2.00						
17																				
18																				
18.2																				
18.9																				
19																				
20																				
20.1																				
20.8																				
21																				
21.5																				
22																				

Lake Merced South - Pump Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf														5.70	7.62		3.59	0.97		1.4
5															6.61	1.00	5.10	1.10		1.3
10															3.70	1.50	5.43	1.20		1.3
12																				
15															2.30	0.25	8.46	1.10		1.5
16																				
17														3.40						
18																				
19																				
19.2																				
20																				
20.4																				
21																				
21.5																				
22																				
23.2																				

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced South - Pistol Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	7.9	15.0	1.9	1.1	13.8	3.3	9.10	2.6	12.0	12.7	6.4	6.5	7.9	7.5	1.16	3.70	1.88	6.16	1.8	NA
5	10.5	5.5	2.0	1.3	9.9	9.0	6.00	1.5	7.2	8.8	5.4	5.3	6.0	5.1	0.91	5.10	4.20	3.92	2.3	NA
6																				
10	9.7	8.8	1.9	1.3	7.3	1.9	1.80	2.6	5.8	6.2	4.8	2.7	7.1	4.5	0.64	6.50	2.18	6.27	2.4	NA
12																				
15	5.8	6.2	2.0	1.3	1.9	0.4	1.10	0.9	4.4	4.0	4.0	2.1	8.0	3.9	0.49	5.60	2.30	4.20	2.3	NA
16																				
17												0.60	12.8							
18										5.10							1.79		3.6	
18.2																				
18.9																				
19																				NA
20														2.6	0.30	3.20		5.82		
20.1																				
20.8																				
21																				
21.5																				
22																				

Lake Merced South - Pump Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	8.7	10.9	1.8	1.1	9.4	3.3	5.80	1.7	8.5	11.7	7.3	4.2	5.6	5.5	1.05	5.10	2.52	3.71	2.7	NA
5	3.2	9.2	1.9	1.4	7.9	9.0	18.80	8.1	28.2	9.2	14.8	2.6	7.1	5.3	0.88	5.60	3.95	3.08	2.7	NA
10	10.9	9.9	1.8	1.2	5.2	1.9	8.50	3.2	11.8	18.6	6.5	2.3	7.7	4.5	0.69	8.40	2.55	2.41	1.4	NA
12																				
15	4.9	6.0	2.1	1.2	4.4	0.4	2.20	3.1	10.6	5.9	4.9	1.7	8.7	4.0	0.50	7.00	2.80	3.64	2.4	NA
16																				
17													9.7							
18																				
19										4.50		0.90						4.48		
19.2																				
20															0.29	6.60	3.30		9.7	NA
20.4																				
21														5.1						
21.5																				
22																				
23.2																				

Lake Merced South - Pistol Range

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.95	1.16		1.78	2.7	3.58	1.4	0.90	1.37	1.50	1.4	0.47	0.84	2.3	2.6		2.60	9.16	2.13
5	2.46	1.11		0.71	3.2	2.20	4.2	1.05	2.49	1.10	1.2	0.42	1.57	2.2	2.6		1.79	3.44	2.44
6																			
10	0.95	***0.45***		0.94	2.7	2.16	2.3	1.04	1.36	1.50	1.2	0.89	1.01	2.7	2.5		1.85	3.42	2.16
12																			
15		1.16		1.55	2.4	2.10	1.6	1.06	***0.25***	1.00	1.3	0.64	1.12	2.2	2.4		1.90	3.00	2.58
16																			
17																			
18	1.12																		
18.2																			2.41
18.9																		3.28	
19						2.16									2.3				
20		***0.45***			2.4		2.2						1.15						
20.1														2.1					
20.8																	1.85		
21				1.78				0.91			1.3								
21.5												0.45							
22									1.37										

Lake Merced South - Pump Station

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**	**TKN**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	1.18	0.45		0.95	3.58	3.6	2.28	0.94	1.22	1.10	1.5	0.81	1.12	2.6	2.0		3.11	3.42	2.32
5	1.34	1.23		1.72	2.30	3.4	2.50	1.09	1.60	1.20	1.1	0.33	0.95	2.7	2.5		2.10	3.81	2.10
10	1.09	0.45		2.27	3.43	2.3	2.67	1.06	1.56	1.30	1.4	0.76	1.04	2.4	2.6		1.88	3.81	2.02
12																			
15	2.52	0.92		2.14	2.90	2.3	4.21	1.16	1.40	1.20	1.2	0.82	2.21	2.2	2.4		1.88	3.08	2.49
16																			
17																			
18						2.0													
19																			
19.2																		3.00	
20	2.35																		
20.4																			2.16
21		***0.45***		1.37	5.33					1.60	1.3		1.51	1.9	2.3				
21.5																	1.90		
22							1.57	1.62	1.57										
23.2												0.17							

Lake Merced
North

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02
	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.05	0.05	0.05	0.03	0.02		0.11		0.04	0.05	0.03	0.025	0.025		0.05	0.05	0.05	0.12	0.06	0.06	0.11	0.04
5	0.05	0.05	0.05	0.02	0.05		0.14		0.01	0.05	0.03	0.025	0.025		0.04	0.07	0.03	0.09	0.06	0.08	0.07	0.06
10	0.05	0.05	0.05	0.02	0.03		0.17		0.07	0.05	0.03	0.025	0.025		0.04	0.05	0.09	0.10	0.03	0.03	0.06	0.05
14									0.02	0.05							0.05					
15	0.13	0.66	0.05	0.04	0.02		0.20					0.025	0.025		0.05	0.24		0.04	0.04	0.05	0.09	0.04
16																						
17																						
17.4																						
17.5																						
18											0.03											
18.8																						
19																						
19.3																						
19.9																						
20																						
20.6																						

Lake Merced
North East

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02
	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N	NH_3-N
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.05		0.05	0.03	0.03		0.05		0.005	0.05	0.03	0.04	0.025		0.26	0.05	0.05	0.10	0.08	0.05	0.09	0.03
5	0.05		0.1	0.02	0.02		0.04		0.005	0.05	0.04	0.04	0.025		0.05	0.06	0.06	0.07	0.11	0.05	0.09	0.06
9																	0.05					
10	0.05		0.05	0.04	0.03		0.05		0.01	0.03		0.04	0.025		0.05	0.06		0.04	0.09	0.04	0.08	0.04
11																						
12																						
13											0.04											
13.8																						
14																						
14.1																						
14.7																						
15																						
15.8																						

Lake Merced
North

	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.10	0.08	0.31	0.13	0.09	0.11	0.01	0.12	0.03	0.03	0.09	0.09	0.09	***0.005***	0.03	0.04	0.06	0.05	0.03	***0.005***	0.03	0.04	0.07
5	0.11	0.13	0.35	0.53	0.15	0.12	0.01	0.05	0.06	0.02	0.07	0.04	0.10	0.04	0.03	0.05	0.06	0.04	0.09	0.01	0.04	0.04	0.02
10	0.10	0.06	0.31	0.18	0.21	0.06	0.01	0.04	0.11	0.05	0.06	0.06	0.08	***0.005***	0.02	0.05	0.08	0.05	0.09	0.02	0.05	0.05	0.02
14																							
15	0.10	0.07	0.36	0.12	0.16	0.10	0.01	0.08	0.10	0.02	0.02	0.04	0.11	***0.005***	0.01	0.05	0.11	0.02	0.07	0.02	0.05	0.08	0.03
16														0.04									
17								0.08			0.04				0.03								
17.4																							
17.5																							
18										0.06		0.03				0.03	0.09	0.03	0.04				
18.8																							
19													0.11							0.02	0.04	0.10	0.03
19.3																							
19.9																							
20																							
20.6																							

Lake Merced
North East

	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.05	0.03	0.22	0.08	0.19	0.10	0.005	0.03	0.03	0.03	0.03	0.04	0.11	0.01	0.01	0.02	0.05	0.06	0.02	0.03	0.15	0.07	0.13
5	0.07	0.03	0.19	0.08	0.16	0.08	0.005	0.03	0.05	0.01	0.08	0.05	0.15	0.15	0.04	0.04	0.08	0.03	0.03	0.02	0.15	0.07	0.02
9																							
10	0.06	0.07	0.29	0.12	0.09	0.09	0.005	0.28	0.03	0.02	0.06	0.03	0.10	0.06	0.04	0.05	0.07	0.03	0.06	0.03	0.13	0.06	0.12
11																							
12																							
13								0.05		0.04	0.07		0.10	0.06	0.03	0.05	0.07		0.05				
13.8																							
14												0.02						0.01		0.02		0.02	0.10
14.1																							
14.7																							
15																					0.15		
15.8																							

Lake Merced
North

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.03	0.21	0.02	0.03	0.05	0.07	0.06	0.05	0.06	0.58	0.17	0.06	0.05	0.25
5	0.10	0.25	0.02	0.04	0.05	0.06	0.03	0.10	0.08	0.60	0.04	0.05	0.04	0.30
10	0.09	0.18	***0.005***	0.02	0.05	0.06	0.05	0.11	0.09	0.64	0.07	0.05	0.02	0.27
14														
15	0.08	0.22	0.04	0.02	0.06	0.10	0.03	0.06		0.70	0.03	0.05	0.09	0.35
16														
17														
17.4									0.18					
17.5										0.78	0.78			
18	0.04			0.09	0.05									
18.8								0.11						0.37
19		0.22	0.04			0.10								
19.3													0.75	
19.9												0.04		
20											0.03			
20.6							0.03							

Lake Merced
North East

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.05	0.40	0.04	0.24	0.08	0.25	0.01	0.10	0.07	0.72	0.01	0.04	0.03	0.19
5	0.09	0.40	0.03	0.17	0.06	0.23	0.02	0.05	0.06	0.70	0.03	0.03	0.01	0.20
9														
10	0.09	0.42	0.03	0.03	0.09	0.24	0.10	0.05	0.21	0.76	0.13	0.04	0.02	0.23
11														
12														
13	0.05							0.03	0.25					
13.8													0.14	
14					0.04									
14.1										0.72				
14.7											0.02			0.22
15		0.37	0.03	0.05		0.29						0.03		
15.8							0.04							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.05	0.13	0.05	0.04	0.06		0.02	0.02	0.005	0.04	0.02	0.04	0.05		0.02	0.06	0.04	0.03	0.05	0.04	0.05	0.06
5	0.05	0.05	0.05		0.03		0.03	0.03	0.005	0.04	0.03	0.04	0.025		0.02	0.05	0.04	0.13	0.04	0.05	0.04	0.04
6				0.03																		
10	0.05	0.05	0.05		0.03		0.04	0.04	0.005	0.04	0.03	0.04	0.025		0.005	0.07	0.05	0.02	0.01	0.04	0.06	0.04
12				0.03																		
15	0.05	0.05	0.05		0.03		0.04	0.04	0.005	0.04					0.02	0.03	0.04	0.19	0.14	0.04	0.05	0.03
16	0.05	0.05																				
17																						
18				0.03								0.04	0.025									
18.2																						
18.9																						
19																						
20											0.04											
20.1																						
20.6																						
20.8																						
21																						
21.5																						
22																						

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.05	0.05	0.05	0.03	0.03		0.005	0.005	0.01	0.05	0.03	0.01	0.025		0.03	0.11	0.05	0.05	0.06	0.03	0.03	0.04
5	0.05	0.05	0.05	0.03	0.04		0.04	0.04	0.02	0.07	0.03	0.07	0.025		0.03	0.05	0.05	0.12	0.05	0.04	0.09	0.03
10	0.05	0.12	0.05		0.04		0.01	0.01	0.02	0.05	0.03	0.06	0.025		0.06	0.03	0.04	0.04	0.05	0.11	0.05	0.04
12				0.07																		
15	0.05	0.05	0.05		0.03		0.01	0.01	0.01	0.04					0.03	0.03	0.05	0.12	0.04	0.04	0.04	0.03
16																						
17																						
18				0.07								0.005										
19													0.025									
19.2																						
20											0.04											
20.4																						
21																						
21.5																						
22																						
22.8																						
23.2																						

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

Depth	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Ft	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L
0	0.11	0.13	0.03	0.04	0.07	0.16	0.005	0.06	0.04	0.04	0.02	0.02	0.03	0.04	0.02	0.01	0.02	0.07	0.04	0.02	0.03	0.05	0.08
5	0.06	0.03	0.16	0.07	0.11	0.04	0.005	0.08	0.03	0.01	0.05	0.04	0.09	0.06	0.04	0.04	0.02	0.09	0.04	0.02	0.03	0.04	0.10
6																							
10	0.03	0.03	0.05	0.07	0.11	0.05	0.04	0.04	0.03	0.04	0.06	0.03	0.07	0.07	0.03	0.03	0.02	0.08	0.03	0.02	0.04	0.05	0.06
12																							
15	0.18	0.02	0.15	0.07	0.06	0.21	0.005	0.07	0.05	0.04	0.03	0.02	0.06	0.06	0.02	0.05	0.02	0.10	0.04	0.02	0.04	0.07	0.12
16																							
17										0.03	0.02												
18								0.04							0.02		0.02		0.04				
18.2																							
18.9																							
19																		0.06					
20												***0.005***	0.06	0.03		0.03				0.04	0.04		0.03
20.1																							
20.6																							
20.8																							
21																						0.02	
21.5																							
22																							

Lake Merced
South - Pump
Station

Depth	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Ft	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L	NH_3-N mg/L
Surf	0.07	0.02	0.04	0.07	0.05	0.07	0.32	0.04	0.04	0.02	0.04	0.05	0.03	0.05	0.005	0.02	0.01	0.07	0.02	0.06	0.04	0.06	0.06
5	0.06	0.08	0.08	0.08	0.05	0.04	0.44	0.02	0.04	0.01	0.03	0.03	0.05	0.03	0.03	0.02	0.02	0.07	0.02	0.03	0.04	0.02	0.03
10	0.65	0.03	0.11	0.12	0.07	0.04	0.34	0.07	0.03	0.05	0.02	0.03	0.06	***0.005***	0.005	0.03	0.02	0.06	0.02	0.03	0.03	0.07	0.04
12																							
15	0.06	0.03	0.09	0.06	0.07	0.03	0.08	0.05	0.02	0.03	0.03	0.04	0.05	0.02	0.005	0.02	0.02	0.06	0.02	0.03	0.04	0.05	0.03
16																							
17											0.02												
18																							
19								0.05		0.04						0.02							
19.2																							
20													0.05	0.01	0.01		0.04	0.06	0.03				
20.4																							
21												0.01								0.06		0.02	0.08
21.5																							
22																					0.03		
22.8																							
23.2																							

Lake Merced
South - Pistol
Range

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.08	0.09	0.02	0.03	0.04	0.19	***0.005***	0.01	0.09	0.06	0.01	0.03	0.04	0.07
5	0.10	0.07	0.01	0.03	0.04	0.15	0.01	0.11	0.09	0.08	0.01	0.03	0.04	0.09
6														
10	0.10	0.07	0.02	0.03		0.01	***0.005***	0.04	0.07	0.06	0.01	0.02	0.05	0.06
12														
15	0.11	0.09	0.02	0.04	0.03	0.05	0.01	0.09	0.12	0.07	0.01	0.03	0.04	0.07
16														
17														
18														
18.2														0.04
18.9													0.04	
19	0.12									0.06				
20		0.09			0.03			0.02						
20.1									0.18					
20.6											0.005			
20.8												0.02		
21			0.02			0.01								
21.5							0.04							
22				0.03										

Lake Merced
South - Pump
Station

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**	**NH_3-N**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.12	0.07	0.02	0.03	0.02	0.03	***0.005***	0.08	0.09	0.04	0.01	0.04	0.05	0.08
5	0.09	0.07	0.02	0.04	0.03	0.13	***0.005***	0.11	0.08		0.005	0.04	0.06	0.08
10	0.09	0.06	0.02	0.03	0.02	0.01	0.03	0.05	0.08	0.04	0.05	0.02	0.05	0.06
12														
15	0.32	0.07	0.08	0.12	0.03	0.19	0.03	0.10	0.10	0.06	0.07	0.03	0.04	0.06
16														
17														
18	0.47													
19														
19.2													0.04	
20														
20.4														0.03
21					0.05	0.04		0.06		0.04				
21.5												0.01		
22		0.08	0.09	0.06										
22.8											0.12			
23.2							0.04							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.01***	0.12	0.07	***0.01***	0.12	0.03	***0.01***		0.08	0.05	***0.01***	0.04	0.05	0.02	***0.01***	***0.01***	0.03	0.03	***0.01***	0.08
5	***0.01***	0.13	0.07	***0.01***	0.13	0.03	***0.01***		0.08	0.05	***0.01***	0.03	0.08	0.04	***0.01***	0.03	0.03	0.05	***0.01***	0.10
10	***0.01***	0.14	0.09	***0.01***	0.12	0.03	***0.01***		0.08	0.06	***0.01***	0.04	0.05	0.03	0.03	0.04	0.03	0.04	***0.01***	0.07
14									0.09	0.05				0.03			0.05			
15	***0.01***	0.23	0.07	0.03	0.17	0.05	***0.01***					0.06	0.05		***0.01***	0.13		0.04	***0.01***	0.10
16																				
17																				
17.4																				
17.5																				
18											***0.01***									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	***0.01***		0.06	***0.01***	0.19	***0.01***	0.03		0.06	0.05	***0.01***	0.09	0.08	0.03	***0.01***	0.03	***0.005***	0.05	***0.01***	0.06
5	***0.01***		0.05	***0.01***	0.17	0.04	0.04		0.06	0.05	***0.01***	0.09	0.08	0.03	***0.01***	0.05	0.04	0.04	***0.01***	0.06
9																	0.03			
10	***0.01***		0.05	***0.01***	0.18	0.03	0.04		0.06	0.05		0.09	0.07	0.02	***0.01***	0.07		0.03	***0.01***	0.08
11																				
12																				
13											***0.01***									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.14	0.16	0.23	0.07	0.03	0.18	0.31	0.16	0.29	0.24	0.09	0.01	***0.005***	0.05	0.11	0.11	0.16	0.20	0.19	0.16	0.06
5	0.14	0.13	0.26	0.05	0.01	0.20	0.32	0.20	0.29	0.24	0.07	0.01	***0.005***	0.05	0.10	0.13	0.23	0.20	0.18	0.17	0.07
10	0.14	0.13	0.23	0.03	0.05	0.20	0.29	0.18	0.28	0.24	0.04	***0.005***	0.06	0.03	0.10	0.11	0.17	0.21	0.18	0.16	0.07
14																					
15	0.15	0.13	0.21	0.01	0.07	0.22	0.30	0.16	0.29	0.21	0.07	0.01	***0.005***	0.03	0.09	0.12	0.18	0.23	0.15	0.10	0.10
16																0.10					
17										0.25			***0.005***				0.20				
17.4																					
17.5																					
18												0.01		0.04				0.18	0.14	0.09	0.14
18.8																					
19															0.10						
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.14	0.13	0.18	0.05	0.03	0.19	0.33	0.18	0.23	0.12	0.14	0.05	0.03	0.04	0.10	0.16	0.15	0.14	0.10	0.05	0.12
5	0.13	0.10	0.18	0.04	0.03	0.19	0.32	0.18	0.28	0.20	0.18	0.03	0.02	0.03	0.35	0.16	0.18	0.14	0.09	0.06	0.09
9																					
10	0.15	0.10	0.18	0.02	0.03	0.21	0.35	0.16	0.21	0.16	0.22	0.08	0.05	0.03	0.13	0.15	0.15	0.14	0.10	0.04	0.08
11																					
12																					
13										0.20		0.05	0.02		0.21	0.14	0.13	0.16	0.08		0.04
13.8																					
14														0.10						0.03	
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.08	0.11	0.26	0.12	0.28	0.15	0.08	0.13	0.13	0.11	0.06	0.16	0.20	0.39	0.18	0.26	0.30	0.19
5	0.18	0.12	0.30	0.13	0.28	0.13	0.08	0.13	0.16	0.10	0.06	0.24	0.26	0.40	0.18	0.26	0.30	0.22
10	0.16	0.12	0.28	0.18	0.31	0.15	0.07	0.14	0.14	0.14	0.18	0.24	0.25	0.36	0.17	0.28	0.30	0.27
14																		
15	0.19	0.14	0.28	0.18	0.34	0.15	0.09	0.16	0.15	0.12	0.09	0.26		0.31	0.16	0.26	0.36	0.21
16																		
17																		
17.4													0.29					
17.5														0.40				
18					0.30				0.21									
18.8												0.18						0.22
19	0.15	0.17	0.30	0.21		0.13	0.09	0.23		0.10								
19.3																	0.33	
19.9																0.21		
20															0.13			
20.6											0.08							

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.09	0.21	0.23	0.19	0.26	0.16	0.09	0.13	0.11	0.11	0.02	0.13	0.20	0.36	0.04	0.26	0.31	0.24
5	0.09	0.20	0.24	0.20	0.25	0.14	0.09	0.13	0.13	0.10	0.04	0.17	0.20	0.30	0.06	0.22	0.32	0.23
9																		
10	0.07	0.19	0.24	0.19	0.25	0.15	0.07	0.16	0.14	0.09	0.06	0.20	0.30	0.33	0.05	0.18	0.30	0.23
11																		
12																		
13					0.25							0.16	0.32					
13.8																	0.32	
14	0.07		0.24	0.15					0.17									
14.1														0.26				
14.7															0.06			0.22
15		0.19				0.14	0.08	0.18		0.09						0.12		
15.8											0.01							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.01***	0.02	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	0.02	***0.01***	***0.01***	***0.005***	0.03	***0.01***	0.09
5	***0.01***	0.03	***0.01***		***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	0.02	***0.01***	***0.01***	***0.005***	0.03	***0.01***	0.06
6				***0.01***																
10	***0.01***	0.05	***0.01***		***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	0.04	***0.01***	***0.01***	***0.005***	0.03	***0.01***	0.09
12				***0.01***																
15	***0.01***	0.08	***0.01***		***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***				0.03	***0.01***	0.03	***0.005***	0.03	***0.01***	0.06
16	***0.01***	0.08																		
17																				
18				***0.01***								***0.01***	***0.01***							
18.2																				
18.5																				
18.9																				
19																				
20											***0.01***									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South -
Pump Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.01***	0.04	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	0.04	***0.01***	***0.01***	***0.005***	0.02	***0.01***	0.09
5	***0.01***	0.03	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	0.06	***0.01***	***0.01***	***0.005***	0.03	***0.01***	0.12
10	***0.01***	0.05	***0.01***		***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	0.04	***0.01***	***0.01***	***0.005***	0.03	***0.01***	0.07
12				***0.01***																
15	***0.01***	0.08	***0.01***		***0.01***	***0.01***	***0.01***	***0.01***	***0.01***	***0.01***				0.03	***0.01***	***0.01***	***0.005***	0.03	***0.01***	0.10
16																				
17																				
18				***0.01***								***0.01***								
19													***0.01***							
19.2																				
20											***0.01***									
20.4																				
20.9																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.08	0.09	0.15	0.11	0.10	0.04	0.15	0.10	0.12	0.06	0.08	0.11	0.03	0.10	0.11	0.07	0.13	0.10	0.09	0.11	0.07
5	0.11	0.09	0.13	0.06	0.06	0.11	0.15	0.12	0.12	0.05	0.10	0.08	0.03	0.09	0.08	0.09	0.11	0.10	0.07	0.11	0.05
6																					
10	0.10	0.06	0.18	0.01	0.03	0.10	0.12	0.10	0.13	0.07	0.09	0.11	0.02	0.09	0.08	0.12	0.10	0.09	0.04	0.13	0.04
12																					
15	0.12	0.06	0.21	0.01	0.03	0.10	0.16	0.11	0.15	0.07	0.05	0.06	0.02	0.10	0.11	0.10	0.12	0.07	0.05	0.10	0.03
16																					
17												0.08	0.01								
18										0.09							0.10		0.06		0.03
18.2																					
18.5																					
18.9																					
19																				0.11	
20														0.11	0.06	0.12		0.06			
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South -
Pump Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.11	0.10	0.17	0.02	0.07	0.06	0.13	0.09	0.13	0.09	0.13	0.02	0.04	0.07	0.12	0.12	0.08	0.02	0.08	0.10	0.03
5	0.11	0.08	0.18	0.01	0.02	0.13	0.14	0.10	0.13	0.04	0.10	0.03	0.02	0.11	0.11	0.14	0.09	0.05	0.06	0.09	0.06
10	0.12	0.10	0.15	0.02	0.01	0.10	0.09	0.09	0.14	0.06	0.09	0.14	0.03	0.10	0.11	0.11	0.09	0.05	0.04	0.11	0.06
12																					
15	0.08	0.09	0.20	0.01	0.01	0.08	0.13	0.14	0.14	0.14	0.11	0.05	0.04	0.12	0.09	0.13	0.14	0.04	0.05	0.10	0.06
16																					
17													0.05								
18																					
19										0.13		0.07						0.04			
19.2																					
20															0.11	0.12	0.07		0.02	0.08	0.07
20.4																					
20.9																					
21														0.10							
21.5																					
22																					
22.8																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.07	0.03	0.08	0.07	0.17	0.05	0.03	0.04	0.02	0.01	0.04	0.03	0.10	0.20	0.09	0.18	0.09	0.07
5	0.08	0.03	0.09	0.08	0.17	0.05	0.03	0.01	0.02	0.01	0.02	0.03	0.09	0.21	0.09	0.16	0.12	0.08
6																		
10	0.11	0.05	0.07	0.06	0.18	0.04	0.03	0.03		***0.005***	0.03	0.03	0.05	0.24	0.12	0.19	0.09	0.08
12																		
15	0.02	0.07	0.11	0.08	0.20	0.05	0.01	0.04	0.01	***0.005***	0.04	0.03	0.10	0.16	0.11	0.15	0.03	0.09
16																		
17																		
18																		
18.2																		0.13
18.5														0.16				
18.9																	0.16	
19					0.16													
20	0.08	0.05		0.08		0.02						0.04						
20.1													0.11					
20.6															0.12			
20.8																0.18		
21			0.10				0.02			0.01								
21.5											0.05							
22								0.07										

Lake Merced
South -
Pump Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**	**Orth P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.02	0.03	0.07	0.06	0.20	0.01	***0.005***	0.06	0.04	***0.005***	***0.005***	0.04	0.08	0.19	0.08	0.13	0.10	0.07
5	0.01	0.04	0.09	0.08	0.18	0.03	0.01	0.04	0.04	0.04	***0.005***	0.05	0.08		0.08	0.17	0.11	0.05
10	0.005	0.06	0.09	0.07	0.20	0.05	***0.005***	0.05	0.04	***0.005***	0.01	0.04	0.09	0.23	0.07	0.14	0.12	0.06
12																		
15	0.06	0.11	0.10	0.08	0.16	0.01	***0.005***	0.07	0.04	***0.005***	0.01	0.07	0.10	0.17	0.07	0.16	0.16	0.06
16																		
17																		
18					0.16													
19																		
19.2																	0.210	
20																		
20.4																		0.05
20.9														0.18				
21	***0.005***		0.08	0.06					0.04	***0.005***		0.07						
21.5																0.20		
22		0.10				0.02	0.01	0.06										
22.8															0.08			
23.2											0.02							

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.09	0.30	***0.005***	0.09	0.21		0.17		0.28	0.32	0.17	0.29	0.29	0.26	0.20	0.50	0.31	0.18	0.16	0.20
5	0.11	0.31	0.01	0.08	0.22		0.17		0.26	0.31	0.17	0.29	0.30	0.26	0.22	0.40	0.32	0.18	0.18	0.22
10	0.11	0.33	***0.005***	0.10	0.22		0.16		0.32	0.29	0.14	0.29	0.29	0.26	0.22	0.39	0.34	0.19	0.17	0.20
14									0.31	0.32				0.25			0.35			
15	0.10	0.41	0.02	0.12	0.28		0.15					0.30	0.33		0.23	0.52		0.19	0.18	0.25
16																				
17																				
17.4																				
17.5																				
18											0.13									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.06		***0.005***	0.07	0.19		0.19		0.22	0.27	0.22	0.30	0.32	0.25	0.25	0.34	0.36	0.16	0.10	0.19
5	0.07		***0.005***	0.08	0.19		0.19		0.24	0.27	0.24	0.29	0.30	0.27	0.24	0.41	0.30	0.18	0.16	0.19
9																	0.23			
10	0.07		***0.005***	0.08	0.23		0.20		0.23	0.30		0.32	0.44	0.20	0.24	0.45		0.13	0.17	0.19
11																				
12																				
13											0.15									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.28	0.23	0.26	0.13	0.10	0.29	0.33	0.19	0.31	0.28	0.21	0.03	0.05	0.05	0.21	0.14	0.20		0.24	0.17
5	0.28	0.25	0.27	0.12	0.14	0.31	0.32	0.22	0.29	0.31	0.21	0.03	0.04	0.05	0.15	0.13	0.26	0.23	0.25	0.18
10	0.29	0.25	0.27	0.15	0.14	0.32	0.33	0.21	0.33	0.28	0.20	0.02	0.13	0.03	0.20	0.19	0.22		0.28	0.24
14																				
15	0.27	0.22	0.26	0.15	0.10	0.36	0.41	0.21	0.32	0.28	0.18	0.07	0.12	0.05	0.12	0.18	0.21	0.29	0.30	0.22
16																0.23				
17										0.29			0.05				0.26			
17.4																				
17.5																				
18												0.07		0.07				0.24	0.30	0.19
18.8																				
19															0.13					
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.23	0.19	0.21	0.14	0.10	0.24	0.36	0.21	0.26	0.20	0.24	0.09	0.07	0.09	0.48	0.28	0.20	0.26	0.15	0.24
5	0.18	0.23	0.20	0.13	0.11	0.35	0.34	0.22	0.28	0.20	0.24	0.09	0.07	0.08	0.41	0.21	0.18	0.23	0.21	0.21
9																				
10	0.22	0.27	0.20	0.13	0.14	0.34	0.38	0.19	0.22	0.20	0.26	0.11	0.08	0.11	0.20	0.24	0.18	0.29	0.15	0.16
11																				
12																				
13										0.21		0.09	0.02		0.24	0.24	0.15	0.27	0.16	
13.8																				
14														0.21						0.18
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.18	0.15	0.15	0.35	0.36	0.34	0.25	0.19	0.30	0.31	0.18	0.16	0.26	0.37	0.39	0.29	0.37	0.52	0.31
5	0.18	0.18	0.18	0.33	0.26	0.31	0.27	0.18	0.23	0.32	0.16	0.14	0.29	0.40	0.40	0.18	0.32	0.52	0.33
10	0.20	0.18	0.16	0.29	0.32	0.31	0.26	0.18	0.32	0.37	0.17	0.23	0.24	0.40	0.39	0.19	0.33	0.52	0.33
14																			
15	0.24	0.19	0.20	0.31	0.29	0.38	0.26	0.20	0.30	0.31	0.17	0.15	0.26		0.44	0.18	0.32	0.52	0.32
16																			
17																			
17.4														0.40					
17.5															0.40				
18	0.29					0.32				0.39									
18.8													0.24						0.30
19		0.16	0.26	0.30	0.29		0.25	0.19	0.29		0.15								
19.3																		0.50	
19.9																	0.29		
20																0.17			
20.6												0.16							

Lake Merced
North East

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.19	0.23	0.23	0.27	0.24	0.27	0.25	0.19	0.34	0.31	0.12	0.14	0.22	0.34	0.36	0.14	0.30	0.46	0.29
5	0.21	0.12	0.22	0.26	0.27	0.27	0.25	0.19	0.26	0.32	0.11	0.12	0.25	0.35	0.33	0.14	0.27	0.46	0.29
9																			
10	0.20	0.12	0.20	0.24	0.30	0.25	0.27	0.17	0.35	0.33	0.12	0.13	0.31	0.37	0.35	0.16	0.21	0.48	0.32
11																			
12																			
13	0.14					0.30							0.25	0.39					
13.8																		0.52	
14		0.18		0.24	0.30					0.28									
14.1															0.34				
14.7																0.16			0.28
15			0.23				0.24	0.15	0.30		0.12						0.19		
15.8												0.11							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.08	0.25	0.03	0.05	0.08		0.07	0.18	0.16	0.25	0.19	0.18	0.20	0.13	0.14	0.22	0.19	0.10	0.11	0.15
5	0.07	0.22	0.03		0.10		0.07	0.18	0.18	0.28	0.16	0.17	0.19	0.15	0.14	0.24	0.15	0.15	0.11	0.09
6				0.06																
10	0.08	0.24	0.04		0.10		0.08	0.14	0.18	0.25	0.18	0.18	0.18	0.16	0.13	0.26	0.13	0.11	0.11	0.13
12				0.07																
15	0.08	0.28	0.03		0.07		0.08	0.11	0.16	0.21				0.17	0.13	0.28	0.18	0.27	0.11	0.10
16	0.08	0.28																		
17																				
18				0.08								0.18	0.18							
18.2																				
18.5																				
18.9																				
19																				
20											0.17									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.08	0.25	0.02	0.05	0.07		0.07	0.17	0.17	0.18	0.20	0.18	0.16	0.16	0.13	0.24	0.19	0.13	0.11	0.11
5	0.07	***0.01***	0.02	0.05	0.13		0.08	0.18	0.17	0.16	0.19	0.18	0.18	0.19	0.13	0.24	0.19	0.12	0.10	0.12
10	0.06	0.24	0.04		0.09		0.07	0.15	0.14		0.18	0.18	0.18	0.16	0.14	0.25	0.19	0.09	0.12	0.12
12				0.05																
15	0.09	0.25	0.01		0.06		0.07	0.22	0.17					0.18	0.14	0.24	0.21	0.11	0.13	0.13
16																				
17																				
18				0.06								0.17								
19													0.18							
19.2																				
20											0.17									
20.4																				
20.9																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.13	0.15	0.18	0.13	0.10	0.18	0.18	0.10	0.18	0.17	0.21	0.11	0.27	0.10	0.21	0.16	0.16	0.18	0.09	0.18
5	0.13	0.18	0.18	0.11	0.07	0.13	0.16	0.14	0.20	0.14	0.24	0.14	0.07	0.11	0.20	0.17	0.15	0.23	0.14	0.17
6																				
10	0.13	0.15	0.21	0.11	0.07	0.11	0.13	0.15	0.20	0.18	0.20	0.13	0.18	0.14	0.22	0.18	0.14	0.20	0.08	0.16
12																				
15	0.13	0.15	0.25	0.12	0.07	0.19	0.16	0.16	0.18	0.17	0.16	0.13	0.13	0.13	0.22	0.17	0.23	0.21	0.14	0.15
16																				
17												0.17	0.37							
18										0.16							0.21		0.06	
18.2																				
18.5																				
18.9																				
19																				0.18
20														0.19	0.11	0.18		0.17		
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.11	0.15	0.20	0.13	0.12	0.08	0.18	0.20	0.18	0.23	0.20	0.12	0.06	0.07	0.15	0.17	0.10	0.18	0.09	0.17
5	0.12	0.16	0.21	0.11	0.07	0.13	0.16	0.17	0.23	0.13	0.24	0.08	0.15	0.16	0.22	0.15	0.11		0.13	0.19
10	0.14	0.17	0.19	0.12	0.06	0.17	0.15	0.17	0.24	0.15	0.24	0.15	0.07	0.15	0.20	0.13	0.15	0.11	0.10	0.19
12																				
15	0.12	0.16	0.25	0.12	0.06	0.20	0.19	0.17	0.24	0.26	0.23	0.16	0.10	0.17	0.24	0.13	0.20	0.11	0.08	0.10
16																				
17													0.10							
18																				
19										0.19		0.11						0.10		
19.2																				
20															0.14	0.18	0.22		0.09	0.12
20.4																				
20.9																				
21														0.18						
21.5																				
22																				
22.8																				
23.2																				

D.3-91

Lake Merced
South - Pistol
Range

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
0	0.16	0.07	0.17	0.18	0.19	0.20	0.15	0.08	0.09	0.10	0.12	0.10	0.09	0.19	0.27	0.14	0.21	0.21	0.12
5	0.16	0.10	0.18	0.19	0.19	0.23	0.14	0.09	0.16	0.11	0.10	0.11	0.10	0.15	0.25	0.15	0.19	0.25	0.12
6																			
10	0.13	0.21	0.09	0.10	0.19	0.21	0.12	0.06	0.12		0.09	0.08	0.11	0.19	0.30	0.17	0.19	0.32	0.11
12																			
15	0.13	0.15	0.18	0.14	0.16	0.24	0.13	0.07	0.15	0.10	0.08	0.08	0.08	0.15	0.17	0.17	0.21	0.30	0.11
16																			
17																			
18	0.15																		
18.2																			0.13
18.5															0.28				
18.9																		0.19	
19						0.16													
20		0.08	0.17		0.17		0.16						0.09						
20.1														0.17					
20.6																0.12			
20.8																	0.19		
21				0.13				0.09			0.10								
21.5												0.07							
22									0.17										

Lake Merced
South - Pump
Station

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**	**Tot P**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.13	0.14	0.20	0.21	0.23	0.22	0.17	0.13	0.14	0.13	0.08	0.05	0.09	0.21	0.24	0.09	0.21	0.40	0.15
5	0.13	0.10	0.12	0.16	0.24	0.18	0.23	0.09	0.16	0.15	0.15	0.06	0.08	0.16		0.08	0.18	0.28	0.16
10	0.07	0.16	0.23	0.20	0.26	0.20	0.11	0.10	0.13	0.15	0.08	0.06	0.10	0.19	0.23	0.1	0.14	0.29	0.14
12																			
15	0.07	0.14	0.21	0.18	0.19	0.21	0.10	0.07	0.13	0.15	0.12	0.07	0.10	0.25	0.25	0.12	0.16	0.29	0.13
16																			
17																			
18						0.21													
19																			
19.2																		0.28	
20	0.08																		
20.4																			0.12
20.9															0.22				
21		0.06		0.19	0.15					0.12	0.07		0.12						
21.5																	0.20		
22			0.20				0.19	0.06	0.12										
22.8																0.11			
23.2												0.05							

Lake Merced
North

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.10	0.10	***0.05***	0.11	***0.05***	0.09	***0.05***		***0.05***	0.10	0.13	0.11	0.12	0.12	0.13	0.13	0.09	0.10	***0.05***	
5	0.10	0.10	***0.05***	0.11	***0.05***	0.10	***0.05***		***0.05***	***0.05***	0.12	0.11	0.12	0.12	0.12	0.13	0.10	0.10	***0.05***	
10	0.10	0.10	***0.05***	0.11	***0.05***	0.08	***0.05***		***0.05***	***0.05***	0.12	0.11	0.12	0.12	0.13	0.12	0.08	0.10	***0.05***	
14									***0.05***	***0.05***				0.12			0.10			
15	0.10	0.10	***0.05***	0.11	***0.05***	0.10	***0.05***					0.11	0.12		0.12	0.12		0.10	***0.05***	
16																				
17																				
17.4																				
17.5																				
18											0.13									
18.8																				
19																				
20																				
20.6																				

Lake Merced
North East

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl	Fl
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.10		***0.05***	***0.05***	***0.05***	0.08	***0.05***		***0.05***	***0.05***	0.12	0.10	0.11	0.12	***0.05***	***0.05***	0.08	0.10	***0.05***	
5	0.10		***0.05***	***0.05***	***0.05***	0.08	***0.05***		***0.05***	***0.05***	0.12	0.10	0.11	0.12	0.10	***0.05***	0.08	0.10	***0.05***	
9																	0.08			
10	***0.05***		***0.05***	***0.05***	***0.05***	0.08	***0.05***		***0.05***	***0.05***		0.10	0.10	0.12	***0.05***	***0.05***		0.10	***0.05***	
11																				
12																				
13											0.12									
14																				
14.1																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.25	0.16	0.16	0.02	0.04	0.14	0.30	0.24	0.32	0.27	0.25	0.18	0.38	0.21	0.36	0.42	0.26	0.23	0.30	0.31	0.15
5	0.25	0.20	0.22	0.18	0.07	0.16	0.30	0.21	0.30	0.27	0.29	0.19	0.38	0.23	0.36	0.37	0.26	0.26	0.30	0.34	0.15
10	0.12	0.20	0.17	0.17	0.12	0.15	0.35	0.27	0.30	0.27	0.32	0.53	0.38	0.23	0.39	0.42	0.27	0.24	0.31	0.31	0.16
14																					
15	0.18	0.18	0.17	0.17	0.09	0.16	0.32	0.26	0.30	0.25	0.26	0.31	0.39	0.24	0.37	0.42	0.27	0.28	0.30	0.31	0.20
16																0.37					
17										0.29			0.42				0.29				
17.4																					
17.5																					
18												0.18		0.24				0.26	0.30	0.30	0.19
18.8																					
19															0.43						
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**	**Fl⁻**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.22	0.17	0.09	0.17	0.09	0.16	0.28	0.19	0.31	0.29	0.27	0.13	0.37	0.23	0.42	0.15	0.27	0.28	0.30	0.30	0.25
5	0.16	0.18	0.13	0.16	0.10	0.18	0.26	0.23	0.33	0.30	0.27	0.12	0.37	0.23	0.39	0.15	0.29	0.26	0.31	0.32	0.22
9																					
10	0.15	0.18	0.12	0.15	0.12	0.13	0.27	0.22	0.32	0.30	0.28	0.14	0.37	0.22	0.41	0.15	0.27	0.24	0.32	0.30	0.24
11																					
12																					
13										0.26		0.17	0.37		0.46	0.18	0.30	0.27	0.32		0.24
14														0.25						0.32	
14.1																					
15																					
15.8																					

D.3-94

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.25	0.25	0.27	0.16	0.24	0.23	0.09	0.14	0.15	0.23	0.24	0.20		
5	0.29	0.22	0.30	0.17	0.25	0.23	0.11	0.17	0.14	0.23	0.23	0.19		
10	0.28	0.25	0.36	0.18	0.25	0.25	0.12	0.15	0.18	0.25	0.26	0.28		
14														
15	0.39	0.23	0.33	0.16	0.25	0.25	0.16	0.20	0.18	0.24	0.29	0.38		
16														
17														
17.4														
17.5														
18					0.28				0.18					
18.8												0.31		
19	0.28	0.25	0.32	0.17		0.24	0.18	0.20		0.26				
20														
20.6											0.25			

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**	**Fl$^-$**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.30	0.29	0.25	0.28	0.24	0.32	0.36	0.12	0.14	0.24	0.13	0.14		
5	0.33	0.27	0.24	0.28	0.27	0.32	0.32	0.16	0.14	0.27	0.14	0.23		
9														
10	0.33	0.27	0.30	0.27	0.21	0.32	0.28	0.15	0.16	0.25	0.19	0.30		
11														
12														
13					0.19							0.27		
14	0.36		0.30	0.28					0.16					
14.1														
15		0.28				0.32	0.38	0.18		0.22				
15.8											0.18			

Lake Merced
South - Pistol
Range

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.40	0.40	0.40	0.36	0.3	0.27	0.28	0.33	0.33	0.33	0.30	0.38	0.30	0.31	0.26	0.29	0.27	0.30	0.23	NA
5	0.40	0.40	0.40		0.3	0.27	0.28	0.33	0.34	0.34	0.29	0.37	0.30	0.30	0.27	0.29	0.27	0.30	0.21	NA
6				0.36																
10	0.40	0.40	0.40		0.3	0.27	0.28	0.33	0.33	0.33	0.29	0.37	0.30	0.32	0.27	0.28	0.27	0.30	0.22	NA
12				0.36																
15	0.40	0.40	0.40		0.3	0.27	0.28	0.33	0.34	0.33				0.31	0.26	0.29	0.27	0.30	0.23	NA
16	0.40	0.40																		
17																				
18				0.36								0.37	0.30							
19																				
20											0.28									
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

Depth	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.40	0.40	0.40	0.36	0.3	0.26	0.28	0.33	0.33	0.33	0.29	0.39	0.30	0.31	0.28	0.28	0.26	0.30	0.22	
5	0.40	0.40	0.40	0.36	0.3	0.27	0.28	0.32	0.34	0.33	0.28	0.38	0.29	0.30	0.26	0.29	0.27	0.30	0.22	
10	0.40	0.40	0.40		0.3	0.27	0.28	0.33	0.34	0.33	0.29	0.38	0.29	0.30	0.26	0.30	0.27	0.30	0.22	
12				0.36																
15	0.40	0.40	0.40		0.3	0.27	0.29	0.32	0.33	0.33				0.31	0.26	0.29	0.27	0.30	0.23	
16																				
17																				
18				0.36								0.37								
19													0.30							
20											0.29									
21																				
22																				
23.2																				

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

Depth	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.47	0.32	0.27	0.51	0.39	0.23	0.52	0.47	0.54	0.55	0.50	0.66	0.46	0.47	0.57	0.40	0.36	0.47	0.52	0.51	0.42
5	0.45	0.33	0.31	0.44	0.37	0.25	0.53	0.47	0.55	0.45	0.52	0.66	0.47	0.47	0.54	0.40	0.37	0.47	0.53	0.48	0.40
6																					
10	0.36	0.32	0.28	0.46	0.37	0.27	0.55	0.47	0.53	0.46	0.52	0.59	0.46	0.47	0.57	0.42	0.37	0.48	0.55	0.46	0.42
12																					
15	0.37	0.32	0.35	0.47	0.34	0.29	0.52	0.50	0.53	0.46	0.52	0.57	0.46	0.46	0.56	0.47	0.39	0.47	0.55	0.52	0.41
16																					
17												0.58	0.52								
18										0.48							0.39		0.51		0.45
19																				0.47	
20														0.45	0.55	0.39		0.45			
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

Depth	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-	Fl^-
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.27	0.36	0.33	0.49	0.36	0.25	0.55	0.47	0.53	0.46	0.52	0.35	0.46	0.46	0.68	0.41	0.39	0.51	0.41	0.37	0.48
5	0.27	0.34	0.32	0.48	0.35	0.28	0.55	0.49	0.54	0.48	0.52	0.35	0.47	0.47	0.60	0.40	0.40	0.48	0.43	0.34	0.50
10	0.37	0.34	0.35	0.48	0.37	0.25	0.54	0.49	0.53	0.46	0.50	0.37	0.48	0.50	0.60	0.40	0.43	0.49	0.43	0.37	0.50
12																					
15	0.36	0.33	0.35	0.49	0.35	0.30	0.57	0.47	0.51	0.48	0.49	0.35	0.50	0.49	0.62	0.37	0.41	0.48	0.43	0.38	0.51
16																					
17													0.43								
18																					
19										0.50		0.36						0.45			
20															0.61	0.38	0.41		0.45	0.38	0.49
21														0.49							
22																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.39	0.44	0.31	0.32	0.38	0.34	0.39	0.35	0.45	0.41	0.25	0.34		
5	0.57	0.43	0.33	0.34	0.41	0.37	0.39	0.37	0.44	0.41	0.33	0.33		
6														
10	0.48	0.41	0.33	0.33	0.37	0.36	0.39	0.37		0.44	0.30	0.34		
12														
15	0.48	0.43	0.32	0.35	0.43	0.38	0.40	0.41	0.45	0.43	0.25	0.36		
16														
17														
18														
19					0.42									
20	0.40	0.42		0.32		0.39						0.34		
21			0.35				0.41			0.42				
21.5											0.26			
22								0.41						

Lake Merced
South - Pump
Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**	**Fl^-**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.36	0.43	0.32	0.32	0.42	0.38	0.46	0.46	0.44	0.44	0.28	0.35		
5	0.43	0.44	0.33	0.34	0.43	0.40	0.46	0.42	0.47	0.45	0.27	0.38		
10	0.40	0.47	0.30	0.33	0.42	0.39	0.45	0.41	0.47	0.48	0.33	0.37		
12														
15	0.39	0.45	0.36	0.35	0.42	0.41	0.45	0.39	0.46	0.46	0.27	0.36		
16														
17														
18					0.48									
19														
20														
21	0.51		0.38	0.32					0.45	0.44		0.36		
22		0.44				0.38	0.44	0.39						
23.2											0.27			

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	9.5	9.1	10.2	7.7	9.7		7.7		9.6	8.7	7.3	8.7	8.2	20.8	6.9	7.9	12.1	5.8	7.9	7.5
5	9.8	9.3	15.4	8.2	9.7		8.0		9.9	13.2	7.2	9.9	8.1	17.1	6.9	7.4	12.8	5.9	8.3	6.8
10	9.2	9.2	12.3	8.4	9.4		8.2		9.6	8.8	7.3	9.2	8.3	23.9	7.1	7.8	14.5	5.9	9.1	6.7
14									9.5	7.4				24.4			12.8			
15	9.0	9.3	15.1	8.0	9.7		8.2					8.9	8.0		6.9	7.3		5.8	8.5	6.1
16																				
17																				
17.4																				
17.5																				
18											7.2									
18.8																				
19																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	7.9		7.0	6.6	8.4		7.4		7.9	15.6	6.6	8.2	7.1	19.6	6.1	9.6	***5.0***	4.4	7.0	5.3
5	7.7		7.9	6.7	8.2		7.3		8.5	4.8	6.7	8.0	9.3	35.6	6.7	8.6	***5.0***	4.5	7.6	5.5
9																	***5.0***			
10	7.3		7.3	6.8	8.3		7.7		8.1	61.1		9.3	7.4	19.9	6.5	7.7		4.5	6.5	5.4
11																				
12																				
13											6.4									
14																				
14.1																				
15																				
15.8																				

D.3-99

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	7.6	9.2	8.7	7.6	7.6	6.4	6.9	6.6	7.1	8.7	7.3	7.9	10.8	19.5	12.5	8.1	9.6	9.0	7.1	
5	7.5	8.5	8.4	7.6	7.2	6.4	6.8	6.5	7.3	8.1	7.6	8.2	10.5	20.1	12.4	7.8	8.7	8.6	7.2	
10	7.5	8.6	10.4	7.5	7.6	6.2	7.0	6.8	7.2	8.5	7.7	8.9	10.9	19.8	12.8	7.6	8.5	8.7	7.4	
14																				
15	7.3		9.7	7.5	7.7	6.2	6.6	7.0	7.7	8.4	7.8	9.1	11.2	20.2	13.3	8.0	8.3	8.6	7.4	
16																				
17										9.2			6.8				7.5			
17.4																				
17.5																				
18												8.5						7.8	7.2	
18.8																				
19															12.3					
20																				
20.6																				

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	6.6	7.9	7.6	6.6	7.4	5.6	6.2	6.1	7.6	7.8	6.2	7.6	12.1	20.0	17.2	8.7	9.5	9.4	8.4	
5	6.2	7.4	7.1	6.2	6.5	5.7	6.6	6.1	7.3	7.6	6.1	6.9	10.8	19.0	16.2	8.2	8.4	8.5	6.8	
9																				
10	6.5		6.9	6.1	6.8		6.4	6.2	9.1	8.6		7.0	6.0		15.0	8.3	7.5	6.8		
11																				
12																				
13										8.7		7.5	6.5		13.5	7.3	7.4	7.4		
14																				
14.1																				
15																				
15.8																				

Lake Merced
North

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	7.1	6.3	7.9	8.12	12.8	9.2	8.4	9.2	13.0	10.2	10.0	10.3	12.4		
5	7.4	6.6	7.8	9.40	10.6	8.5	7.5	9.3	10.9	10.9	10.0	10.1	12.4		
10	6.9	6.7	7.3	8.07	13.6	8.6	7.9	9.1	13.7	11.0	10.8	10.3	11.6		
14															
15	6.9	6.8	7.6	7.82	13.1	8.7	8.0	9.1	16.2	10.9	9.2	10.4	13.4		
16															
17															
17.4															
17.5															
18	7.4					9.8				13.7					
18.8													11.2		
19		6.7	7.7	8.07	10.3		8.2	8.6	12.3		10.7				
20															
20.6												9.7			

Lake Merced
North East

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	8.4	6.7	8.0	8.45	11.7	14.6	8.9	10.4	12.0	11.1	9.3	8.6	13.4		
5	7.8	6.2	7.5	9.28	14.0	10.7	7.7	8.2	10.8	12.2	7.3	10.0	11.6		
9															
10	6.7	6.3	7.8	5.80	9.9	9.7	7.6	8.6	9.9	11.7	8.2	9.9	9.9		
11															
12															
13	7.0					8.7							10.9		
14		6.4		8.25	10.0					10.7					
14.1															
15			7.8				8.2	8.7	9.6		8.2				
15.8												11.4			

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	6.2	15.4	8.2	5.9	6.7		5.6	7.1	7.5	9.6	5.8	7.5	6.6	16.3	5.1	7.6	10.2	5.0	6.4	5.9
5	6.5	12.7	7.5		6.8		5.9	6.5	7.5	8.9	6.0	7.3	6.6	27.0	5.9	7.0	***5.0***	5.4	6.9	6.3
6				7.1																
10	6.5	13.8	10.3		6.4		5.8	6.6	7.1	9.5	6.0	8.0	6.7	20.6	5.4	6.3	***5.0***	4.9	7.1	6.0
12				5.6																
15	6.4	10.0	8.3		6.5		7.0	6.5	9.2	9.7				15.4	5.9	5.3	***5.0***	4.7	6.5	
16	7.3																			
17																				
18				6.6								8.1	7.2							
19																				
20											6.3									
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	9.0	12.3	9.5	5.4	6.7		6.0	6.6	7.4	11.7	6.2	6.9	6.7	15.2	5.3	6.5	***5.0***	5.0	7.1	5.5
5	6.3	14.1	7.2	6.5	6.8		6.1	6.6	7.1	12.5	6.3	7.5	7.2	15.5	5.6	5.9	***5.0***	5.0	6.8	5.7
10	6.1	9.3	7.0		6.4		5.8	6.6	7.6	14.1	6.3	7.3	6.8	11.2	5.6	5.4	10.1	4.8	6.3	5.6
12				5.5																
15	6.3	9.8	9.5		6.5		6.4	6.4	7.6	10.8				16.4	5.6	5.8	***5.0***	4.7	6.1	5.7
16																				
17																				
18				6.2								6.6								
19													7.3							
20											6.2									
21																				
22																				
23.2																				

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	6.1	7.2	6.9	5.5	5.7	5.0	4.6	5.2	4.7	5.7	5.1	5.5	6.8	14.5	8.6	5.3	5.8	5.6	4.4	
5	6.3	7.1	7.2	5.6	5.7	5.1	4.8	4.7	4.7	5.7	4.8	5.2	7.2	18.0	10.4	5.0	5.7	5.3	4.4	
6																				
10	6.0	7.3	7.0	5.8	5.0	4.9	4.8	4.6	5.2	5.9	4.8	4.9	6.6	15.1	9.2	5.0	5.3	5.3	4.4	
12																				
15		6.8	7.2	5.4			4.8		4.6				7.2	13.4	8.7	5.4	5.4	5.8	4.2	
16																				
17												6.2	4.6							
18										6.1							5.4		4.0	
19																				
20																5.4		5.4		
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	5.6	7.3	7.1	5.5	4.6	4.8	4.2	4.6		5.5	5.9	5.0	6.2	10.8		6.0	5.7	4.9	4.3	
5	6.1	7.0	7.2	5.6	5.5	4.8	4.7	4.6	4.7	5.9	5.8	5.0	6.8	14.5		5.1	5.1	6.9	4.3	
10	6.0	7.1	3.5	5.5	4.8	4.3	5.3	4.5	4.5	5.6	5.6	5.6	6.1	13.7		5.8	5.2	5.5	4.4	
12																				
15	5.6	7.1	3.4	5.5	4.7	4.4	4.7	4.6	4.5	5.4	5.3	6.3	6.6	12.2		5.5	5.2	5.2	4.3	
16																				
17													4.4							
18																	5.2			
19										7.0		6.2						5.8		
20																			4.3	
21																				
22																				
23.2																				

Lake Merced
South - Pistol
Range

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	5.1	4.8	4.7	7.93	12.3	7.2	5.9	6.2	9.9	8.1	9.5	8.3	9.25		
5	***2.5***	4.4	5.0	6.98	8.9	6.9	5.3	6.1	8.1	7.8	10.0	7.0	8.98		
6															
10	***2.5***	4.2	5.2	8.22	8.8	6.8	7.2	6.1	18.6	7.0	9.0	8.9	9.16		
12															
15	***2.5***	4.3	4.8	7.21	10.2	6.0	5.4	6.0	13.9	7.1	9.3	8.6	8.89		
16															
17															
18	4.9														
19						5.9									
20		5.1	5.3		7.6		5.6						9.14		
21				6.33				7.9		7.7	9.5				
21.5												8.7			
22									8.0						

Lake Merced
South - Pump
Station

	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**	**TOC**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***2.5***	4.2	4.7	8.38	8.6	7.3	7.3	7.1	10.0	10.6	8.0	9.3	8.56		
5	***2.5***	4.4	5.0	5.99	9.7	6.7	6.4	6.4	11.0	7.8	9.3	9.2	7.56		
10	***2.5***	4.3	5.2	6.59	11.0	6.3	5.4	6.4	7.4	8.4	8.2	7.1	8.56		
12															
15	5.3	4.5	4.8	6.01	9.6	5.9	5.4	6.4	7.6	7.5	8.6	9.1	8.94		
16															
17															
18						5.9									
19															
20	4.9														
21		4.7		6.68	7.6					7.6	7.9		7.37		
22			5.8				5.2	6.2	9.4						
23.2												7.5			

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.02		0.03	0.03	0.04	0.03	0.06	0.07	0.09	***0.005***	***0.005***	0.05	***0.005***	***0.005***
5																				
10							0.04		0.05	0.04		0.03	0.07	0.08	0.07	***0.005***	***0.005***	0.06	***0.005***	***0.005***
14																				
15																				
16																				
17																				
17.4																				
17.5																				
18											0.08									
18.8																				
19																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.04		0.05	0.05	0.06	0.05	0.07	0.10	0.08	***0.005***	***0.005***	0.04	***0.005***	***0.005***
5																				
9																	***0.005***			
10							0.08		0.07	0.07		0.48	0.09	0.10	0.10	***0.005***		0.05	0.01	***0.005***
11																				
12																				
13											0.17									
14																				
14.1																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.06	0.03	0.17	0.04	0.02	0.16	***0.005***	0.05	0.05	***0.005***	***0.005***	0.04	0.30
5																					
10	***0.005***	***0.005***	0.02		***0.005***	***0.005***	***0.005***	***0.005***	0.06				0.15	0.18		0.02	0.08	***0.005***			
14																					
15				***0.005***							0.25										
16																					
17										0.06											
17.4																					
17.5																					
18												0.13							***0.005***	***0.005***	0.10
18.8																					
19															***0.005***						
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.01	***0.005***	0.19	0.04	0.07	0.03	***0.005***	0.03	0.07	***0.005***	0.03	0.04	0.10
5																					
9																					
10	***0.005***	0.01	***0.005***	0.01	***0.005***	***0.005***	***0.005***	***0.005***	0.01		0.20		0.04	0.08		0.02	0.14	0.07			
11																					
12																					
13										0.02		0.07			***0.005***				0.02		0.20
14																				0.04	
14.1																					
15																					
15.8																					

D.3-106

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.02	***0.005***	0.10	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.02	0.07	0.04	0.02		
5														
10														
14														
15														
16														
17														
17.4														
17.5														
18					***0.005***				0.04					
18.8												0.08		
19	0.02	***0.005***	0.04	***0.005***		***0.005***	0.03	***0.005***		0.09				
20														
20.6											0.07			

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.02	***0.005***	0.03	0.01	0.05	0.07	0.05	***0.005***	0.03	0.13	0.11	0.05		
5														
9														
10														
11														
12														
13					***0.005***							0.04		
14	0.04		0.03	0.02					0.03					
14.1														
15		***0.005***				0.05	0.04	***0.005***		0.19				
15.8											0.09			

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.02	0.01	0.05	0.05	0.05	0.01	0.05	0.07	0.06	***0.005***	***0.005***	0.02	***0.005***	***0.005***
5																				
6																				
10							0.03	0.02	0.14	0.05		0.02	0.08	0.08	0.08	***0.005***	***0.005***	0.04	***0.005***	0.02
12																				
15																				
16																				
17																				
18																				
19																				
20											0.14									
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.02	0.01	0.02	0.14	0.07	0.02	0.05	0.07	0.07	***0.005***	***0.005***	0.01	***0.005***	***0.005***
5																				
10							0.03	0.01	0.04	0.07		0.02	0.05	0.09	0.07	0.11	***0.005***	0.08	***0.005***	***0.005***
12																				
15																				
16																				
17																				
18																				
19																				
20											0.06									
21																				
22																				
23.2																				

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	0.01	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.01	0.05	***0.005***	***0.005***	0.01	0.03
5																					
6																					
10	***0.005***	***0.005***	***0.005***		***0.005***	***0.005***	***0.005***	***0.005***	***0.005***				***0.005***	0.03		0.01	0.07	***0.005***			
12																					
15				0.02							***0.005***										
16																					
17												0.01									
18										***0.005***									***0.005***		0.07
19																				0.01	
20															***0.005***						
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	***0.005***	0.01	0.05	***0.005***	***0.005***	***0.005***	***0.005***
5																					
10	***0.005***	***0.005***	***0.005***		***0.005***	***0.005***	***0.005***	***0.005***	***0.005***				0.01	0.06		***0.005***	0.04	***0.005***			
12																					
15				***0.005***							***0.005***										
16																					
17																					
18																					
19										***0.005***		0.01									
20															***0.005***				***0.005***	***0.005***	0.07
21																					
22																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.01	***0.005***	0.03	***0.005***	***0.005***	0.04	0.02	***0.005***	0.01	0.02	0.03	***0.005***		
5														
6														
10														
12														
15														
16														
17														
18														
19					***0.005***									
20	***0.005***	***0.005***		0.01		0.05						0.01		
21			0.05				***0.005***		0.01	0.03				
21.5											0.03			
22								***0.005***						

Lake Merced
South - Pump
Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**	**Fe**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	***0.005***	***0.005***	0.11	0.01	0.08	0.05	0.01	***0.005***	0.01	0.04	0.05	0.06		
5														
10														
12														
15														
16														
17														
18					***0.005***									
19														
20														
21	***0.005***		0.11	0.02					0.01	0.06		0.03		
22						0.07	0.04	***0.005***						
23.2											0.04			

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.07		0.15	0.10	0.25	0.20	0.13	0.10	0.05	0.13	0.14	0.08	0.09	0.10
5																				
10							0.07		0.17	0.10		0.19	0.13	0.11	0.06	0.13	0.13	0.08	0.12	0.10
14																				
15																				
16																				
17																				
17.4																				
17.5																				
17.8																				
18											0.33									
18.8																				
19																				
19.3																				
19.9																				
20																				
20.6																				

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.10		0.13	0.11	0.24	0.26	0.16	0.09	0.05	0.11	0.14	0.07	0.09	0.10
5																				
9																	0.26			
10							0.11		0.13	0.12		0.33	0.16	0.10	0.06	0.18		0.07	0.10	0.12
11																				
12																				
13											0.19									
13.8																				
14																				
14.1																				
14.7																				
15																				
15.8																				

Lake Merced
North

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.11	***0.005***	0.11	0.05	0.08	0.09	0.22	0.08	0.23	0.18	0.17	0.04	0.04	0.03	0.06	0.18	0.07	0.16	0.08	0.07	0.05
5																					
10	0.11	***0.005***	0.12		0.09	0.12	0.21	0.08	0.24				0.04	0.03		0.17	0.12	0.17			
14																					
15				0.05							0.19										
16																					
17										0.21											
17.4																					
17.5																					
17.8																					
18												0.08							0.09	0.07	0.05
18.8																					
19															0.57						
19.3																					
19.9																					
20																					
20.6																					

Lake Merced
North East

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.13	0.18	0.11	0.08	0.15	0.15	0.17	0.12	0.14	0.16	0.12	0.05	0.07	0.12	0.11	0.21	0.11	0.15	0.07	0.13	0.08
5																					
9																					
10	0.14	0.20	0.09	0.08	0.17	0.27	0.19	0.11	0.17		0.12		0.06	0.09		0.21	0.17	0.10			
11																					
12																					
13										0.20		0.07			0.28				0.08		0.09
13.8																					
14																				0.16	
14.1																					
14.7																					
15																					
15.8																					

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.04	0.07	0.17	0.20	0.29	0.08	0.22	0.13	0.06	0.07	0.14	0.07	0.09	0.145	0.02	0.13	0.085	0.07
5																		
10																		
14																		
15																		
16																		
17																		
17.4													0.39					
17.5																		
17.8														0.171				
18					0.36				0.34									
18.8												0.06						0.09
19	0.05	0.25	0.28	0.21		0.08	0.31	0.49		0.07								
19.3																		
19.9																0.18		
20															0.1			
20.6											***0.005***							

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.09	0.23	0.14	0.18	0.23	0.11	0.16	0.15	0.07	0.09	***0.005***	0.10	0.10	0.130	0.1	0.07	0.09	
5																		
9																		
10																		
11																		
12																		
13					0.18							0.12						
13.8																		
14	0.11		0.15	0.20					0.12									
14.1														0.138				
14.7															0.09			0.07
15		0.24				0.12	0.19	0.25		0.09						0.1		
15.8											***0.005***							

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.03	0.05	0.11	0.05	0.12	0.10	0.11	0.06	0.02	0.03	0.04	0.04	0.03	0.04
5																				
6																				
10							0.04	0.05	0.13	0.07		0.13	0.12	0.06	0.02	0.03	0.04	0.05	0.03	0.04
12																				
15																				
16																				
17																				
18																				
18.2																				
18.5																				
18.9																				
19																				
20											0.11									
20.1																				
20.6																				
20.8																				
21																				
21.5																				
22																				

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf							0.03	0.05	0.11	0.08	0.13	0.09	0.10	0.06	0.02	0.03	0.04	0.04	0.03	0.04
5																				
10							0.03	0.05	0.11	0.09		0.10	0.10	0.06	0.02	0.04	0.05	0.05	0.03	0.04
12																				
15																				
16																				
17																				
18																				
19																				
19.2																				
20											0.13									
20.4																				
20.9																				
21																				
21.5																				
22																				
22.8																				
23.2																				

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
South - Pistol
Range

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.05	0.14	0.10	0.05	0.04	0.06	0.12	0.04	0.04	0.03	0.07	0.02	0.03	0.02	0.03	0.08	0.03	0.04	0.04	0.04	0.04
5																					
6																					
10	0.05	0.08	0.10		0.03	0.05	0.12	0.04	0.04				0.02	0.01		0.08	0.07	0.04			
12																					
15				0.05							0.07										
16																					
17												0.03									
18										0.05									0.04		0.04
18.2																					
18.5																					
18.9																					
19																				0.04	
20															0.14						
20.1																					
20.6																					
20.8																					
21																					
21.5																					
22																					

Lake Merced
South - Pump
Station

	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.04	0.07	0.07	0.05	0.03	0.05	0.11	0.04	0.03	0.03	0.07	0.02	0.03	0.02	0.04	0.08	0.03	0.04	0.04	0.03	0.03
5																					
10	0.04	0.08	0.08		0.04	0.06	0.12	0.04	0.03				0.03	0.02		0.08	0.06	0.04			
12																					
15				0.05							0.08										
16																					
17																					
18																					
19										0.06		0.03									
19.2																					
20															0.18				0.04	0.03	0.03
20.4																					
20.9																					
21																					
21.5																					
22																					
22.8																					
23.2																					

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.04	0.04	0.07	0.17	0.10	0.04	0.05	0.05	0.02	0.02	0.31	0.02	0.07	0.034	0.01	0.11	0.054	0.03
5																		
6																		
10																		
12																		
15																		
16																		
17																		
18																		
18.2																		0.03
18.5														0.061				
18.9																		
19					0.11													
20	0.03	0.04		0.19		0.04						0.01						
20.1													0.15					
20.6															0.01			
20.8																0.04		
21			0.10				0.04		0.03	0.02								
21.5											0.02							
22								0.06										

Lake Merced
South - Pump
Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**	**Mn**
Ft	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Surf	0.03	0.03	0.07	0.18	0.13	0.04	0.03	0.06	0.01	0.02	0.03	0.03	0.08	0.046	0.01	0.03	0.051	0.03
5																		
10																		
12																		
15																		
16																		
17																		
18					0.30													
19																		
19.2																		
20																		
20.4																		0.03
20.9														0.040				
21	0.03		0.09	0.20					0.02	0.02		0.04	0.14					
21.5																0.06		
22						0.04	0.05	0.05										
22.8															0.05			
23.2											0.02							

Lake Merced
North

Depth Ft	15-May-97 MTBE ug/L	10-Sep-97 MTBE ug/L	3-Dec-97 MTBE ug/L	16-Mar-98 MTBE ug/L	8-Jul-98 MTBE ug/L	23-Sep-98 MTBE ug/L	17-Mar-99 MTBE ug/L	21-Jun-99 MTBE ug/L	15-Sep-99 MTBE ug/L	8-Dec-99 MTBE ug/L	21-Mar-00 MTBE ug/L	21-Jun-00 MTBE ug/L	9-Aug-00 MTBE ug/L	19-Dec-00 MTBE ug/L	7-Mar-01 MTBE ug/L	20-Jun-01 MTBE ug/L	1-Oct-01 MTBE ug/L	18-Dec-01 MTBE ug/L	5-Mar-02 MTBE ug/L	30-Apr-02 MTBE ug/L
Surf	0.6	***0.25***	***0.25***	***0.25***	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.50	***0.25***	2.1	***0.025***	***0.25***	***0.25***
5	0.7	***0.25***	***0.25***																	
10	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.50	***0.25***	1.9	***0.025***	***0.25***	***0.25***
14																				
15	***0.25***	***0.25***	***0.25***																	
16																				

Lake Merced
North East

Depth Ft	15-May-97 MTBE ug/L	10-Sep-97 MTBE ug/L	3-Dec-97 MTBE ug/L	16-Mar-98 MTBE ug/L	8-Jul-98 MTBE ug/L	23-Sep-98 MTBE ug/L	17-Mar-99 MTBE ug/L	21-Jun-99 MTBE ug/L	15-Sep-99 MTBE ug/L	8-Dec-99 MTBE ug/L	21-Mar-00 MTBE ug/L	21-Jun-00 MTBE ug/L	9-Aug-00 MTBE ug/L	19-Dec-00 MTBE ug/L	7-Mar-01 MTBE ug/L	20-Jun-01 MTBE ug/L	1-Oct-01 MTBE ug/L	18-Dec-01 MTBE ug/L	5-Mar-02 MTBE ug/L	30-Apr-02 MTBE ug/L
Surf	***0.25***		***0.25***	***0.25***	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.60	***0.25***	***0.25***	***0.025***	***0.25***	***0.25***
5	***0.25***		***0.25***																	
9																	***0.25***			
10	***0.25***		***0.25***	***0.25***	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.50	***0.25***		***0.025***	***0.25***	***0.25***
15																				
16																				

Lake Merced
South - Pistol
Range

Depth Ft	15-May-97 MTBE ug/L	10-Sep-97 MTBE ug/L	3-Dec-97 MTBE ug/L	16-Mar-98 MTBE ug/L	8-Jul-98 MTBE ug/L	23-Sep-98 MTBE ug/L	17-Mar-99 MTBE ug/L	21-Jun-99 MTBE ug/L	15-Sep-99 MTBE ug/L	8-Dec-99 MTBE ug/L	21-Mar-00 MTBE ug/L	21-Jun-00 MTBE ug/L	9-Aug-00 MTBE ug/L	19-Dec-00 MTBE ug/L	7-Mar-01 MTBE ug/L	20-Jun-01 MTBE ug/L	1-Oct-01 MTBE ug/L	18-Dec-01 MTBE ug/L	5-Mar-02 MTBE ug/L	30-Apr-02 MTBE ug/L
Surf	0.7	***0.25***	0.6	1.9	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.70	***0.25***	***0.25***	***0.025***	0.9	***0.25***
5	0.8	***0.25***	0.6																	
6																				
10	0.7	***0.25***	0.6	2.0	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.70	***0.25***	***0.25***	***0.025***	0.8	***0.25***
15	0.9	***0.25***	0.6																	
16	0.8	***0.25***																		

Lake Merced
South -
Pump Station

Depth Ft	15-May-97 MTBE ug/L	10-Sep-97 MTBE ug/L	3-Dec-97 MTBE ug/L	16-Mar-98 MTBE ug/L	8-Jul-98 MTBE ug/L	23-Sep-98 MTBE ug/L	17-Mar-99 MTBE ug/L	21-Jun-99 MTBE ug/L	15-Sep-99 MTBE ug/L	8-Dec-99 MTBE ug/L	21-Mar-00 MTBE ug/L	21-Jun-00 MTBE ug/L	9-Aug-00 MTBE ug/L	19-Dec-00 MTBE ug/L	7-Mar-01 MTBE ug/L	20-Jun-01 MTBE ug/L	1-Oct-01 MTBE ug/L	18-Dec-01 MTBE ug/L	5-Mar-02 MTBE ug/L	30-Apr-02 MTBE ug/L
Surf	0.7	***0.25***	0.5	1.9	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.68	***0.25***	***0.25***	***0.025***	0.8	***0.25***
5	0.7	***0.25***	0.6																	
10	0.7	***0.25***	0.6	1.9	***0.25***				***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	0.68	***0.25***	***0.25***	***0.025***	0.8	***0.25***
15	0.8	***0.25***	0.6																	

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

Lake Merced
North

Depth Ft	18-Jun-02 MTBE ug/L	23-Aug-02 MTBE ug/L	23-Oct-02 MTBE ug/L	11-Feb-03 MTBE ug/L	14-May-03 MTBE ug/L	15-Jul-03 MTBE ug/L	30-Sep-03 MTBE ug/L	2-Dec-03 MTBE ug/L	27-May-04 MTBE ug/L	29-Aug-04 MTBE ug/L	27-Oct-04 MTBE ug/L	9-Dec-04 MTBE ug/L	9-Feb-05 MTBE ug/L	18-Apr-05 MTBE ug/L	23-Jun-05 MTBE ug/L	17-Aug-05 MTBE ug/L	28-Sep-05 MTBE ug/L	31-Oct-05 MTBE ug/L	29-Nov-05 MTBE ug/L	29-Dec-05 MTBE ug/L	23-Jan-06 MTBE ug/L
Surf	***0.25***	***0.25***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***
5																					
10	***0.25***	***0.25***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***													
14																					
15																					
16									***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***

Lake Merced
North East

Depth Ft	18-Jun-02 MTBE ug/L	23-Aug-02 MTBE ug/L	23-Oct-02 MTBE ug/L	11-Feb-03 MTBE ug/L	14-May-03 MTBE ug/L	15-Jul-03 MTBE ug/L	30-Sep-03 MTBE ug/L	2-Dec-03 MTBE ug/L	27-May-04 MTBE ug/L	29-Aug-04 MTBE ug/L	27-Oct-04 MTBE ug/L	9-Dec-04 MTBE ug/L	9-Feb-05 MTBE ug/L	18-Apr-05 MTBE ug/L	23-Jun-05 MTBE ug/L	17-Aug-05 MTBE ug/L	28-Sep-05 MTBE ug/L	31-Oct-05 MTBE ug/L	29-Nov-05 MTBE ug/L	29-Dec-05 MTBE ug/L	23-Jan-06 MTBE ug/L
Surf	***0.25***	***0.25***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***
5																					
9																					
10	***0.25***	***0.25***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***
15																					
16																					

Lake Merced
South - Pistol
Range

Depth Ft	18-Jun-02 MTBE ug/L	23-Aug-02 MTBE ug/L	23-Oct-02 MTBE ug/L	11-Feb-03 MTBE ug/L	14-May-03 MTBE ug/L	15-Jul-03 MTBE ug/L	30-Sep-03 MTBE ug/L	2-Dec-03 MTBE ug/L	27-May-04 MTBE ug/L	29-Aug-04 MTBE ug/L	27-Oct-04 MTBE ug/L	9-Dec-04 MTBE ug/L	9-Feb-05 MTBE ug/L	18-Apr-05 MTBE ug/L	23-Jun-05 MTBE ug/L	17-Aug-05 MTBE ug/L	28-Sep-05 MTBE ug/L	31-Oct-05 MTBE ug/L	29-Nov-05 MTBE ug/L	29-Dec-05 MTBE ug/L	23-Jan-06 MTBE ug/L
Surf	***0.25***	***0.25***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***
5																					
6																					
10	***0.25***	***0.25***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***
15																					
16																					

Lake Merced
South -
Pump Station

Depth Ft	18-Jun-02 MTBE ug/L	23-Aug-02 MTBE ug/L	23-Oct-02 MTBE ug/L	11-Feb-03 MTBE ug/L	14-May-03 MTBE ug/L	15-Jul-03 MTBE ug/L	30-Sep-03 MTBE ug/L	2-Dec-03 MTBE ug/L	27-May-04 MTBE ug/L	29-Aug-04 MTBE ug/L	27-Oct-04 MTBE ug/L	9-Dec-04 MTBE ug/L	9-Feb-05 MTBE ug/L	18-Apr-05 MTBE ug/L	23-Jun-05 MTBE ug/L	17-Aug-05 MTBE ug/L	28-Sep-05 MTBE ug/L	31-Oct-05 MTBE ug/L	29-Nov-05 MTBE ug/L	29-Dec-05 MTBE ug/L	23-Jan-06 MTBE ug/L
Surf	***0.25***	***0.025***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***
5									***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***
10	***0.25***	***0.025***	***0.25***	0.5	***0.25***	***0.25***	***0.25***	***0.25***													
15																					

Lake Merced
North

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08
Depth Ft	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L
Surf	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***		
5													
10											***0.25***		
14													
15										***0.25***			
16	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***				

Lake Merced
North East

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	27-Dec-07	28-Mar-08	10-Jun-08		
Depth Ft	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L
Surf	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***		
5													
9													
10	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***		
15													
16													

Lake Merced
South - Pistol
Range

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	27-Dec-07	28-Mar-08	10-Jun-08		
Depth Ft	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L
Surf	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***		
5													
6													
10	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***		
15													
16													

Lake Merced
South -
Pump Station

	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	27-Dec-07	28-Mar-08	10-Jun-08		
Depth Ft	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L	**MTBE** ug/L
Surf	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***		
5	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***	***0.25***				
10										***0.25***	***0.25***		
15													

Lake Merced
North

Bacteriological Data (MPN)	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Total Coliform														
E. Coli														

Lake Merced
North East

Bacteriological Data (MPN)	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Total Coliform														
E. Coli														

Lake Merced
South - Pistol
Range

Bacteriological Data (MPN)	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Total Coliform														
E. Coli														

Lake Merced
South - Pump
Station

Bacteriological Data (MPN)	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Total Coliform														
E. Coli														

Lake Merced
North

Bacteriological Data (MPN)	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04
Total Coliform				1109	1986	1300		1120	437	1120	756	2419	1733	>2419
E. Coli				34	14	17		62	63	13	6	9	22	19

Lake Merced
North East

Bacteriological Data (MPN)	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04
Total Coliform				2419	>2419	>2419		1203	2419	2419	2419	2419	2419	>2419
E. Coli				13	36	11		25	11	7	7	10	15	12

Lake Merced
South - Pistol
Range

Bacteriological Data (MPN)	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04
Total Coliform				1203	1046	1120		649	436	344	770	2419	1986	197
E. Coli				15	14	6		336	22	15	26	48	53	4

Lake Merced
South - Pump
Station

Bacteriological Data (MPN)	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04
Total Coliform				1414	1120	1046		488	365	153	1203	2419	727	309
E. Coli				23	37	35		82	32	3	15	39	65	7

Lake Merced
North

Bacteriological Data (MPN)	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06
Total Coliform	7	11,000	>2419	>2419	124	354	1414	>2419	629	2419	579	691	179	2419	1986	510	>2420	>2420
E. Coli	135	200	35	2	33	25	26	5	4	20	18	8	21	17	46	7	5	20

Lake Merced
North East

Bacteriological Data (MPN)	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06
Total Coliform	>2419	8,130	2419	1120	2419	1046	1986	>2419	437	1986	>2419	>2419	>2419	914	2419	689	>2420	>2420
E. Coli	52	100	8	20	5	50	<1	5	1	13	38	1	10	2	34	3	5	5

Lake Merced
South - Pistol
Range

Bacteriological Data (MPN)	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06
Total Coliform	649	2690.0	2419	920	530.0	249.0	N/A	358	722	1733	755	501.0	921.0	1733.0	>2419	687.0	513	816
E. Coli	33	100.0	81	4	10.0	30.0	N/A	20	84	99	28	7.0	17.0	15.0	5.0	33.0	3	13

Lake Merced
South - Pump
Station

Bacteriological Data (MPN)	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06
Total Coliform	479	2260.0	1986	1986	420.0	299.0	109	110	687	1300	1300	436.0	816.0	1733.0	549.0	378.0	1300	687
E. Coli	23	100.0	99	2	20.0	10.0	16	12	37	78	56	13.0	29.0	13.0	11.0	41.0	18	59

Lake Merced
North

Bacteriological Data (MPN)	29-Mar-07	26-Jun-07	20-Aug-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Total Coliform	1553	96	>2419	437	272	516	>2420	534	961	1046	>2420
E. Coli	16	4	285	28	3	35	20	59	17	4	22

Lake Merced
North East

Bacteriological Data (MPN)	29-Mar-07	26-Jun-07	20-Aug-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Total Coliform	>2420	361	>2419	>2420	1986	2420	>2420	2420	>2420	579	1120
E. Coli	6	3	5	9	6	1	108	16	7	5	4

Lake Merced
South - Pistol
Range

Bacteriological Data (MPN)	29-Mar-07	26-Jun-07	20-Aug-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Total Coliform	1300.0	286	756	>2420	830	>2420	1120	727	530	517	961
E. Coli	47.0	5	34	91	11	33.0	37.0	27.0	11	15	10

Lake Merced
South - Pump
Station

Bacteriological Data (MPN)	29-Mar-07	26-Jun-07	20-Aug-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Total Coliform	1120.0	284	866	***2420***	1414		914	411	173	260	>2420
E. Coli	93.0	12	10	81	7		75	24	4	7	17

Lake Merced North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.							1,769		3,258	938	1,749	6,995	2,492	1,414	1,183	3,250	5,293	2,191	1209	4523	6,231
5																					
10							2,312		3,131	2,003	1,166	5,997	2,332	1,863	1,206	2,647	5,427	1,863	663	3853	5,963

Lake Merced North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.							2,834		4,085	1,126	1,983	2,117	1,956	1,956	2,013	3,082	3,953	2,827	1089	2198	3,853
5																					
10							2,908		3,333	1,172	1,869	2,090	2,660	1,863	1,997	2,580	3,886	1,668	1283	2198	3,035

Lake Merced South - Pistol Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.							1,360	2,054	3,852	1,045	1,467	2,405	2,144	972	600	1,179	2,278	1,206	472	1266	~1600*
5																					
10							1,347	2,032	3,493	1,065	1,320	2,486	2,050	817	553	1,132	2,345	1,407	429	1240	N/A

Lake Merced South - Pump Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.							1,253	2,016	6,705	1,253	1,769	3,719	2,144	737	700	1,199	2,613	1,655	442	1374	1,554
5																					
10							1,474	2,118	5,233	1,079	1,621	2,573	1,923	864	683	1,085	2,546	1,206	402	1280	1,467

Lake Merced North

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	1,943	3260	1219	6,834	4,389	4,221	2435	650	2117	4288	851	1146	1099	1293	4858	5461	2385	2874	2198	3,317	9,514
5																					
10	2,312	2358	1441	6,499	4,556	3,551	2147	637	1923	4523	1698	1501	1025	1407	5327	3987	2720	2171	3229	3,219	5,561

Lake Merced North East

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	1,997	2422	1528	3,082	2,399	5,729	2569	1,374	1816	2714	1491	2332	3417	1179	2982	3719	2412	1876	4255	2,389	2,352
5																					
10	1,910	2152	1635	3,618	2,204	3,886	2335	1,585	1695	2613	1521	2372	3243	1347	3819	3276	2955	1970	3920	2,750	4,757

Lake Merced South - Pistol Range

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	2,472	1,826	750	2,144	2,278	2,915	1,782	1,183	N/A	1534	1695	985	1360.1	1635	2258	4824.0	2559	1467	1186	1,350	7,973
5																					
10	2,184	1,836	858	1,702	1,977	3,109	1,394	1,116	2358	2030	992	911	1206.0	1970	1956	4924.5	2486	1387	1367	1,273	2,178

Lake Merced South - Pump Station

	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	2,513	2,191	757	2,037	2,064	3,109	1,374	1,226	2841	1923	995	1072	1139.0	1829	1809	4422.0	2640	1387	1079	1,554	2,131
5																					
10	2,298	2,334	750	2,037	2,023	2,325	1,732	1,484	2486	1461	905	992	1058.6	2231	2137	4891.0	2613	1367	1427	1,065	2,037

Lake Merced North

	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	4167	2117		4248	3162	1080	3377	4074	2137
5					3109	1072	3292	3404	2131
10	4308	2171		4020					

Lake Merced North East

	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	2466	2265		3886	2061	1166	2442	3176	3618
5					1560	1110	2602	2908	3430
10	2312	2760		3417					

Lake Merced South - Pistol Range

	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	2586.2	929	1376.9	1420	2117	777	1276	2533	1414
5					2262	683	1265	2452	1160
10	3430.4	1063	1450.6	1313					

Lake Merced South - Pump Station

	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**	**Algal Biomass**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	3001.6	990	1363.5	1487	2841	683	1260	2131	1809
5					3832	563	1284	1997	1487
10	3229.4	1142	1373.5	1394					

Lake Merced
North

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Depth							**Chlorophyll a**		**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft							☞g/L		µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
Surf.							26.4		48.6	14.0	26.1	104.4	37.2	21.1	17.7
5															
10							34.5		46.7	29.9	17.4	89.5	34.8	27.8	18.0

Lake Merced
North East

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Depth							**Chlorophyll a**		**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft							☞g/L		µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
Surf.							42.3		61.0	16.8	29.6	31.6	29.2	29.2	30.1
5															
10							43.4		49.8	17.5	27.9	31.2	39.7	27.8	29.8

Lake Merced
South - Pistol
Range

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Depth							**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft							☞g/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
Surf.							20.3	30.7	57.5	15.6	21.9	35.9	32.0	14.5	9.0
5															
10							20.1	30.3	52.1	15.9	19.7	37.1	30.6	12.2	8.3

Lake Merced
South - Pump
Station

	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01
Depth							**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft							☞g/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	mg/L	µg/L
Surf.							18.7	30.1	100.1	18.7	26.4	55.5	32.0	11.0	10.5
5															
10							22.0	31.6	78.1	16.1	24.2	38.4	28.7	12.9	10.2

Lake Merced
North

	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	mg/L	mg/L	ppb	ppb	mg/L	ppb	mg/L	µg/L	ppb	µg/L	ppb	µg/L	µg/L	µg/L
Surf.	48.5	79.0	32.7	18.1	67.5	93.0	29.0	48.7	18.2	102.0	65.5	63.0	36.4	9.7	31.6
5															
10	39.5	81.0	27.8	9.9	57.5	89.0	34.5	35.2	21.5	97.0	68.0	53.0	32.1	9.5	28.7

Lake Merced
North East

	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	mg/L	mg/L	ppb	ppb	mg/L	ppb	mg/L	µg/L	ppb	µg/L	ppb	µg/L	µg/L	µg/L
Surf.	46.0	59.0	42.2	16.3	32.8	57.5	29.8	36.2	22.8	46.0	35.8	85.5	38.4	20.5	27.1
5															
10	38.5	58.0	24.9	19.2	32.8	45.3	28.5	32.1	24.4	54.0	32.9	58.0	34.9	23.7	25.3

Lake Merced
South - Pistol
Range

	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	mg/L	mg/L	ppb	ppb	mg/L	ppb	mg/L	µg/L	ppb	µg/L	ppb	µg/L	µg/L	µg/L
Surf.	17.6	34.0	18.0	7.1	18.9	~24*	36.9	27.3	11.2	32.0	34.0	43.5	26.6	17.7	N/A
5															
10	16.9	35.0	21.0	6.4	18.5	N/A	32.6	27.4	12.8	25.4	29.5	46.4	20.8	16.7	35.2

Lake Merced
South - Pump
Station

	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	mg/L	mg/L	ppb	ppb	mg/L	ppb	mg/L	µg/L	ppb	µg/L	ppb	µg/L	µg/L	µg/L
Surf.	17.9	39.0	24.7	6.6	20.5	23.2	37.5	32.7	11.3	30.4	30.8	46.4	20.5	18.3	42.4
5															
10	16.2	38.0	18.0	6.0	19.1	21.9	34.3	34.8	11.2	30.4	30.2	34.7	25.9	22.2	37.1

Lake Merced
North

	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	64.0	12.7	9.9	3.3	17.7	41.1	36.6	7.7	24.2	45.4	17.1	16.4	19.3	72.5	81.5
5															
10	67.5	25.4	10.6	3.6	14.6	39.7	28.2	7.2	26.6	42.0	22.4	15.3	21.0	79.5	59.5

Lake Merced
North East

	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	40.5	22.3	16.0	27.8	26.7	51.0	27.7	6.4	31.2	77.5	34.8	51.0	17.6	44.5	55.5
5															
10	39.0	22.7	15.8	22.1	24.1	46.4	34.1	7.4	31.1	42.8	35.4	48.4	20.1	57.0	48.9

Lake Merced
South - Pistol
Range

	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	22.9	25.3	7.6	12.8	30.3	21.8	23.7	5.4	19.7	29.4	14.7	20.3	24.4	33.7	72.0
5															
10	30.3	14.8	7.0	13.0	32.1	21.6	23.3	4.8	21.4	32.2	13.6	18.0	29.4	29.2	73.5

Lake Merced
South - Pump
Station

	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05	29-Dec-05	23-Jan-06	01-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	28.7	14.9	7.0	13.7	27.1	19.5	27.0	4.7	26.7	30.2	16.0	17.0	27.3	27.0	66.0
5															
10	21.8	13.5	7.0	14.5	27.7	23.5	26.0	4.8	19.9	34.5	14.8	15.8	33.3	31.9	73.0

Lake Merced
North

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**		**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	35.6	42.9	32.8	49.5	142.0	62.2	31.6		63.4	47.2	16.1	50.4	60.8	31.9
5										46.4	16.00	49.1	50.8	31.8
10	40.6	32.4	48.2	48.1	83.0	64.3	32.4		60.0					

Lake Merced
North East

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**		**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L		µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	36.0	28.0	63.5	35.7	35.1	36.8	33.8		58.0	30.8	17.4	36.4	47.4	54.0
5										23.3	16.6	38.8	43.4	51.2
10	44.1	29.4	58.5	41.1	71.0	34.5	41.2		51.0					

Lake Merced
South - Pistol
Range

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	38.2	21.9	17.7	20.2	119.0	38.6	13.9	20.6	21.2	31.6	11.6	19.0	37.8	21.1
5										33.8	10.2	18.9	36.6	17.3
10	37.1	20.7	20.4	19.0	32.5	51.2	15.9	21.7	19.6					

Lake Merced
South - Pump
Station

	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**	**Chlorophyll a**
Ft	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Surf.	39.4	20.7	16.1	23.2	31.8	44.8	14.8	20.4	22.2	42.4	10.2	18.8	31.8	27.0
5										57.2	8.4	19.2	29.8	22.2
10	39.0	20.4	21.3	15.9	30.4	48.2	17.0	20.5	20.8					

Plankton Count - Dominant Species (>98% of total population)

Lake Merced North

15-May-97			10-Sep-97			3-Dec-97			16-Mar-98			8-Jul-98			17-Mar-99		
Organism	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./m^3**	**No./mL**
Oscillatoria	160,000,000	160	Oscillatoria	320,000,000	320	Oscillatoria	1,200,000,000	1,200	Oscillatoria	410,000,000	410	Oscillatoria (1:100 dilution)	1,500,000,000	1,500	Oscillatoria	1,100,000,000	1,100
Anabaena	15,000,000	15	Anabaena	280,000	0.280	Copepod	19,000	0.019	Mougeotia	4,100,000	4.100	Anabaena	10,000,000	10	Anabaena	1,000,000	1
Melosira	8,000,000	8	Melosira	41,000	0.041	Rotifer	19,000	0.019	Nauplius	86,000	0.086	Copepod	89,000	0.089	Spirulina	440,000	0.440
Spondylosium	4,000,000	4	Copepod	41,000	0.041	Cladoceran	19,000	0.019	Copepod	35,000	0.035	Rotifer	13,000	0.013	Rotifer	230,000	0.230
Nauplius Larva	95,000	0.095	Nauplius Larva	25,000	0.025	**Total**	1,200,057,000	1,200	**Total**	414,221,000	414	Nauplius	13,000	0.013	Closterium	140,000	0.140
Rotifer	68,000	0.068	**Total**	320,387,000	320							**Total**	1,510,115,000	1,510	Copepoda	92,000	0.092
Copepod	55,000	0.055													Mougeotia	23,000	0.023
Fragilaria	55,000	0.055													Epithemia	23,000	0.023
Total	187,273,000	187													**Total**	1,101,948,000	1,102

Lake Merced North East

15-May-97			10-Sep-97			3-Dec-97			16-Mar-98			8-Jul-98			17-Mar-99		
Organism	**No./cuM**	**No./mL**				**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./m^3**	**No./mL**
Oscillatoria	430,000,000	430				Oscillatoria	370,000,000	370	Oscillatoria	240,000,000	240	Oscillatoria (1:100 dilution)	1,700,000,000	1,700	Oscillatoria	2,200,000,000	2,200
Melosira	22,000,000	22				Mougeotia	3,400,000	3	Rotifer	130,000	0	Anabaena	1,300,000	1	Rotifer	180,000	0
Anabaena	15,000,000	15				Ankistrodesmus	870,000	1	Anabaena	78,000	0	Copepod	140,000	0	Closterium	78,000	0
Spondylosium	7,400,000	7				Copepod	310,000	0	Copepod	65,000	0	Nauplius	60,000	0	Nauplius	52,000	0
Rotifer	100,000	0				Rotifer	85,000	0	**Total**	240,273,000	240	**Total**	1,701,500,000	1,702	Cladoceran	52,000	0
Copepod	100,000	0				Cladoceran	56,000	0							Mougeotia	52,000	0
Total	474,600,000	475				**Total**	374,721,000	375							Synedra	26,000	0
															Anabaena	26,000	0.026
															Total	2,200,466,000	2,200

Lake Merced North

21-Jun-99	15-Sep-99			8-Dec-99			21-Mar-00			21-Jun-00		
	Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
	Oscillatoria	1,900,000,000	1,900	*Oscillatoria*	1,100,000,000	1,100	*Oscillatoria*	1,800,000,000	1,800	*Oscillatoria*	550,000,000	550
	Anabaena	1,800,000	2	*Mougeotia*	410,000	0.410	*Mougeotia*	3,039,244	3	*Anabaena*	35,000,000	35
	Gomphosphaeria	770,000	1	*Closterium*	170,000	0.170	*Melosira*	1,823,546	2	*Melosira*	8,200,000	8
	Mougeotia	640,000	1	Rotifer	69,000	0.069	*Anabaena*	1,823,546	2	*Synedra*	490,000	0.490
	Anacystis	470,000	0.470	Naviculoid Diatom	69,000	0.069	*Closterium*	1,215,698	1.216	*Mougeotia*	230,000	0.230
	Closterium	430,000	0.430	*Cymbella*	69,000	0.069	*Fragilaria*	607,849	0.608	*Chlorella*	210,000	0.210
	Spirulina	210,000	0.210	Copepoda	34,000	0.034	*Copepoda*	607,849	0.608	*Ankistrodesmus*	110,000	0.110
	Mallomonas	170,000	0.170	*Mallomonas*	34,000	0.034	*Rhizolenia*	607,849	0.608	*Coelosphaerium*	61,000	0.061
	Naviculoid Diatom	130,000	0.130	*Scenedesmus*	34,000	0.034	*Synedra*	607,849	0.608	*Scenedesmus*	61,000	0.061
	Scenedesmus	85,000	0.085	*Coelastrum*	34,000	0.034	*Closteridium*	607,849	0.608	Rotifera	46,000	0.046
	Tetraedron	85,000	0.085	*Anabaena*	34,000	0.034	**Total**	1,810,941,278	1,811	Copepoda	31,000	0.031
	Fragilaria	85,000	0.085	**Total**	1,100,957,000	1,101				Nauplius	31,000	0.031
	Paramecium	43,000	0.043							*Navicula*	31,000	0.031
	Pediastrum	43,000	0.043							*Cymbella*	15,000	0.015
	Cladoceran	43,000	0.043							*Stephanodiscus*	15,000	0.015
	Selenastrum	43,000	0.043							*Closteriopsis*	15,000	0.015
	Total	1,905,047,000	1,905							**Total**	626,000	595

Lake Merced North East

21-Jun-99	15-Sep-99			8-Dec-99			21-Mar-00			21-Jun-00		
	Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
	Oscillatoria	1,300,000,000	1,300	*Oscillatoria*	1,600,000,000	1,600	*Oscillatoria*	3,100,000,000	3,100	*Oscillatoria*	1,300,000,000	1,300
	Mougeotia	2,600,000	3	*Closterium*	690,000	1	*Melosira*	8,200,000	8	*Anabaena*	16,000,000	16
	Anabaena	560,000	1	*Mougeotia*	430,000	0	*Mougeotia*	5,700,000	6	*Melosira*	6,900,000	7
	Anacystis	530,000	1	Nauplius	170,000	0	*Synedra*	3,300,000	3	*Ankistrodesmus*	860,000	1
	Closterium	450,000	0	*Synedra*	130,000	0	*Anabaena*	2,400,000	2	*Synedra*	740,000	1
	Naviculoid Diatom	260,000	0	*Anabaena*	130,000	0	*Gleocystis*	820,000	1	*Mougeotia*	520,000	1
	Ankistrodesmis	230,000	0	*Spirulina*	87,000	0	**Total**	3,120,420,000	3,120	*Chlorella*	360,000	0
	Copepoda	190,000	0	*Closteridium*	87,000	0				*Cymbella*	140,000	0
	Nauplius	150,000	0	*Scenedesmus*	43,000	0				*Scenedesmus*	120,000	0
	Cymbella	150,000	0	*Cymbella*	43,000	0				*Fragilaria*	72,000	0
	Fragilaria	110,000	0	Copepoda	43,000	0				*Polyplelephanides*	48,000	0
	Actinastrum	75,000	0	*Actinastrum*	43,000	0				*Coelosphaerium*	48,000	0
	Pediastrum	38,000	0	Rotifer	43,000	0				*Stephanodiscus*	48,000	0
	Scenedesmus	38,000	0	*Coelosphaerium*	43,000	0				*Gomphoneis*	24,000	0
	Ostrocoda	38,000	0	**Total**	432,000	0				*Closterium*	24,000	0
	Mallomonas	38,000	0							*Closteriopsis*	24,000	0
	Rotifer	38,000	0							**Total**	1,325,928,000	1,326
	Total	525,000	1									

Lake Merced North

9-Aug-00			19-Dec-00			7-Mar-01			20-Jun-01			1-Oct-01		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,900,000,000	1,900	*Oscillatoria* (20/1 dilution)	1,600,000,000	1,600	*Oscillatoria*	1,800,000,000	1,800	*Oscillatoria*	1,200,000,000	1,200	*Oscillatoria*	2,700,000,000	2,700
Melosira	6,600,000	7	*Melosira*	1,400,000	1,400	*Melosira*	1,600,000	2	*Anabaena*	14,000,000	14	*Melosira*	970,000	1
Anabaena	2,800,000	3	*Mougeotia*	1,100,000	1,100	Rotifera	300,000	0.300	*Melosira*	1,600,000	2	*Anabaena*	600,000	1
Ankistrodesmus	280,000	0.280	*Closterium*	370,000	0.370	*Scenedesmus*	250,000	0.250	*Synedra*	1,200,000	1	*Closterium*	340,000	0.340
Coelosphaerium	170,000	0.170	*Anabaena*	250,000	0.250	*Ankistrodesmus*	220,000	0.220	*Ankistrodesmus*	160,000	0.160	*Ankistrodesmus*	300,000	0.300
Nauplius	130,000	0.130	*Ankistrodesmus*	250,000	0.250	*Closterium*	190,000	0.190	*Closterium*	110,000	0.110	*Coelosphaerium*	150,000	0.150
Mougeotia	87,000	0.087	*Scenedesmus*	120,000	0.120	Copepoda	82,000	0.082	*Fragilaria*	90,000	0.090	*Copepoda*	150,000	0.150
Rotifera	43,000	0.043	Naviculoid Diatom	120,000	0.120	*Anabaena*	55,000	0.055	Copepoda	45,000	0.045	*Scenedesmus*	75,000	0.075
Closteriopsis	22,000	0.022	Copepoda	120,000	0.120	*Synedra*	55,000	0.055	*Staurastrum*	22,000	0.022	*Nauplius*	38,000	0.038
Stephanodiscus	22,000	0.022	**Total**	1,603,730,000	1,604	Nauplius	55,000	0.055	*Cyclotella*	22,000	0.022	*Rotifera*	38,000	0.038
Staurastrum	22,000	0.022				*Cymbella*	27,000	0.027	Nauplius	22,000	0.022	**Total**	2,702,661,000	2,703
Copepoda	22,000	0.022				*Ceratium*	27,000	0.027	*Coelosphaerium*	22,000	0.022			
Pediastrum	22,000	0.022				**Total**	1,802,861,000	1,803	**Total**	1,217,293,000	1,217			
Scenedesmus	22,000	0.022												
Total	842,000	1,910												

Lake Merced North East

9-Aug-00			19-Dec-00			7-Mar-01			20-Jun-01			1-Oct-01		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,800,000,000	1,800	*Oscillatoria* (20/1 dilution)	1,400,000,000	1,400	*Oscillatoria*	4,800,000,000	4,800	*Oscillatoria*	2,000,000,000	2,000	*Oscillatoria*	2,600,000,000	2,600
Melosira	10,000,000	10	*Mougeotia*	4,100,000	4	*Ankistrodesmus*	730,000	0.730	*Anabaena*	12,000,000	12	*Melosira*	4,100,000	4
Anabaena	3,300,000	3	*Melosira*	1,600,000	2	Rotifera	380,000	0.380	*Melosira*	4,800,000	5	*Ankistrodesmus*	1,900,000	2
Ankistrodesmus	1,600,000	2	*Ankistrodesmus*	570,000	1	*Melosira*	270,000	0.270	*Synedra*	2,700,000	3	Rotifera	160,000	0.160
Mougeotia	280,000	0	*Closterium*	460,000	0	*Synedra*	190,000	0.190	*Ankistrodesmus*	1,100,000	1.100	Nauplius	120,000	0.120
Closterium	250,000	0	*Cyclotella*	230,000	0	*Staurastrum*	120,000	0.120	*Closterium*	400,000	0.400	*Cymbella*	120,000	0.120
Nauplius	140,000	0	*Anacystis*	110,000	0	*Scenedesmus*	77,000	0.077	*Cyclotella*	400,000	0.400	*Closterium*	120,000	0.120
Scenedesmus	110,000	0	Rotifera	110,000	0	Nauplius	38,000	0.038	*Ophiocytium*	130,000	0.130	Copepoda	120,000	0.120
Synedra	84,000	0	Nauplius	110,000	0	*Closterium*	38,000	0.038	Copepoda	130,000	0.130	*Anabaena*	41,000	0.041
Rotifera	84,000	0	Naviculoid Diatom	110,000	0	*Stephanodiscus*	38,000	0.038	Nauplius	100,000	0.100	*Aphanizomenon*	41,000	0.041
Cymbella	56,000	0	*Zygnema*	110,000	0	Copepoda	38,000	0.038	*Fragilaria*	67,000	0.067	**Total**	2,606,722,000	2,607
Ophiocytium	56,000	0	*Gloeocystis*	110,000	0	**Total**	4,801,919,000	4,802	Rotifera	67,000	0.067			
Coelosphaerium	56,000	0	*Stephanodiscus*	110,000	0				*Sphaerocystis*	33,000	0.033			
Closteriopsis	56,000	0	**Total**	1,407,730,000	1,408				*Staurastrum*	33,000	0.033			
Navicula	56,000	0							*Scenedesmus*	33,000	0.033			
Copepoda	28,000	0							**Total**	2,021,993,000	2,022			
Nematoda	28,000	0												
Total	1,816,184,000	1,816												

Lake Merced North

18-Dec-01			5-Mar-02			30-Apr-02			18-Jun-02			23-Aug-02		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,100,000,000	1,100	*Oscillatoria (50:1 dil)*	960,000,000	960	*Oscillatoria*	1,300,000,000	1,300	*Oscillatoria*	580,000,000	580	*Oscillatoria(50:1dil)*	1,000,000,000	1,000
Melosira	2,000,000	2	*Anabaena*	380,000	0.380	*Anabaena*	82,000,000	82	*Anabaena*	19,000,000	19	*Anabaena*	1,100,000	1
Ankistrodesmus	230,000	0.230	*Nauplius*	230,000	0.230	*Melosira*	17,000,000	17	*Melosira*	3,500,000	4	*Mougeotia*	1,000,000	1
Closterium	210,000	0.210	*Rotifera*	140,000	0.140	*Ankistrodesmus*	1,100,000	1	*Synedra*	400,000	0.400	*Melosira*	310,000	0.310
Anabaena	100,000	0.100	*Ankistrodesmus*	110,000	0.110	*Closterium*	980,000	1	*Closterium*	290,000	0.290	Rotifera	280,000	0.280
Fragilaria	63,000	0.063	*Synedra*	67,000	0.067	*Cyclotella*	46,000	0.046	*Ankistrodesmus*	230,000	0.230	*Coelosphaerium*	280,000	0.280
Copepoda	21,000	0.021	*Copepoda*	67,000	0.067	Copepoda	46,000	0.046	Copepoda	90,000	0.090	Nauplius	130,000	0.130
Epithemia	21,000	0.021	*Stephanodiscus*	45,000	0.045	Nauplius	23,000	0.023	*Cyclotella*	90,000	0.090	Copepoda	100,000	0.100
Nauplius	21,000	0.021	*Closterium*	45,000	0.045	*Fragilaria*	23,000	0.023	Nauplius	72,000	0.072	*Closterium*	77,000	0.077
Total	1,102,666,000	1,103	*Mallomonas*	23,000	0.023	*Staurastrum*	23,000	0.023	Rotifera	18,000	0.018	Cladocera	26,000	0.026
			Staurastrum	23,000	0.023	*Ceratium*	23,000	0.023	**Total**	603,690,000	604	*Anacystis*	26,000	0.026
			Cladocera	23,000	0.023	Rotifera	23,000	0.023				*Gloeocystis*	26,000	0.026
			Scenedesmus	23,000	0.023	*Epithemia*	23,000	0.023				*Navicula*	26,000	0.026
			Fragilaria	23,000	0.023	**Total**	1,401,310,000	1,401				*Scenedesmus*	26,000	0.026
			Anacystis	23,000	0.023							**Total**	1,006,814,000	1,007
			Total	961,222,000	961									

Lake Merced North East

18-Dec-01			5-Mar-02			30-Apr-02			18-Jun-02			23-Aug-02		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,800,000,000	1,800	*Oscillatoria (50:1 dil)*	1,800,000,000	1,800	*Oscillatoria*	1,900,000,000	1,900	*Oscillatoria*	3,500,000,000	3,500	*Oscillatoria (20:1 dil)*	1,300,000,000	1,300
Melosira	6,300,000	6	*Melosira*	1,900,000	2	*Melosira*	73,000,000	73	*Anabaena*	18,000,000	18	*Melosira*	2,100,000	2
Ankistrodesmus	1,500,000	2	*Rotifera*	660,000	0.660	*Anabaena*	7,500,000	8	*Melosira*	16,000,000	16	*Mougeotia*	1,500,000	2
Closterium	300,000	0.300	*Closterium*	540,000	0.540	*Closterium*	1,600,000	2	*Synedra*	820,000	0.820	*Anabaena*	690,000	0.690
Rotifera	130,000	0.130	*Ankistrodesmus*	370,000	0.370	*Ankistrodesmus*	1,200,000	1.200	*Ankistrodesmus*	620,000	0.620	*Ankistrodesmus*	240,000	0.240
Fragilaria	67,000	0.067	*Nauplius*	250,000	0.250	Rotifera	340,000	0.340	*Closterium*	270,000	0.270	*Closterium*	180,000	0.180
Staurastrum	67,000	0.067	*Stephanodiscus*	210,000	0.210	Copepoda	300,000	0.300	Rotifera	140,000	0.140	Cladocera	120,000	0.120
Nauplius	34,000	0.034	*Copepoda*	170,000	0.170	*Coelosphaerium*	110,000	0.110	*Staurastrum*	100,000	0.100	Rotifera	120,000	0.120
Total	1,808,398,000	1,808	*Anacystis*	83,000	0.083	Nauplius	75,000	0.075	Nauplius	100,000	0.100	*Mallomonas*	90,000	0.090
			Anabaena	42,000	0.042	*Scenedesmus*	75,000	0.075	Copepoda	34,000	0.034	*Synedra*	90,000	0.090
			Synedra	42,000	0.042	*Cymbella*	37,000	0.037	**Total**	3,536,084,000	3,536	Copepoda	90,000	0.090
			Scenedesmus	42,000	0.042	*Epithemia*	37,000	0.037				*Coelosphaerium*	90,000	0.090
			Gloeocystis	42,000	0.042	*Synedra*	37,000	0.037				*Ceratium*	30,000	0.030
			Total	1,804,351,000	1,804	**Total**	1,984,311,000	1,984				Nauplius	30,000	0.030
												Cymbella	30,000	0.030
												Scenedesmus	30,000	0.030
												Pinnularia	30,000	0.030
												Total	1,305,460,000	1,305

Lake Merced North

23-Oct-02			11-Feb-03			14-May-03			15-Jul-03			30-Sep-03		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,500,000,000	1,500	*Oscillatoria*	1,700,000,000	1,700	*Oscillatoria*	1,600,000,000	1,600	*Oscillatoria*	1,400,000,000	1,400	*Oscillatoria*	980,000,000	980
Melosira	3,100,000	3	*Melosira*	3,200,000	3	*Melosira*	3,600,000	4	*Anabaena*	7,400,000	7	*Anabaena*	1,400,000	1,400
Anabaena	2,700,000	3	*Ankistrodesmus*	130,000	0.130	*Anabaena*	1,500,000	2	*Melosira*	900,000	0.900	*Melosira*	290,000	0.290
Closterium	500,000	0.500	*Closterium*	130,000	0.130	*Synedra*	710,000	0.710	*Ankistrodesmus*	230,000	0.230	*Closterium*	150,000	0.150
Ankistrodesmus	150,000	0.150	Copepoda	25,000	0.025	*Ankistrodesmus*	630,000	0.630	*Closterium*	120,000	0.120	Copepoda	77,000	0.077
Nauplius	88,000	0.088	Nauplius	25,000	0.025	*Closterium*	490,000	0.490	Copepoda	100,000	0.100	Nauplius	46,000	0.046
Copepoda	59,000	0.059	*Cymbella*	25,000	0.025	*Cyclotella*	220,000	0.220	Nauplius	84,000	0.084	Rotifera	31,000	0.031
Scenedesmus	29,000	0.029	Rotifera	25,000	0.025	*Scenedesmus*	110,000	0.110	Rotifera	63,000	0.063	*Epithemia*	31,000	0.031
Total	1,506,626,000	1,507	*Scenedesmus*	25,000	0.025	Rotifera	82,000	0.082	*Stephanodiscus*	63,000	0.063	*Synedra*	31,000	0.031
			Total	1,703,585,000	1,704	*Cymbella*	27,000	0.027	*Scenedesmus*	42,000	0.042	*Cymbella*	15,000	0.015
						Staurastrum	27,000	0.027	*Synedra*	42,000	0.042	*Scenedesmus*	15,000	0.015
						Fragilaria	27,000	0.027	*Spirolina*	21,000	0.021	**Total**	982,086,000	982
						Total	1,607,423,000	1,607	**Total**	1,409,065,000	1,409			

Lake Merced North East

23-Oct-02			11-Feb-03			14-May-03			15-Jul-03			30-Sep-03
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	
Oscillatoria	2,300,000,000	2,300	*Oscillatoria*	1,700,000,000	1,700	*Oscillatoria*	1,700,000,000	1,700	*Oscillatoria*	1,900,000,000	1,900	
Melosira	3,400,000	3	*Melosira*	1,800,000	2	*Melosira*	6,700,000	7	*Melosira*	5,500,000	6	
Anabaena	1,300,000	1.300	*Ankistrodesmus*	220,000	0.220	*Anabaena*	5,800,000	6	*Anabaena*	300,000	0.300	
Closterium	760,000	0.760	Rotifera	220,000	0.220	*Closterium*	790,000	0.790	*Closterium*	240,000	0.240	
Ankistrodesmus	610,000	0.610	Nauplius	190,000	0.190	*Ankistrodesmus*	400,000	0.400	Rotifera	180,000	0.180	
Copepoda	230,000	0.230	*Closterium*	160,000	0.160	*Synedra*	220,000	0.220	*Ankistrodesmus*	150,000	0.150	
Nauplius	150,000	0.150	*Synedra*	120,000	0.120	*Fragilaria*	110,000	0.110	*Synedra*	150,000	0.150	
Rotifera	110,000	0.110	*Cymbella*	31,000	0.031	Nauplius	85,000	0.085	Copepoda	89,000	0.089	
Synedra	38,000	0.038	**Total**	1,702,741,000	1,703	*Scenedesmus*	85,000	0.085	*Staurastrum*	30,000	0.030	
Cymbella	38,000	0.038				*Staurastrum*	56,000	0.056	Nauplius	30,000	0.030	
Ophiocytium	38,000	0.038				*Cynbella*	56,000	0.056	*Navicula*	30,000	0.030	
Total	2,306,674,000	2,307				Copepoda	28,000	0.028	*Ophiocytium*	30,000	0.030	
						Ceratium	28,000	0.028	*Stephanodiscus*	30,000	0.030	
						Rotifera	28,000	0.028	*Sphaerocystis*	30,000	0.030	
						Total	1,714,386,000	1,714	**Total**	1,906,789,000	1,907	

Lake Merced North

2-Dec-03			27-May-04		29-Aug-04		27-Oct-04		9-Dec-04		9-Feb-05		18-Apr-05	
Organism	**No./m³**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	890,000,000	890	*Melosira*	18	*Coelosphaerium*	60	*Oscillatoria*	100	*Oscillatoria*	24	*Asterionella*	140	*Oscillatoria*	9.1
Anabaena	440,000	0.440	*Oscillatoria*	5	*Fragilaria*	14	*Anabaena*	88	*Anabaena*	9.6	*Oscillatoria*	140	*Ceratium*	0.83
Mougeotia	128,719	0.129	*Ceratium*	3.7	*Anabaena*	4.4	*Fragilaria*	11	*Coelosphaerium*	0.77	*Anabaena*	8.2	*Anabaena*	0.54
Nauplius	100,000	0.100	*Sphaerocystis*	1.1	*Melosira*	1.9	*Stephanodiscus*	3.5	*Melosira*	0.44	*Stephanodiscus*	3.4	*Sphaerocystis*	0.38
Ankistrodesmus	100,000	0.100	*Anabaena*	0.55	*Aphanizomenon*	1.5	*Melosira*	1.1	*Stephanodiscus*	0.2	*Closterium*	1.3	*Synedra*	0.064
Rotifera	77,000	0.077	*Copepoda*	0.2	*Asterionella*	0.77	*Coelosphaerium*	0.7	*Staurastrum*	0.11	*Melosira*	0.61	*Asterionella*	0.064
Stephanodiscus	51,000	0.051	*Synedra*	0.18	*Cyclotella*	0.13	Rotifera	0.47	*Closterium*	0.11	*Coelosphaerium*	0.49	*Coelosphaerium*	0.048
Closterium	51,000	0.051	*Fragilaria*	0.13	*Ceratium*	0.077	*Staurastrum*	0.28	*Asterionella*	0.086	*Ceratium*	0.2	*Cyclotella*	0.024
Copepoda	26,000	0.026	*Nauplius*	0.18	*Staurastrum*	0.077	Nauplius	0.1	*Cladocera*	0.086	*Synedra*	0.14	*Tabellaria*	0.024
Mallomonas	26,000	0.026	*Zygnema*	0.05	*Oscillatoria*	0.051	Copepoda	0.073	*Copepoda*	0.071	*Fragilaria*	0.098	Copepoda	0.016
Staurastrum	26,000	0.026	*Mallomonas*	0.034	*Gloeocystis*	0.051	Cladocera	0.058	*Fragilaria*	0.057	Rotifera	0.039	*Fragilaria*	0.016
Cladocera	26,000	0.026	*Staurastrum*	0.034	*Synedra*	0.026	*Sphaerocystis*	0.029	*Ceratium*	0.057	*Pediastrum*	0.039	*Stephanodiscus*	0.016
Scenedesmus	26,000	0.026	*Anacystis*	0.017	*Cladocera*	0.026	*Ceratium*	0.014	*Cyclotella*	0.057	*Staurastrum*	0.039	*Pediastrum*	0.008
Fragilaria	26,000	0.026	*Coelosphaerium*	0.017	*Closterium*	0.026	*Asterionella*	0.014	*Nauplius*	0.028	*Epithemia*	0.02	*Staurastrum*	0.008
Anacystis	26,000	0.026	Total	29.192	*Copepoda*	0.026	*Synedra*	0.014	*Synedra*	0.028	**Total**	294.575	*Melosira*	0.008
Total	891,129,719	891			Total	83.06	*Cymbella*	0.014	*Pediastrum*	0.014			*Desmidium*	0.008
							Closterium	0.014	*Rotifera*	0.014			**Total**	11.154
							Total	205.38	**Total**	35.728				

Lake Merced North East

2-Dec-03			27-May-04		29-Aug-04		27-Oct-04		9-Dec-04		9-Feb-05		18-Apr-05	
Organism	**No./m³**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	1,100,000,000	1,100	*Oscillatoria*	520	*Oscillatoria*	350	*Oscillatoria*	310	*Oscillatoria*	350	*Oscillatoria*	350	*Oscillatoria*	640
Anabaena	340,000	0.340	*Melosira*	2.3	*Coelosphaerium*	7.4	*Anabaena*	5.5	*Anabaena*	15	*Asterionella*	33	*Anabaena*	8.6
Nauplius	170,000	0.170	*Anabaena*	1.1	*Anabaena*	2.3	*Stephanodiscus*	4.4	*Stephanodiscus*	2.7	*Stephanodiscus*	4.3	*Aphanizomenon*	5.5
Melosira	140,000	0.140	*Ceratium*	0.4	*Ceratium*	2.1	*Closterium*	4.1	*Synedra*	0.61	*Synedra*	3.7	*Stephanodiscus*	1.5
Mougeotia	140,000	0.140	*Rotifera*	0.25	*Melosira*	1.4	*Fragilaria*	1	*Closterium*	0.52	*Anabaena*	0.59	*Ceratium*	0.77
Closterium	100,000	0.100	*Synedra*	0.15	*Fragilaria*	0.87	*Synedra*	0.78	*Coelosphaerium*	0.3	*Closterium*	0.51	*Closterium*	0.55
Rotifera	69,000	0.069	*Closterium*	0.13	*Synedra*	0.82	*Melosira*	0.64	*Asterionella*	0.26	*Melosira*	0.18	*Asterionella*	0.29
Stephanodiscus	69,000	0.069	*Nauplius*	0.1	*Asterionella*	0.46	*Rotifera*	0.36	*Melosira*	0.16	Rotifera	0.12	*Melosira*	0.27
Copepoda	69,000	0.069	*Pennate Diatom*	0.1	*Ophiocytium*	0.1	*Asterionella*	0.32	Nauplius	0.07	*Coelosphaerium*	0.1	*Cyclotella*	0.22
Coelosphaerium	69,000	0.069	*Fragilaria*	0.076	*Copepoda*	0.051	*Coelosphaerium*	0.11	Cladocera	0.07	*Staurastrum*	0.081	*Staurastrum*	0.18
Ankistrodesmus	34,000	0.034	*Cladocera*	0.076001	*Closterium*	0.051	*Staurastrum*	0.085	*Staurastrum*	0.047	Cladocera	0.061	*Rotifera*	0.18
Synedra	34,000	0.034	*Anacystis*	0.076002	*Nauplius*	0.051	*Ceratium*	0.085	Copepoda	0.047	*Cymbella*	0.041	*Coelosphaerium*	0.13
Scenedesmus	34,000	0.034	*Sphaerocystis*	0.076003	*Cladocera*	0.026	*Cymbella*	0.021	Rotifera	0.023	*Ceratium*	0.02	*Fragilaria*	0.11
Cyclotella	34,000	0.034	*Coelosphaerium*	0.05	**Total**	365.629	**Total**	327.401	*Fragilaria*	0.023	**Total**	392.703	*Nauplius*	0.11
Total	1,101,302,000	1,101.302	*Copepoda*	0.025					*Ceratium*	0.023			*Synedra*	0.088
			Zygnema	0.025					**Total**	369.853			*Copepoda*	0.066
			Total	524.934006									*Sphaerocystis*	0.044
													Total	658.608

Lake Merced North

23-Jun-05		17-Aug-05		28-Sep-05		31-Oct-05			29-Nov-05		29-Dec-05		23-Jan-06		1-Mar-06	
Organism	**No./mL**	**Organism**	**No./m3**	**Organism**	**No./mL**	**Organism**	**No./m^3**	**No./mL**	**Organism**	**No./mL**			**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria (20:1dil)	290	*Oscillatoria*	270	*Oscillatoria*	480	*Oscillatoria*	280,000,000	280	*Oscillatoria*	460	*Oscillatoria*	360	*Oscillatoria*	190	*Oscillatoria*	260
Anabaena	4	*Closterium*	17	*Anabaena*	24.000	*Anabaena*	2,100,000	2	*Closterium*	4.3					*Melosira*	16
Aphanizomenon	1	*Melosira*	3.1	*Ceratium*	5.100	*Ceratium*	860,000	1	*Synedra*	0.45					*Anabaena*	14
Stephanodiscus	0.47	*Anabaena*	2.8	*Nauplius*	4.800	*Cladoceran*	170,000	0.17	*Stephanodiscus*	0.36					*Closterium*	12
Melosira	0.36	*Ceratium*	0.37	*Rotifera*	0.250	*Nauplius*	130,000	0.13	*Ceratium*	0.34					*Asterionella*	4.3
Nauplius	0.17	*Stephanodiscus*	0.21	Copepoda	0.170	*Rotifer*	77,000	0.08	*Melosira*	0.34					**Total**	306
Fragilaria	0.13	Copepoda	0.093	Cladocera	0.084	*Copepod*	58,000	0.06	Copepoda	0.23						
Copepoda	0.13	Nauplius	0.093	*Mallomonas*	0.084	**Total**	283,395,000	283	Rotifera	0.18						
Closterium	0.13	*Ankistrodesmus*	0.093	***Total***	514.000				Nauplius	0.16						
Rotifera	0.086	*Synedra*	0.093						*Anabaena*	0.14						
Ceratium	0.021	Rotifera	0.046						*Coelosphaerium*	0.11						
Nitzschia	0.021	*Epithemia*	0.023						Cladocera	0.09						
Scenedesmus	0.021	*Staurastrum*	0.023						*Pediastrum*	0.023						
Total	296.539	Cladocera	0.023						*Asterionella*	0.023						
		Pediastrum	0.023						*Ophiocytium*	0.023						
		Total	293.99						**Total**	466.769						

Lake Merced North East

23-Jun-05		17-Aug-05		28-Sep-05		31-Oct-05			29-Nov-05		29-Dec-05		23-Jan-06		1-Mar-06	
Organism	**No./mL**	**Organism**	**No./m3**	**Organism**	**No./mL**	**Organism**	**No./m3**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria (20:1 dil)	40	*Oscillatoria*	650	Oscillatoria	590	*Oscillatoria*	290,000,000	290	*Oscillatoria*	450	*Oscillatoria*	430	*Asterionella*	160	*Oscillatoria*	500
Anabaena	14	*Melosira*	6.3	Anabaena	3.1	*Ceratium*	1,700,000	2	*Closterium*	7.0			*Ceratium*	19	*Synedra*	5.9
Aphanizomenon	2.1	*Closterium*	5.0	Melosira	1.7	*Anabaena*	1,300,000	1	*Ceratium*	1.2			*Oscillatoria*	5.1	**Total**	506
Melosira	0.47	*Anabaena*	0.76	Rotifer	0.34	*Melosira*	700,000	1	*Stephanodiscus*	0.220			*Cyclotella*	1.3		
Rotifera	0.26	*Stephanodiscus*	0.55	Ceratium	0.26	*Ankistrodesmus*	690,000	1	Rotifera	0.190			*Copepoda*	1.3		
Closterium	0.26	*Synedra*	0.45	Nauplius	0.26	*Nauplius*	200,000	0.20	Nauplius	0.160			*Cladocera*	1.3		
Fragilaria	0.21	*Ceratium*	0.24	Copepoda	0.087	Rotifera	86,000	0.09	Cladocera	0.160			**Total**	188		
Stephanodiscus	0.21	Nauplius	0.21	**Total**	596	*Stephanodiscus*	86,000	0.09	*Asterionella*	0.064						
Nauplius	0.13	Rotifera	0.17			Cladocera	29,000	0.03	*Copepoda*	0.064						
Copepoda	0.064	*Sphaerocystis*	0.17			**Total**	294,791,000	295	*Pediastrum*	0.032						
Sphaerocystis	0.064	Copepoda	0.10						**Total**	918.020						
Ceratium	0.043	*Fragilaria*	0.034													
Asterionella	0.043	*Pinnularia*	0.034													
Coelosphaerium	0.043	*Asterionella*	0.034													
Dinobryon	0.021	**Total**	664													
Total	57.918															

Lake Merced North

26-Apr-06		14-Jun-06		24-Aug-06		25-Oct-06		20-Dec-06		29-Mar-07		26-Jun-07		20-Aug-07		27-Dec-07		28-Mar-08	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	320	*Oscillatoria*	490	*Oscillatoria*	230	*Oscillatoria*	680	*Oscillatoria*	1100	*Oscillatoria*	1300	*Oscillatoria*	1570	*Oscillatoria*	300			*Oscillatoria*	44
Anabaena	64													*Dictyosphaerium*	7.4			*Melosira*	4.6
Synedra	4.7													Total	307.4				49
Closterium	0.79																		
Total	389																		

Lake Merced North East

26-Apr-06		14-Jun-06		24-Aug-06		25-Oct-06		20-Dec-06		29-Mar-07		26-Jun-07		20-Aug-07		27-Dec-07		28-Mar-08	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	540	*Oscillatoria*	460	*Oscillatoria*	870	*Oscillatoria*	1100	*Oscillatoria*	1400	*Oscillatoria*	1680	*Oscillatoria*	270					*Oscillatoria*	4.7
																		Melosira	1.8
																		Total	6.5

Lake Merced North

10-Jun-08		24-Sep-08		4-Dec-08		24-Mar-09		4-Jun-09		22-Sep-09		15-Dec-09	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	128	*Oscillatoria*	22.8	*Oscillatoria*	160	*Oscillatoria*	410	*Oscillatoria*	990	*Oscillatoria*	1000	*Oscillatoria*	410

Lake Merced North East

10-Jun-08		24-Sep-08		4-Dec-08		24-Mar-09		4-Jun-09		22-Sep-09		15-Dec-09	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	74.6	*Oscillatoria*	29.4	*Oscillatoria*	120	*Oscillatoria*	610	*Oscillatoria*	1200	*Oscillatoria*	12000	*Oscillatoria*	550

Lake Merced South - Pistol Range

15-May-97			10-Sep-97			3-Dec-97			16-Mar-98			8-Jul-98			17-Mar-99		
Organism	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./m^3**	**No./mL**
Oscillatoria	1,300,000,000	1,300	Oscillatoria	390,000,000	390	Oscillatoria	1,000,000,000	1,000	Oscillatoria	540,000,000	540	Oscillatoria (1:50 dilution)	240,000,000	240	Oscillatoria	51,000,000	51
Anabaena	7,500,000	7.5	Anabaena	7,100,000	7	Anabaena	1,200,000	1	Rotifer	130,000	0	Ulothrix	13,000,000	13	Mougeotia	110,000	0
Ceratium	300,000	0.30	**Total**	397,100,000	397	Copepod	86,000	0	Anabaena	78,000	0	Anabaena	1,200,000	1	Asterionella	840,000	1
Copepoda	138,000	0.14				Rotifer	64,000	0	Copepod	65,000	0	Melosira	1,100,000	1	Closterium	30,000	0
Staurastrum	138,000	0.14				Ceratium	43,000	0	**Total**	540,273,000	540	Nauplius	170,000	0	Nauplius	30,000	0
Rotifera	79,000	0.079				**Total**	1,001,393,000	1,001				Copepod	150,000	0	Spirulina	23,000	0
Total	1,308,155,000	1,308										**Total**	255,620,000	256	Copepoda	23,000	0
															Actinastrum	15,000	0
															Anabaena	15,000	0
															Navicula	7,600	0
															Fragilaria	7,600	0
															Synedra	7,600	0
															Anacystis	7,600	0
															Staurastrum	7,600	0
															Total	52,124,000	52

Lake Merced South - Pump Station

15-May-97			10-Sep-97			3-Dec-97			16-Mar-98			8-Jul-98			17-Mar-99		
Organism	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./cuM**	**No./mL**	**Organism**	**No./m^3**	**No./mL**
Oscillatoria	1,000,000,000	1,000	Oscillatoria	290,000,000	290	Oscillatoria	1,000,000,000	1,000	Oscillatoria	87,000,000	87	Oscillatoria (1:50 dilution)	360,000,000	360	Oscillatoria	60,000,000	60
Anabaena	8,100,000	8	Anabaena	220,000	0	Anabaena	620,000	1	Anabaena	28,000	0	Ulothrix	7,900,000	8	Mougeotia	130,000	0
Ceratium	180,000	0	Dinobryon	56,000	0	Copepod	94,000	0	Mougeotia	28,000	0	Anabaena	2,000,000	2	Asterionella	100,000	0
Copepod	39,000	0	Copepod	21,000	0	Rotifer	19,000	0	Rotifer	14,000	0	Melosira	890,000	1	Copepoda	46,000	0
Total	1,008,319,000	1,008	**Total**	290,297,000	290	**Total**	1,000,733,000	1,001	**Total**	87,070,000	87	Copepod	90,000	0	Actinastrum	46,000	0
												Nauplius	90,000	0	Spirulina	28,000	0
												Total	370,970,000	371	Nauplius	18,000	0
															Rotifer	18,000	0
															Closterium	18,000	0
															Ankistrodesmus	18,000	0
															Staurastrum	18,000	0
															Ceratium	9,200	0
															Anabaena	9,200	0
															Synedra	9,200	0
															Total	60,467,600	60

Lake Merced South - Pistol Range

21-Jun-99			15-Sep-99			8-Dec-99			21-Mar-00			21-Jun-00		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	500,000,000	500	*Oscillatoria*	450,000,000	450	*Oscillatoria*	868,706,613	869	*Oscillatoria*	1,600,000,000	1,600	*Oscillatoria*	370,000,000	370
Mougeotia	2,500,000	3	*Anabaena*	8,900,000	9	*Mougeotia*	251,495	0	*Melosira*	2,900,000	3	*Anabaena*	11,000,000	11
Anabaena	2,000,000	2	*Mougeotia*	600,000	1	*Spirulina*	188,621	0	*Anabaena*	2,500,000	3	*Melosira*	1,700,000	2
Spirulina	320,000	0	*Spirulina*	380,000	0	*Anabaena*	167,664	0	*Closterium*	2,500,000	3	*Mougeotia*	320,000	0
Closteridium	230,000	0	*Mallomonas*	220,000	0	*Scenedesmus*	104,790	0	*Mougeotia*	1,800,000	2	*Chlorella*	160,000	0
Closterium	200,000	0	*Fragilaria*	160,000	0	*Closterium*	62,874	0	*Synedra*	730,000	1	*Ankistrodesmus*	150,000	0
Scenedesmus	120,000	0	*Anacystis*	140,000	0	*Microcystis*	62,874	0	*Scenedesmus*	730,000	1	*Closterium*	84,000	0
Gomphosphaeria	73,000	0	Copepoda	99,000	0	Nauplius	41,916	0	*Microcystis*	360,000	0	*Closteriopsis*	84,000	0
Rotifer	29,000	0	*Staurastrum*	99,000	0	Naviculoid Diatom	41,916	0	*Nauplius*	360,000	0	Nauplius	66,000	0
Copepoda	29,000	0	Naviculoid Diatom	79,000	0	*Actinastrum*	20,958	0	*Staurastrum*	360,000	0	Copepoda	56,000	0
Navicula	14,000	0	*Gomphosphaeria*	79,000	0	Rotifer	20,958	0	**Total**	1,612,240,000	1,612	*Navicula*	56,000	0
Staurastrum	14,000	0	*Cyclotella*	40,000	0	*Pinnularia*	20,958	0				*Coelosphaerium*	47,000	0
Synedra	14,000	0	*Closterium*	40,000	0	*Cymbella*	20,958	0				*Scenedesmus*	38,000	0
Nauplius	14,000	0	Nauplius	40,000	0	Copepoda	20,958	0				*Coelastrum*	19,000	0
Cymbella	14,000	0	*Actinastrum*	20,000	0	**Total**	869,733,552	870				*Amphora*	19,000	0
Total	505,571,000	506	*Scenedesmus*	20,000	0							*Dinobryon*	9,400	0
			Pinnularia	20,000	0							*Staurastrum*	9,400	0
			Tetraedron	20,000	0							Cladocera	9,400	0
			Total	460,956,000	461							*Pinnularia*	9,400	0
												Synedra	9,400	0
												Total	383,846,000	384

Lake Merced South - Pump Station

21-Jun-99			15-Sep-99			8-Dec-99			21-Mar-00			21-Jun-00		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	660,000,000	660	*Oscillatoria*	590,000,000	590	*Oscillatoria*	1,060,499,160	1,060	*Oscillatoria*	1,600,000,000	1,600	*Oscillatoria*	330,000,000	330
Anabaena	3,200,000	3	*Anabaena*	23,000,000	23	*Spirulina*	362,449	0	*Melosira*	3,100,000	3	*Anabaena*	12,000,000	12
Mougeotia	1,900,000	2	*Spirulina*	1,300,000	1	*Mougeotia*	93,968	0	*Synedra*	1,600,000	2	*Melosira*	2,000,000	2
Spirulina	550,000	1	*Mougeotia*	500,000	1	*Microcystis*	80,544	0	*Anabaena*	1,500,000	2	*Coelosphaerium*	110,000	0
Closteridium	280,000	0	*Gomphosphaeria*	120,000	0	*Anabaena*	67,120	0	*Scenedesmus*	1,000,000	1	Copepoda	99,000	0
Closterium	260,000	0	*Ceratium*	99,000	0	Naviculoid Diatom	53,696	0	*Mougeotia*	1,000,000	1	*Chlorella*	99,000	0
Scenedesmus	94,000	0	*Anacystis*	99,000	0	*Pinnularia*	40,272	0	**Total**	1,608,200,000	1,608	*Closterium*	99,000	0
Copepoda	47,000	0	*Ankistrodesmis*	99,000	0	*Gleocystis*	13,424	0				*Ankistrodesmus*	55,000	0
Navicula	47,000	0	*Closterium*	79,000	0	*Fragilaria*	13,424	0				*Fragilaria*	44,000	0
Synedra	31,000	0	*Staurastrum*	60,000	0	**Total**	1,061,224,058	1,061				*Ceratium*	44,000	0
Anacystis	16,000	0	*Cymbella*	40,000	0							*Synedra*	33,000	0
Gomphosphaeria	16,000	0	Nauplius	40,000	0							Nauplius	33,000	0
Epithemia	16,000	0	*Mallomonas*	40,000	0							Rotifera	33,000	0
Pinnularia	16,000	0	*Tetraedron*	20,000	0							*Navicula*	33,000	0
Total	666,473,000	666	Copepoda	20,000	0							*Dinobryon*	33,000	0
			Fragilaria	20,000	0							*Polyblepharides*	22,000	0
			Pinnularia	20,000	0							*Staurastrum*	22,000	0
			Actinastrum	20,000	0							*Caloneis*	11,000	0
			Total	615,576,000	616							**Total**	344,770,000	345

Lake Merced South - Pistol Range

9-Aug-00			19-Dec-00			7-Mar-01			20-Jun-01			1-Oct-01		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,300,000,000	1,300	*Oscillatoria** (dil 10x)	400,000,000	400	*Oscillatoria*	520,000,000	520	*Oscillatoria*	840,000,000	840	*Oscillatoria*	1,300,000,000	1,300
Anabaena	5,500,000	6	*Mougeotia*	600,000	1	*Melosira*	3,800,000	4	*Anabaena*	6,800,000	7	*Anabaena*	8,600,000	9
Melosira	1,400,000	1	*Melosira*	490,000	0	*Closterium*	180,000	0	*Melosira*	2,200,000	2	*Melosira*	2,400,000	2
Ankistrodesmus	200,000	0	*Closterium*	330,000	0	*Anacystis*	140,000	0	*Stephanodiscus*	1,700,000	2	*Coelosphaerium*	240,000	0
Coelosphaerium	180,000	0	*Anacystis*	270,000	0	*Synedra*	120,000	0	*Cyclotella*	1,100,000	1	*Ankistrodesmus*	96,000	0
Mougeotia	160,000	0	*Coelosphaerium*	190,000	0	*Anabaena*	53,000	0	*Aphanizomenon*	1,100,000	1	*Closterium*	96,000	0
Closteriopsis	130,000	0	*Anabaena*	120,000	0	Copepoda	35,000	0	*Dinobryon*	470,000	0	Rotifera	72,000	0
Actinastrum	110,000	0	*Pinnularia*	62,000	0	Nauplius	35,000	0	*Fragilaria*	420,000	0	*Ceratium*	72,000	0
Synedra	72,000	0	*Epithemia*	62,000	0	Rotifera	35,000	0	*Anacystis*	210,000	0	Copepoda	24,000	0
Copepoda	54,000	0	Copepoda	41,000	0	*Ankistrodesmus*	18,000	0	*Coelosphaerium*	150,000	0	*Scenedesmus*	24,000	0
Scenedesmus	18,000	0	Rotifera	41,000	0	Navicula	18,000	0	Rotifera	130,000	0	**Total**	1,311,624,000	1,312
Amphora	18,000	0	*Synedra*	41,000	0	*Cymbella*	18,000	0	Copepoda	95,000	0			
Closterium	18,000	0	Nauplius	21,000	0	*Cocconeis*	18,000	0	*Closterium*	95,000	0			
Total	1,307,860,000	1,308	*Ankistrodesmus*	21,000	0	**Total**	524,470,000	524	*Staurastrum*	76,000	0			
			Navicula	21,000	0				*Gloeocystis*	76,000	0			
			Total	402,310,000	402				Nauplius	57,000	0			
									Kirchneriella	38,000	0			
									Synedra	38,000	0			
									Synedra	38,000	0			
									Ceratium	19,000	0			
									Epithemia	19,000	0			
									Tetraedron	19,000	0			
									Total	854,850,000	855			

Lake Merced South - Pump Station

9-Aug-00			19-Dec-00			7-Mar-01			20-Jun-01			1-Oct-01		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,300,000,000	1,300	*Oscillatoria* (dil 10x)	450,000,000	450	*Oscillatoria*	570,000,000	570	*Oscillatoria (dil 50:1)*	870,000,000	870	*Oscillatoria*	990,000,000	990
Anabaena	7,300,000	7	*Melosira*	550,000	1	*Melosira*	4,000,000	4	*Anabaena*	3,000,000	3	*Melosira*	1,800,000	2
Melosira	1,300,000	1	*Mougeotia*	450,000	0	*Closterium*	190,000	0	*Melosira*	2,100,000	2	*Anabaena*	590,000	1
Coelosphaerium	270,000	0	Copepoda	130,000	0	*Synedra*	140,000	0	*Aphanizomenon*	650,000	1	*Dictyosphaerium*	540,000	1
Ankistrodesmus	200,000	0	*Anacystis*	130,000	0	*Scenedesmus*	85,000	0	*Fragilaria*	550,000	1	*Ankistrodesmus*	280,000	0
Mougeotia	98,000	0	*Coelosphaerium*	85,000	0	*Anacystis*	51,000	0	*Anacystis*	450,000	0	*Closterium*	240,000	0
Synedra	39,000	0	*Closterium*	85,000	0	*Ankistrodesmus*	51,000	0	*Dinobryon*	380,000	0	Rotifera	160,000	0
Copepoda	20,000	0	*Anabaena*	64,000	0	*Anabaena*	51,000	0	*Cyclotella*	280,000	0	*Cyclotella*	71,000	0
Closteriopsis	20,000	0	Rotifera	43,000	0	Nauplius	51,000	0	*Coelosphaerium*	120,000	0	Copepoda	47,000	0
Epithemia	20,000	0	*Pinnularia*	43,000	0	*Fragilaria*	34,000	0	*Kirchneriella*	120,000	0	Nauplius	47,000	0
Scenedesmus	20,000	0	*Cymbella*	43,000	0	*Ophiocytium*	17,000	0	Copepoda	83,000	0	*Ophiocytium*	24,000	0
Nauplius	20,000	0	*Navicula*	43,000	0	*Epithemia*	17,000	0	*Navicula*	50,000	0	*Pinnularia*	24,000	0
Ceratium	20,000	0	*Epithemia*	43,000	0	*Coelosphaerium*	17,000	0	*Cymbella*	50,000	0	**Total**	993,823,000	994
Rotifera	20,000	0	*Synedra*	21,000	0	*Staurastrum*	17,000	0	*Closterium*	50,000	0			
Chlorella	20,000	0	*Ankistrodesmus*	21,000	0	Copepoda	17,000	0	*Ceratium*	33,000	0			
Stephanodiscus	20,000	0	**Total**	451,751,000	452	**Total**	574,738,000	575	*Staurastrum*	33,000	0			
Staurastrum	20,000	0							*Synedra*	17,000	0			
Cymbella	20,000	0							Nauplius	17,000	0			
Total	1,309,427,000	1,309							Rotifera	17,000	0			
									Pinnularia	17,000	0			
									Gloeocystis	17,000	0			
									Amphora	17,000	0			
									Scenedesmus	17,000	0			

Lake Merced South - Pistol Range

18-Dec-01			5-Mar-02			30-Apr-02			18-Jun-02			23-Aug-02		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	820,000,000	820	*Oscillatoria (50:1 dil)*	600,000,000	600	*Oscillatoria*	760,000,000	760	*Oscillatoria*	1,700,000,000	1,700	*Oscillatoria (50:1 dil)*	1,000,000,000	1,000
Melosira	4,000,000	4	*Anabaena*	1,000,000	1	*Melosira*	4,100,000	4	*Melosira*	7,300,000	7	*Anabaena*	12,000,000	12
Closterium	220,000	0	*Dinobryon*	400,000	0	*Anabaena*	2,600,000	3	*Anabaena*	1,600,000	2	*Melosira*	1,100,000	1
Anabaena	160,000	0	*Mougeotia*	360,000	0	*Closterium*	210,000	0	*Ankistrodesmus*	230,000	0	*Ankistrodesmus*	280,000	0
Ankistrodesmus	160,000	0	*Stephanodiscus*	130,000	0	*Ankistrodesmus*	170,000	0	*Closterium*	210,000	0	Nauplius	190,000	0
Copepoda	69,000	0	Anacystis	110,000	0	Rotifera	150,000	0	*Cyclotella*	150,000	0	*Closterium*	160,000	0
Pinnularia	69,000	0	*Rotifera*	95,000	0	Copepoda	58,000	0	Rotifera	130,000	0	*Stephanodiscus*	140,000	0
Fragilaria	52,000	0	*Synedra*	76,000	0	Nauplius	39,000	0	*Scenedesmus*	85,000	0	Copepoda	120,000	0
Staurastrum	34,000	0	*Nauplius*	76,000	0	*Dictyosphaerium*	39,000	0	Copepoda	85,000	0	*Diatoma*	92,000	0
Synedra	17,000	0	*Spirulina*	76,000	0	**Total**	767,366,000	767	*Cymbella*	64,000	0	*Coelosphaerium*	92,000	0
Rotifera	17,000	0	*Melosira*	38,000	0				Nauplius	64,000	0	*Navicula*	92,000	0
Pediastrum	17,000	0	*Fragilaria*	19,000	0				*Synedra*	42,000	0	Rotifera	69,000	0
Scenedesmus	17,000	0	Navicula	19,000	0				*Pinnularia*	21,000	0	*Scenedesmus*	69,000	0
Total	824,832,000	825	*Closterium*	19,000	0				*Staurastrum*	21,000	0	*Gloeocystis*	69,000	0
			Ankistrodesmus	19,000	0				Cladocera	21,000	0	*Staurastrum*	46,000	0
			Total	602,437,000	602				**Total**	1,710,023,000	1,710	*Synedra*	46,000	0
												Pinnularia	46,000	0
												Fragilaria	23,000	0
												Mallomonas	23,000	0
												Cladocera	23,000	0
												Dictyosphaerium	23,000	0
												Oedogonium	23,000	0
												Pediastrum	23,000	0
												Total	1,014,749,000	1,015

Lake Merced South - Pump Station

18-Dec-01			5-Mar-02			30-Apr-02			18-Jun-02			23-Aug-02		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	960,000,000	960	*Oscillatoria*	600,000,000	600	*Oscillatoria*	900,000,000	900	*Oscillatoria*	2,500,000,000	2,500	*Oscillatoria* (50:1 dil)	930,000,000	930
Melosira	2,800,000	3	*Anabaena*	380,000	0	*Melosira*	6,900,000	7	*Melosira*	8,900,000	9	*Anabaena*	7,600,000	8
Anabaena	780,000	1	*Mougeotia*	380,000	0	*Anabaena*	3,700,000	4	*Ankistrodesmus*	510,000	1	*Melosira*	330,000	0
Closterium	98,000	0	*Dinobryon*	330,000	0	*Closteridium*	530,000	1	*Cyclotella*	400,000	0	*Mougeotia*	130,000	0
Copepoda	49,000	0	Melosira	180,000	0	Rotifera	100,000	0	*Anabaena*	280,000	0	*Coelosphaerium*	100,000	0
Epithemia	49,000	0	*Rotifera*	160,000	0	*Ankistrodesmus*	100,000	0	*Staurastrum*	260,000	0	*Stephanodiscus*	83,000	0
Ankistrodesmus	33,000	0	*Coelosphaerium*	130,000	0	Nauplius	79,000	0	*Closterium*	230,000	0	*Synedra*	67,000	0
Staurastrum	33,000	0	*Stephanodiscus*	120,000	0	*Synedra*	26,000	0	Copepoda	170,000	0	Nauplius	67,000	0
Fragilaria	16,000	0	*Nauplius*	82,000	0	Copepoda	26,000	0	Rotifera	140,000	0	*Scenedesmus*	50,000	0
Nauplius	16,000	0	*Closterium*	82,000	0	*Staurastrum*	26,000	0	*Scenedesmus*	110,000	0	*Ankistrodesmus*	50,000	0
Rotifera	16,000	0	*Anacystis*	66,000	0	**Total**	911,487,000	911	*Cymbella*	57,000	0	*Diatoma*	50,000	0
Total	963,890,000	964	*Spirulina*	66,000	0				Cladocera	57,000	0	Copepoda	33,000	0
			Ankistrodesmus	49,000	0				*Pinnularia*	28,000	0	Rotifera	33,000	0
			Kirchneriella	33,000	0				**Total**	2,511,142,000	2,511	*Closterium*	33,000	0
			Fragilaria	16,000	0							*Sphaerocystis*	33,000	0
			Mallomonas	16,000	0							Euglena	33,000	0
			Copepoda	16,000	0							*Ceratium*	17,000	0
			Total	602,106,000	602							*Anacystis*	17,000	0
												Navicula	17,000	0
												Tetraedron	17,000	0
												Ophiocytium	17,000	0
												Total	938,777,000	939

Lake Merced South - Pistol Range

23-Oct-02			11-Feb-03			14-May-03			15-Jul-03			30-Sep-03		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	930,000,000	930	*Oscillatoria*	1,100,000,000	1,100	*Oscillatoria*	1,200,000,000	1,200	*Oscillatoria*	1,300,000,000	1,300	*Oscillatoria*	1,100,000,000	1,100
Anabaena	2,600,000	3	*Melosira*	3,100,000	3	*Melosira*	8,400,000	8	*Anabaena*	3,800,000	4	*Anabaena*	4,100,000	4
Melosira	780,000	1	*Closterium*	250,000	0	*Closterium*	490,000	0	*Melosira*	1,900,000	2	*Melosira*	190,000	0
Nauplius	280,000	0	Rotifera	130,000	0	*Synedra*	380,000	0	Copepoda	110,000	0	*Ceratium*	160,000	0
Rotifera	87,000	0	Copepoda	100,000	0	*Ankistrodesmus*	380,000	0	*Closterium*	61,000	0	*Closterium*	160,000	0
Closterium	65,000	0	*Cyclotella*	100,000	0	Rotifera	220,000	0	Nauplius	46,000	0	Copepoda	160,000	0
Epithemia	43,000	0	*Cymbella*	51,000	0	*Scenedesmus*	160,000	0	*Cymbella*	46,000	0	Rotifera	130,000	0
Synedra	22,000	0	Nauplius	25,000	0	Nauplius	82,000	0	Rotifera	30,000	0	Nauplius	53,000	0
Copepoda	22,000	0	*Synedra*	25,000	0	*Staurastrum*	55,000	0	*Staurastrum*	15,000	0	*Epithemia*	27,000	0
Ankistrodesmus	22,000	0	*Scenedesmus*	25,000	0	*Anabaena*	55,000	0	*Cyclotella*	15,000	0	**Total**	1,104,980,000	1,105
Scenedesmus	22,000	0	*Ankistrodesmus*	25,000	0	*Asterionella*	27,000	0	**Total**	1,306,023,000	1,306			
Pinnularia	22,000	0	**Total**	1,103,831,000	1,104	*Epithemia*	27,000	0						
Total	933,965,000	934				*Ceratium*	27,000	0						
						Copepoda	27,000	0						
						Total	1,210,330,000	1,210						

Lake Merced South - Pump Station

23-Oct-02			11-Feb-03			14-May-03			15-Jul-03			30-Sep-03		
Organism	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**	**Organism**	**No./m³**	**No./mL**
Oscillatoria	1,100,000,000	1,100	*Oscillatoria*	1,100,000,000	1,100	*Oscillatoria*	980,000,000	980	*Oscillatoria*	700,000,000	700	*Oscillatoria*	550,000,000	550
Anabaena	4,800,000	5	*Melosira*	3,300,000	3	*Melosira*	5,200,000	5	*Anabaena*	7,400,000	7	*Anabaena*	3,800,000	4
Melosira	370,000	0	*Closterium*	160,000	0	*Anabaena*	320,000	0	*Melosira*	1,800,000	2	*Melosira*	430,000	0
Rotifera	110,000	0	Rotifera	110,000	0	*Ankistrodesmus*	230,000	0	*Ankistrodesmus*	75,000	0	*Ceratium*	220,000	0
Ankistrodesmus	65,000	0	*Cyclotella*	90,000	0	*Synedra*	110,000	0	*Closterium*	56,000	0	*Rotifera*	220,000	0
Cyclotella	43,000	0	Nauplius	45,000	0	Rotifera	85,000	0	Copepoda	56,000	0	*Nauplius*	140,000	0
Nauplius	43,000	0	*Ankistrodesmus*	45,000	0	Copepoda	64,000	0	*Staurastrum*	37,000	0	*Closterium*	68,000	0
Closterium	43,000	0	*Cymbella*	45,000	0	Nauplius	21,000	0	*Synedra*	37,000	0	*0*	45,000	0
Staurastrum	22,000	0	*Scenedesmus*	45,000	0	*Staurastrum*	21,000	0	*Cymbella*	19,000	0	*Synedra*	22,000	0
Copepoda	22,000	0	*Synedra*	45,000	0	*Scenedesmus*	21,000	0	Cladocera	19,000	0	**Total**	554,945,000	555
Epithemia	22,000	0	*Anabaena*	23,000	0	**Total**	986,072,000	986	Nauplius	19,000	0			
Ceratium	22,000	0	*Staurastrum*	23,000	0				*Cyclotella*	19,000	0			
Total	1,105,562,000	1,106	Copepoda	23,000	0				**Total**	709,537,000	710			
			Ophiocytium	23,000	0									
			Total	1,103,977,000	1,104									

Lake Merced South - Pistol Range

2-Dec-03			27-May-04		29-Aug-04		27-Oct-04		9-Dec-04		9-Feb-05		18-Apr-05	
Organism	**No./m³**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	660,000,000	660	*Oscillatoria*	505	*Oscillatoria*	1600	Oscillatoria	2100	*Oscillatoria*	1400	*Oscillatoria*	910	*Oscillatoria*	630
Anabaena	540,000	1	*Melosira*	1.3	*Anabaena*	11	Anabaena	4.7	*Melosira*	0.33	*Melosira*	0.92	*Melosira*	5.4
Fragilaria	670,000	1	*Anabaena*	1.1	*Melosira*	1.1	Melosira	1.2	*Anabaena*	0.14	*Anabaena*	0.19	*Anabaena*	5.3
Mougeotia	200,000	0	*Stephanodiscus*	0.35	*Copepoda*	0.078	Ceratium	0.12	*Closterium*	0.094	*Closterium*	0.12	*Asterionella*	1
Ankistrodesmus	98,000	0	*Closterium*	0.24	*Closterium*	0.078	Rotifera	0.094	*Copepoda*	0.07	*Coelosphaerium*	0.073	*Closterium*	0.55
Nauplius	74,000	0	*Ankistrodesmus*	0.11	*Rotifera*	0.026	Fragilaria	0.031	*Rotifera*	0.047	*Asterionella*	0.073	*Synedra*	0.26
Coelosphaerium	74,000	0	*Pennate Diatom*	0.11	*Ankistrodesmus*	0.026	Coelosphaerium	0.031	*Coelosphaerium*	0.024	Nauplius	0.024	Rotifera	0.16
Closterium	74,000	0	*Synedra*	0.089	*Nauplius*	0.026	Scenedesmus	0.031	*Nauplius*	0.024	Rotifera	0.024	*Ankistrodesmus*	0.065
Rotifera	49,000	0	*Scenedesmus*	0.089	**Total**	1612.334	Closterium	0.031	**Total**	1400.729	*Synedra*	0.024	Nauplius	0.032
Melosira	49,000	0	*Coelosphaerium*	0.067			Synedra	0.031			**Total**	911.448	*Epithemia*	0.032
Cyclotella	49,000	0	*Tetraedron*	0.067			Nauplius	0.031					Copepoda	0.032
Ceratium	25,000	0	*Staurastrum*	0.044			**Total**	2106.3					**Total**	642.831
Synedra	25,000	0	*Copepoda*	0.044										
Cladocera	25,000	0	*Nauplius*	0.044										
Pennate Diatom	25,000	0	*Rotifera*	0.044										
Total	661,977,000	662	*Anacystis*	0.044										
			Dinobryon	0.022										
			Asterionella	0.022										
			Total	508.786										

Lake Merced South - Pump Station

2-Dec-03			27-May-04		29-Aug-04		27-Oct-04		9-Dec-04		9-Feb-05		18-Apr-05	
Organism	**No./m³**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	700,000,000	700	*Oscillatoria (10:1)*	440	*Oscillatoria*	1400	*Oscillatoria*	1900	*Oscillatoria*	850	*Oscillatoria*	1200	*Oscillatoria*	500
Anabaena	250,000	0	*Melosira*	0.92	*Anabaena*	1.6	*Anabaena*	3	*Melosira*	0.27	*Melosira*	1.2	*Melosira*	4.5
Mougeotia	250,000	0	*Anabaena*	0.9	*Melosira*	1.3	*Melosira*	0.81	*Closterium*	0.11	*Anabaena*	0.17	*Anabaena*	2.8
Melosira	250,000	0	*Stephanodiscus*	0.26	*Ankistrodesmus*	0.12	*Ceratium*	0.21	*Anabaena*	0.08	*Synedra*	0.11	*Asterionella*	0.42
Ankistrodesmus	230,000	0	*Closterium*	0.13	*Rotifera*	0.093	*Rotifera*	0.12	*Coelosphaerium*	0.027	*Coelosphaerium*	0.083	*Closterium*	0.29
Fragilaria	140,000	0	*Copepoda*	0.064	*Ceratium*	0.093	*Closterium*	0.09	*Copepoda*	0.027	Nauplius	0.083	*Synedra*	0.13
Nauplius	91,000	0	*Rotifera*	0.064	*Closterium*	0.07	*Ankistrodesmus*	0.06	*Cymbella*	0.027	Rotifera	0.055	Rotifera	0.032
Closterium	91,000	0	*Anacystis*	0.064	*Synedra*	0.023	*Staurastrum*	0.03	**Total**	850.541	Copepoda	0.055	Copepoda	0.016
Ankistrodesmus	68,000	0	*Dinobryon*	0.043	**Total**	1403.299	*Copepoda*	0.03			*Closterium*	0.055	*Epithemia*	0.016
Cladocera	23,000	0	*Synedra*	0.043			*Stephanodiscus*	0.03			*Ankistrodesmus*	0.028	*Coelosphaerium*	0.016
Copepoda	23,000	0	*Nauplius*	0.043			**Total**	1904.38			*Scenedesmus*	0.028	**Total**	508.22
Rotifera	23,000	0	*Coelosphaerium*	0.043							**Total**	1201.867		
Xanthidium	23,000	0	*Pennate Diatom*	0.043										
Pennate Diatom	23,000	0	*Tetraedron*	0.043										
Cyclotella	23,000	0	*Scenedesmus*	0.043										
Total	701,508,000	702	*Staurastrum*	0.021										
			Ankistrodesmus	0.021										
			Spirogyra	0.021										
			Total	442.766										

Lake Merced South - Pistol Range

23-Jun-05		17-Aug-05		28-Sep-05		31-Oct-05			29-Nov-05		29-Dec-05		23-Jan-06		1-Mar-06	
Organism	**No./mL**	**Organism**	**No./m3**	**Organism**	**No./mL**	**Organism**	**No./m3**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria (20:1 dil)	580	*Oscillatoria*	410	*Oscillatoria*	620	*Oscillatoria*	870,000,000	870	*Oscillatoria*	840	*Oscillatoria*	1100	*Oscillatoria*	940	*Oscillatoria*	830
Anabaena	25	*Melosira*	16	*Anabaena*	12	*Anabaena*	5,700,000	6	*Melosira*	11						
Aphanizomenon	13	*Anabaena*	3.5	*Copepod*	0.59	*Rotifera*	170,000	0.17	*Anabaena*	3						
Melosira	0.41	*Closterium*	0.32	Nauplius	0.39	*Nauplius*	83,000	0.08	Copepoda	0.082						
Stephanodiscus	0.22	*Ceratium*	0.065	*Melosira*	0.28	*Ceratium*	63,000	0.06	*Closterium*	0.055						
Coelosphaerium	0.12	*Ankistrodesmus*	0.043	*Ceratium*	0.19	*Copepod*	21,000	0.02	*Ankistrodesmus*	0.028						
Ceratium	0.059	Nauplius	0.043	Pediastrum	0.095	**Total**	876,078,988	876	*Asterionella*	0.028						
Closterium	0.059	Copepoda	0.022	**Total**	634				**Total**	854						
Mallomonas	0.039	**Total**	429.993													
Nauplius	0.039															
Scenedesmus	0.039															
Fragilaria	0.039															
Asterionella	0.039															
Cladocera	0.02															
Copepoda	0.02															
Rotifera	0.02															
Staurastrum	0.02															
Synedra	0.02															
Total	619.2															

Lake Merced South - Pump Station

23-Jun-05		17-Aug-05		28-Sep-05		31-Oct-05			29-Nov-05		29-Dec-05		23-Jan-06		1-Mar-06	
Organism	**No./mL**	**Organism**	**No./m3**	**Organism**	**No./mL**	**Organism**	**No./m3**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria (20:1 dil)	651.8251425	*Oscillatoria*	700	*Oscillatoria*	590	*Oscillatoria*	810		*Oscillatoria*	980	*Oscillatoria*	1200	*Oscillatoria*	1000	*Oscillatoria*	850
Anabaena	25.5122959	*Melosira*	18	*Anabaena*	6.5	*Anacystis*	140		*Melosira*	10						
Aphanizomenon	16.42412456	*Anabaena*	4	*Nauplius*	0.16	*Melosira*	11		*Anabaena*	3.4						
Melosira	0.350443625	*Ceratium*	0.28	Ceratium	0.16	*Anabaena*	8.1		*Closterium*	0.1						
Stephanodiscus	0.186903267	*Closterium*	0.17	*Copepoda*	0.082	*Closterium*	0.4		Nauplius	0.05						
Cyclotella	0.163540358	Copepoda	0.087	*Melosira*	0.082	*Stephanodiscus*	0.06		*Asterionella*	0.025						
Ceratium	0.14017745	Rotifera	0.065	**Total**	597	Rotifera	0.04		*Epithemia*	0.025						
Nauplius	0.070088725	*Ankistrodesmus*	0.065			*Epithemia*	0.04		*Coelosphaerium*	0.025						
Rotifera	0.070088725	*Stephanodiscus*	0.043			Copepoda	0.04		*Ankistrodesmus*	0.025						
Coelosphaerium	0.070088725	*Coelosphaerium*	0.022			*Ophiocytium*	0.02		**Total**	994						
Fragilaria	0.046725817	*Asterionella*	0.022			Nauplius	0.02									
Copepoda	0.046725817	Nauplius	0.022			**Total**	969.72									
Navicula	0.046725817	*Epithemia*	0.022													
Dinobryon	0.023362908	**Total**	722.798													
Cladocera	0.023362908															
Closterium	0.023362908															
Pinnularia	0.023362908															
Scenedesmus	0.023362908															
Total	695.0698858															

Lake Merced South - Pistol Range

26-Apr-06		14-Jun-06		24-Aug-06		25-Oct-06		20-Dec-06		29-Mar-07		26-Jun-07		20-Aug-07		27-Dec-07		28-Mar-08	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	1200	*Oscillatoria*	1300	*Oscillatoria*	1,000	*Oscillatoria*	1,700	*Oscillatoria*	840	*Oscillatoria*	430	*Oscillatoria*	510	*Oscillatoria*	790	*Oscillatoria*	630	*Oscillatoria*	35
Melosira	36	*Anabeana*	3.8																
Synedra	9.0	*Melosira*	2.5																
Asterionella	6.4	**Total**	1306.3																
Anabaena	6.4																		
Closterium	3.9																		
Fragilaria	1.3																		
Total	1263																		

Lake Merced South - Pump Station

26-Apr-06		14-Jun-06		24-Aug-06		25-Oct-06		20-Dec-06		29-Mar-07		26-Jun-07		20-Aug-07		27-Dec-07		28-Mar-08	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	970	*Oscillatoria*	730	*Oscillatoria*	1200	*Oscillatoria*	1,700	*Oscillatoria*	1000	*Oscillatoria*	400	*Oscillatoria*	550	NA		*Oscillatoria*	740	*Oscillatoria*	63
Melosira	44	*Anabaena*	3.4																
Anabaena	14	*Melosira*	2.3																
Synedra	6.4	**Total**	736																
Asterionella	4.8																		
Closterium	3.2																		
Total	1042																		

Lake Merced South - Pistol Range

10-Jun-08		24-Sep-08		4-Dec-08		24-Mar-09		4-Jun-09		22-Sep-09		15-Dec-09	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	35	*Oscillatoria*	52	*Oscillatoria*	76	*Oscillatoria*	320	*Oscillatoria*	630	*Oscillatoria*	1800	*Oscillatoria*	910

Lake Merced South - Pump Station

10-Jun-08		24-Sep-08		4-Dec-08		24-Mar-09		4-Jun-09		22-Sep-09		15-Dec-09	
Organism	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**	**Organism**	**No./mL**
Oscillatoria	17	*Oscillatoria*	54	*Oscillatoria*	340	*Oscillatoria*	430	*Oscillatoria*	750	*Oscillatoria*	1500	*Oscillatoria*	850

Lake Merced
North

Secchi Disc	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02
Depth (feet)	2.0	1.2	1.5	2.0	1.0	1.0	2.0		1.0	1.0	1.5	1.0	1.0	1.0	1.5	1.0	1.0	1.0	2.0

Lake Merced North
East

Secchi Disc	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02
Depth (feet)	2.5		3.3	2.0	1.5	1.5	1.0		1.0	1.0	1.2	1.5	1.5	1.0	1.0	1.0	1.0	1.0	2.0

Lake Merced
South - Pistol
Range

Secchi Disc	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02
Depth (feet)	1.7	1.0	1.5	2.0	2.5	1.5	2.5	1.5	1.0	1.0	1.4	1.5	1.5	2.5	2.5	1.0	1.0	1.5	2.5

Lake Merced
South - Pump
Station

Secchi Disc	15-May-97	10-Sep-97	3-Dec-97	16-Mar-98	8-Jul-98	23-Sep-98	17-Mar-99	21-Jun-99	15-Sep-99	8-Dec-99	21-Mar-00	21-Jun-00	9-Aug-00	19-Dec-00	7-Mar-01	20-Jun-01	1-Oct-01	18-Dec-01	5-Mar-02
Depth (feet)	1.7	1.0	1.5	2.0	2.5	1.5	2.5	1.5	1.0	1.0	1.8	1.5	1.5	2.0	2.5	1.0	1.0	1.5	2.0

Lake Merced North

Secchi Disc	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05
Depth (feet)	1.0	1.0	1.0	1.5	1.0	1.0	1.0		1.0	7.0	2.5	2.0	5.0	4.5	10.0		2.0	1.5	2.0	2.0

Lake Merced North East

Secchi Disc	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05
Depth (feet)	1.0	1.0	1.0	1.5	1.0	1.5	1.5	1.5	1.0	2.5	1.5	2.5	2.0	2.5	2.0		1.5	1.5	2.0	2.0

Lake Merced South - Pistol Range

Secchi Disc	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05
Depth (feet)	2.0	1.5	2.0	2.0	1.5	1.5	1.5	2.0	1.5	2.5	1.5	1.5	2.0	2.5	3.0	1.5	2.0	2.0	2.0	2.0

Lake Merced South - Pump Station

Secchi Disc	30-Apr-02	18-Jun-02	23-Aug-02	23-Oct-02	11-Feb-03	14-May-03	15-Jul-03	30-Sep-03	2-Dec-03	27-May-04	29-Aug-04	27-Oct-04	9-Dec-04	9-Feb-05	18-Apr-05	23-Jun-05	17-Aug-05	28-Sep-05	31-Oct-05	29-Nov-05
Depth (feet)	2.0	1.5	2.0	1.5	1.5	2.0	1.5	1.5	2.0	2.5	1.3	1.5	2.0	2.5	3.0	1.5	2.5	2.0	1.5	2.0

Lake Merced North

Secchi Disc	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth (feet)	2.5	2.5	3.0		1.5	1.0	1.5	1.0	1.5	1.0	0.5	1.5	2.5	1.0	0.8	2.0	2.0	1.3	1.0	1.5

Lake Merced North East

Secchi Disc	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth (feet)	1.5	1.5	1.5	6.5	1.5	1.0	1.5	1.5	1.5	1.0	0.5	2.5	3.0	1.0	0.5	2.0	2.0	1.5	1.0	1.5

Lake Merced South - Pistol Range

Secchi Disc	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth (feet)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	2.5	2.5	1.5	1.5	2.0	3.0	2.0	1.2	1.8	2.5	2.0	1.3	2.0

Lake Merced South - Pump Station

Secchi Disc	29-Dec-05	23-Jan-06	1-Mar-06	26-Apr-06	14-Jun-06	24-Aug-06	25-Oct-06	20-Dec-06	29-Mar-07	26-Jun-07	20-Aug-07	27-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09	15-Dec-09
Depth (feet)	2.0	2.0	2.0	2.0	1.5	1.5	1.5	2.5	2.5	1.5	1.5	2.0	3.0	2.0	1.0	1.5	2.5	2.0	1.3	2.0

Lake Merced North

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**Br**	**Br**	**Br**	**Br**
Ft	mg/L	mg/L	mg/L	mg/L
Surf	0.43	0.54	0.52	0.42
5	0.43	0.54	0.54	0.42
10	0.44	0.54	0.51	0.42
15	0.42	0.53	0.53	0.42

Lake Merced North East

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**Br**	**Br**	**Br**	**Br**
Ft	mg/L	mg/L	mg/L	mg/L
0	0.39		0.49	0.35
5	0.39		0.48	0.35
10	0.38		0.48	0.35

Lake Merced South - Pistol Range

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**Br**	**Br**	**Br**	**Br**
Ft	mg/L	mg/L	mg/L	mg/L
Surf	0.23	0.26	0.34	0.26
5	0.23	0.28	0.34	
6				0.26
10	0.23	0.29	0.33	
12				0.26
15	0.23	0.29	0.33	
16	0.22	0.32		
18				0.26

Lake Merced South - Pump Station

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**Br**	**Br**	**Br**	**Br**
Ft	mg/L	mg/L	mg/L	mg/L
Surf	0.23	0.28	0.34	0.26
5	0.23	0.29	0.34	0.26
10	0.22	0.28	0.33	
12				0.26
15	0.23	0.26	0.33	
18				0.26

Lake Merced North

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**SO4**	**SO4**	**SO4**	**SO4**
Ft	mg/L	mg/L	mg/L	mg/L
Surf	22	16	13	16
5	22	16	13	16
10	22	16	13	16
15	22	15	13	16

Lake Merced North East

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**SO4**	**SO4**	**SO4**	**SO4**
Ft	mg/L	mg/L	mg/L	mg/L
0	30		23	26
5	30		23	26
10	30		22	26

Lake Merced South - Pistol Range

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**SO4**	**SO4**	**SO4**	**SO4**
Ft	mg/L	mg/L	mg/L	mg/L
Surf	11	7.1	7.4	16
5	11	7.1	7.5	
6				16
10	11	6.8	7.5	
12				16
15	11	6.4	7.4	
16	11	6.4		
18				16

Lake Merced South - Pump Station

	15-May-97	10-Sep-97	03-Dec-97	16-Mar-98
Depth	**SO4**	**SO4**	**SO4**	**SO4**
Ft	mg/L	mg/L	mg/L	mg/L
Surf	11	7.0	7.6	16
5	11	6.9	7.5	16
10	11	6.8	7.6	
12				16
15	11	6.5	7.6	
18				16

Lake Merced North

	26-Jun-07	20-Aug-07	26-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09
Depth	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surf	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***
Btm	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***

Lake Merced North East

	26-Jun-07	20-Aug-07	26-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09
Depth	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surf	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***
Btm	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***		***0.5***	***0.5***	***0.5***	***0.5***

Lake Merced South - Pistol Range

	26-Jun-07	20-Aug-07	26-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09
Depth	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surf	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***
Btm		***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	1.42	***0.5***	***0.5***	***0.5***

Lake Merced South - Pump Station

	26-Jun-07	20-Aug-07	26-Dec-07	28-Mar-08	10-Jun-08	24-Sep-08	4-Dec-08	24-Mar-09	4-Jun-09	22-Sep-09
Depth	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**	**Pb**
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
Surf	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***
Btm	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***	***0.5***

Note: Bold, italicized formats indicate half the reported value for statistical purposes.

APPENDIX D-4
Lake Merced Water Quality Graphs

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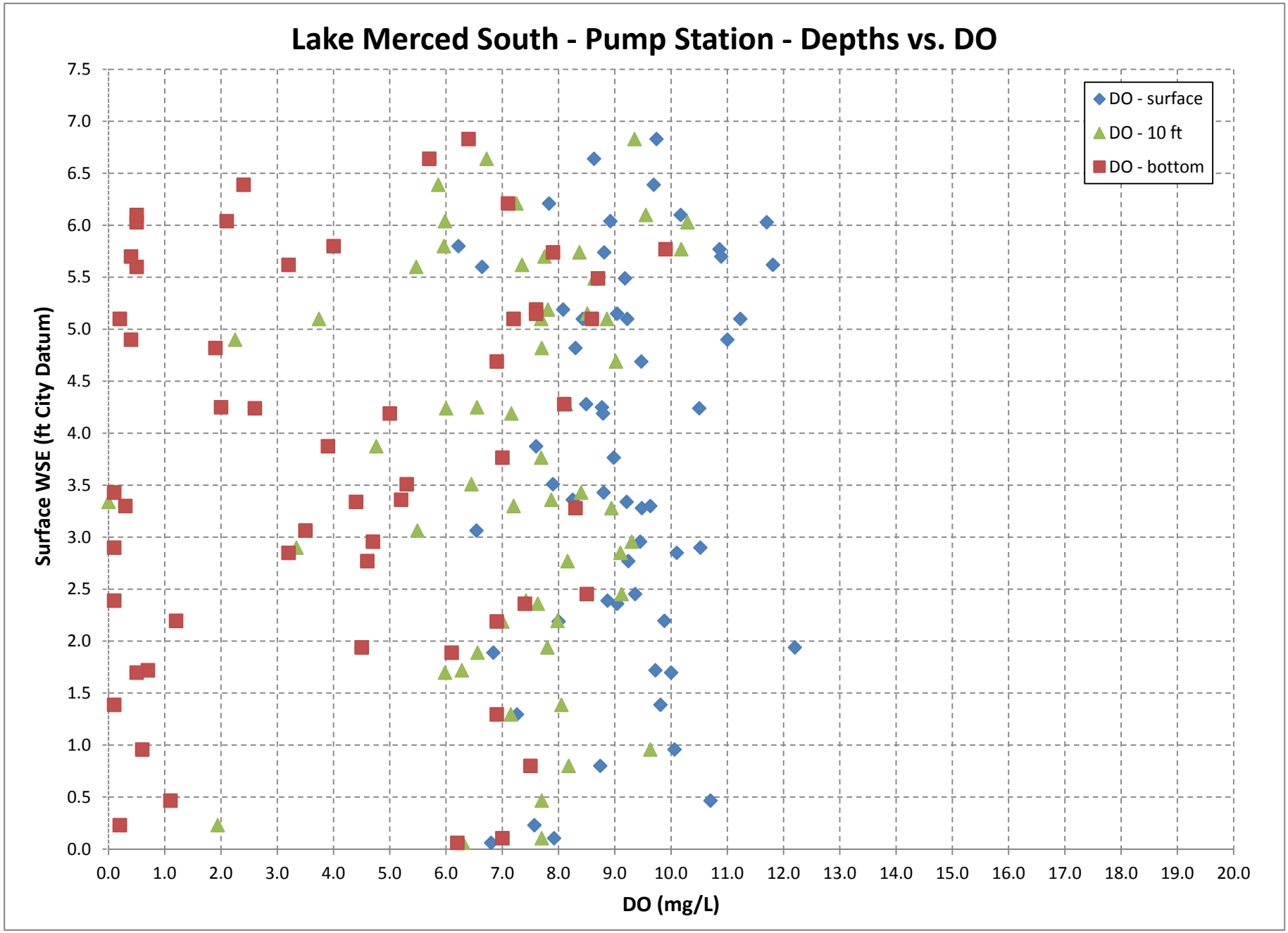
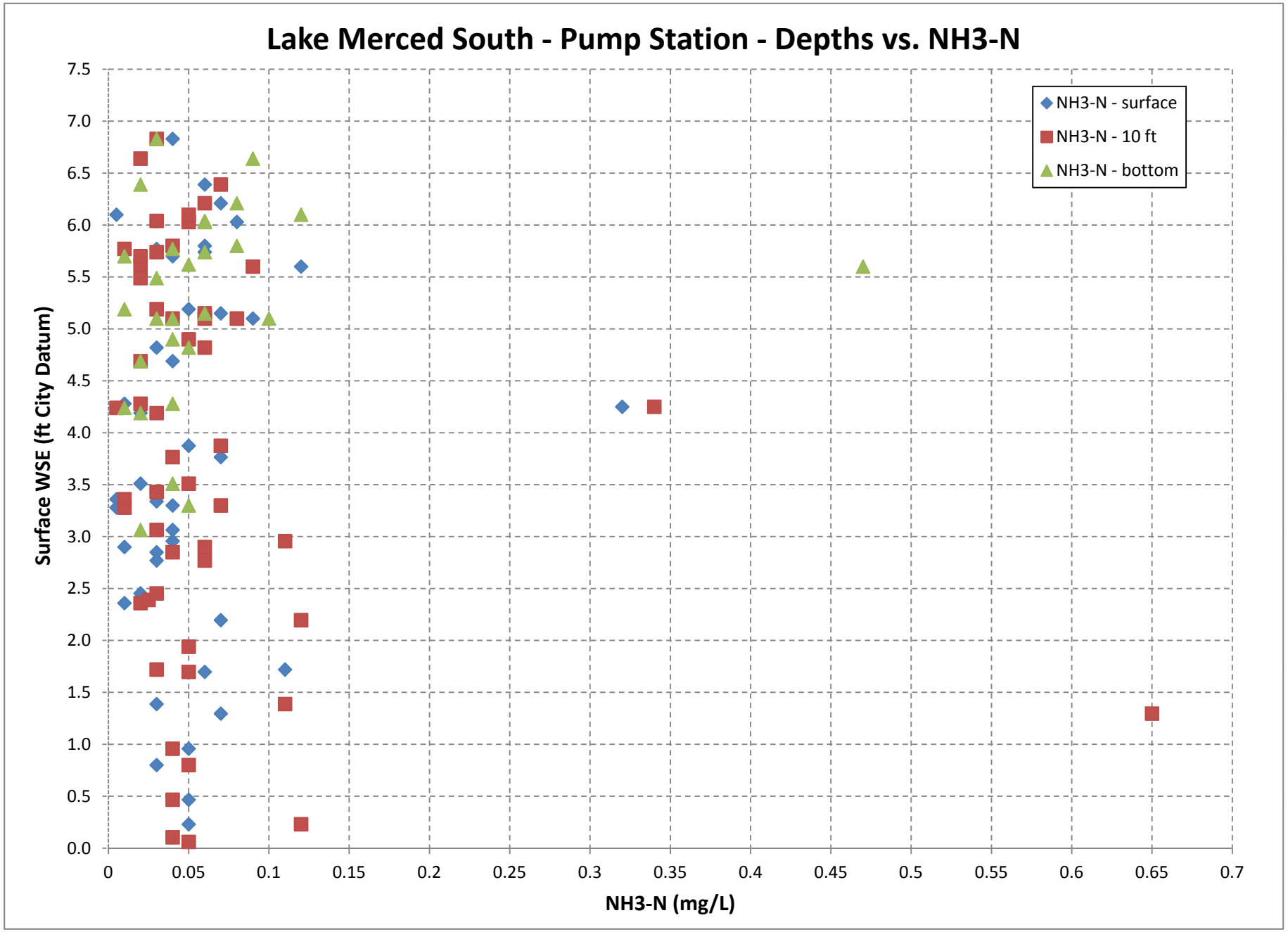
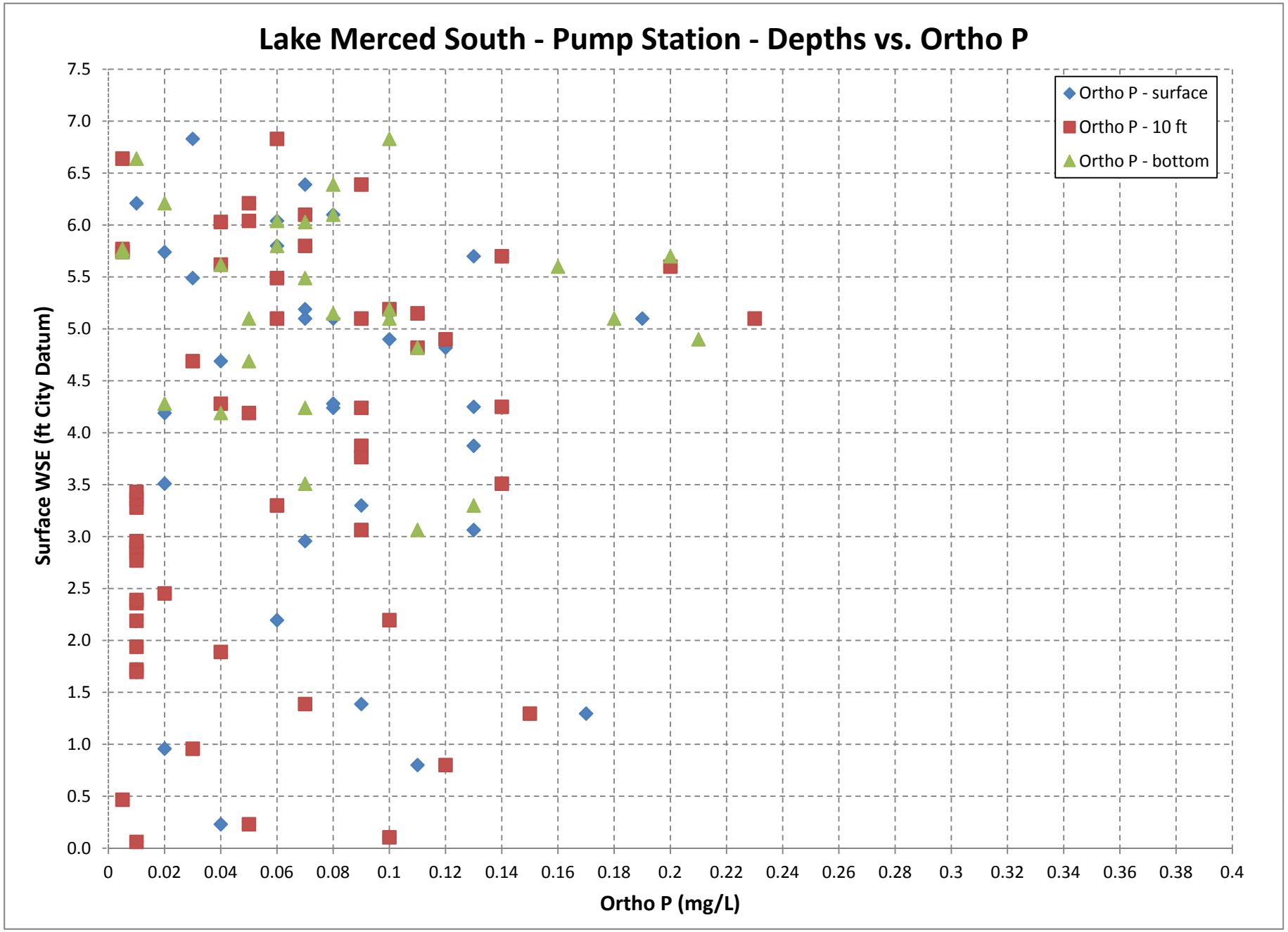
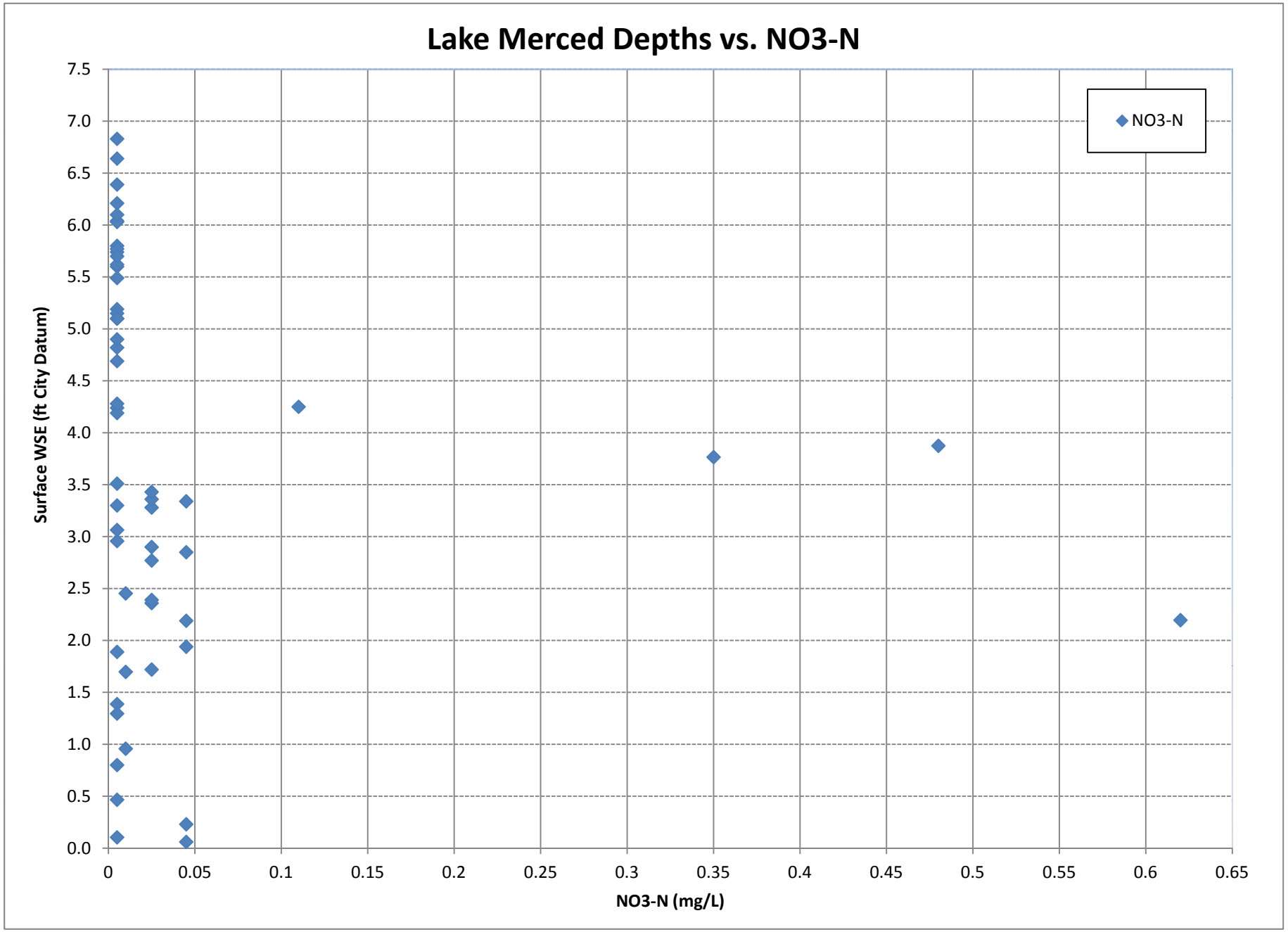
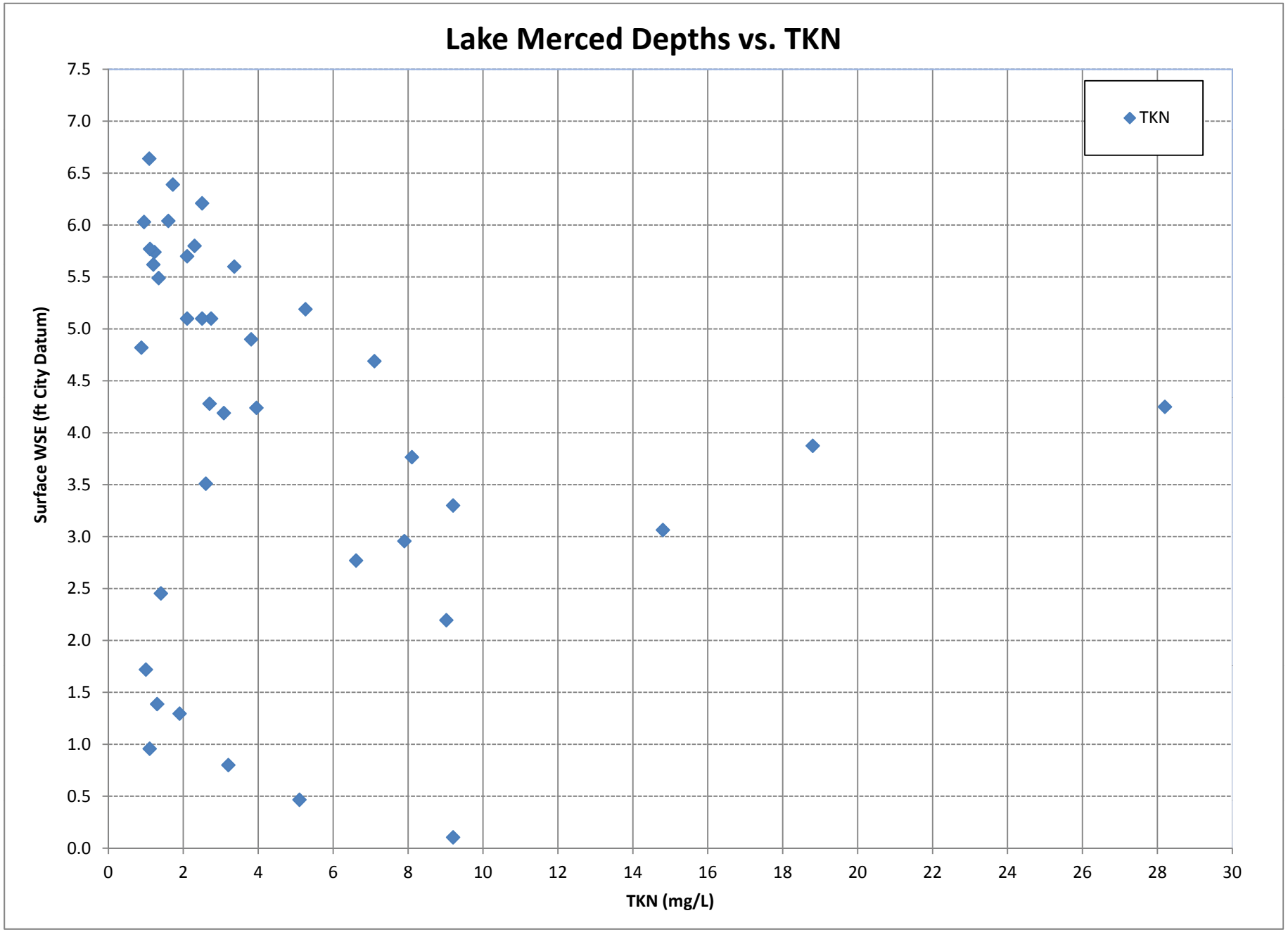
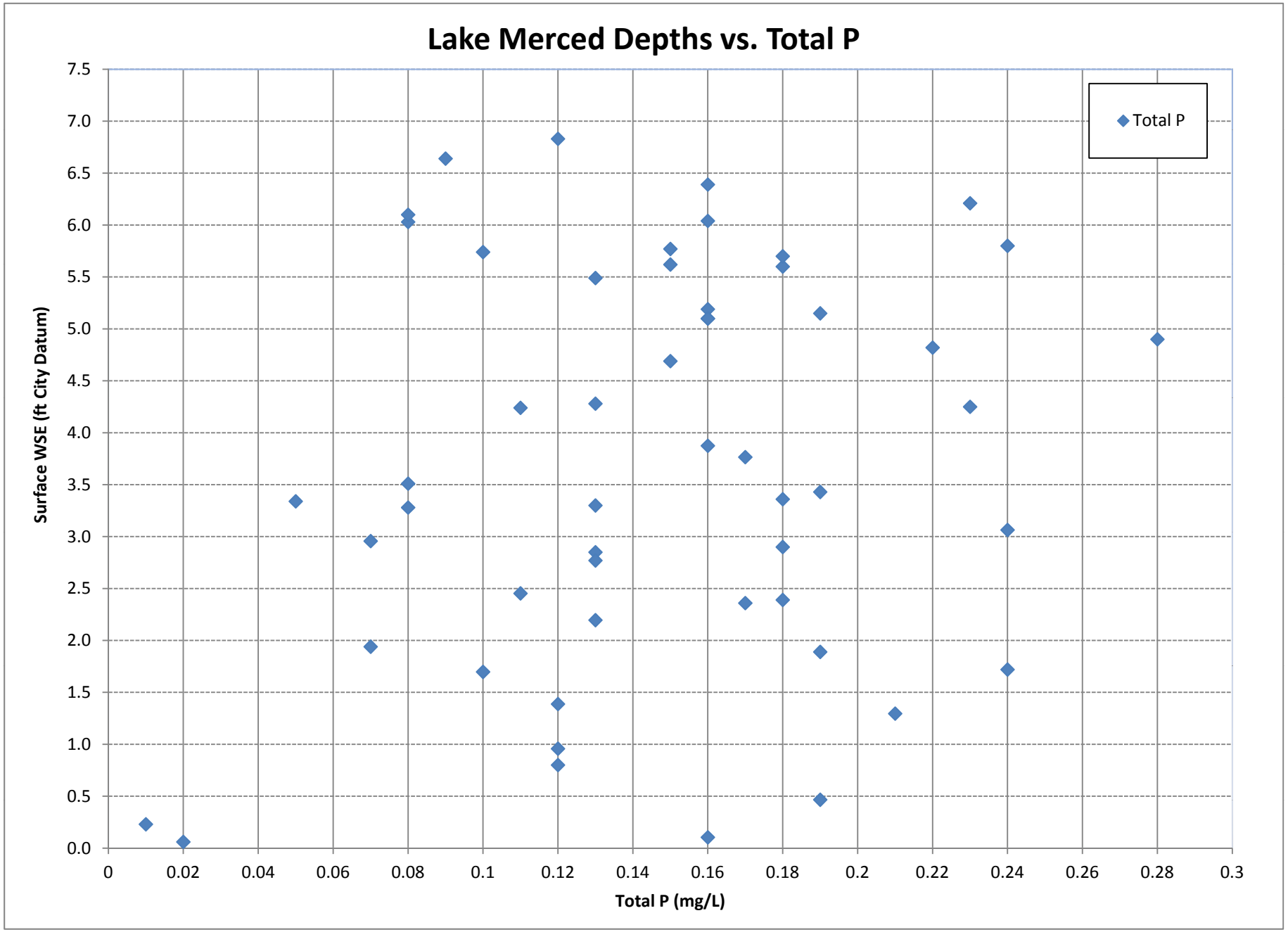

Lake Merced South - Pump Station - Depths vs. DO
Surface WSE (ft City Datum)
DO (mg/L)
DO - surface
DO - 10 ft
DO - bottom
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0

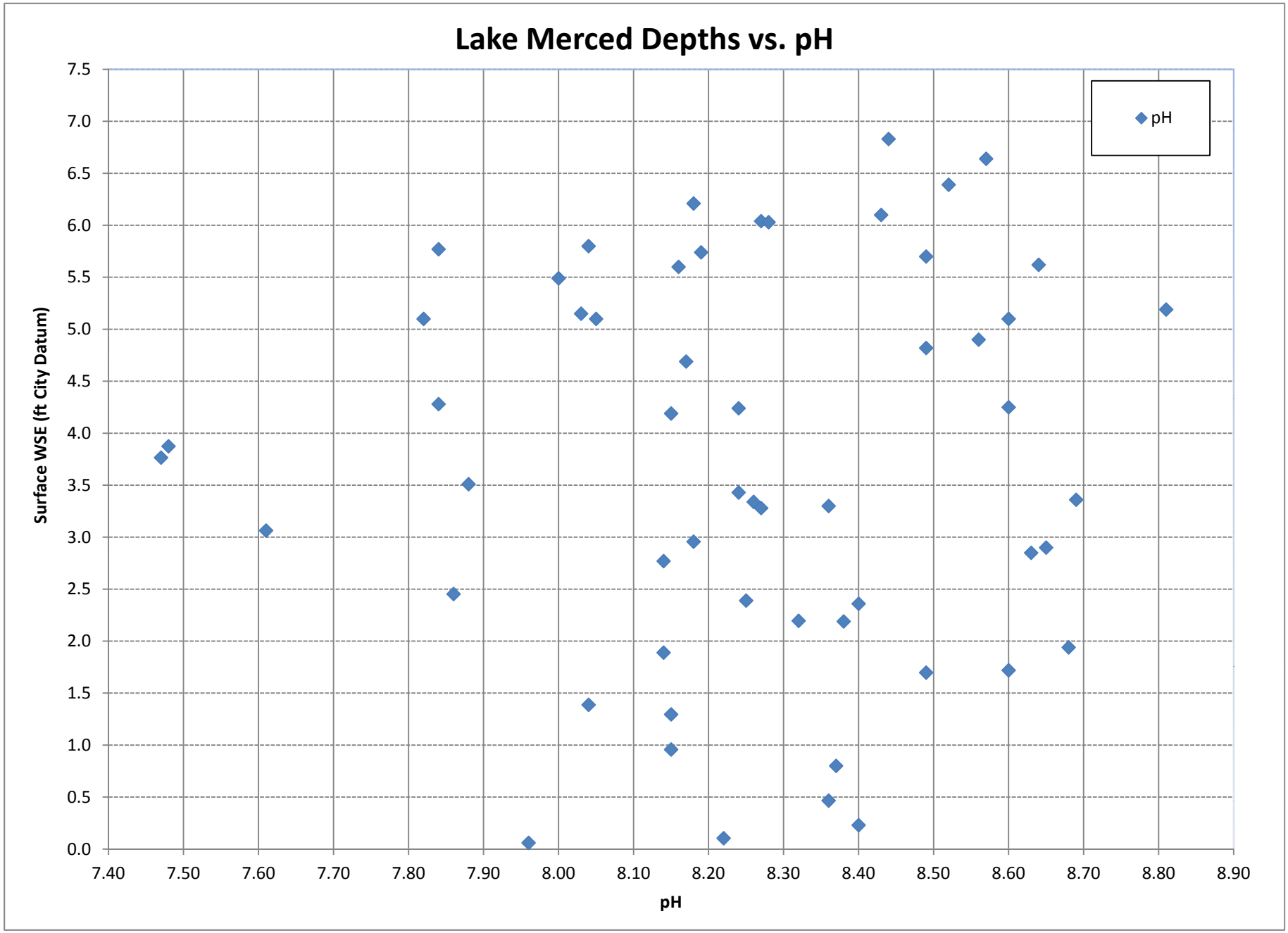

Lake Merced South - Pump Station - Depths vs. NH3-N
Surface WSE (ft City Datum)
NH3-N (mg/L)
NH3-N - surface
NH3-N - 10 ft
NH3-N - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7

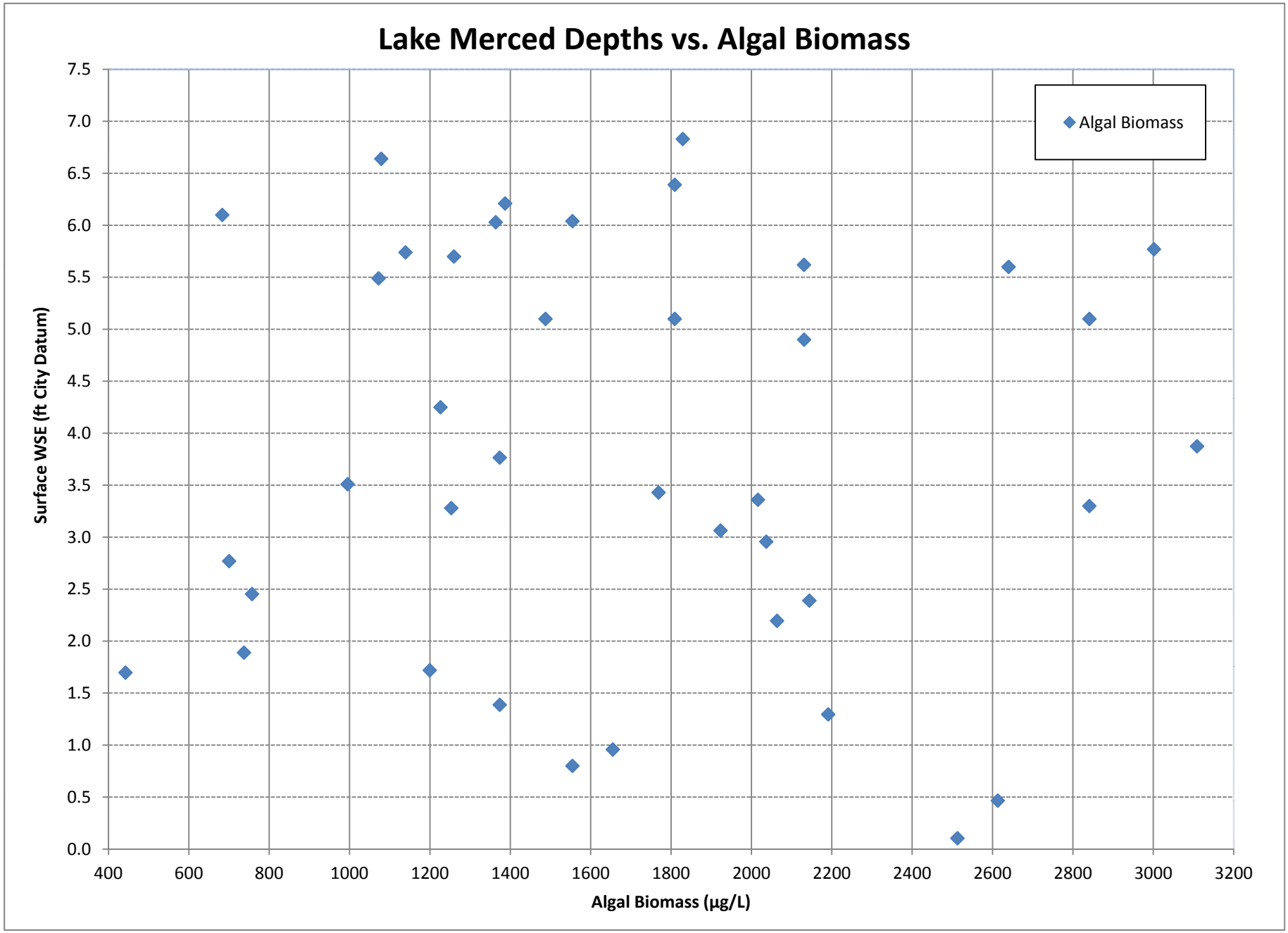

Lake Merced South - Pump Station - Depths vs. Ortho P
Surface WSE (ft City Datum)
Ortho P (mg/L)
Ortho P - surface
Ortho P - 10 ft
Ortho P - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4

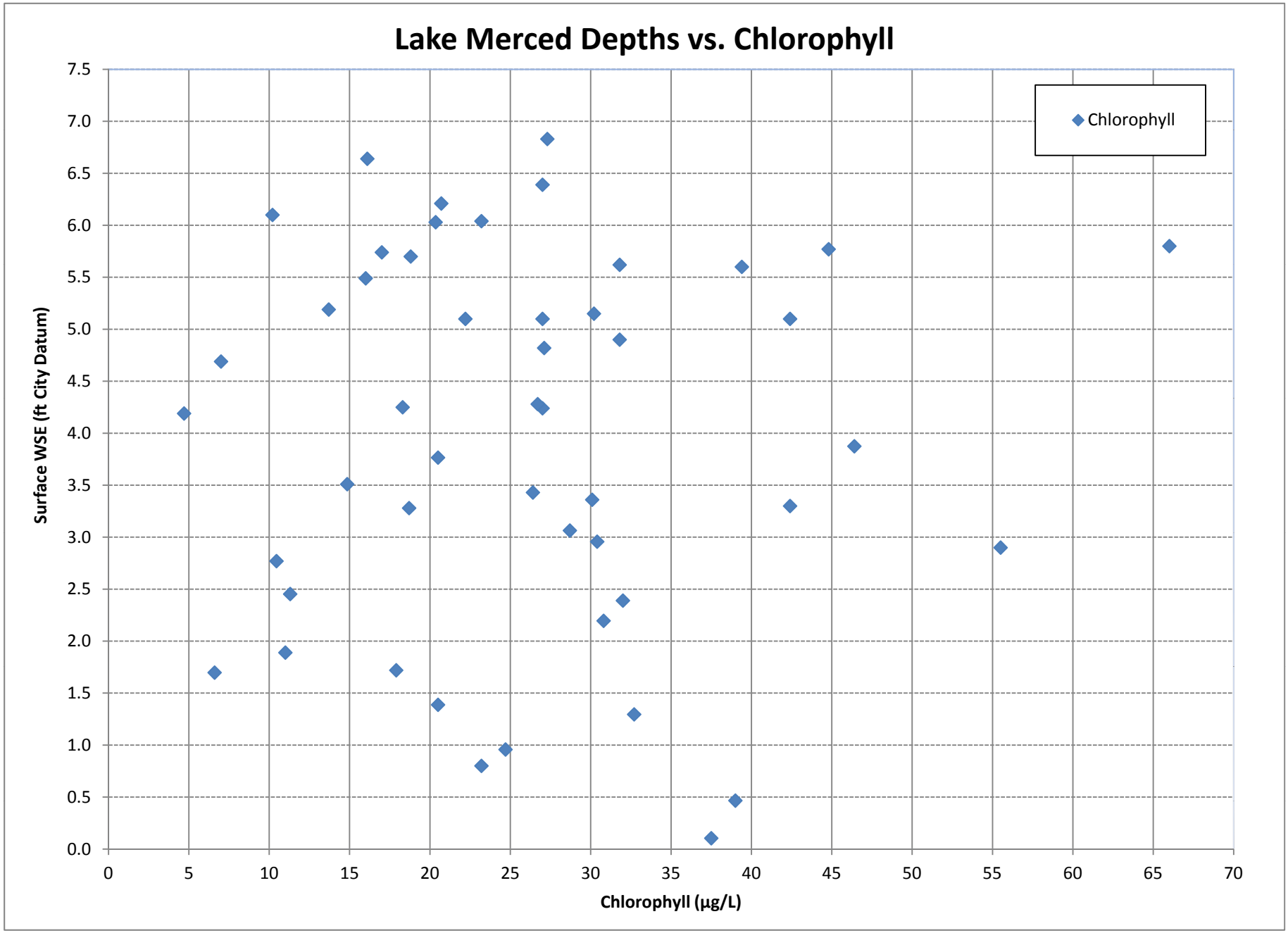

Lake Merced Depths vs. NO3-N
NO3-N
Surface WSE (ft City Datum)
NO3-N (mg/L)
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65

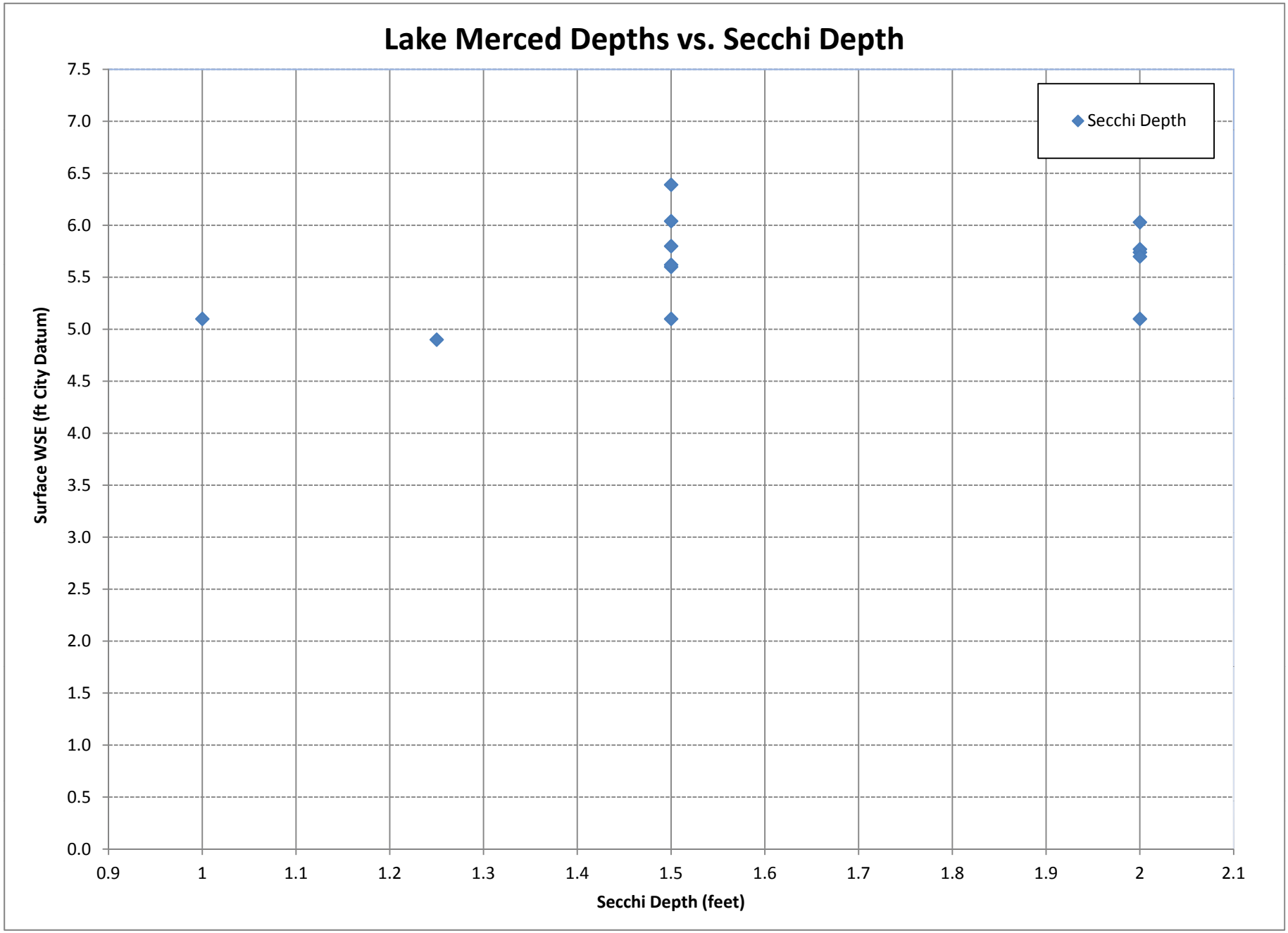

Lake Merced Depths vs. TKN
Surface WSE (ft City Datum)
TKN (mg/L)
TKN
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

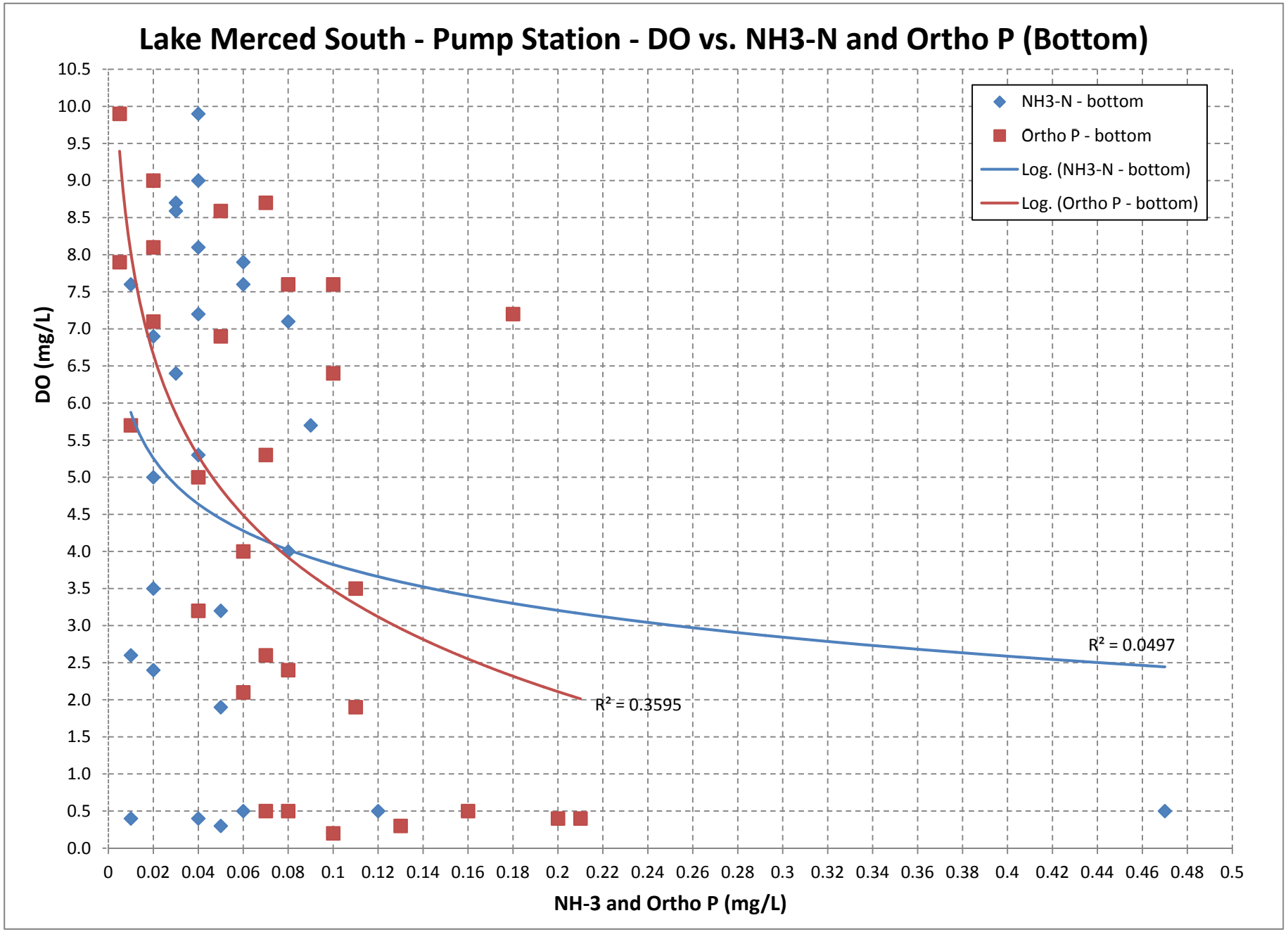

Lake Merced Depths vs. Total P
Surface WSE (ft City Datum)
Total P (mg/L)
Total P
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3

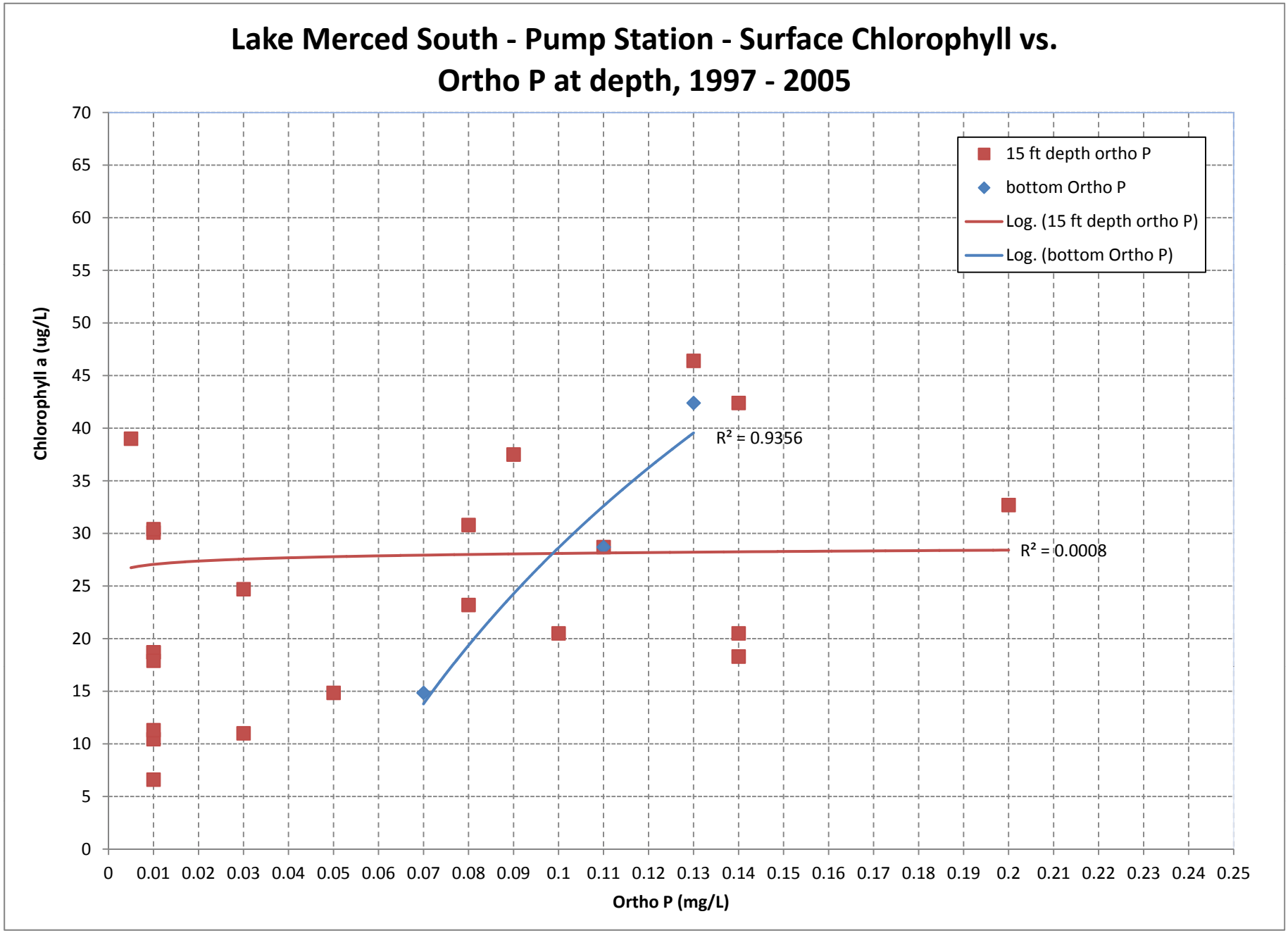

Lake Merced Depths vs. pH
Surface WSE (ft City Datum)
pH
pH
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
7.40
7.50
7.60
7.70
7.80
7.90
8.00
8.10
8.20
8.30
8.40
8.50
8.60
8.70
8.80
8.90

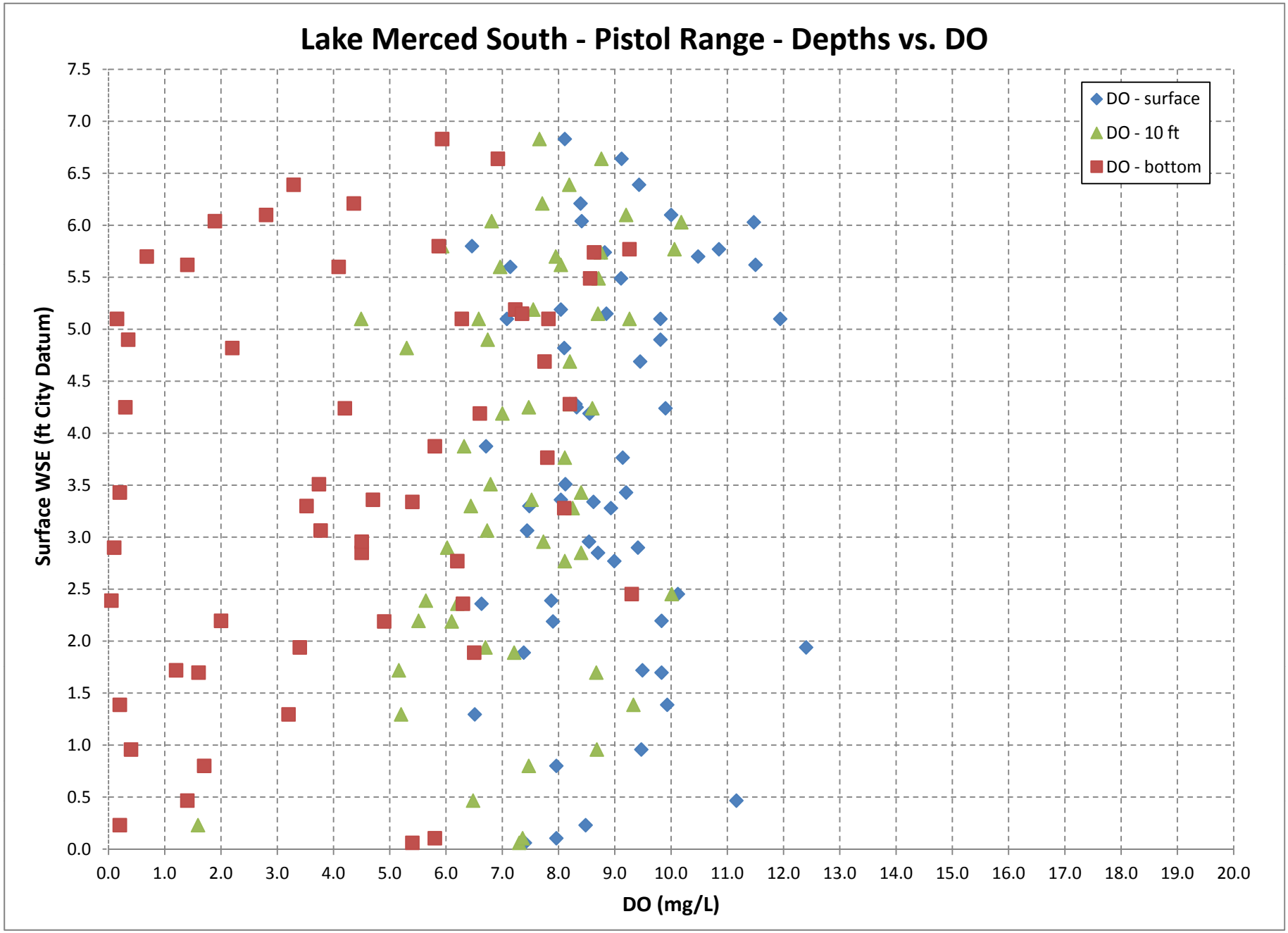

Lake Merced Depths vs. Algal Biomass
Surface WSE (ft City Datum)
Algal Biomass (µg/L)
Algal Biomass
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
2800
3000
3200

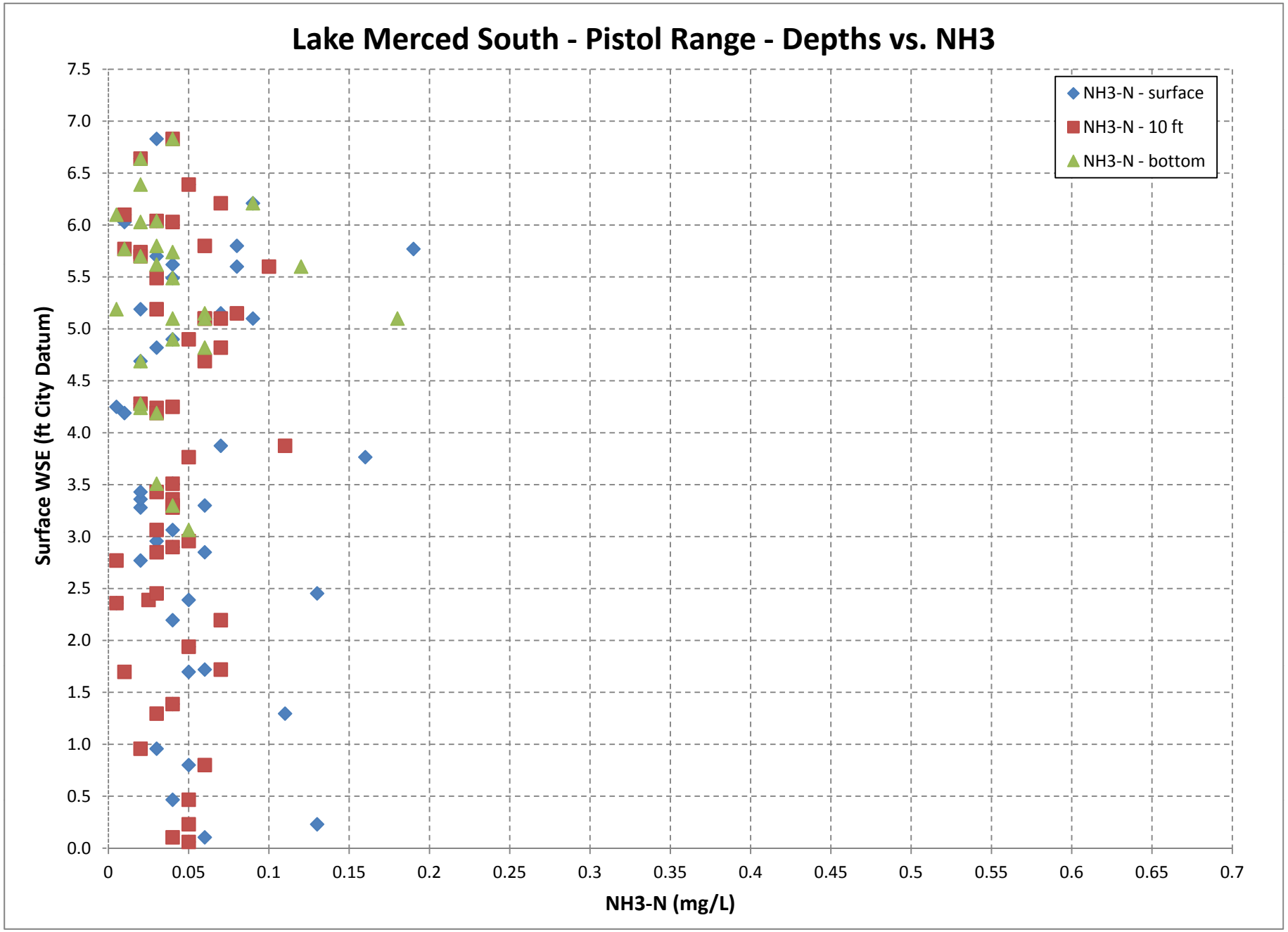

Lake Merced Depths vs. Chlorophyll
Chlorophyll
Surface WSE (ft City Datum)
Chlorophyll (µg/L)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70

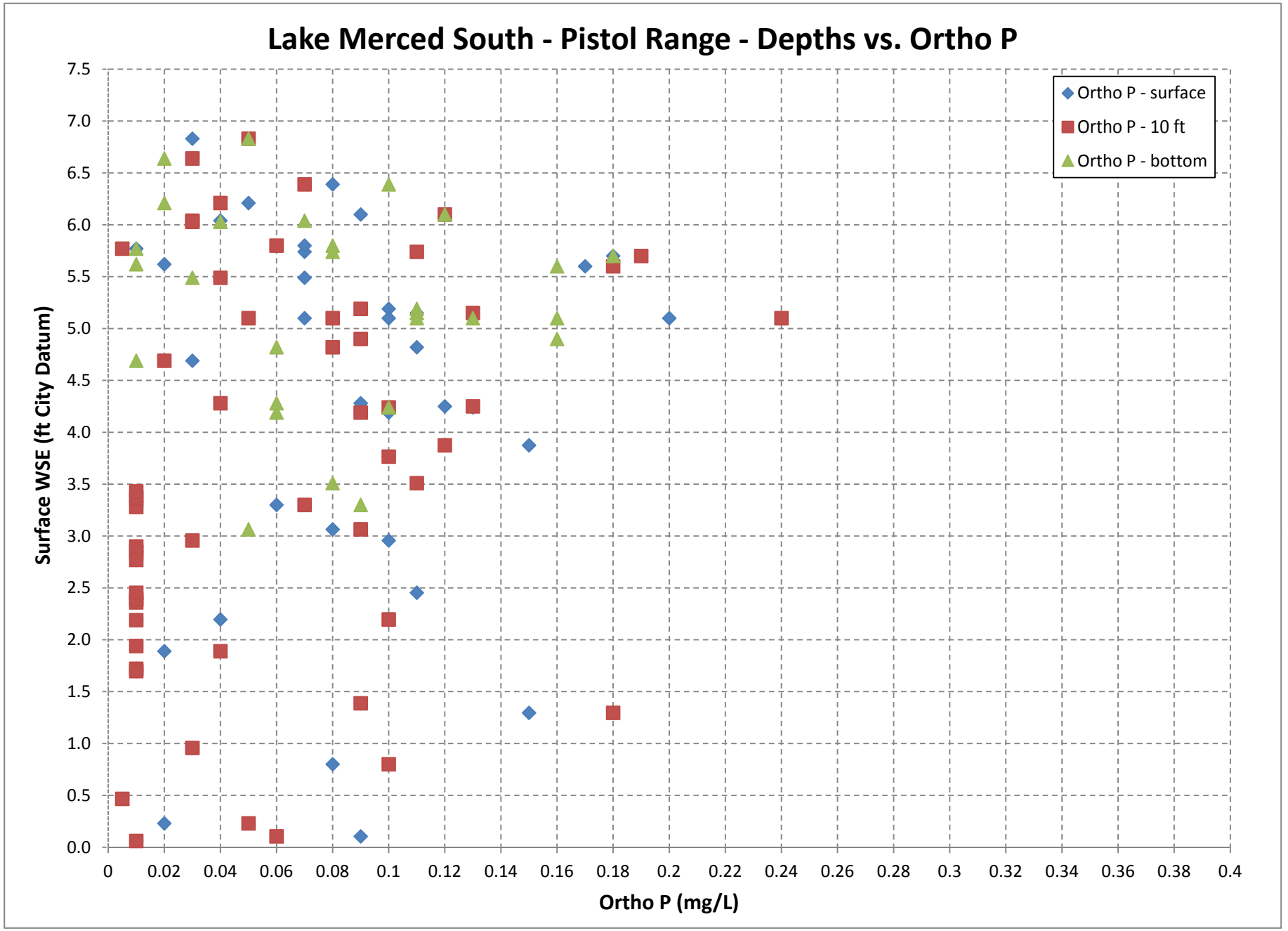

Lake Merced Depths vs. Secchi Depth
Surface WSE (ft City Datum)
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.9
1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
1.8
1.9
2
2.1
Secchi Depth (feet)
Secchi Depth

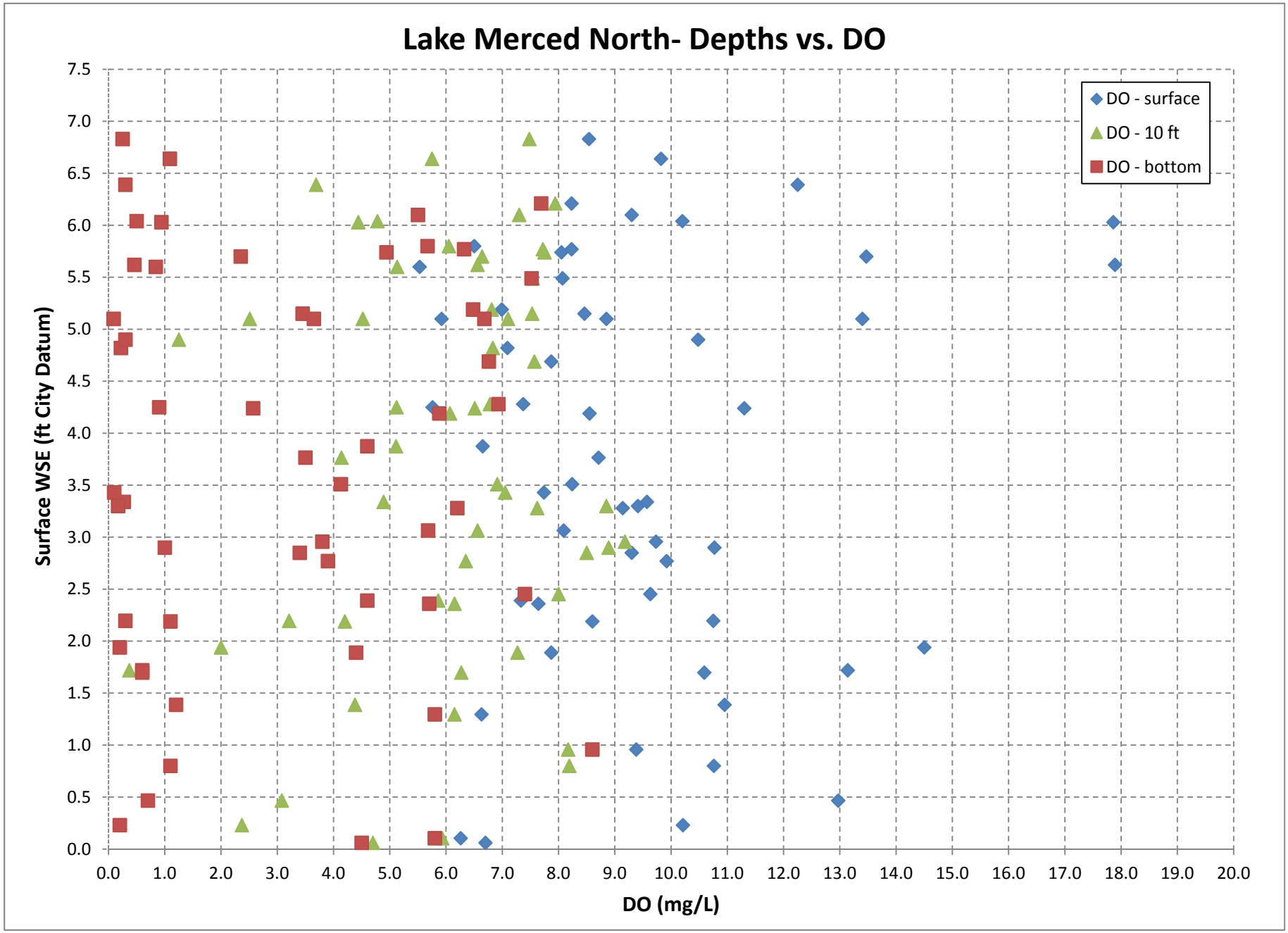

Lake Merced South - Pump Station - DO vs. NH3-N and Ortho P (Bottom)
DO (mg/L)
NH-3 and Ortho P (mg/L)
NH3-N - bottom
Ortho P - bottom
Log. (NH3-N - bottom)
Log. (Ortho P - bottom)
R² = 0.0497
R² = 0.3595

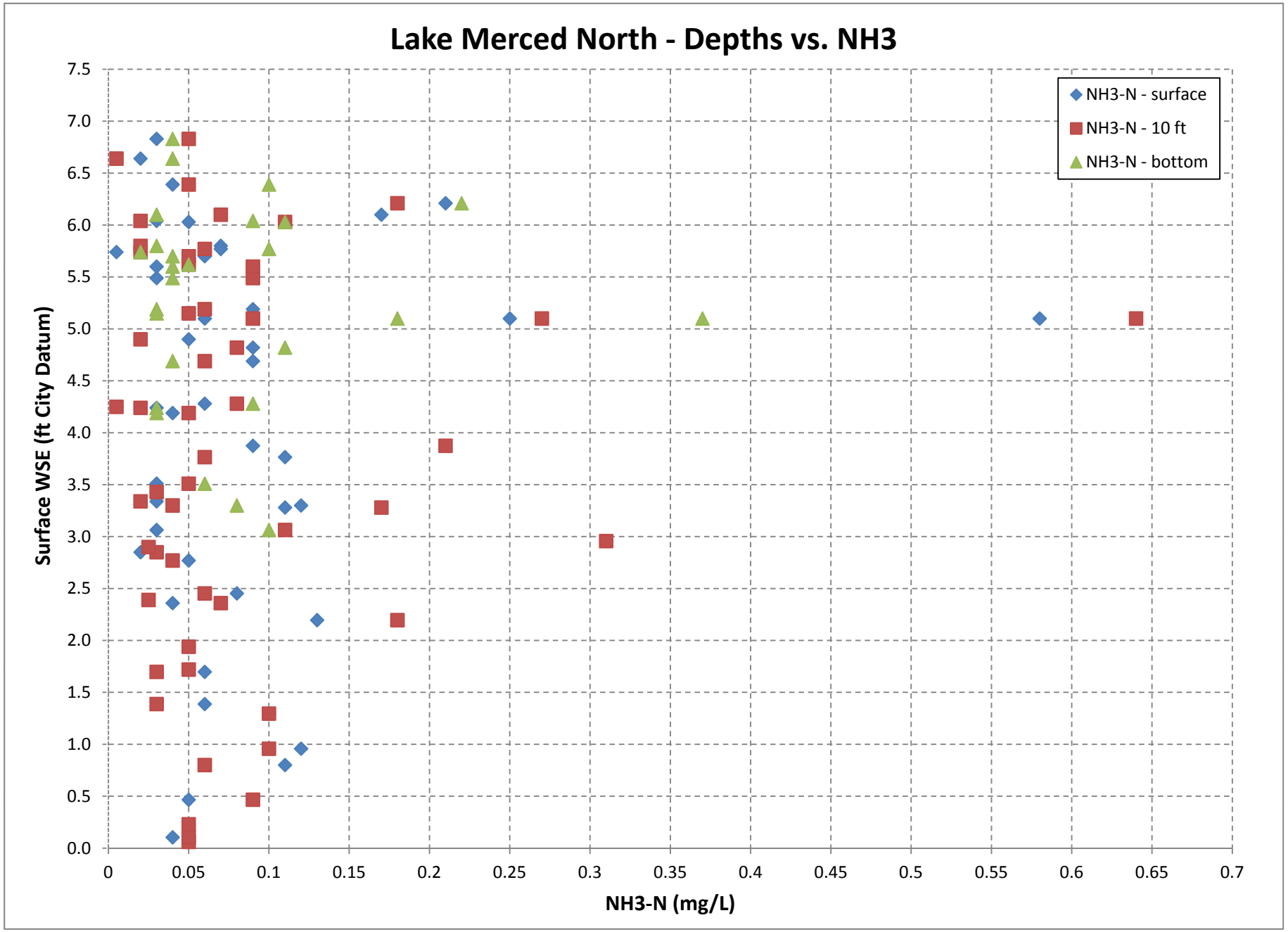

Lake Merced South - Pump Station - Surface Chlorophyll vs. Ortho P at depth, 1997 - 2005
Chlorophyll a (ug/L)
Ortho P (mg/L)
15 ft depth ortho P
bottom Ortho P
Log. (15 ft depth ortho P)
Log. (bottom Ortho P)
R² = 0.9356
R² = 0.0008
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
0 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.1 0.11 0.12 0.13 0.14 0.15 0.16 0.17 0.18 0.19 0.2 0.21 0.22 0.23 0.24 0.25

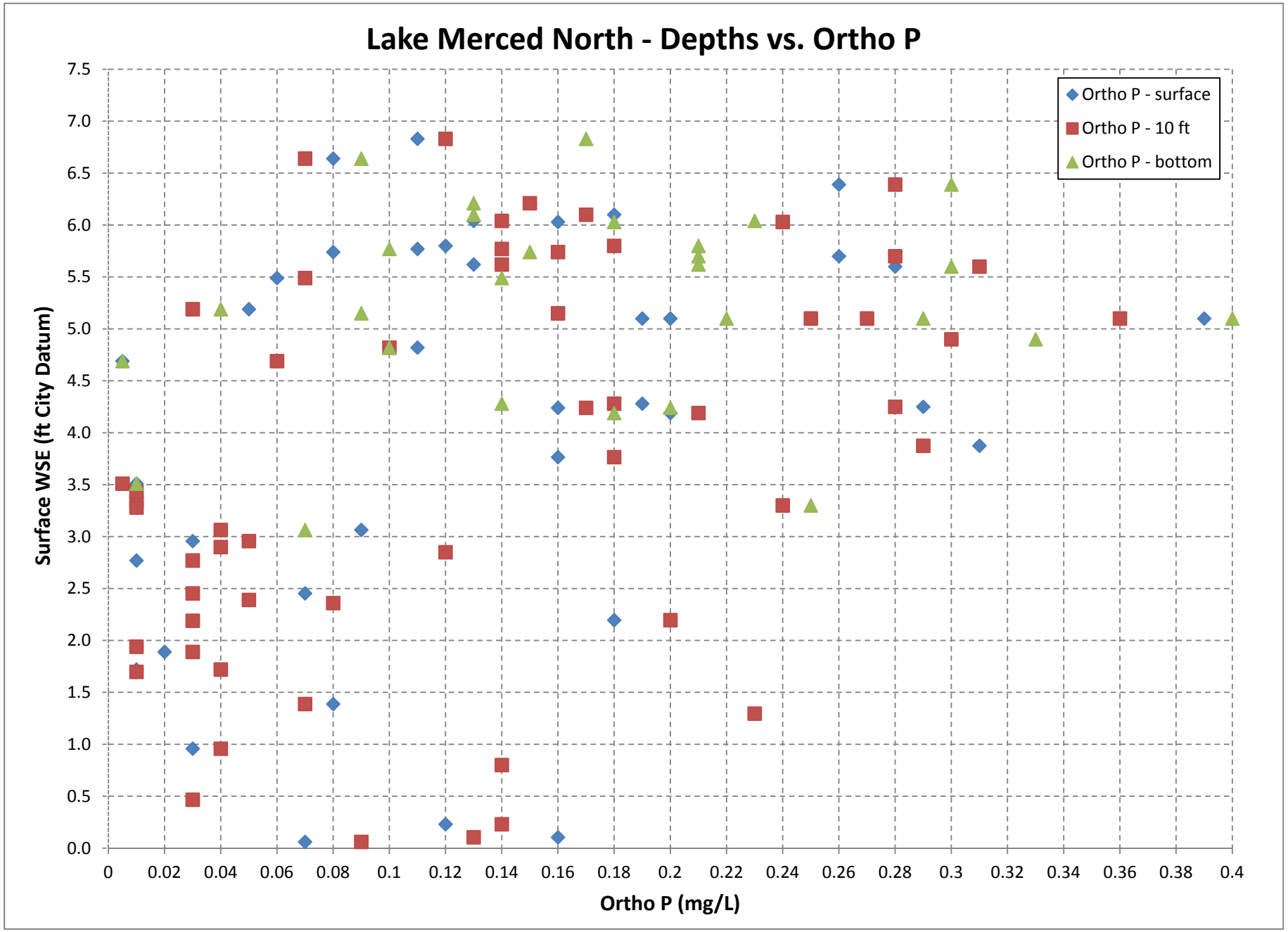

Lake Merced South - Pistol Range - Depths vs. DO
Surface WSE (ft City Datum)
DO (mg/L)
DO - surface
DO - 10 ft
DO - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0

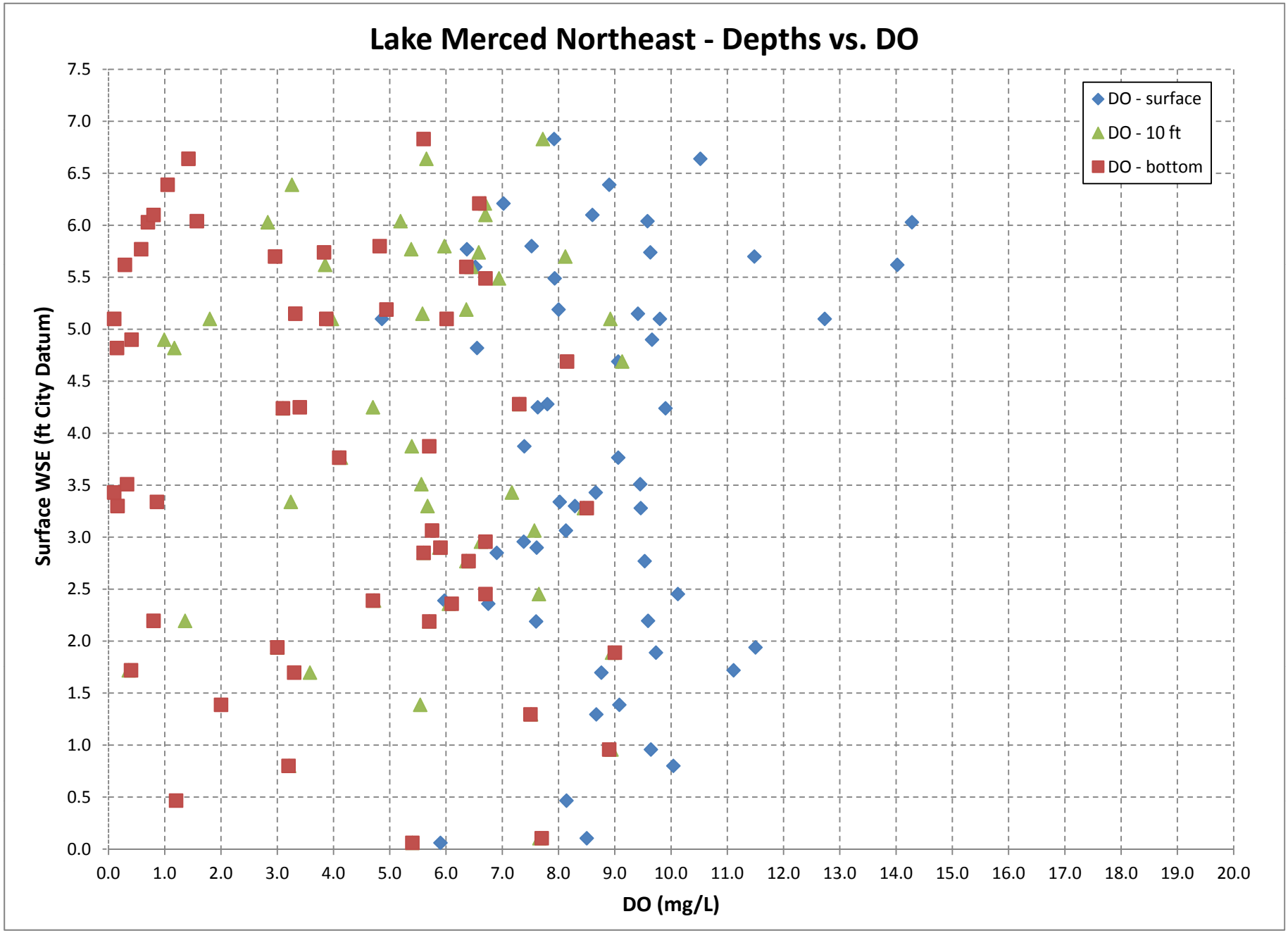

Lake Merced South - Pistol Range - Depths vs. NH3
Surface WSE (ft City Datum)
NH3-N (mg/L)
NH3-N - surface
NH3-N - 10 ft
NH3-N - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7

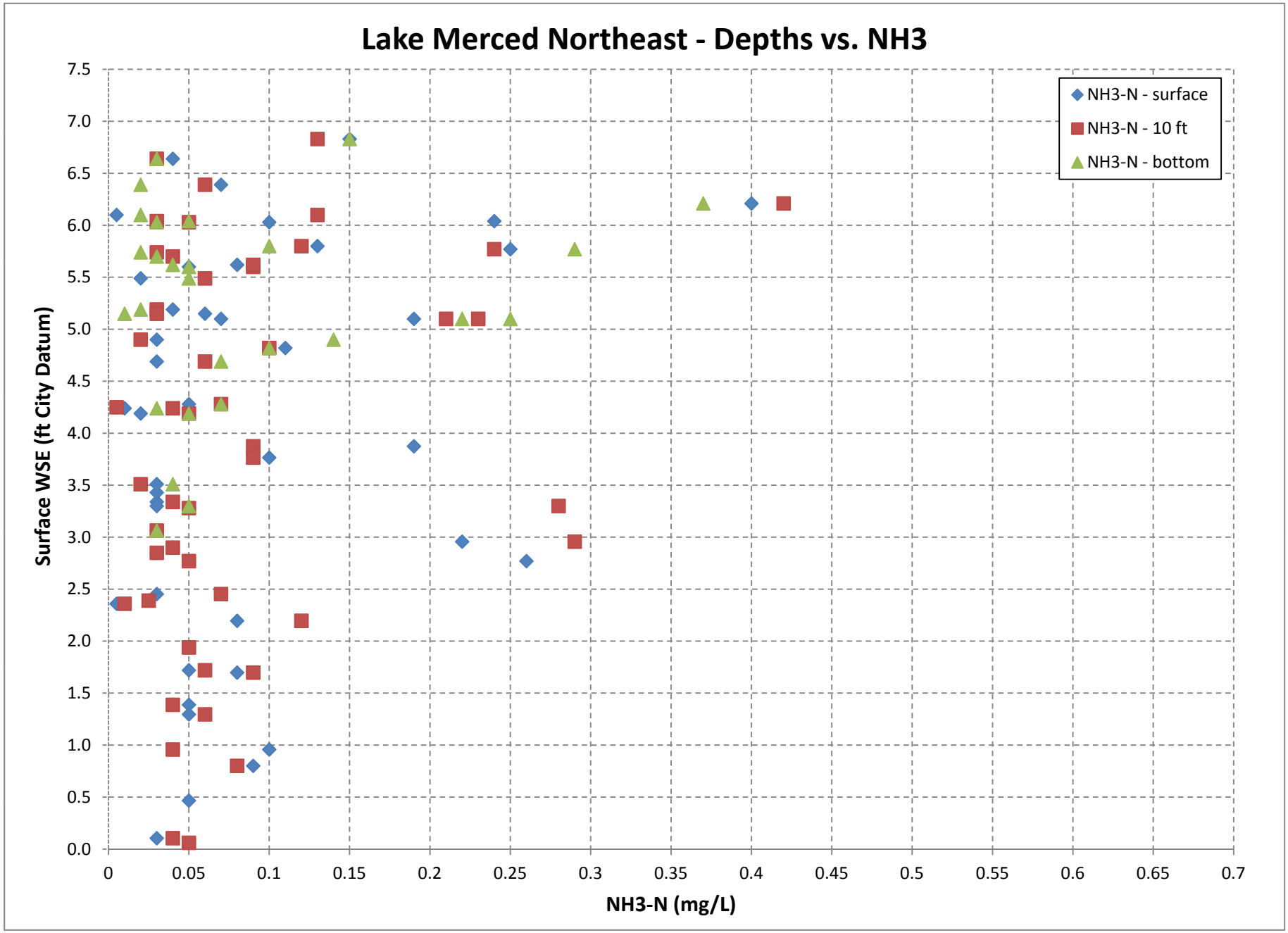

Lake Merced South - Pistol Range - Depths vs. Ortho P
Surface WSE (ft City Datum)
Ortho P (mg/L)
Ortho P - surface
Ortho P - 10 ft
Ortho P - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4

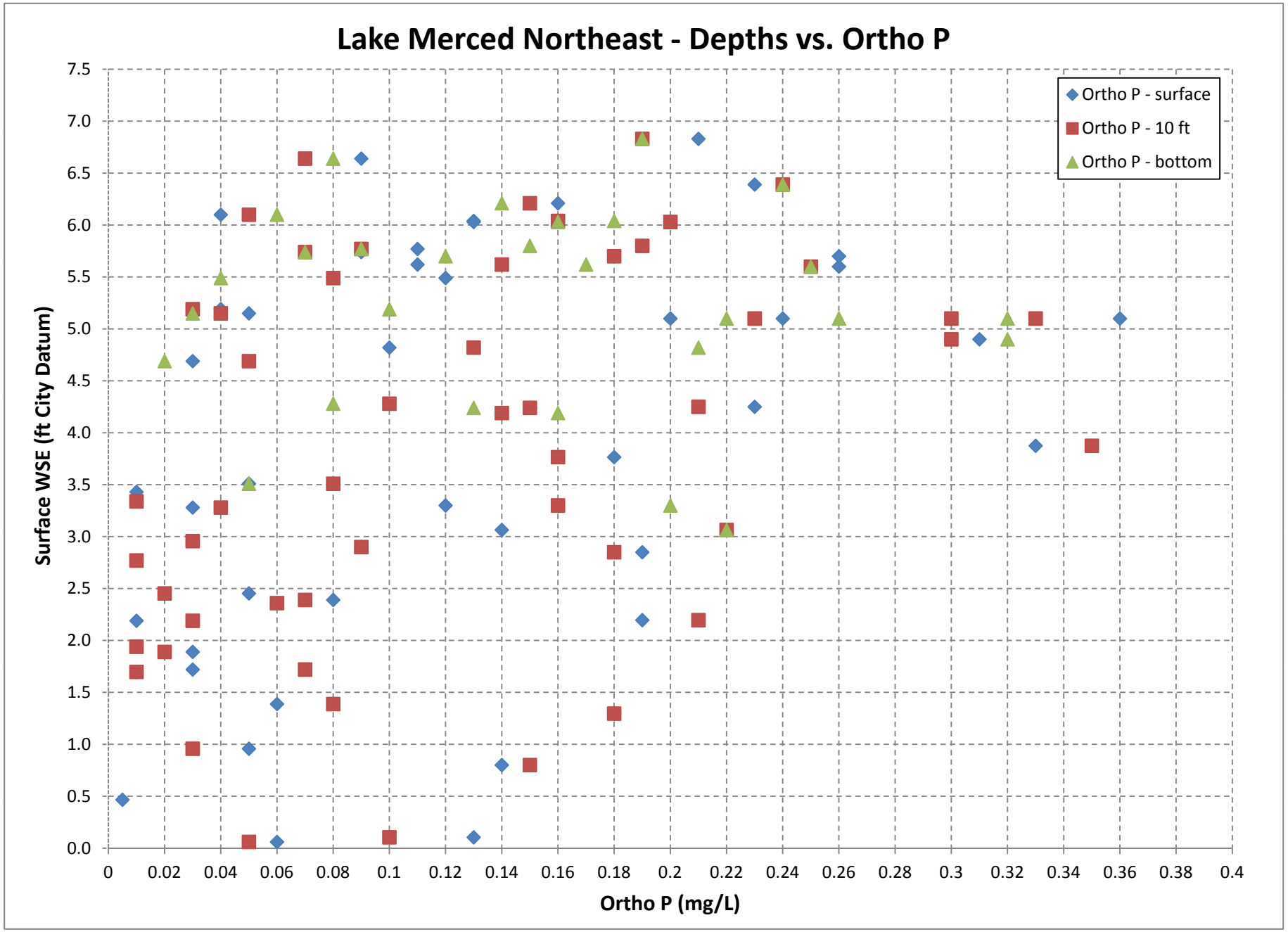

Lake Merced North- Depths vs. DO
Surface WSE (ft City Datum)
DO (mg/L)
DO - surface
DO - 10 ft
DO - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0


Lake Merced North - Depths vs. NH3
Surface WSE (ft City Datum)
NH3-N (mg/L)
NH3-N - surface
NH3-N - 10 ft
NH3-N - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7


Lake Merced North - Depths vs. Ortho P
Surface WSE (ft City Datum)
Ortho P (mg/L)
Ortho P - surface
Ortho P - 10 ft
Ortho P - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4


Lake Merced Northeast - Depths vs. DO
Surface WSE (ft City Datum)
DO (mg/L)
DO - surface
DO - 10 ft
DO - bottom
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5.0
5.5
6.0
6.5
7.0
7.5
0.0
1.0
2.0
3.0
4.0
5.0
6.0
7.0
8.0
9.0
10.0
11.0
12.0
13.0
14.0
15.0
16.0
17.0
18.0
19.0
20.0


Lake Merced Northeast - Depths vs. NH3
Surface WSE (ft City Datum)
NH3-N (mg/L)
NH3-N - surface
NH3-N - 10 ft
NH3-N - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0.45
0.5
0.55
0.6
0.65
0.7


Lake Merced Northeast - Depths vs. Ortho P
Surface WSE (ft City Datum)
Ortho P (mg/L)
Ortho P - surface
Ortho P - 10 ft
Ortho P - bottom
7.5
7.0
6.5
6.0
5.5
5.0
4.5
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0.22
0.24
0.26
0.28
0.3
0.32
0.34
0.36
0.38
0.4

APPENDIX D-5
Task 10.1 Technical Memorandum, Groundwater Modeling Analysis for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project

The hydrographs referenced in Section 5.16, Hydrology and Water Quality, are the hydrographs showing simulated groundwater levels by model layer, included in Attachment 10.1-B.

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Technical Memorandum 10.1

Groundwater Modeling Analysis

for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project

18 April 2012

Prepared for

San Francisco Public Utilities Commission
525 Golden Gate Avenue, 10th Floor
San Francisco, CA 94102

K/J Project No. 0864001

Supplemental Explanation for Hydrographs - TM10.1

This supplemental explanation is prepared to address discrepancies on several graphs presented in TM 10.1.

First, the x-axis on several graphs showing model results was shifted. The x-axis is named Scenario Year which should correspond to a water year[1]. However, the graph template was plotted using a calendar year, so the intervals on the x-axis represent the period from January to December. The result is that the graph is shifted 3-months later relative to Scenario Year.

Second, the shaded area representing the Design Drought was added manually and because of this process, it was not presented consistently on the graphs. By definition per the PEIR, the 8.5-year Design Drought includes one Hold year before the 7.5-year Take period. In addition, the Design Drought needs to be shifted 3-months later for the x-axis issue to be consistent with the model output. The Design Drought should be shown as Scenario Years 35.5 to 44.0 on the shifted x-axis.

The following is a list of figures in TM 10.1 where the Design Drought shaded area is shown slightly different and does not match the correct display of the Design Drought. The figures should be viewed based on the correct representation of the Design Drought as explained above.

- Figures 10.1-6 through 10.1-13 (a total of eight figures) have the shifted x-axis. The Design Drought should be shown as Scenario Years 35.5 to 44.0 on the shifted x-axis.
- Attachment 10.1-B hydrographs with model simulated groundwater levels have the shifted x-axis. The Design Drought should be shown as Scenario Years 35.5 to 44.0 on the shifted x-axis.
- Attachment 10.1-G graphs showing model simulated lake levels have the shifted x-axis. The Design Drought should be shown as Scenario Years 35.5 to 44.0 on the shifted x-axis.

[1] A water year is October 1 of the previous year to September 30 of the current (named) year.

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18 April 2012

Task 10.1 Technical Memorandum

San Francisco Public Utilities Commission

Groundwater Modeling Analysis for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project

Prepared for: Greg Bartow and Jeff Gilman, SFPUC

Prepared by: Sevim Onsoy and Michael Maley, Kennedy/Jenks Consultants

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1. Introduction

This Technical Memorandum (TM) was prepared to document work performed by Kennedy/Jenks Consultants (Kennedy/Jenks) for the San Francisco Public Utilities Commission (SFPUC) pursuant to the amended Task Order (TO) authorizations CUW30103-TO-1.12 of the Regional Groundwater Storage and Recovery (GSR) Project and CUW30102-TO-2.7 of the San Francisco Groundwater Supply (SFGW) Project. These projects are funded by the SFPUC's Water System Improvement Program (WSIP).

1.1. Purpose

The main purpose of this TM is to document the setup and application of the groundwater modeling analysis being prepared to evaluate groundwater issues for the GSR and SFGW Projects. For evaluating conditions at Lake Merced, the Lake Merced Lake-Level Model (refer to as the Lake-Level Model) was also used as the primary tool. The existing Westside Basin Groundwater-Flow Model (referred to as the Westside Basin Groundwater Model) (HydroFocus 2007, 2009, and 2011) was used as a quantitative tool to support analyses necessary for the groundwater issues that may occur during the implementation of the proposed GSR and SFGW Projects. The specific objectives of this TM are as follows:

- To provide a brief overview of the existing Westside Basin Groundwater Model and the Lake-Level Model
- To present the model scenario assumptions and modifications made to the model to develop the model scenarios
- To present and evaluate the results from the simulated model scenarios

This TM documents how the model was applied and provides an assessment for the application of the model results to specific groundwater issues that may result from the implementation of the proposed GSR and SFGW Projects. The evaluation of the model results with respect to these potential groundwater issues are presented in separate TMs listed below.

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- Task 10.2 Assessment of Groundwater-Surface Water Interactions for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project
- Task 10.3 Assessment of Seawater Intrusion for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project
- Task 10.4 Changes in Groundwater Levels and Storage for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project
- Task 10.5 Assessment of Pumping Induced Land Subsidence for the Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project
- Task 10.6 Assessment of Changes in Groundwater Quality for the Regional Groundwater Storage and Recovery Project
- Task 10.7 Well Interference Analysis for the Regional Groundwater Storage and Recovery Project and Cumulative Analysis
- Task 10.8A Updated Analysis of Well Pumping Influences for the San Francisco Groundwater Supply Project and Cumulative Analysis

1.2. General Approach

The overall scope of Task 10.1 was to model scenarios by applying the previously-developed Westside Basin Groundwater Model, by HydroFocus (2007, 2009, and 2011), as a supporting tool to assess potential physical effects that may result from the GSR and SFGW Project operations. The Westside Basin Groundwater Model is a regional, basin-wide groundwater model of the Westside Groundwater Basin (Westside Basin) in western San Francisco and San Mateo County. The Westside Basin Groundwater Model developed by HydroFocus (2007, 2009, and 2011) for the City of Daly City (Daly City) was reviewed with assistance from the California Water Services Company (Cal Water), the City of San Bruno (San Bruno) and SFPUC, and the model was accepted for use in selected applications by all parties. Therefore, the Westside Basin Groundwater Model is a publicly available tool that is capable of supporting water resources planning and management on an ongoing basis (HydroFocus 2007, 2009, and 2011).

The Lake-Level Model is a spreadsheet based water balance model that has been used for evaluating conditions at Lake Merced. The model has been used for various studies of Lake Merced by EDAW, Inc., and Talavera & Richardson (2004), LSCE (2008), Kennedy/Jenks (2009a, and 2009b), and Jacobs Associates (2011a and 2011b).

The hydrogeological conceptual model that forms the basis for the Westside Basin Groundwater Model is based on the *Task 8B Technical Memorandum No.1 Hydrologic Setting of the Westside Basin* (TM#1) (LSCE, 2010). A summary of the hydrogeological conceptual model is presented in this TM to provide the context necessary for evaluating the model assumptions and setup.

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Five model scenarios were constructed and simulated to evaluate potential groundwater and related hydrological effects from the GSR and SFGW Projects and from the cumulative scenario, which involves the GSR and SFGW Projects and other reasonably foreseeable future projects (e.g., the Vista Grande Drainage Basin Improvements Project as assessed by Jacobs Associates (2011a, 2011b) and the City of Daly City (2012)). The proposed GSR and SFGW Project pumping assumptions were incorporated into the groundwater model scenarios to evaluate the response of the model to projected pumping conditions under the proposed projects and the cumulative scenario and to analyze long-term regional basin-wide changes in groundwater levels and storage. The Lake-Level Model was applied to the five scenarios to evaluate potential groundwater-surface water interactions resulting from the proposed projects and the cumulative scenario.

The activities undertaken in Task 10.1 are summarized below:

- **Documentation of Model Scenario Assumptions** – The proposed five model scenarios simulated include Scenario 1 (also referred to as Existing Conditions without SFPUC Projects), Scenario 2 (GSR Project), Scenario 3a and Scenario 3b (SFGW Project), and Scenario 4 (Cumulative Scenario). Model assumptions for the five scenarios were developed. Potential model modifications to the recently updated Westside Groundwater Model were evaluated, particularly with respect to assumptions regarding pumping and recharge resulting from the hydrological data used in the model scenarios.
- **Model Scenario Simulations** – This included setting up, running, and post-processing the five proposed model scenarios using the Westside Basin Groundwater Model. The model setup and model assumptions used in the five model scenarios are described in Sections 5 and 6.

  During the development of the proposed future model scenarios, modeling assumptions and modifications were reviewed and approved by SFPUC prior to running the model scenarios. In addition, the major model assumptions that were used in the scenarios were presented to the Partner Agencies (PAs) for the GSR Project (Daly City, Cal Water, and San Bruno), and the San Francisco Planning Department, Environmental Planning Division (EP) for their review and approval prior to running the model for each scenario.
- **Lake Merced Lake-Level Model Scenario Simulations** – The Lake-Level Model has been developed by SFPUC and others for the purpose of evaluating the feasibility of potential future projects on maintaining lake level in Lake Merced. Because of this history of use, the Lake-Level Model was used as the primary tool to evaluate the effects of the GSR and SFGW Projects and other reasonably foreseeable future projects on Lake Merced. The Lake-Level Model is a spreadsheet-based water balance model and offers a more realistic conceptualization of the water balance of the lake than the MODFLOW model. The model has been calibrated to historical measured lake levels and applied in this analysis to simulate the five scenarios that involve the GSR and SFGW Project scenarios and other reasonably foreseeable future projects. The model development, assumptions, and modifications are described in Section 8.

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A brief overview of the proposed GSR and SFGW Projects and the hydrogeologic setting in the Westside Basin are presented in Sections 2 and 3, respectively. The Westside Basin Groundwater Model is the primary tool used for evaluating the effects of the SFGW, GSR and other reasonably foreseeable future projects with respect to key groundwater issues. The discussion in Sections 4, 5, 6 and 7 focuses on the Westside Basin Groundwater Model. The Lake-Level Model is only used to evaluate the effects of the GSR and SFGW Projects and other reasonably foreseeable future projects on Lake Merced lake levels. Section 8 presents the development and application of the Lake-Level Model for easier reference.

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2. GSR and SFGW Project Description

This section provides brief background information on the proposed projects that are considered as part of the model scenarios presented in this TM. The proposed projects include the GSR and SFGW Projects, and other reasonably foreseeable future projects that are considered as part of the Cumulative Scenario.

2.1. GSR Project

The GSR Project is a conjunctive use project that would increase groundwater supplies in the southern portion of the Westside Basin during periods of drought when SFPUC surface water supplies become limited (MWH, 2008). The GSR Project is based on the concept of providing available supplemental surface water from the SFPUC Regional Water System to the PAs. This water would be used by the PAs instead (or "in-lieu") of pumping groundwater from the Westside Basin, thereby increasing the amount of groundwater that would be stored in the aquifer. During periods of drought, both the PAs and SFPUC would pump groundwater from the Westside Basin. The SFPUC plans to install 16 new production wells for the GSR Project to recover the stored groundwater.

The GSR Project is sponsored by SFPUC in coordination with the PAs. The PAs historically have pumped groundwater from the southern portion of the Westside Basin (referred to as the South Westside Basin) for municipal purposes. Daly City and San Bruno serve municipal water demand in their respective cities. Cal Water serves South San Francisco, Colma, and a very small part of Daly City.

For SFPUC, the GSR Project will ultimately develop enough groundwater pumping capacity to produce 8,100 acre-feet per year (afy), or 7.2 million gallons per day (mgd), in addition to groundwater extraction from existing PA wells (MWH, 2008). The project will be designed to provide up to 60,500 acre-feet (af) of stored water from the GSR Project wells to meet SFPUC system demands during the last 7.5 years of SFPUC's Design Drought. The total duration of the Design Drought is 8.5 years. SFPUC anticipates that it will exercise its dry-year supplies after the first year of drought. Therefore, the storage is assumed to be used over the last 7.5 years of the Design Drought. The combined pumping rate (7.2 mgd) and duration (7.5 years) are consistent with the SFPUC's dry-year demands as described in the Urban Water Management Plan (SFPUC, 2010).

The SFPUC and PAs have developed the Draft GSR Project Operating Agreement (Draft GSR Operating Agreement) that is summarized in Attachment 10.1-A. The Draft GSR Operating Agreement can only be approved if the San Francisco Planning Commission certifies the Project Environmental Impact Report (EIR) and the SFPUC as the project sponsor approves the project. Following these actions, the SFPUC, Daly City, Cal Water, and San Bruno can then consider approval of the GSR Operating Agreement.

Under the Draft GSR Operating Agreement, the SFPUC would "store" water in the South Westside Basin through the mechanism of in-lieu recharge by providing supplemental surface water to the PAs as a substitute for the PAs groundwater pumping. The supplemental water

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deliveries would result in up to 60,500 af of "put" credits that would accrue to the SFPUC Storage Account. During shortages of SFPUC system water due to drought, emergencies or scheduled maintenance, or if the SFPUC Storage Account is at its full capacity of 60,500 af, the PAs would return to pumping from their existing wells. If a positive balance exists in the SFPUC Storage Account and there is a drought, then the SFPUC could also pump during this take period using the GSR Project wells installed by the SFPUC.

2.1.1. Put/Take/Hold Sequence

The GSR Project uses a “put/take/hold” sequence representing in-lieu groundwater recharge during wet years and groundwater extraction during dry years. The Hetch Hetchy and Local Simulation model (HH/LSM), which was used extensively for long term planning purposes in the SFPUC’s WSIP Program Environmental Impact Report (PEIR), outputs a put/take/hold sequence on a monthly basis together with a track of the volume of water stored in the SFPUC Storage Account (SFPUC, 2007; SFPUC, 2009a). As described below, the SFPUC Storage Account defines the amount of supplemental SFPUC system water that is stored in the groundwater basin, based on the amount of supplemental surface water deliveries to the PAs. The PEIR underpins the WSIP as a whole, and any individual WSIP project (including the GSR and SFGW Projects) must be as consistent with the PEIR as is practicable.

For reference, put/take/hold periods within the HH/LSM monthly sequence and this TM are defined as follows:

- A put period is a period where there are no water shortages and there is sufficient capacity in the SFPUC Storage Account for that account to be recharged. During put periods, the PAs would receive supplemental surface water from the SFPUC and reduce their groundwater pumping. As a result, the SFPUC surface water would be used “in-lieu” of groundwater pumping, and the reduced pumping would effectively increase the volume of groundwater in storage that would be available during dry years or an extended drought.
- A take period is a dry period when water shortages are triggered and water is taken from the SFPUC Storage Account. During these take periods, both the proposed GSR Project wells and the PA wells would extract groundwater. The SFPUC would recover groundwater that has already been “stored” or “banked” during put periods by pumping the proposed 16 GSR Project production wells in the South Westside Basin. In addition, the PAs would return to their typical groundwater pumping.
- A hold period is a period where there are no water shortages, but the SFPUC Storage Account is “full” and supplemental water deliveries do not occur. During hold periods, the PAs would return to their typical groundwater pumping, and the GSR Project wells would pump only small amounts to exercise the wells.
- In the PEIR, the put/take/hold conditions are defined as annual periods that run from July 1 to June 30 of the following calendar year. Therefore, the model scenarios start in July to simulate full annual put, take, or hold sequence.

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2.1.2. SFPUC Storage Account

The SFPUC Storage Account represents the volume of water that is stored during put periods as defined by the amount of supplemental surface water deliveries made to the PAs. The in-lieu recharge is assumed to match the amount of supplemental water deliveries to the PAs with no losses in the SFPUC Storage Account except during take periods of groundwater pumping. Accruals in the SFPUC Storage Account would be recorded based on metered, in-lieu surface water deliveries and corresponding metered decreases in groundwater pumping below "designated quantities" agreed to by the PAs (Attachment 10.1-A).

A “Full SFPUC Storage Account” represents approximately 60,500 af of supplemental surface water deliveries to the PAs that are stored (or banked) in the basin in-lieu of groundwater pumping. This amount is based upon the designed operation of the GSR Project supplying an average of 7.2 mgd over the Design Drought (MWH, 2008). When 60,500 af of groundwater is stored in the basin, the SFPUC Storage Account would be considered full, and no additional supplemental water deliveries would occur.

The SFPUC has developed an 8.5-year Design Drought for planning purposes. Over this 8.5-year period, the SFPUC anticipates it will exercise its dry year supplies after the first year of the drought. Therefore, the 60,500 af of storage is assumed to be used over the 7.5 years of the Design Drought, with the GSR Project wells operating at a maximum capacity of 7.2 mgd.

The GSR Project and the Cumulative Scenario involve the Full SFPUC Storage Account of 60,500 af to maintain consistency of analysis with the PEIR studies and the assumptions made in the HH/LSM runs (SFPUC, 2007; SFPUC, 2009a). To achieve the Full SFPUC Storage Account, the model scenarios involving the GSR Project simulate the PA wells pumping at their reduced put period rates until the in-lieu recharge banked in the basin reaches the Full SFPUC Storage Account of 60,500 af. This amount includes the existing SFPUC Storage Account of approximately 20,000 af[1] at the beginning of the simulation (i.e., June 2009 initial conditions), and then adds approximately 40,500 af to the SFPUC Storage Account during the model simulation (assuming a put rate of 5.52 mgd by the PA wells that is equivalent to 80 percent of the total PA pumping of 6.9 mgd). Using the put rate of 5.52 mgd, it would take approximately 6.5 years (or 79 months) to reach the Full SFPUC Storage Account condition of 60,500 af[2].

[1] The accrued volume in the SFPUC Storage Account at the start of the model scenarios is approximately 20,000 acre-feet (af) based on records of in-lieu exchange with the Partner Agencies (PAs) prior to July 2009.

[2] Assuming the initial SFPUC Storage Account of 20,000 af in June 2009 and the put rate of 5.52 mgd (or 6,182 afy), it would take 79 months, or approximately 6.5 years, to reach the Full SFPUC Storage Account of 60,500 af. This is equivalent to the difference in the Full SFPUC Storage Account and the initial SFPUC Storage Account (40,500 af = 60,500 af – 20,000 af) divided by the put rate (5.52 mgd = 6,182 afy).

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2.2. SFGW Project

The SFGW Project would provide a reliable, local source of high-quality groundwater in the northern portion of the Westside Basin (North Westside Basin) to supplement the San Francisco municipal water system.

The SFGW Project would construct up to six wells and associated facilities in the western part of San Francisco and extract an annual average of up to 4.0 mgd of water from the North Westside Basin (SFPUC, 2009b). The extracted groundwater, which would be used both for regular and emergency water supply purposes, would be blended in small quantities with imported surface water before entering the municipal drinking water system for distribution. The SFGW Project includes two phases. Phase one would build four new groundwater wells at the Lake Merced Pump Station, West Sunset Playground, South Sunset Playground, and the Golden Gate Park Central Pump Station. Phase two would modify two existing irrigation wells (South Windmill Replacement and North Lake) in Golden Gate Park. With the future implementation of the Westside Recycled Water Project, North Lake and South Windmill Replacement wells in Golden Gate Park would be used to produce municipal supply as part of the SFGW Project, and irrigation pumping would be replaced with recycled water. If the Westside Recycled Water Project is not implemented, then phase two of SFGW Project would not occur.

2.3. Vista Grande Drainage Basin Improvement Project

The City of Daly City prepared the Vista Grande Drainage Basin Alternatives Analysis in 2011 based on the recommendations of the Vista Grande Watershed Plan (City of Daly City, 2012). The purpose of the alternatives analysis is to develop and evaluate alternatives that will reduce or eliminate flooding, reduce erosion along Lake Merced, and provide other potential benefits such as habitat enhancement and lake level augmentation. The recommended program outlined in the plan includes construction of a new stormwater tunnel, construction of a detention basin in Westlake Park, and potential for treatment wetlands in San Francisco to treat stormwater for diversion from the Vista Grande Canal to Lake Merced (Jacobs Associates, 2011a, 2011b; City of Daly City, 2012).

For the analysis of the GSR and SFGW Projects, the use of Lake Merced as part of the stormwater project for Daly City is considered to be one of the reasonably foreseeable future projects that are included as part of the Cumulative Scenario. Other cumulative projects are discussed in Section 5.4.

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3. Physical Setting

Understanding the hydrogeological conceptual model is important in assessing the results of the numerical Westside Basin Groundwater Model and the Lake-Level Model. This section provides a brief overview of the physical conditions within the project areas of the proposed GSR and SFGW Projects to provide necessary context in evaluating the setup and application of the model scenarios. The hydrogeologic conditions described include the regional geologic setting, aquifer formations, and surface water features. In addition, a brief discussion of the historical and recent pumping conditions in the basin is provided. A more detailed description of the regional geologic setting can be found in *Technical Memorandum No. 1: Hydrologic Setting of the Westside Basin* (LSCE, 2010).

3.1. Westside Groundwater Basin

The groundwater basin beneath the western part of San Francisco from the vicinity of Golden Gate Park and extending southeasterly into San Mateo County is identified in the California Department of Water Resources (DWR) Bulletin 118 as both the Merced Valley Basin and the Westside Basin (DWR, 2003). Since it is more commonly known as the Westside Basin, this designation is used in this TM. In addition, more recent DWR initiatives use the Westside Basin name (e.g., California Statewide Groundwater Elevation Monitoring Program). Figure 10.1-1 shows the boundary of the Westside Basin.

For discussion purposes in this TM, the Westside Basin, which covers about 40 square miles in area, has been divided into northern and southern portions at the San Francisco County-San Mateo County line. This subdivision is a political division, which is not representative of a physical boundary, and is not meant to imply that there is any restriction of groundwater flow between the two areas. The portion of the basin that lies within San Francisco County is referred to as the North Westside Basin, which has an area of approximately 15 square miles (Figure 10.1-1). The portion of the basin that lies within San Mateo County is referred to as the South Westside Basin with an area of approximately 25 square miles underlying Daly City, Colma, South San Francisco, San Bruno, Millbrae, and Burlingame (Figure 10.1-1) (SFPUC, 2010).

The Westside Basin is bounded by bedrock highs in Golden Gate Park to the north and at Coyote Point to the south (DWR, 2003; Rogge, 2003; San Bruno, 2007). San Bruno Mountain and San Francisco Bay form the eastern boundary of the Basin (Cal Water, 2006). The San Andreas Fault and Pacific Ocean form the western boundary, and its southern limit is defined by a bedrock high that separates it from the San Mateo Plain Groundwater Basin (DWR, 2003; Rogge, 2003; San Bruno, 2007). The Westside Basin opens to the Pacific Ocean on the northwest and San Francisco Bay on the southeast. The major structural features include the San Andreas Fault system and the Serra Fault.

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3.2. Aquifers

The Westside Basin includes five major geologic formations: Franciscan Complex, Merced Formation, Colma Formation, Dune Sands, and Bay Deposits (LSCE, 2010). Groundwater development in the Westside Basin primarily occurs in various aquifer units in the Colma and Merced Formations from the Golden Gate Park area, through Daly City and South San Francisco, to San Bruno. The Merced Formation is the primary water-producing aquifer in the Basin (LSCE, 2006). Within the two major water bearing zones in the Westside Basin, there are multiple smaller aquifer zones that are delineated vertically by different sand and clay layers within the Merced and Colma formations. The thickness and extent of these interbedded sand and clay layers vary spatially throughout the Westside Basin. The aquifer units in the Westside Basin are further described in TM#1 (LSCE, 2010).

All of the municipal groundwater extraction wells in Daly City, South San Francisco, and San Bruno are screened in the deeper, semi-confined to confined aquifers in the Merced Formation, where the water quality is better than in shallower aquifers (San Bruno, 2007). The Colma Formation is of interest because Lake Merced is incised within this formation (LSCE, 2006).

For discussion purposes, the aquifer units are informally designated as the Shallow Aquifer, the Primary Production Aquifer, and the Deep Aquifer. The Shallow Aquifer is limited to the vicinity of Lake Merced and the area north towards Golden Gate Park, and the Primary Production Aquifer is generally present throughout much of the Westside Basin (LSCE, 2010). In the North Westside Basin, aquifer units are separated by two distinctive fine-grained units, known as the -100-foot clay and the W-clay (LSCE, 2004). In the Daly City area, the -100-foot clay is absent, and the aquifer system is primarily composed of the Primary Production Aquifer overlying the W-Clay and the Deep Aquifer underlying the W-Clay. Further to the south in the South San Francisco area, the W-Clay is absent and the Primary Production Aquifer is split into shallow and deep units that are separated by a thick fine-grained unit at an elevation of approximately 300 feet below mean sea level (msl). The Primary Production Aquifer in the San Bruno area is located at an elevation less than -200 feet, and it underlies a thick, surficial predominantly fine-grained unit comprised of clay, sandy clay, and sand beds (LSCE, 2010).

3.3. Groundwater Flow

Groundwater levels and the general direction of groundwater flow vary in the Westside Basin. At the northern end of the Westside Basin, groundwater in the Shallow Aquifer tends to flow in a westerly direction towards the Pacific Ocean. From South San Francisco southward to Burlingame in the vicinity of San Francisco Bay, groundwater within shallow units overlying the Primary Production Aquifer generally flows east towards San Francisco Bay (Rogge, 2003; San Bruno, 2007). Groundwater from the vicinity of Lake Merced north to Stern Grove and Golden Gate Park is encountered at relatively shallow depths (ranging from approximately 5 to 60 feet), while south of Lake Merced the depth to groundwater can exceed 300 feet (LSCE, 2006).

Based on groundwater level data measured during spring and fall 2009 monitoring events, groundwater elevation contours were prepared for the Shallow Aquifer and the Primary

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Production Aquifer and presented in the 2009 Westside Basin Groundwater Monitoring Report (SFPUC, 2010). The 2009 groundwater elevation contour maps also include data from three monitoring wells that were installed by SFPUC in 2009 in the South Westside Basin in Daly City, San Bruno, and Millbrae. The contours of groundwater elevation for the Shallow Aquifer exhibit westerly groundwater flow directions both in spring and fall 2009, with higher groundwater elevations in the eastern portion of the aquifer than the western portion near the Pacific Coast. No significant differences in flow directions were identified through the spring and fall 2009.

Based on the spring and fall 2009 monitoring events, the contours of groundwater elevation for the Primary Production Aquifer exhibit westerly groundwater flow directions in the North Westside Basin, similar to the Shallow Aquifer, and a southerly flow direction from the Lake Merced area towards Daly City and South San Francisco. The southerly groundwater flow gradient between Daly City and South San Francisco appears to be relatively flat as compared to the steep gradient between Lake Merced and Daly City (SFPUC, 2010; LSCE, 2010).

3.4. Lakes

The most notable surface water feature of the Westside Basin is Lake Merced, located in southwestern San Francisco (Figure 10.1-1). Lake Merced is a freshwater lake, bounded by Skyline Boulevard, Lake Merced Boulevard, and John Muir Boulevard, approximately 0.25 mile east of the Pacific Ocean. Lake Merced is a major natural habitat for many species of birds and waterfowl and a regional recreational venue offering fishing, boating, bicycling, and wildlife viewing. The lake, composed of four water bodies named North Lake, East Lake, South Lake, and Impound Lake, is incised within the upper portion of the Shallow Aquifer, representing a surface expression of groundwater table. In the early 1990s several investigations were conducted and have continued on a regular basis to investigate and monitor the lake levels and lake-aquifer interactions (LSCE, 2002, 2004, and 2010).

Pine Lake is a small, shallow lake approximately three acres in size, located north-northeast of Lake Merced in the westernmost portion of Stern Grove and Pine Lake Park. Groundwater produced by the Stern Grove well is used for maintaining water levels in Pine Lake (personal comm., Jeff Gilman, 2010).

Golden Gate Park, located in the North Westside Basin, contains several artificial lakes that are used for recreation and are lined with clay to minimize leakage; however, several of the lakes reportedly leak a considerable amount of water to the water table (Yates et al., 1990). Groundwater pumped from the three Golden Gate Park wells (Elk Glen, North Lake, and South Windmill Replacement wells) is used for irrigation and for maintaining the artificial lakes (personal comm., Jeff Gilman, 2011).

3.5. Groundwater Pumping

Groundwater pumping in the Westside Basin occurs for municipal, irrigation and other non-potable uses (golf courses, zoo, parks, and cemeteries). Groundwater pumping is the most significant groundwater outflow component for the Westside Basin. Almost all historical

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groundwater development in the Westside Basin has been in the South Westside Basin for municipal supply in Daly City, South San Francisco, and San Bruno and golf course and cemetery irrigation. Total municipal pumping in the Westside Basin was about 7,500 afy from the mid-1970s to the mid-1980s, and then ranged from 6,000 afy to 8,000 afy until 2001. From 2002 to 2007, total municipal pumping fluctuated greatly as a result of the In-Lieu Recharge Demonstration Study conducted by SFPUC, Daly City, Cal Water (in South San Francisco), and San Bruno (LSCE, 2005; LSCE, 2010). Historical trends and recent pumping conditions for municipal, irrigation, and other non-potable pumping are summarized below. Groundwater pumping in the Basin is described in detail in TM#1 (LSCE, 2010).

Daly City – Groundwater pumping by Daly City increased from about 1,000 afy to nearly 5,000 afy between 1950 and 1970. Since then, groundwater pumping has ranged between approximately 3,000 afy and 5,000 afy, where it remained until October 2002, when an increase in deliveries from SFPUC's Regional Water System were made available to replace the majority of Daly City's groundwater supply as part of the In-Lieu Recharge Demonstration Study (LSCE, 2005). Daly City pumping totaled about 3,600 af for 2008 (LSCE, 2010). Supplemental water deliveries by SFPUC to Daly City resumed in 2009. Daly City pumping was approximately 1,667 af in 2009 (SFPUC, 2010) and 1,743 af in 2010 (SFPUC, 2011). Based on the long-term pumping records from 1959 to 2009, the median pumping by Daly City is estimated to be 3.78 mgd (or approximately 4,235 af).

Cal Water – Groundwater pumping by Cal Water in South San Francisco has progressively declined from about 2,200 afy in 1947, to about 1,600 afy in 1969, to about 1,200 afy in 2002. The decreases in groundwater pumping have been offset by increases in SFPUC's Regional Water System deliveries. In early 2003, groundwater pumping in South San Francisco was discontinued as part of the In-Lieu Recharge Demonstration Study (LSCE, 2005) that ended in early 2005 in South San Francisco. Groundwater pumping for municipal supply in South San Francisco resumed on a limited basis in March 2008 and totaled 206 af during 2008 (LSCE, 2010). Groundwater pumping by Cal Water was 380 af in 2009 (SFPUC, 2010) and 453 af in 2010 (SFPUC, 2011). Based on the long-term pumping records from 1959 to 2009, the median pumping by Cal Water is estimated to be 1.18 mgd (or approximately 1,320 af).

San Bruno – Pumping in San Bruno ranged from approximately 1,000 afy to 2,300 afy from 1950 to the late 1990s and from 1,700 afy to 3,100 afy from the late 1990s through 2001. In 2002, San Bruno decreased groundwater pumping to approximately 1,240 af and further decreased groundwater production to about 550 af in 2003 and 2004 as part of the In-Lieu Recharge Demonstration Study (LSCE, 2005). San Bruno pumping resumed to about 1,800 afy to 2,300 afy after cessation of the In-Lieu Recharge Demonstration Study in early 2005 (LSCE, 2010). Groundwater pumping by San Bruno was 2,379 af in 2009 (SFPUC, 2010) and 2,364 af in 2010 (SFPUC, 2011). Based on the long-term pumping records from 1959 to 2009, the median pumping by San Bruno is estimated to be 1.88 mgd (or approximately 2,110 af).

Irrigation and Other Non-Potable Groundwater Pumping – Groundwater has historically been developed for irrigation supply and other non-potable uses in the Westside Basin, most notably on golf courses around Lake Merced, cemeteries in Colma, at the San Francisco Zoo,

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and in Golden Gate Park. In 2005, the delivery of recycled water for irrigation largely reduced groundwater use at the golf courses around Lake Merced, leaving the cemeteries, California Golf Club, San Francisco Zoo, and Golden Gate Park as the notable pumpers for irrigation and other non-potable uses at an estimated 3,000 afy (SFPUC, 2009c; Carollo, 2008).

Given the estimated historical irrigation pumping of about 6,000 afy, total combined pumping of groundwater for municipal and irrigation uses is estimated to have ranged from 12,000 afy to 14,000 afy from the mid-1980s through 2001. During the In-Lieu Recharge Demonstration Study conducted by SFPUC in coordination with the PAs from October 2002 to March 2005, municipal pumping by Daly City, Cal Water, and San Bruno was reduced as a result of SFPUC's supplemental surface water deliveries to the PAs in-lieu of municipal pumping by the PAs. Total pumping (municipal and irrigation) in 2005 was estimated to range from 5,500 af to 6,500 af. Total pumping between 2006 and 2010 remained below 9,000 af, ranging from 5,400 af in 2006 to 8,500 af in 2008. Total pumping in the Westside Basin in 2009 was estimated to be 6,800 af (SFPUC, 2010).

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4. Westside Basin Groundwater Model

The Westside Basin Groundwater Model is a regional, basin-wide groundwater model of the Westside Groundwater Basin in western San Francisco and San Mateo County (Figure 10.1-2).

4.1. History of Model Development

The Westside Basin Groundwater Model was first developed through Daly City's 2002-2003 AB303-funded investigation of the Westside Groundwater Basin (City of Daly City, 2003). During the period 2003-2007, additional work funded by Daly City, San Bruno, Cal Water, and SFPUC further developed and calibrated the model (HydroFocus, 2007). In 2009, a revised groundwater model (version 2.1) was released that included several corrections and improvements to the model's historical pumping data set with no adjustments to the modeled aquifer parameter values (HydroFocus, 2009). The most recent modeling work (version 3.1) includes an updated historical calibration and a no-project scenario that is documented in detail by HydroFocus (2011). A brief summary of the 2011 updates includes the following:

- Historical Simulation – The updated Historical Simulation (version 3.1) simulates monthly hydrologic conditions during the period October 1958 through September 2009. The simulation period is discretized into monthly stress periods. The Historical Simulation was extended from 47 years to 51 years, with the extended model period covering December 2005 to September 2009.
- Updated Model Parameters – During model calibration, several corrections, modifications and improvements were made to the model structure, aquifer parameters and boundary conditions based on new data and from review of model performance. Modifications are noted in the following with more detailed discussion of the model in Section 4.2.
- 2008 No-Project Scenario – This scenario is based on a 47-year simulation period that uses the hydrologic conditions from October 1958 to December 2005 using the calibrated Historical Simulation version 3.1

The Historical Simulation calibration period of 51 years covers various types of hydrological events ranging from wet periods to droughts of different magnitude and duration, allowing adequate time for analyzing basin response under various hydrological conditions.

The 2008 No-Project Scenario assumes no new projects but includes new supply wells, planned operational changes in the magnitude and spatial distribution of pumping, and existing recycled water projects as of May 2008. The 2008 No-Project Scenario was used as the starting point for developing Scenario 1 (or the Existing Conditions) for this modeling analysis.

4.2. Model Overview

This section summarizes the model representation of the Westside Basin, including the model extent, model layer structure, aquifer properties used in the model, and model boundary

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conditions. This is intended as an overview of the detailed discussion of the model representation reported previously by HydroFocus (2007, 2009, and 2011). These aspects of the model remain the same and were not modified for the purposes of the modeling analysis documented in this TM.

4.2.1. Model Structure

The Westside Basin Groundwater Model was constructed using MODFLOW 2000, a finite-difference numerical modeling software developed by the United States Geological Survey (USGS) (Harbaugh et al., 2000). Model coordinates are based on the California State Plane Zone 3 coordinate system of the North American Datum of 1983 (NAD 83), in units of feet. The vertical datum is the National Geodetic Vertical Datum of 1929 (NGVD 29). All model inputs are based on English units for length (feet) and time (days) (HydroFocus, 2007).

The model domain is the geographical area covered by the numerical model. The model domain is mostly consistent with the extent of the Westside Basin and extends into the Pacific Ocean along the western boundary and San Francisco Bay along the eastern boundary, as shown in Figure 10.1-2.

The model grid provides the mathematical structure for developing and operating the numerical model. The Westside Basin Groundwater Model domain is divided into a set of grid cells (grid discretization), containing 189 rows and 126 columns. The cells in horizontal directions have variable dimensions ranging from 250 feet near Lake Merced to 1,000 feet near the model edges.

Model layers provide vertical resolution for the model to simulate variations in groundwater elevations and aquifer stresses with depth. In the vertical direction, the Westside Basin Groundwater Model is composed of five layers to characterize the conceptual basin geology. Figure 10.1-3 shows the representation of the model layering superimposed on the regional north-to-south subsurface cross-section. The upper surface of the model represents the land surface topography, and the bottom of Model Layer 5 represents the bedrock surface elevation. Land surface elevations were determined using digital elevation models (DEM) that specify land surface elevation at horizontal locations uniformly spaced about 90 feet apart (HydroFocus, 2007, 2009, and 2011).

For the Westside Basin Groundwater Model version 3.1, adjustments to the model layering were completed to incorporate new data. Top and bottom model layer elevations were updated using information from recently installed monitoring wells, new depth-to-bedrock information, and updated hydrogeologic sections (HydroFocus, 2011).

4.2.2. Aquifer Properties

Aquifer properties (e.g., horizontal and vertical hydraulic conductivity, specific storage, and specific yield) describe the physical characteristics of the aquifer and the hydraulic properties that control groundwater flow. The numerical model requires that these properties are defined for every active cell in the model. In the Westside Basin Groundwater Model version 3.1,

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adjustments were made to calibrate horizontal and vertical conductivity values in the parameter zones; no changes were made to specific yield or specific storage. These are discussed in greater detail in the HydroFocus report (2011).

In the Westside Basin Groundwater Model, Model Layer 1 was specified as convertible and Model Layers 2 through 5 were specified as confined. Under the convertible conditions, MODFLOW calculates the transmissivity of each model cell as the assigned hydraulic conductivity multiplied by the saturated thickness as defined by the simulated groundwater elevation and the bottom of the model layer, and the storage coefficient is the specific yield (Harbaugh et al., 2000). For the confined Model Layers 2 through 5, the transmissivity is the product of the layer thickness and hydraulic conductivity, and the storage coefficient is the product of layer thickness and specific storage.

Each model layer in the Westside Basin Groundwater Model was divided into subareas (also referred to as parameter zones) within which aquifer parameters are assumed to be uniform. The delineation of the parameter zones and calibrated aquifer parameters associated with the parameter zones as used in the updated Historical Simulation and the 2008 No-Project Scenario were described by HydroFocus (2007, 2009, and 2011). The parameter zones were modified in version 3.1 to account for updated geologic information and the spatial distribution of new monitoring well locations (HydroFocus, 2011).

4.2.3. Boundary Conditions

Model boundary conditions represent areas where groundwater enters and exits the model domain. Boundary condition data must be entered for each stress period at each boundary condition cell, other than no-flow cells. The model boundaries in the existing Historical Simulation and the 2008 No-Project Scenario are represented as follows:

- Groundwater pumpage in the model was represented using the well package. In the MODFLOW well package, the monthly groundwater pumping extraction rates are specified in the model cell and layer corresponding to each well location and for each stress period. A detailed description of the MODFLOW well package can be found elsewhere (Harbaugh et al., 2000).
- The MODFLOW drain package was included to represent shallow groundwater discharge from Model Layer 1 in the Bay Plain subarea. Evidence for shallow groundwater and seepage includes groundwater encountered in shallow monitoring wells (for example, at leaky underground storage tank sites), sustained baseflow in the Colma Creek gauging record (1 to 2 cubic feet per second (cfs)), and the visible presence of creek channels and ditches inland throughout the Bay Plain as far west as Highway 101 (HydroFocus, 2011).
- Lake Merced was simulated with the lake package (MODFLOW 2000 LAK3 package) to simulate the hydraulic interaction between Lake Merced and the adjoining groundwater system, and to estimate the amount of inflow and outflow across the lakebed. The lake package consists of several data sets (e.g., initial lake level, inflows to and outflows from

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the lake such as rainfall, evaporation, runoff, lake additions, and withdrawals) to couple the groundwater flow system with the lake water budget and to calculate lake levels and inflow and outflow across the lakebed. Documentation of the MODFLOW LAK3 package can be found in Merritt and Konikow (2000).

- Rainfall, temperature, and municipal water use input data sets for the Soil Moisture Budget (SMB) model were extended to include the period January 2006 through September 2009. The SMB is used to estimate recharge from precipitation and return flows and is entered into the model using the MODFLOW recharge package. In version 3.1, changes were made to simulate rainfall and the spatial temperature distribution, which resulted in an about 7-percent decrease in average rainfall in the Westside Basin relative to version 2.1 over the historical model period from 1959 and 2009 (HydroFocus, 2011).
- The Serra Fault was represented as a no-flow boundary in the southwest and as a horizontal flow barrier in the northwest. The San Andreas Fault was represented as a no-flow boundary.
- Groundwater seepage from the lakes and ponds in Golden Gate Park was represented using the MODFLOW well package as a specified flux boundary that adds water to the aquifer at a constant rate equal to the measured leakage rate (HydroFocus, 2007). A seepage investigation found that total lake leakage was 627 acre-feet per year (SFRPD, 1994).
- San Francisco Bay and the Pacific Ocean were represented as constant head boundaries with head values of zero feet NGVD 29.
- No-flow boundaries were specified along the northern edge of the onshore part of the basin boundary near Golden Gate Park, near the eastern end of Golden Gate Park, the southern boundary, and the onshore part of the eastern boundary.

4.3. Summary of Model Strengths and Limitations

A calibrated numerical model, such as the Westside Basin Groundwater Model, is considered capable of reasonable simulation quality. However, when evaluating model results, it is important to consider the strengths and limitations of the model. This section summarizes the strengths and limitations of the Westside Basin Groundwater Model based on previous modeling analyses, reports, and documentation (HydroFocus, 2007, 2009, and 2011).

4.3.1. Version 3.1 Model Calibration

Simulated groundwater levels in version 3.1 were calibrated to the available measured groundwater elevations collected during the simulation period at various locations throughout the Basin (HydroFocus, 2011). After the model was recalibrated, the basin-wide root-mean-square-error (RMSE) was reduced from 25.8 to 18.9 feet. The RMSE is a statistical measure that evaluates the average difference (or residual) between modeled and observed groundwater

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levels and provides a measure of the overall error in the model. Therefore, the calibration results indicate that, on average, modeled groundwater levels are within about 19 feet of observed water levels. The RMSE represents about 4 percent of the total range in observed water levels across the model. This ratio shows how the model error relates to the overall hydraulic gradient across the model. Typically, a calibration is considered good when this ratio is below 15 percent (ESI, 2001).

Another calibration measure is the residual mean, which includes positive and negative residuals depending on whether the modeled results are higher or lower than the measured groundwater levels. The residual mean provides a measure of the average deviation between modeled and observed water levels. In version 3.1, the residual mean is fairly small and positive (1.6 feet) indicating simulated water levels are on average slightly higher than the observed water levels. These calibration results indicate that the updated model is a reasonable tool for basin-scale analyses and comparisons of water resources management alternatives. Some degree of difference or residual between the observed and model simulated groundwater elevations is expected because residuals may be due in part to localized effects or data quality issues.

4.3.2. Model Strengths

The Westside Basin Groundwater Model was developed to assist basin-wide data interpretation and system understanding and is considered a reliable data analysis tool for various purposes. The model provides a means to synthesize data and integrate processes that potentially influence groundwater conditions. It was developed over a period of several years under the oversight of several technical groups. The model input represents agreed-upon conceptual hydrogeologic and water use conditions as presently understood in the Westside Groundwater Basin. The model was calibrated using more than 2,000 observed monthly water levels in 125 wells representing a broad range of locations, depths and hydrologic conditions. The numerical model provides information and insights that cannot be obtained from available field measurements and/or analytical tools without the capability to synthesize and integrate all processes that potentially influence groundwater conditions (HydroFocus, 2011).

As suggested by HydroFocus (2007), the strongest predictive ability of the existing model is in relative changes over time, rather than absolute predictions of water levels. Therefore, this regional model is most capable of analyzing differences in water level rather than the actual groundwater elevation output by the model. In addition, HydroFocus (2007) states that the model is best suited for assessing groundwater levels and storage changes over large parameter zones, which vary in size from 476 acres to nearly 10,000 acres, as the Historical Simulation calibration was performed with the average conditions in these zones in mind. In other words, the model may not be able to re-create the groundwater elevations at local areas or at a single well correctly, but the composite statistics of that well and many others nearby are much more accurate and representative. As described by HydroFocus (2007), the model was initially developed as a tool to assist with the following types of evaluations and groundwater management scenarios:

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- Regional (basin-wide) data interpretation and system understanding:
    - Basin management decisions.
    - Monitoring networks and existing data gaps.
- Regional water supply project operations (for example, conjunctive use and local groundwater water projects) by assessing the following types of changes due to changes in pumping rates and patterns:
    - Changes in water table and deeper groundwater elevations (magnitude and trends).
    - Changes in Lake Merced water levels (magnitude and trends).
    - Changes in the quantity of water stored in the basin.
    - Changes in the water budget and potential for saltwater (or seawater) intrusion.

For evaluating effects of a proposed future project, the Westside Basin Groundwater Model is considered useful in simulating the relative effect of possible conjunctive use or groundwater supply projects in the Westside Basin. As mentioned by HydroFocus (2007), planning analyses based on projected future conditions, such as the future modeling scenarios, are typically based on the relative differences between two projected conditions. The advantage of analyzing relative differences is that it minimizes the effects of model uncertainty. It is therefore preferable to employ the Westside Basin Groundwater Model to analyze relative changes (for example, compare the differences between simulated “no project” and “with project” scenarios) rather than using the model to predict absolute groundwater elevations, localized aquifer storage changes, or Lake Merced water levels.

4.3.3. Model Limitations

Overall, version 3.1 of the model is considered an appropriate quantitative tool for evaluating groundwater conditions in the Westside Basin. However, there are some specific areas of the weakness and/or limitations in the model and model calibration that are summarized below based on previous studies and modeling analysis by HydroFocus (2007, 2009, and 2011), and subsequently identified during this analysis.

Despite improvements in the historical calibration in version 3.1 (HydroFocus, 2011), the model subareas with the highest RMSE are the Colma and San Bruno subareas. This is attributed to historical water level measurement limitations, model scaling, and uncertainty in vertical hydraulic conductivity and vertical hydraulic gradients. Therefore, the model results should be evaluated with care to account for the higher potential uncertainty of model results in the San Bruno and Colma areas.

During the Historical Simulation calibration, the simulation of lake levels in Lake Merced improved slightly from version 2.1 to 3.1. The model generally reproduces the lake levels and trends during the period from 1972 to 1995. During the first 14 years (1958 to 1972) and the last 13 years of the simulation (1996 to 2009), simulated lake levels were consistently 2 to 3 feet

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higher than measured data, but with some differences as high as 7 feet. The model is considered useful in simulating the relative effect of possible regional groundwater supply projects on Lake Merced levels; however, the simulation of lake level management scenarios with the objective of projecting absolute lake levels is not recommended.

The MODFLOW lake package does not include a mechanism to simulate the control of a lake level via a spillway. Although not a large issue for the historical simulations, some of the future case scenarios have the potential for lake levels to increase to the level of the spillway. Without a spillway mechanism, MODFLOW will allow the lake levels to rise to levels that are not physically possible. This also could have an impact on shallow groundwater levels due to groundwater-surface water interactions with the lake. Scenarios where the lake level rises above the level of the spillway require an iterative process whereby the lake package inputs are adjusted until the lake levels remain below the level of the spillway. Because of these limitations, the Lake-Level Model discussed in Section 8 was used for evaluating the effects of the GSR and SFGW Projects, and other reasonably foreseeable future projects.

In reviewing the model structure in the Golden Gate Park area, it was found that the aquifer thickness in the model was substantially thinner than was found in the Golden Gate Park Central Pump Station test well. Based on this test well, it appears that the model does not account for data from deep exploratory borings drilled in January 2010 and presented in a geologic cross-section J-J' in *Task 8B Technical Memorandum No. 1: Hydrologic Setting of the Westside Basin* (LSCE, 2010). The model uses only Model Layer 1 in the central and eastern parts of Golden Gate Park, whereas pumping tests of production wells show confined aquifer behavior. In addition, compilation of pumping test results shows that the horizontal hydraulic conductivity (K_h) values used by the Westside Basin Groundwater Model in the North Westside Basin are lower than those obtained from measured data. It is recommended that future revisions to the model should include updating the model layer inputs in the Golden Gate Park area to be consistent with the existing hydrogeologic data. This is an important area for evaluating the SFGW Project; therefore, model results for Golden Gate Park will need to be evaluated with care because the model may overestimate the simulated drawdowns from the future proposed wells in this area.

In version 3.1, the MODFLOW drain package was used to reduce the degree to which simulated groundwater levels were above the topographic surface representing potential flooding situations. Flooded cells periodically occurred where the aquifer is thin or in areas characterized by a shallow water table, and these can often be ignored because the model resolution is not fine enough to capture the topographic pattern of the surface.

Other weaknesses that have been subsequently identified during this investigation relate to the boundary conditions where the model interacts with the Pacific Ocean and San Francisco Bay. These boundary conditions were set to a constant head of zero elevation in the existing Westside Basin Groundwater Model. This characterization does not handle the density difference between seawater and freshwater, or the wedged shape of possible seawater intrusion (see Task 10.3 TM). In addition, the constant head boundary condition is located on the landward side of the coast, rather than the seaward side; this prescription is overly rigid,

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preventing the near-ocean water levels from behaving dynamically. HydroFocus (2007) states that “model results should be interpreted with caution near constant head boundaries like the Pacific Ocean or San Francisco Bay.”

As mentioned above, for evaluating effects of a future project compared to the conditions without the project, the model could help assess the relative differences between two projected conditions. However, it should be noted that because model scenario runs are a projection of assumed future hydrologic conditions relative to assumed no project conditions, it is always understood that the simulated relative changes in groundwater levels and aquifer storage may not equal the actual changes determined from future observed hydrologic conditions (HydroFocus, 2007).

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5. Model Scenario Descriptions

A calibrated numerical model, such as the Westside Basin Groundwater Model, is considered capable of reasonable quality simulations. The numerical model can serve as a useful quantitative tool for future planning, management, and evaluation of technical issues related to groundwater resources.

Five model scenarios were set up and simulated under Task 10.1. Table 10.1-1 provides a summary of the model scenario descriptions. The main model assumptions in each scenario are described in the following subsections, and further details on the model setup and assumptions are provided in Section 6 below. The amount of groundwater pumping is the major model input that varies among the simulated MODFLOW model scenarios. Table 10.1-2 presents a summary of pumping assumptions used in each of the five model scenarios. The Lake-Level Model is the primary tool used to evaluate the effects of each of the five scenarios listed in Table 10.1-1. Section 8 provides a detailed description of Lake-Level Model development and assumptions and model results in evaluating the effects of the GSR and SFGW Projects and other reasonably foreseeable projects.

5.1. Scenario 1 – Existing Conditions

Scenario 1 was set up and simulated to represent the Existing Conditions and does not include the SFPUC Projects (both GSR and SFGW Projects). Scenario 1 is based on a new hydrologic sequence proposed by SFPUC over a 47.25-year simulation period and initial conditions representative of June 2009. Total pumping assumptions made under Scenario 1 are summarized in Table 10.1-2.

A detailed description of the model assumptions and modifications for Scenario 1 is provided in Section 6. The 2008 No-Project Scenario developed by HydroFocus (2011) was used as the starting point for the development of Scenario 1. However, there are some important differences between Scenario 1 and the HydroFocus 2008 No-Project Scenario. These differences are listed below:

- In order to allow all five model scenarios to be directly comparable, Scenario 1 uses a new hydrologic sequence. The HydroFocus 2008 No-Project Scenario used an exact repeat of the historical hydrology from October 1958 to December 2005. As described further in Section 6.3, the new hydrologic sequence has a period of 47.25 years. It was established by rearranging the historical monthly sequence of hydrologic conditions available from the HydroFocus modeling analysis (2011) and includes the 8.5-year Design Drought period for the GSR Project, consistent with the PEIR (SFPUC, 2007; SFPUC, 2009a).
- Initial conditions for groundwater levels and Lake Merced represent June 2009 conditions for Scenario 1, compared to September 2002 used in the 2008 No-Project Scenario. As described further in Section 6.4, the initial conditions are based on the June 2009 water levels from the updated calibrated Historical Simulation by HydroFocus

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(2011). June 2009 groundwater levels as initial conditions represent the accrued SFPUC Storage Account of approximately 20,000 af at the start of the model scenarios.

- Pumping assumptions for the PA production wells were modified to incorporate the pumping assumptions representative of the Existing Conditions. Pumping by the PAs for the Existing Conditions is 6.84 mgd, compared to 6.9 mgd assumed in the 2008 No-Project Scenario. PA pumping under the Existing Conditions was derived from the median values of individual agency pumping over the historical period from 1959 to 2009. Under the Existing Conditions, the pumping distribution among each of the PA wells and the vertical distribution of pumping by model layers are essentially the same as in the HydroFocus 2008 No-Project Scenario (2011).
- In order to be consistent with the new hydrologic sequence, the SMB pre-processing model for estimating groundwater recharge and irrigation was revised. The SMB model uses precipitation, temperature, evapotranspiration and municipal water supply as inputs. As explained further in Section 6.5, the simulated monthly recharge resulting from municipal water use in municipal areas was revised based on the results of the revised SMB. Scenario 1 uses the same future municipal water use as projected in the 2008 No-Project Scenario, but that municipal water use was rearranged in order to reflect the new hydrologic sequence.
- Monthly irrigation pumping estimates were modified for the Existing Conditions as a result of the revised SMB to be consistent with the new hydrologic sequence. Monthly irrigation pumping in Scenario 1 is based on the results of the revised SMB. Further modification to the irrigation pumping simulated by the revised SMB was then made to account for actual pumping data for the following irrigation wells: Golden Gate Park irrigation wells (Elk Glen, North Lake, and South Windmill Replacement wells), California Golf Club No.2, Zoo No.5, Edgewood Development Center well, and Stern Grove well (Section 6.6).
- As a result of the revised SMB for the Existing Conditions, the Lake Merced lake package was modified consistent with the new hydrologic sequence, as explained further in Section 6.9. The modified lake package for Scenario 1 assumes no lake additions but accounts for water withdrawals from the lake when the lake levels are in excess of the lake spillway. In comparison, the HydroFocus 2008 No-Project Scenario assumes no Vista Grande stormwater diversions into Lake Merced and no other water additions to the lake.

5.2. Scenario 2 – GSR Project

Scenario 2 simulates the future operation of the GSR Project. The model was set up and simulated based on the new hydrologic sequence (Section 6.3) and identical assumptions for irrigation pumping as in Scenario 1, as presented in Table 10.1-2. The total PA pumping was assumed to be 6.9 mgd. This PA pumping rate is assumed to result in no appreciable storage change in the South Westside Basin (HydroFocus, 2011). For consistency with the PEIR,

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Scenario 2 was simulated based on the hydrologic sequence that also includes the GSR Project's Design Drought hydrology, as described below (SFPUC, 2007; SFPUC, 2009a). Descriptions of the hydrologic sequence and Design Drought hydrology are pertinent to all scenarios and are presented below in Section 6.3. Table 10.1-2 summarizes pumping assumptions made for the proposed GSR Project wells and the PA wells under Scenario 2. Irrigation pumping assumptions under Scenario 2 remain the same as in Scenario 1 (Existing Conditions), as further discussed in Section 6. The proposed GSR Project municipal well locations are shown in Figure 10.1-4. Table 10.1-3 provides a summary of pumping capacities for the proposed GSR Project municipal wells. GSR Project wells would pump at 7.23 mgd during take periods and at 0.04 mgd during put and hold years to exercise the wells.

5.2.1. Partner Agency Wells

Locations of the PA municipal wells are shown in Figure 10.1-4. Table 10.1-4 lists the PA municipal wells that are assumed to be pumping under the modeling scenarios and analysis.

As presented in the pumping summary in Table 10.1-2, total pumping by the PAs under Scenario 2 was assumed to be 6.9 mgd during take and hold years, based on the designated pumping amounts provided by the PAs to SFPUC as part of the GSR Project. The PA wells are planned to pump up to 20 percent of the take period volume during put periods to allow for well exercising and to avoid encrustation (MWH, 2008). As a result, the PA pumping during put periods would be reduced to 1.38 mgd, resulting in approximately 5.52 mgd of in-lieu stored water in the basin during a put year. Pumping by the PAs is consistent with the 2008 No-Project Scenario by HydroFocus (2011).

5.2.2. In-Lieu Recharge Demonstration Study

A brief overview of the In-Lieu Recharge Demonstration Study conducted by the SFPUC in coordination with the PAs from October 2002 to March 2005 is provided herein as this study is pertinent to the GSR Project, the accrued SFPUC Storage Account, and the initial conditions of June 2009 used for the model scenarios. The In-Lieu Recharge Demonstration Study involved delivery of supplemental surface water from SFPUC to reduce the PAs groundwater pumping. The reduced pumping effectively increased the volume of groundwater in storage (LSCE, 2005).

The purpose of the study was to evaluate the response of the Basin to the resultant in-lieu natural recharge resulting from reduced pumping. After the completion of the In-Lieu Recharge Demonstration Study, the SFPUC continued to deliver supplemental surface water to Cal Water through January 2007 and to Daly City through April 2007. The accrued volume in the SFPUC Storage Account at the start of the model scenarios in June 2009 is approximately 20,000 af based on records of in-lieu exchange with the PAs prior to July 2009. Table 10.1-5 presents the amount and timing of supplemental surface water deliveries to the PAs from October 2002 to April 2007, as provided by the SFPUC (personal comm., Greg Bartow, 2010). No supplemental deliveries were conducted from May 2007 to May 2009.

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5.3. Scenarios 3a and 3b – SFGW Project

Scenarios 3a and 3b represent the SFGW Project scenarios and consist of the assumptions used for Scenario 1, with the added assumption of future operation of the SFGW Project. Two model scenarios were set up and simulated based on differing pumping assumptions for the proposed SFGW Project wells, as a result of the availability of recycled water to replace groundwater that is currently used for irrigation in Golden Gate Park.

Approximate locations of the proposed SFGW Project wells are shown in Figure 10.1-4. Table 10.1-6 lists the well identifications and proposed well pumping capacities for the SFGW Project municipal wells. As summarized in Table 10.1-2, Scenario 3a would pump four of the six proposed wells at 3.0 mgd, while the other two SFGW Project wells would remain as irrigation wells and their irrigation pumping rates would be the same as in Scenario 1 (Existing Conditions). Under Scenario 3b, the six proposed project wells would pump at the 4.0 mgd pumping target. Irrigation pumping assumptions at the other irrigation wells under Scenarios 3a and 3b remain the same as in the Existing Conditions, as further discussed in Section 6.6.

For the purpose of the SFGW Project modeling scenarios, the location of the Golden Gate Park Central Pump Station well for Scenarios 3a and 3b was slightly modified by relocating the well in the model to the adjacent model grid cell to the west, where the model layer becomes thicker and accommodates the assigned pumping by the well. As discussed earlier (Section 4.3.3), the aquifer thickness assigned by the model in the vicinity of this well was thinner than the data obtained from a test well and other nearby exploratory borings.

5.4. Scenario 4 – Cumulative Scenario

Scenario 4 is the Cumulative Scenario that includes the assumed operation of the GSR and SFGW Projects, projected pumping for the PAs and third party pumpers, and other reasonably foreseeable future projects. Reasonably foreseeable projects that are considered include (1) the Vista Grande Drainage Basin Improvements Project, and (2) the Holy Cross cemetery future build-out with its anticipated increase in irrigation pumping. The Cumulative Scenario assumes the same hydrologic sequence and initial conditions for groundwater levels and Lake Merced as Scenario 1. Total pumping assumptions for Scenario 4 are summarized in Table 10.1-2. As mentioned above, Scenario 4 assumes the operations of the GSR Project and SFGW Project; thus, it includes the combined pumping from both proposed projects. As presented in Table 10.1-2, the total PA pumping rates for each PA under Scenario 4 are the same as those under Scenario 2. Pumping assumptions by the PAs and locations of pumping wells account for reasonably foreseeable plans for future proposed wells by Daly City, Cal Water and San Bruno. For the SFGW Project, the pumping assumptions under Scenario 4 are the same as pumping assumptions under Scenario 3b (Table 10.1-2). A detailed description of pumping assumptions is provided in Section 6.7 for the GSR Project wells and the PA municipal wells and in Section 6.8 for the SFGW Project wells.

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6. Westside Basin Groundwater Model Setup

Because of the complexity of a natural system, assumptions are necessary to define the model domain, aquifer properties and boundary conditions required for the numerical model. Therefore, a model is a simplification of the natural system. The quality of a model is highly dependent upon the accuracy of the conceptual understanding of the hydrogeology and the quality and quantity of the data.

This section presents a summary of the modeling assumptions that are common to all five model scenarios developed, modifications made to the model scenarios compared to the 2008 No-Project Scenario that was previously developed by HydroFocus (2011), and detailed pumping assumptions used for the PA municipal wells, the proposed GSR and SFGW Project municipal wells.

6.1. Common Modeling Assumptions

Modeling assumptions used in the five model scenarios that remain the same as in the 2008 No-Project Scenario are as follows:

- The model domain and grid discretization, model layer structure, and stress period setup are the same as in the 2008 No-Project Scenario (HydroFocus, 2011).
- All of the five model scenarios use the same boundary conditions (e.g., no-flow and constant-head boundary conditions) as in the 2008 No-Project Scenario (HydroFocus, 2011).
- The five modeling scenarios simulate the new hydrologic sequence that covers 47.25 years of monthly hydrologic conditions (a total of 567 monthly stress periods) by rearranging the historical hydrologic conditions available in the HydroFocus 2008 No-Project Scenario and Historical Simulation (2011).
- Land use conditions assumed in all of the future model scenarios are the same as in the 2008 No-Project Scenario, which simulates land use conditions as of May 2008. Therefore, land use zones and recharge zones used in all of the model scenario setups are the same as in the 2008 No-Project Scenario (HydroFocus, 2011).
- All five model scenarios simulate the hydraulic connection between Lake Merced and the surrounding groundwater system based on the lake and aquifer properties that were used in the 2008 No-Project Scenario (HydroFocus, 2011). The lake geometry and key variables used in the lake package remain the same as previously reported by HydroFocus (2007) (see Table 3 in the HydroFocus 2007 Report).
- All model scenarios assume ongoing pumping for the existing irrigation wells similar to the pumping assumptions in the 2008 No-Project Scenario. Modifications made to irrigation pumping assumptions are introduced in Section 6.2 and described further in Section 6.6.

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6.2. Modifications to 2008 No-Project Scenario

Modifications to the 2008 No-Project Scenario were made to construct the model scenarios. The major modifications are listed below and described in the following sections:

- Hydrologic data based on the new hydrologic sequence (Section 6.3);
- Initial conditions used for groundwater levels (Section 6.4);
- Revised SMB analysis consistent with the hydrologic sequence and resulting modifications made to the recharge package (Section 6.5), the lake package (Section 6.9), and the irrigation pumping assumptions (Section 6.6);
- Pumping assumptions to incorporate the GSR Project (Section 6.7) and SFGW Project (Section 6.8). The 2008 No-Project Scenario (HydroFocus, 2011) assumes water use conditions as of May 2008 while the modeling scenarios presented here simulate water use conditions as of June 2009 as a representation of the publication of the Notice of Preparation (NOP) for the GSR Project in June 2009 and the NOP for the SFGW Project in December 2009; and
- Initial conditions for Lake Merced and modifications made for the lake spillways (Section 6.9).

The modifications made for the hydrologic sequence, initial conditions, and the revised SMB analysis are common to all five scenarios. Monthly irrigation pumping demand for the model scenarios was revised based on the results of the revised SMB analysis, to be consistent with the hydrologic sequence. The methodology developed by HydroFocus in the 2008 No-Project Scenario (2011) was used to revise the SMB and estimate the monthly irrigation demand for each irrigation well. Minor modifications were made to selected irrigation wells to update the irrigation demand estimated by the revised SMB to account for the actual data for those wells, as described in Section 6.6 as part of the irrigation pumping assumptions.

6.3. Hydrology

The five model scenarios use the same 47.25-year hydrologic sequence so that model scenario results are all directly comparable. This sequence is based on historical hydrological conditions and includes the 8.5-year Design Drought period used in the PEIR (SFPUC, 2007; SFPUC, 2009a). The 8.5-year Design Drought repeats the December 1975 to March 1978 drought period following the dry hydrologic conditions of July 1987 to November 1992. To incorporate the Design Drought, the historical hydrologic sequence was rearranged. The rearranged hydrologic sequence used for the five model scenarios presented in this analysis consists of the following:

- July 1996 to September 2003
- October 1958 to November 1992
- December 1975 to June 1978
- July 2003 to September 2006

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The following is the rationale for developing the new hydrologic sequence and maintaining a consistency with the PEIR and the associated HH/LSM design drought run (SFPUC, 2007; SFPUC, 2009a).

As part of the initial conditions, the SFPUC Storage Account has approximately 20,000 af in storage in 2009 based on the past pilot program and agreed upon water exchanges. In order to identify a starting point for the rearranged hydrologic sequence that is consistent with the prior PEIR analyses for the GSR Project, the HH/LSM results were analyzed to identify a time when the simulated SFPUC Storage Account value was approximately 20,000 af. This was done in order to identify a starting condition that is equivalent to the actual SFPUC Storage Account value in July 2009. The analysis identified that this SFPUC Storage Account value occurs in the HH/LSM simulation at the beginning of July 1996 following the prolonged dry years (or take periods) during the 1987 to 1992 drought.

For the model scenarios involving the GSR Project (Scenarios 2 and 4), the Design Drought begins with the Full SFPUC Storage Account of 60,500 af in storage. This means that the SFPUC Storage Account must be “filled” from its 20,000 af initial condition to the “full” 60,500 af condition during the early part of the model simulation. The simplest way to accomplish this objective is to start the GSR Project and the Cumulative Scenario in put periods in order to simulate the filling of the SFPUC Storage Account. Filling of the SFPUC Storage Account therefore occurs during the first “block” of the rearranged hydrologic sequence (i.e., July 1996 to September 2003). Following the filling of the SFPUC Storage Account, the rearranged hydrologic sequence continues with October 1958 to November 1992. For this period, the put/take/hold conditions for the GSR Project are also based upon the HH/LSM output, and the SFPUC Storage Account is full at the beginning of the Design Drought.

The Design Drought is developed by repeating the period from December 1975 to March 1978 and incorporating it into the rearranged hydrologic sequence following November 1992. The PEIR design drought analysis ended in March 1978; however, the rearranged hydrologic sequence continues the Design Drought through June 1978 to maintain a complete rainfall year. To accommodate the Design Drought, the period from December 1992 to July 1995 is not included in the sequence, which is consistent with the PEIR analysis. Since the SFPUC Storage Account is depleted in 7.5 years, it does not cover the complete hydrologic year in the eighth year of the drought. Therefore, the final six months of the eighth year of the Design Drought (January to June 1978) are defined as hold months.

In the PEIR analysis, the Design Drought simulation ended at the end of the Design Drought. For these simulations, the Design Drought is followed by a period of put years. This period (from July 2003 to September 2006) is long enough to bring the SFPUC Storage Account back to 20,000 af at the end of the model scenarios. The July 2003 to September 2006 period is used because it is considered appropriate to keep a multi-year block of rainfall years together. Analysis of observed reservoir storage data was required in order to confirm that the period from July 2003 to September 2006 could be considered a put period. This analysis was necessary because the available HH/LSM simulations do not include this time period.

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Rearranging the historical hydrologic sequence in the manner described above is justifiable because weather patterns are generally random. There is no reason that a historical hydrology sequence would repeat exactly in the future. For the rearrangement of the historical hydrologic sequence, the modified sequence was kept as simple as possible by maintaining long continuous blocks of the historical hydrologic sequences. Except for the Design Drought, individual rainfall years were kept together. The rearranged sequences start in either July or October in order to be consistent with the California climate.

The rearranged hydrologic sequence was evaluated with respect to the total rainfall at the Lake Merced precipitation station. This analysis examined the cumulative departure of total precipitation relative to the long-term average (Figure 10.1-5). The historic period of the original hydrologic sequence from October 1958 to December 2005 was near normal. The cumulative departure relative to the long-term average was less than 0.2 inch or 0.04 inch per year over the 47.25-year interval. For the rearranged hydrologic sequence, the cumulative departure is a deficit of 19.4 inches or 0.4 inch per year over the 47.25-year interval. The deficit is due to repeating the December 1975 to June 1978 drought period as part of the Design Drought. This repeat period replaces the December 1992 to June 1995 period, which has higher rainfall. Since most groundwater recharge is related to precipitation, this provides for a conservative evaluation of groundwater conditions during this period.

6.4. Initial Conditions

Initial conditions are the groundwater elevations assigned for each active model cell in each model layer at the beginning of model simulations. For all five model scenarios, model-simulated June 2009 groundwater levels from the HydroFocus Historical Simulation (2011) were used as the initial conditions. The MODFLOW model uses monthly time steps and the model is set to start in July 2009; therefore, June 2009 represents the month prior to model initiation. The calibrated model simulation of June 2009 represents the best characterization of groundwater elevations for the entire basin as is required for the model.

All five scenarios use the same June 2009 initial conditions in order to allow a direct comparison of the model scenario results. The initial condition of June 2009 represents the SFPUC Storage Account of 20,000 af that was stored between 2002 and 2009 (personal comm., Greg Bartow, 2010) during the In-Lieu Recharge Demonstration Study.

6.5. Recharge

For all five model scenarios, the recharge pre-processor SMB model was used to revise recharge consistent with the hydrologic sequence and revised results were entered into the model using the MODFLOW recharge package. This approach was based on the same pre- and post-processing approach developed by HydroFocus (2011). All five scenarios use the same revised recharge package.

In the Westside Basin Groundwater Model, pre-processing programs (e.g., SMB) were used to simulate the spatial and temporal distribution of groundwater recharge. Hydrologic processes

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simulated by the SMB model include municipal water deliveries, rainfall, runoff, infiltration, soil moisture storage, potential evapotranspiration, irrigation, pipe leaks, and deep percolation. The SMB model uses climate and water delivery data to calculate the temporal and spatial distribution of deep percolation. The final product generated by the SMB is a single model input data set representing monthly groundwater recharge time-series (recharge package) for input to the uppermost active model layer (Model Layer 1). In the Westside Basin Groundwater Model, recharge was distributed to recharge zones as delineated by HydroFocus. A detailed description of the pre-processing programs and the delineated recharge zones is previously reported by HydroFocus (2007, 2009, and 2011).

In the 2008 No-Project Scenario by HydroFocus, simulated monthly groundwater recharge in irrigated areas was also generated using the SMB model. As described earlier, the land use conditions and recharge zones assumed in Scenario 1 and the project model scenarios are the same as in the 2008 No-Project Scenario. However, altered hydrology in the new hydrologic sequence (including the Design Drought) leads to changes in the rate of groundwater recharge in irrigated areas. To account for the change in the monthly groundwater recharge model inputs, the MODFLOW recharge package in the 2008 No-Project Scenario was modified. It should be noted that in the 2008 No-Project Scenario, simulated monthly recharge in municipal areas is determined from both municipal water use and the historical temperature and rainfall data, as described by HydroFocus (2011). Municipal water use consists of both surface water and groundwater pumping for municipal use. For all five model scenarios, total municipal water use was assumed to remain the same as in the 2008 No-Project Scenario. Therefore, in all five model scenarios, monthly groundwater recharge that would result from municipal water use is essentially the same as in the 2008 No-Project Scenario, but altered according to the new hydrologic sequence.

6.6. Irrigation and Non-Potable Groundwater Pumping

This section describes modeling assumptions for irrigation and other non-potable pumping used in the model scenarios. The PA pumping assumptions and the project specific assumptions are presented separately in subsequent sections.

Irrigation and non-potable pumping assumptions were modified from the 2008 No-Project Scenario as a result of running the SMB model to be consistent with the new hydrologic sequence. A summary of the irrigation and non-potable pumping assumptions used in the model scenarios is presented in Table 10.1-2.

In the HydroFocus 2008 No-Project Scenario (2011), irrigation pumping for wells without metered data records was based on the monthly demand estimated by the SMB model. As mentioned earlier, rainfall, temperature, and municipal water use are input data sets for the SMB. As a result of changes in the hydrologic data used in the model scenarios, the SMB-estimated irrigation demand was updated to generate irrigation demand estimates that are consistent with the new hydrologic sequence. In the model scenarios, the SMB model was run with the input data sets that were rearranged according to the hydrologic sequence, following the same approach developed by HydroFocus (2011).

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Minor modifications were made to the revised estimates of irrigation pumping resulting from the SMB model run to account for pumping data that are representative of actual pumping conditions, based on information provided by SFPUC. These modifications include the Golden Gate Park irrigation wells (Elk Glen, North Lake, and South Windmill Replacement), California Golf No.02, the Edgewood Development Center well, Zoo No.05, and the Stern Grove well, as described below:

- **Golden Gate Park Irrigation Wells** – The 2008 No-Project Scenario (HydroFocus, 2011) estimates Golden Gate Park irrigation at approximately 1.12 mgd (or 1,252 afy), based on metered data provided by SFPUC. For the Existing Conditions, irrigation pumping in Golden Gate Park was adjusted upward to approximately 1,280 afy to match 2008 meter data, which is the most recent and complete metered record that is representative of actual pumping. Pumping in each of the three individual wells was increased with the following pumping distribution among the wells to maintain the same proportion of total pumping as in the pumping distribution used in the 2008 No-Project Scenario.
    - Elk Glen – increased pumping from 0.011 to 0.081 mgd (from 12 to 91 afy).
    - North Lake – increased pumping from 0.302 to 0.563 mgd (338 to 631 afy).
    - South Windmill Replacement – decreased pumping from 0.805 to 0.498 mgd (902 to 558 afy).
- **California Golf Club No.02** – decreased pumping from 0.212 mgd to 0.192 mgd (from 237 to 215 afy), based on rates provided verbally by the California Golf Club (personal comm., Rick Kavakoff, 2009).
- **Zoo No.5** – decreased pumping from 0.404 to 0.321 mgd (from 452 to 360 afy), as provided by the SFPUC based on the average of 2005, 2006, 2007, and 2008 data (SFPUC, 2009c).
- **Edgewood Development Center** – increased pumping from 0.007 to 0.009 mgd (from 8 to 10 afy) (personal comm., Jeff Gilman, 2009).
- **Stern Grove Well** – reduced pumping from 0.042 to 0.0043 mgd (from 47 to 4.8 afy) to account for the new information available about the use of the well as a supplemental water source for Pine Lake (written comm., Jeff Gilman, 2010). The well is assumed to be pumped approximately four days per year, as needed, to maintain the water level in Pine Lake at 31.5 feet (City Datum).

6.6.1. SFGW Project Scenarios

Irrigation and non-potable pumping assumptions for Scenario 1 and Scenarios 3a and 3b are essentially the same, except changes described below.

- For Scenario 3a, the Stern Grove well irrigation pumping is increased from 0.0043 mgd to 0.012 mgd (from 4.8 to 13.6 afy) for Scenario 3a, which represents 0.008 mgd (8.8 af)

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more pumping than Scenario 1. Based on the monthly pumping assumptions provided by SFPUC, the Stern Grove well would pump seven months (January, May, June, July, August, September, and October) with pumping rates ranging from 1.1 af per month to 2.3 af per month.

- For Scenario 3b, the Stern Grove well irrigation pumping is increased from 0.0043 mgd to 0.013 mgd (from 4.8 to 14.8 afy) for Scenario 3b, which represents 0.009 mgd (10 af) more pumping than Scenario 1. Based on the monthly pumping assumptions provided by SFPUC, the Stern Grove well would pump seven months (January, May, June, July, August, September, and October) with pumping rates ranging from 1.2 af per month to 2.5 af per month.

The Stern Grove well pumping volumes under Scenarios 3a and 3b are based on the supplemental water needed to maintain the water level in Pine Lake at 31.5 feet (City Datum), based on information provided by SFPUC. Pumping of the Stern Grove well is proportional to the total pumping of the SFGW Project, in which the total pumping in Scenario 3a is less than the total pumping in Scenario 3b.

6.6.2. Cumulative Scenario

Irrigation and non-potable pumping assumptions for Scenario 3b and Scenario 4 are essentially the same, except changes described below.

- Based on the results of the revised SMB, the long-term average irrigation demand by Holy Cross cemetery was estimated at 0.19 mgd (212 afy) for Scenario 1 and the GSR and SFGW Project scenarios (Scenarios 2, 3a, and 3b). The Cumulative Scenario required further adjustments to take into account the planned future build-out in the Holy Cross cemetery. Based on the potential future build-out at the Holy Cross cemetery, additional pumping of 0.04 mgd (or 45 afy) was estimated for the Cumulative Scenario. The Holy Cross cemetery build-out was projected to be at a rate of about 1.5 acre per year from 2010 to 2030 (total of 30 acres over 20 years) (personal comm., Roger Appleby, 2010). With a conservative irrigation rate of 1.5 af per acre, the additional estimated future irrigation pumping rate was estimated to be 45 afy (or 0.04 mgd).

6.7. GSR Project

The GSR Project is sponsored by the SFPUC in collaboration with the three PAs (Cal Water, Daly City, and San Bruno), who operate their own municipal supply wells and purchase wholesale water from SFPUC's Regional (surface) Water System. The overall objective of the GSR Project is to develop a new dry-year groundwater supply that can be utilized at a rate of 7.2 mgd (or 8,100 afy) above the existing municipal groundwater pumping over a 7.5-year drought period. Water would be stored in the aquifer through in-lieu recharge equal to the

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reduction in pumping by the PAs made possible by supplemental SFPUC surface water supplies delivered in wet and normal years.

6.7.1. GSR Project Pumping

Figure 10.1-4 shows the locations of the proposed GSR Project municipal wells that were incorporated into the model scenarios involving the GSR Project. Table 10.1-7 shows the total pumping volumes assumed for the proposed GSR Project municipal wells during the put/take/hold sequence. The general assumption is that pumping in each GSR Project well would be reduced in duration to 4 hours per month for well exercising during put and hold periods. For the purpose of these modeling scenarios, month-to-month pumping was assumed to be constant, with no seasonal pumping variations.

Table 10.1-8 shows the assumed pumping distribution by model layers for each of the GSR Project wells. The general assumptions made to allocate the pumping vertically take into account the proposed well screen intervals in conjunction with the hydraulic conductivity differences in Model Layers 4 and 5. Where the W-clay is present, it was assumed that the screen footage in Model Layers 1 through 4 was given the double weighting above the W-clay that it is below the W-clay in Model Layer 5, except at TW-CUP-10A, where the proposed screen is only planned for the zone above the W-clay. For areas without the W-clay, e-logs were reviewed to determine how to allocate pumping (either equal weighting for all screens or double the weighting from the upper screen). The pumping allocation was based on the fact that the calibrated horizontal hydraulic conductivity (K_h) values are generally 8 feet/day in Model Layers 3 and 4 compared to 4 feet/day in Model Layer 5 (HydroFocus, 2011). Moreover, based on the conceptual understanding of the subsurface geology, review of the available well logs, analysis of footage of screen in various layers times weighting factors, it appears that the majority of pumping in practice is derived from depths corresponding to Model Layer 4.

6.7.2. Partner Agency Pumping

Figure 10.1-4 shows the locations of the PA municipal puping wells that were incorporated into the five model scenarios. The locations of the proposed wells were based on the information provided by Cal Water and Daly City to SFPUC.

The total pumping by the PAs for Scenario 2 is 6.9 mgd, compared to 6.84 mgd under Scenario 1 (Table 10.1-2). As shown in Table 10.1-1 and 10.1-2, the total PA pumping assumptions used for the GSR Project under Scenarios 2 and 4 are essentially the same, but the locations of the PA municipal pumping wells used for each scenario vary slightly, as shown in Table 10.1-7 and discussed below.

- **San Bruno** - Under Scenarios 2 and 4, San Bruno would continue to pump its existing five wells (SB-No.15, SB-No.16, SB-No.17, SB-No.18, and SB-No.20). As of early 2012, San Bruno was evaluating the potential to replace SB-No.15 and had identified several potential replacement sites. Since the GSR Project EIR modeling can only assume one location for the replacement of SB-No.15, it was agreed that the current location of SB-No.15 was reasonable to use because the current SB-No.15 location is the closest

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location to the proposed GSR Project wells and thus provides a conservative analysis by concentrating pumping in that area (i.e., the GSR Project proposed well at Golden Gate National Cemetery is about a quarter mile north of SB-No.15).

Another alternate location was about one mile northwest of the proposed GSR Project well at the SFPUC Millbrae Facility (CUP-M-1). However, CUP-M-1 is expected to have the lowest pumping rate (about 160 gpm as shown in Table 10.1-3) of all of the GSR Project wells because the saturated thickness at this location is less than areas where the proposed GSR Project wells to the north are located. Thus, it would not be conservative to use this as the replacement location for SB-No.15 for this analysis.

- **Daly City** – Under Scenario 2, Daly City plans to pump the five existing wells (Jefferson, Vale, Daly City No.4, Westlake, and Junipero Serra), but Scenario 4 accounts for Daly City's future plans to use two proposed wells (Daly City A Street Replacement well and Daly City No.4 Replacement well). Under Scenario 4, Daly City total pumping would be the same as Scenario 2, but using four existing wells (Jefferson, Vale, Westlake, and Junipero Serra) and the two proposed wells.
- **Cal Water** – Under Scenario 2, Cal Water proposes to pump five wells, including three of the existing wells (SSF1-19, SSF1-20, and SSF1-21) and two proposed wells (SSF1-22 and SSF1-23), based on the information provided by Cal Water to SFPUC. Under Scenario 2, three existing wells (SSF1-14, SSF1-17, and SSF1-18) were assumed to be out of production. Based on the documents provided by Cal Water, SSF1-14 and SSF1-17 were reported inactive, and SSF1-18 was reported to be replaced with the proposed well SSF1-23. The existing well SSF1-15 was assigned "zero" pumping based on the information from Cal Water that indicates the well will be destroyed due to age and contaminants. Under Scenario 4, Cal Water was assumed to be pumping the two existing wells (SSF1-20 and SSF1-21) and two proposed wells (SSF1-22 and SSF1-23). Based on the information provided by Cal Water, proposed wells SSF1-24 and SSF1-25 are considered redundant and no pumping was assigned to these wells for the purpose of the Cumulative Scenario.

Table 10.1-7 shows the total pumping at each PA municipal well during the put/take/hold sequence. Pumping during put periods was assumed to be 20 percent of the take period pumping in each well. For San Bruno wells, the pumping distribution among the individual wells and the monthly pumping distribution for each well are the same for Scenarios 1, 2 and 4, and they are assumed to be proportional to those in the 2008 No-Project Scenario (HydroFocus, 2011). Under Scenario 2, Daly City pumping distribution among the wells is the same as Scenario 1 and follows the same distribution as in the 2008 No-Project Scenario (HydroFocus, 2011). Under Scenario 4, total pumping by Daly City was distributed among the six wells evenly. Under Scenario 2, pumping among the individual Cal Water wells was determined based on the pumping rates provided by Cal Water and inputs from SFPUC. For Scenario 4, pumping among the individual Cal Water municipal wells was determined based on pumping rates provided by Cal Water for each well.

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Table 10.1-8 presents the pumping distribution by model layers for each PA municipal well. For the existing PA municipal wells, vertical pumping distribution by model layers is the same as in the 2008 No-Project Scenario. The four Cal Water proposed wells (SSF1-22, SSF1-23, SSF1-24, and SSF1-25) would be similar in nature to the existing wells SSF1-20 and SSF1-21 and would be located in the vicinity of the existing wells, based on the information provided by Cal Water to SFPUC. In light of the estimated screen zones of 380 to 570 feet below ground surface (bgs) for the proposed wells, which are similar to existing wells SSF1-20 and SSF1-21, under Scenarios 2 and 4, the depth distribution of the Cal Water pumping by model layers for the proposed wells was assumed to be similar to that for the existing wells SSF1-20 and SSF1-21.

6.7.3. Put/Take/Hold Sequence

In the modeling scenarios involving the GSR Project (Scenarios 2 and 4), the hydrologic sequence follows the put/take/hold sequence to simulate in-lieu groundwater recharge during wet years and groundwater extraction during dry years. As described earlier, the HH/LSM, which was used extensively for long-term planning purposes in the SFPUC's PEIR, outputs a put/take/hold sequence on a monthly basis and tracks the volume of water stored in the SFPUC Storage Account (SFPUC, 2007; SFPUC, 2009a). The following is the description of the put/take/hold sequence used in the hydrologic sequence for the model scenarios, compared to the original put/take/hold in the HH/LSM run:

- The original HH/LSM put/take/hold sequence is based on the in-lieu recharge rate (or put rate) of 7.23 mgd. This put rate is equal to the rate of groundwater pumping during a take period in the HH/LSM simulation run. For the current modeling scenarios, on the other hand, the in-lieu recharge rate during a put year is 5.52 mgd and the rate of groundwater extracted during a take year is 7.23 mgd. The pumping rate of 5.52 mgd represents the 80 percent of total PA pumping of 6.9 mgd during a put period. As a result of the differences in the put rate, the hydro sequence has slightly longer put periods for the model scenarios compared to the original HH/LSM model outputs. The longer put periods are used in order to ensure the volume of put in the current modeling scenarios is not less than the volume of put in the HH/LSM outputs.
- In the PEIR, the put/take/hold conditions are defined as annual periods that run from July to June. The put/take/hold sequence used for the GSR Project under Scenario 2 and the Cumulative Scenario is consistent with this approach.
- The put/take/hold sequence used in the current modeling scenarios includes the Design Drought period as used in the SFPUC's PEIR.
- The put/take/hold sequence in the current modeling scenarios includes a recovery period (put period) following the Design Drought that brings the SFPUC Storage Account back to the same value as the initial condition (20,000 af). This allows a direct comparison of groundwater conditions with respect to the SFPUC Storage Account at the beginning and the end of the GSR Project under Scenario 2 and the Cumulative Scenario.

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- The put/take/hold sequence used in the current modeling scenarios starts with a put condition for the GSR Project and the Cumulative Scenario. This is done in order to simulate the filling of the SFPUC Storage Account to the "full" condition (60,500 af) prior to the Design Drought.

The put/take/hold sequence used in the current modeling scenarios is presented in Table 10.1-9. The Design Drought is represented by the 7.5-year period of take months from Simulation Year 36 through 44.

6.8. SFGW Project

The SFGW Project consists of the development of up to 4.0 mgd of local San Francisco groundwater in the North Westside Basin as a regular and emergency drinking water supply. The WSIP primary level-of-service goal for the SFGW Project is to increase the long-term water supply available to the SFPUC.

As shown in Table 10.1-2, the PA pumping assumptions used for the SFGW Project scenarios (Scenarios 3a and 3b) are the same as Scenario 1. These assumptions are covered in Section 5.1 and are not discussed further in this section.

6.8.1. SFGW Project Pumping

Figure 10.1-4 shows the locations of the six proposed SFGW Project municipal wells that were incorporated into the model scenarios involving the SFGW Project. Table 10.1-6 shows the normal design and average pumping capacity for the SFGW Project municipal wells. Table 10.1-10 shows the percent pumping distribution for each well under Scenarios 3a and 3b. Pumping by each SFGW Project municipal well was estimated by distributing the total monthly pumping (combined pumping for the four wells for Scenario 3a and for the six wells for Scenario 3b) among the wells proportional to each well's normal design pumping capacity.

The model layer-by-layer pumping distribution for the SFGW Project wells is presented in Table 10.1-8. Pumping among the model layers was distributed proportional to the layer thicknesses and the screened intervals of the wells (i.e., construction details) as provided by the SFPUC. In locations where the screened interval spans the entire model layer, pumping was distributed proportional to the layer thickness. When the well screen falls within only a portion of the model layer, pumping was distributed proportional to the length of well screen within that layer. Table 10.1-11 shows calculated monthly pumping by each SFGW Project well for Scenarios 3a and 3b. Monthly pumping varies, but total pumping remains the same annually (i.e., 3.0 mgd for Scenario 3a and 4.0 mgd for Scenario 3b).

Pumping assumptions for the three existing Golden Gate Park wells (Elk Glen, North Lake, and South Windmill Replacement wells) under Scenarios 3a and 3b are summarized in Tables 10.1-2, 10.1-6, and 10.1-10. If recycled water were available for irrigation, the Elk Glen well would not pump (Table 10.1-2), while the North Lake and South Windmill Replacement wells would pump at 0.50 mgd and 0.65 mgd, respectively, for municipal supply (Table 10.1-10). Without recycled water for irrigation, all three existing wells would pump at a total combined rate

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of approximately 1.14 mgd based on the monthly irrigation pumping assumptions used in the Existing Conditions (Table 10.1-2).

6.9. Lake Merced

Lake Merced is an important hydrological feature in the Westside Basin. It is simulated in the Westside Basin Groundwater Model using the MODFLOW Lake Package, generally following the conditions used for the 2008 No-Project Scenario. Details regarding the MODFLOW simulation of Lake Merced are discussed in Sections 6.9.1 through 6.9.3.

Lake Merced water levels are also simulated using the Lake-Level Model, as discussed in Section 6.9.5. Lake Merced level management operations are considered as a reasonably foreseeable future project under Scenario 4 (Cumulative Scenario) and discussed in Section 6.9.4. The current understanding of the Lake Merced management operations is that it will raise and maintain Lake Merced water levels up to an elevation of 9.5 feet (City Datum) (18.12 feet NGVD 29) with supplemental water derived from stormwater diverted from Daly City's Vista Grande Canal.

6.9.1. Model Modifications to Lake Package

For the model scenarios, monthly runoff entering Lake Merced from Harding Park Golf Course and nearby residential areas was estimated based on the results from the revised SMB model and revised results were imported into the model using the MODFLOW Lake Package (LAK3). In the 2008 No-Project Scenario, monthly runoff entering the lake is extracted from the SMB model. Following the same approach developed by HydroFocus (2011), the SMB model was revised to update the lake package consistent with the new hydrologic sequence. Similar to the 2008 No-Project Scenario, all five model scenarios, except the Cumulative Scenario, assume no Vista Grande stormwater diversions into Lake Merced and no other water additions to the lake.

The MODFLOW Lake Package was further modified for initial lake levels and lake spillway, compared with the 2008 No-Project Scenario, as described separately in the following subsections 6.9.2 and 6.9.3.

6.9.2. Initial Lake Condition

For all model scenarios, the initial Lake Merced water level was set to match the simulated June 2009 lake level from the version 3.1 Historical Simulation (HydroFocus, 2011). Simulated rather than measured (observed) Lake Merced lake levels are used because this change improves the model performance by ensuring that the lake levels are in equilibrium with groundwater conditions in the model. If this approach were not used, then there may be undesirable effects in the water balance and nearby groundwater levels as the model works to achieve a new equilibrium with the different initial lake condition. The initial lake level at South Lake was set to 17.95 feet (NGVD 29). The San Francisco City Datum (City Datum) is another reference datum commonly used for Lake Merced lake level measurements. Relative to the City Datum, the initial lake level at South Lake was set to 9.33 feet (City Datum).

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6.9.3. Model Modifications for the Lake Spillway

The MODFLOW Lake Package does not include a mechanism to simulate the control of a lake level with a spillway. Without a spillway mechanism, MODFLOW would allow the lake levels to rise to levels that are not physically possible, which could affect the simulated shallow groundwater levels (due to groundwater-surface water interactions with the lake) and the overall Westside Basin water balance. For all five model scenarios, there were instances where the MODFLOW-simulated Lake Merced lake level was above the level of the spillway. Therefore, scenarios were run iteratively by adjusting the Lake Package input file to remove excess water from the lake (as lake spills) until the lake levels remained below the level of the spillway. This approach is different than the 2008 No-Project Scenario, which assumed no spills from the lake.

For Scenarios 1, 2, 3a and 3b, the existing Lake Merced water spillway elevation of 21.62 feet (NGVD 29, or 13.0 feet City Datum) was used. For Scenario 4, the projected modified spillway elevation of 18.12 feet (NGVD 29, or 9.5 feet City Datum) was used based on documentation for the Vista Grande Drainage Basin Alternatives Analysis project for Daly City (Brown and Caldwell, 2010, Jacobs Associates, 2011a, 2011b; City of Daly City, 2012).

The MODFLOW Lake Package uses a water balance method to calculate inflows and outflows from the lake outside of the groundwater contribution (e.g., precipitation, stormwater runoff, evaporation, and direct water additions and withdrawals). These values are defined in the Lake Package by the user prior to the model input files. The inflows and outflows from the groundwater contribution are calculated by MODFLOW.

To adjust for the spillway, the outflows that represent the lake spills (i.e., direct water withdrawals) in the Lake Package were increased iteratively until the MODFLOW-simulated lake levels stayed below the level of the spillway for consecutive months. A single month where the lake level was less than 0.1 foot above the spillway was allowed.

6.9.4. Cumulative Scenario

For the Cumulative Scenario (Scenario 4), the use of Lake Merced as part of the Vista Grande Drainage Basin Alternatives Analysis project for Daly City is considered to be a reasonably foreseeable future project. Daly City's Vista Grande Drainage Basin Alternatives Analysis recommended the alternative, in which stormwater flow from the Vista Grande Canal would be diverted to Lake Merced (Jacobs Associates, 2011a, 2011b; City of Daly City, 2012).

Daly City evaluated 24 potential scenarios for the Lake Merced Alternative for various flow configurations related to the presence or absence of a wetland and the level of the spillway (Brown and Caldwell, 2010). Given that the Lake Merced Alternative scenarios are still in the initial design stage, a scenario that provides an average flow to the lake is considered acceptable given that averages have been used for assumptions in other instances (e.g., the PA pumping assumptions). The 75 cfs Daly City scenario was selected for use in this modeling analysis. 75 cfs represents a cutoff volume, so that all flow down the Vista Grande Canal exceeding this cutoff volume would be diverted to Lake Merced (Brown and Caldwell, 2010). Stormwater discharges into Lake Merced occur when water flows in the Vista Grande Canal

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exceed the cutoff volume and are diverted into the Lake Merced. These flows occur periodically in response to large storms, and were calculated as part of the Vista Grande Drainage Basin Alternatives Analysis (Brown and Caldwell, 2010) based on historical precipitation data. Stormwater flows were calculated to occur as diversions to Lake Merced in every year, and range from 19 to 681 afy with an average of 207 afy (Brown and Caldwell, 2010). These flows were added to the MODFLOW Lake Package as an input into Lake Merced as stormwater discharges.

The Lake Merced Alternative scenarios also include provisions for an engineered wetland and modification of the Lake Merced spillway (Brown and Caldwell, 2010). In the 75 cfs scenario, the average baseflow in the Vista Grande Canal is assumed to be diverted into an engineered wetland for treatment and then discharged to Lake Merced on an ongoing basis. Baseflows have been estimated to range from 18 to 26 af per month (Kennedy/Jenks, 2009). These were also added to the MODFLOW Lake Package as an input into Lake Merced.

Finally, the 75 cfs scenario contains a provision to lower the spillway out of Lake Merced by 3.5 feet from an elevation of 21.62 to 18.12 feet (NGVD 29), or from 13.0 feet to 9.5 feet (City Datum). Spillway discharges at the lower spillway elevation were calculated using the methodology described in Section 6.9.3.

6.9.5. Use of Lake Merced Results

As mentioned in Section 4, the Westside Basin Groundwater Model has the ability to reproduce long-term trends in the Lake Merced lake levels as shown in the Historical Simulation by HydroFocus (2011), but there is uncertainty in estimating absolute lake levels. Comparisons between simulated and observed lake levels show differences that range from -2.0 to 7.0 feet. The model generally reproduces the trends and relative changes seen in the historical data for Lake Merced during the period from 1972 to 1995. During the first 14 years (1958 to 1972) and the last 13 years of the simulation (1996 to 2009), simulated lake levels were consistently 2 to 3 feet higher than measured data and show periods of divergence between historical and measured trends. The MODFLOW model is considered useful in simulating the relative effect of possible regional groundwater supply projects on Lake Merced levels; however, the simulation of lake level management scenarios with the objective of projecting absolute lake levels is not recommended.

Because of these issues with the MODFLOW representation of Lake Merced, the Lake-Level Model, discussed in Section 8, is also used to simulate the Lake Merced water levels for the five model scenarios.

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7. MODFLOW Model Scenario Results

The results of MODFLOW model simulations for all five scenarios are presented in this section. The evaluation of these results with respect to specific groundwater issues is discussed in the following TMs:

- Task 10.2 for assessment of groundwater-surface water interactions
- Task 10.3 for assessment of seawater intrusion
- Task 10.4 for changes in groundwater levels and storage
- Task 10.5 for assessment of pumping induced land subsidence
- Task 10.6 for assessment of changes in groundwater quality

7.1. Documentation of Model Results

The model results are typically presented based on the water year (from October of the previous calendar year through September). The simulation period is 47 years and three months. The first three months of the simulation period from July 2009 to September 2009 are considered as Year Zero (0), and are excluded in the summary tables. This exclusion is made because the partial data would bias model result statistics (e.g., annual average, annual minimum, and annual maximum). The model results are presented for scenario years 1 through 47.

7.1.1. Hydrographs

The Westside Basin Groundwater Model can be used to report groundwater levels specific to each of the five model layers. To facilitate this analysis, model-simulated groundwater levels corresponding to Model Layers 1 and 4 are presented, because they are representative of the response of the unconfined and Primary Production aquifers, respectively.

Model-simulated hydrographs from selected key representative monitoring well locations were prepared across the entire groundwater basin. Twelve representative monitoring locations (shown in Figure 10.1-4) were used to show model-simulated groundwater elevations. This is a subset of the 125 observation wells present in the model.

Attachment 10.1-B presents hydrographs for the 12 selected well locations to demonstrate results from the individual model scenarios, and also to compare the results of the project model scenarios (Scenarios 2, 3a, 3b, and 4) relative to the Existing Conditions (Scenario 1). Attachment 10.1-B includes hydrographs of model-simulated absolute water levels at the 12 selected locations for Model Layers 1 through 5, and of the water levels from the five scenarios for Model Layers 1 and 4 relative to the Existing Conditions. These hydrographs are included to show how the pumping assumptions in the various scenarios result in changes in the hydrologic conditions of the Westside Basin. Model Layer 1 results provide information about expected changes to the Shallow Aquifer (where present) and to unconfined groundwater conditions; whereas, Model Layer 4 results give an indication of simulated groundwater level changes anticipated in the confined Primary Production Aquifer portion of the model. Model Layer 5 also

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encompasses portions of the Deep Aquifer, but it is not laterally continuous and thus not as well-suited for evaluation as is Model Layer 4 output.

7.1.2. Volumetric Water Budgets

Volumetric water budget graphs and tables were prepared for each of the five scenarios for the entire simulation period. The water budget (also referred to as water balance or hydrologic budget) presented in this TM shows the major components of inflows to and outflows from the Westside Basin. Water budget analysis was conducted at three different regional scales listed below and results are presented in the following subsections:

- Westside Basin
- North and South Westside Basins
- Five water budget zones that are collectively referred to as the "Developed Subbasin" by HydroFocus (2011)

7.1.2.1. Westside Basin Water Budget

Attachment 10.1-C presents annual water budget graphs and summary tables as well as annual and net changes in groundwater storage for each of the five scenarios for the entire Westside Basin. Average, maximum, and minimum annual inflows and outflows are summarized for each of the five scenarios in Table 10.1-12. The average values in the summary tables represent the average annual inflows and outflows for the simulation period based on the water year. As mentioned earlier, model results for the first partial year (July to September) are excluded in the summary tables. The minimum and maximum values represent the minimum and maximum annual inflows and outflows, respectively, for the simulation period. Results in Attachment 10.1-C are summarized on an annual basis to show the annual water balance itemized into individual major inflows and outflows. The annual change in groundwater storage is also tabulated and plotted. The negative values for the annual change in groundwater storage represent a decline in the groundwater storage, while the positive values represent an increase in groundwater storage. It should be noted that the net change in groundwater storage graphs represent values relative to the beginning of the simulation. Groundwater storage at the beginning of the simulation is set to zero ("0"); thus, changes in the basin storage are reported relative to the beginning storage. Since the model scenarios use the same initial conditions, the zero basin storage at the beginning of the simulation corresponds to the same basin storage values for the five model scenarios, each starting with the same June 2009 initial condition that is representative of the SFPUC Storage Account of 20,000 af.

7.1.2.2. North and South Westside Basin Water Budgets

A zone budget analysis was performed to summarize model results for the North Westside Basin and South Westside Basin separately. The U.S. Geological Survey post-processor ZONEBUDGET (Harbaugh, 1990) was used to extract the simulated volumetric water budget (summed over the five model layers). Two water budget zones are separated south of the San

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Francisco-San Mateo County line to represent the North and South Westside Basins. As mentioned earlier, this division is not intended to represent a physical boundary, but is used merely for the convenience of representing the model results spatially. The model cells representing Lake Merced are all located in the North Westside Basin. Therefore, the flow between the lake and the surrounding aquifer system is accounted for as part of the North Westside Basin water budget only. Attachment 10.1-D presents volumetric water budget graphs and tables for the North and South Westside Basins separately, and are presented in the same way as for the entire Westside Basin. In addition to the water budget components (inflows and outflows), two components are presented to keep track of flow exchanges between the North and South Westside Basins, as shown in the summary tables and annual water balance graphs.

7.1.2.3. Developed Subbasin Water Budgets

Similar to the approach taken by HydroFocus (2011), a water budget zone analysis was conducted to summarize volumetric budgets for the five water budget zones that are collectively referred to as the "Developed Subbasin" by HydroFocus. The U.S. Geological Survey post-processor ZONEBUDGET (Harbaugh, 1990) was used to extract the simulated volumetric water budget (summed over the five model layers) for the San Francisco, Daly City, Colma, South San Francisco, and San Bruno water budget zones. These water budget zones encompass the inland area where all municipal water supply wells are located. The boundaries of the Developed Subbasin represent the institutional boundaries that coincide with the most intensely developed water use areas within the basin. This water budget zone analysis presents results for ten different sub-areas, including the aforementioned five zones in the Developed Subbasin and five adjacent sub-areas (beneath the Pacific Ocean, San Francisco Bay Plain, south of San Bruno in Millbrae and Burlingame areas, and across the Serra Fault). Attachment 10.1-E presents results of the water budget zone analyses for the ten sub-areas for each of the five scenarios. Each summary table presents the annual average inflows, outflows, and the net change (in units of afy) over the entire simulation period. The major inflows include recharge, seepage from Lake Merced and inflow from San Francisco Bay and the Pacific Ocean (represented by constant head). The major outflows include pumping, outflow to San Francisco Bay and Pacific Ocean, and seepage to Lake Merced. The summary tables also show the net flow to or from the Developed Subbasin and the adjacent sub-areas.

7.1.3. Groundwater Elevation Contour Maps

Contour maps of the model simulated groundwater elevation data were generated at selected key time periods. Model simulated groundwater elevation contour maps are presented in Attachment 10.1-F to show the model response to various pumping stresses and recovery periods, such as at the end of simulation (for all scenarios), and at the end of the Design Drought with the long-term take period (for Scenarios 2 and 4, each involving the GSR Project). These groundwater elevation contour maps demonstrate general and regional trends in groundwater flow directions and localized cones of depression around the primary pumping areas. Contour maps of the simulated groundwater elevation data were plotted for Model Layer 1 (for Scenarios 1, 3a, 3b, and 4) and Model Layer 4 (for Scenarios 1, 2, and 4) to represent the

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model response in the unconfined and deeper aquifers in the basin. Contour maps of the simulated groundwater elevation maps in Model Layer 1 were generated to demonstrate the model response in the SFGW Project area in the North Westside Basin where the Shallow Aquifer and unconfined groundwater conditions exist. Contour maps of the simulated groundwater elevation maps in Model Layer 4 generally represent the model response in the Primary Production Aquifer that is present in the GSR Project area in the South Westside Basin.

Dry cells shown on the contour maps for Model Layer 1 define areas where MODFLOW-simulated groundwater elevations are below the bottom of the layer. Dry cells do not necessarily imply dewatering the aquifer. During the model simulation, simulated heads can oscillate, in which cells convert from wet to dry and then convert back from dry to wet.

7.1.4. Lake Hydrographs

Hydrographs for Lake Merced water levels were prepared for all of the five model scenarios using the Lake-Level Model discussed in Section 8. A composite graph showing results of all scenarios on a single graph based on the Lake-Level Model is shown in Section 8.2. The lake hydrographs for each model scenario are also presented in Attachment 10.1-G. To be consistent with the datum used in the Westside Basin Groundwater Model and the groundwater elevation hydrograph results from that model, lake levels are shown using both the NGVD 29 datum and the City Datum. All five scenarios account for water removal from the lake to keep the lake levels below the spillway. As described earlier, the lake spillway is assumed to be 13 feet (City Datum) for Scenarios 1, 2, 3a, and 3b, and to be 9.5 feet (City Datum) for Scenario 4. Because of limitations in the MODFLOW Lake Package (Section 4.3.3), the results of the Lake-Level Model are considered the most appropriate for analysis of groundwater-surface water interactions at Lake Merced.

7.2. Model Scenario Assessment

Model results were reviewed to check that simulated results from individual scenarios are appropriate and consistent with model inputs. General trends observed in groundwater levels, water balances, and resulting changes in groundwater storage were checked for consistency among model scenarios.

7.2.1. Model Convergence

All of the future model scenarios met the mathematical convergence criteria specified in the existing Westside Groundwater Flow Model in all time steps. Therefore, the model-simulated results converged appropriately, and the resulting water balance was considered acceptable.

7.2.2. Assessment of Model Scenario Results

Groundwater pumping assumptions used to develop the model scenarios are the significant model inputs that differentiate one scenario from another and can be used as a measure to check consistency among scenarios. Simulated groundwater levels are expected to vary

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depending on the magnitude of pumping applied and the spatial and temporal distribution of pumping.

Figure 10.1-6 presents simulated groundwater levels for the model scenarios for Model Layer 1 at a monitoring well located in Golden Gate Park (SWM-GS). Figure 10.1-7 shows simulated differences in groundwater elevations at the same location relative to the Existing Conditions (Scenario 1). Given the proximity of this monitoring well to a proposed SFGW Project municipal well (South Windmill Replacement), groundwater levels in the vicinity of this well are expected to be most heavily influenced by the SFGW Project operations, while the GSR Project operations are not expected to have much effect. Therefore, Scenarios 3a, 3b, and 4 results are expected to be similar to each other throughout the simulation period. Since the SFGW Project pumping operations propose to produce additional year-round groundwater supply in the North Westside Basin compared to the Existing Conditions, groundwater levels resulting from Scenarios 3a, 3b, and 4 would be expected to be lower than those of the Existing Conditions in this area. The model results shown in Figures 10.1-6 and 10.1-7 are consistent with these expected results.

On the other hand, due to the large distance between the SWM-GS monitoring location and the GSR Project operations in the South Westside Basin, the overall effect of the GSR Project pumping on groundwater levels in Golden Gate Park area would be expected to be minor (i.e., groundwater levels for Scenario 2 would be similar to those for the Existing Conditions). As also shown in Figures 10.1-6 and 10.1-7, all hydrographs start at the same level, as expected, representing the same initial conditions used in all five scenarios. As the simulation time elapses, groundwater levels for Scenarios 1 and 2 behave in similar ways at the location of this monitoring well because of the minor effect of the GSR Project operations on this location. Similarly, as the simulation time progresses, Scenarios 3a, 3b, and 4 show similar trends since the results are more influenced by the SFGW Project operations at this location. The model results shown in Figures 10.1-6 and 10.1-7 are consistent with these expected results.

Figures 10.1-8 and 10.1-9 show the model-simulated groundwater elevations for Model Layer 4 in the Daly City area (DC-A St), which would be subject to influence from the proposed GSR Project operations and possibly to the proposed pumping for the SFGW Project . Because of its location, the effect of the GSR Project on groundwater levels at the DC-A St monitoring location would be expected to be greater compared to that of the SFGW Project. As expected, the SFGW Project alone would result in a small, incremental decline in groundwater levels as a result of the year-round additional pumping compared to Scenario 1, while the effects of the GSR Project would vary significantly depending on the timing of the put/take/hold sequence and the associated pumping assumptions. Figures 10.1-8 and 10.1-9 demonstrate the expected results, where the effect of the GSR Project would be more pronounced at this location. As expected, model–simulated groundwater levels decline during take periods, recover during put periods, and return to the trends seen in Scenario 1 during hold periods.

Figures 10.1-10 and 10.1-11 show the model-estimated aggregate change in groundwater storage and changes in groundwater storage relative to the Existing Conditions (Scenario 1). All five scenarios start with the same initial conditions of June 2009; thus, the storage plots start

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with zero to indicate the beginning of the simulation. As discussed earlier, the June 2009 groundwater levels account for the SFPUC Storage Account of 20,000 af in the basin, but do not account for basin hydraulic inefficiencies and potential storage losses. This subject is described in TM 10.4.

As shown in Figures 10.1-10 and 10.1-11, groundwater storage results for Scenario 1 and Scenarios 3a and 3b follow similar trends of general decline, with the decline in Scenarios 3a and 3b greater than that under Scenario 1, due to the increased pumping under the SFGW Project. The aggregate changes in groundwater storage of Scenarios 3a and 3b are similar, as expected, with a slightly greater decline in Scenario 3a. This is in response to the seasonal irrigation pumping in Golden Gate Park under Scenario 3a, compared to Scenario 3b, which assumes regular municipal pumping from the two proposed SFGW Project wells and supplemental recycled water to replace the irrigation pumping in Golden Gate Park. Due to the combined pumping assumed under the Cumulative Scenario (Scenario 4), the change in storage would be greater under the Cumulative Scenario compared to Scenario 1, and compared to Scenario 2 (GSR Project) or Scenarios 3a and 3b (SFGW Project) alone. As expected, the trend in model-simulated groundwater storage decline is similar for Scenarios 2 and 4. The additional storage decline in Scenarios 2 and 4 compared to Scenario 1 is due to the take periods during the 7.5-year Design Drought, but the overall decline is greater under Scenario 4 than Scenario 2 because of the greater combined pumping of the GSR and SFGW Projects in Scenario 4. Similar to the effects seen on groundwater levels, the resulting changes in groundwater storage from the scenarios involving the GSR Project are primarily controlled by the put/take/hold sequence.

Figure 10.1-12 shows the net change in groundwater pumping relative to the Existing Conditions (Scenario 1). As expected for Scenario 2, additional pumping varies as a function of the put/take/hold sequence, where pumping goes below the Existing Conditions rates during put periods, goes above the Existing Conditions rates during take periods, and returns to similar rates as in the Existing Conditions during hold periods. Scenario 4 shows trends similar to Scenario 2, but pumping is greater due to the addition of Scenario 3b pumping for the SFGW Project to Scenario 4; as a result, the hold period pumping under Scenario 4 returns to levels similar to Scenario 3b, as opposed to those of the Existing Conditions.

7.3. Application of Model Scenario Results

In the context of the modeling scenarios and related analyses, the Westside Basin Groundwater Model is considered a useful tool for simulating the relative effect of model scenarios such as those presented in this TM.

It is most useful to evaluate the relative changes of the model results presented here. Scenario 1 represents the Existing Conditions that provides a basis of comparison for evaluating the relative change both with and without the SFPUC Projects in Scenario 2 (GSR Project), Scenarios 3a and 3b (SFGW Project), and Scenario 4 (Cumulative Scenario). Given the same hydrologic sequence and the same initial conditions used in all five model scenarios, the model scenarios can be directly compared to the Existing Conditions. Simulated relative changes in

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groundwater levels and aquifer storage may not equal the actual changes determined from future observed hydrologic conditions, as also mentioned by HydroFocus (2007).

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8. Lake Merced Lake-Level Model

Because of concerns about the ability of MODFLOW (Westside Basin Groundwater Model) to accurately simulate lake levels in Lake Merced, the analysis also utilizes the Lake-Level Model. A more complete discussion of the development of the Lake-Level Model is included in Attachment 10.1-H. Below is a summary of the application of this model to the evaluation of Lake Merced for the analysis of the GSR and SFGW Projects and the Cumulative Scenario.

8.1. Background on the Lake Merced Lake-Level Model

The Lake-Level Model is a spreadsheet-based water balance model. The model sums up the inflows and outflows from Lake Merced on a monthly time scale. The water balance components are each calculated independently. The sum represents the net change in water volume in the lake for that month. Based on this net change in water volume, a new lake level is calculated. A positive net change represents an increase in the lake level, whereas a negative net change represents a decrease in lake level.

The Lake-Level Model was calibrated to historical lake levels over a 70-year period from October 1939 to June 2009. This period includes a variety of hydrological conditions including wet, normal and dry precipitation years, flood events, and periods of high and low lake levels corresponding to a variety of conditions that are considered representative of future conditions. Overall, the Lake-Level Model closely follows both the long-term and short-term trends by demonstrating a very strong correlation of the magnitude of both annual and seasonal fluctuations reasonably well. The comparison of simulated and historical lake levels between October 1939 and June 2009 is discussed in more detail in the technical memorandum documenting the development of the Lake-Level Model, which is included as Attachment 10.1-H.

The Lake-Level Model previously has been used to support the Vista Grande Drainage Basin Alternatives Analysis in 2011 (Brown and Caldwell, 2010, Jacobs Associates, 2011a, 2011b). Some minor modifications have been made to the historical calibration analysis as part of this study, which primarily deal with shifting the basis for precipitation from the Mission Dolores to the Lake Merced Pump Station precipitation gauges. These changes are documented in Attachment 10.1-H.

8.2. Simulation of the GSR and SFGW Projects

For the analysis of the Existing Conditions and the GSR and SFGW Projects (Scenarios 1, 2, 3a and 3b), the Lake-Level Model was based on the historical calibration analysis model but with modifications to the natural hydrology with new provisions to simulate other reasonably foreseeable future projects. The water-balance components that constitute the natural background hydrology, such as precipitation, groundwater inflow/outflow, evaporation, and transpiration, are the foundation for the Lake-Level Model. However, some modifications were necessary for the analysis of the GSR and SFGW Projects to account for potential future conditions rather than historical conditions. These modifications include:

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- The same 47.25-year rearranged hydrologic sequence that was used for the MODFLOW scenarios (see Section 6.3). The model inputs for the natural hydrology were based on the same historical data for the appropriate months in the sequence.
- Initial Lake Merced level is set to the measured June 2009 lake level of 14.32 feet (NGVD 29) or 5.7 feet (City Datum).
- The approach used for the groundwater inflow to and outflow from Lake Merced was changed to use the water balance values of groundwater inflow to and outflow from Lake Merced based on the corresponding scenario of the MODFLOW model. Using the MODFLOW water balance results is considered a more reliable approach because the proposed changes incorporate conditions, such as the in-lieu recharge from the GSR Project, that do not have a historical equivalent.

The Lake-Level Model results for Scenarios 1, 2, 3a and 3b are discussed in Attachment 10.1-G, and a composite hydrograph showing the Lake Merced water levels for these scenarios is shown in Figure 10.1-13.

8.3. Simulation of the Vista Grande Drainage Basin Improvements

For this analysis, the Vista Grande Drainage Basin Improvements project is considered a reasonably foreseeable future project as part of the Cumulative Scenario (Scenario 4). In addition to the conditions used in Scenarios 1, 2, 3a and 3b, Scenario 4 required additional modifications to accommodate the Vista Grande Drainage Basin Improvements project.

The primary component of the Vista Grande Drainage Basin Improvements project is the diversion of stormwater flows directly into Lake Merced. As discussed in Section 6.9.4, Scenario 4 incorporates the 75 cfs scenario of the Vista Grande Drainage Basin Improvements project. Below is a summary of how the various aspects of the Vista Grande Drainage Basin Improvements project are addressed in the Lake-Level Model.

Stormwater discharges into Lake Merced would occur when discharge rates in the Vista Grande Canal exceed 75 cfs, and the excess flows would be diverted into Lake Merced. These flows occur periodically in response to large storms, and were calculated as part of the Vista Grande Drainage Basin Alternatives Analysis based on historical precipitation data (Brown and Caldwell, 2010, Jacobs Associates, 2011a, 2011b). Stormwater flows (greater than 75 cfs) were calculated to occur in every year, and range from 19 to 681 afy with an average of 207 afy (Brown and Caldwell, 2010). These stormwater flows were input directly into the Lake-Level Model as an inflow to Lake Merced. The Lake-Level Model was modified to incorporate the flows provided by Brown and Caldwell, and these changes are included here.

The Lake Merced Alternative scenarios of the Vista Grande Drainage Basin Improvements project also include provisions for an engineered wetland and modification of the Lake Merced spillway (Brown and Caldwell, 2010). In the 75 cfs scenario, the average baseflow in the Vista Grande Canal is assumed to be diverted into an engineered wetland for treatment and then discharged to Lake Merced on an ongoing basis. Typical flows in the Vista Grande Canal, or

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baseflow, would be continuously diverted through an engineered wetland for treatment prior to discharge into Lake Merced. Baseflows have been estimated to range from 18 to 26 af per month (Kennedy/Jenks, 2009). These were also added to the Lake-Level Model.

The Lake-Level Model results for Scenario 4 are presented in Attachment 10.1-G, and a composite hydrograph showing the Lake Merced water levels for these scenarios is shown in Figure 10.1-13.

8.4. Strengths and Limitations of the Lake Merced Lake-Level Model

The primary strength of the Lake-Level Model is that it has a more realistic conceptualization of the lake than does the MODFLOW Lake Package, and has been calibrated to historical data (Attachment 10.1-H). The primary conceptualization strengths include the followings:

- The Lake-Level Model has a significantly stronger correlation to the measured Lake Merced lake levels than the MODFLOW model over the 1958 to 2009 model calibration period. The MODFLOW model has periods where the simulated lake levels differ from the measured data by 3 to 6 feet. The improved performance by the Lake-Level Model is attributed to more site-specific and detailed handling of the hydrologic conditions. The relative strengths of the Lake-Level Model compared to the MODFLOW model for simulating Lake Merced are discussed in more detail in Attachment 10.1-H.
- The Lake-Level Model uses the measured June 2009 lake level of 5.7 feet (City Datum) as the starting condition. The MODFLOW model needs to use the calibrated model lake level of 9.33 feet (City Datum) to maintain equilibrium and not create mass balance issues. Therefore, the Lake-Level Model is more consistent with the Existing Conditions.
- The Lake-Level Model has a mechanism to account for the loss of water over the spillway that is automatically invoked anytime the lake level reaches the spillway level.
- The Lake-Level Model uses measured lake levels whereas the MODFLOW model needs to use simulated lake levels from the Historical Simulation.
- Estimates of stormwater runoff from the surrounding areas are calculated more realistically, allowing for variability of land use and other factors.
- The physical characterization of the lake accounts for changing lake surface area with changing lake levels, which is not available in the MODFLOW Lake Package.
- Evapotranspiration is allowed to vary depending on temperature data, based on whether the month is above, near, or below average.

The primary limitation of the Lake-Level Model is that the groundwater-surface water interactions are based upon an assumption of overall groundwater conditions. This is addressed in the analysis for the GSR and SFGW Projects and for the Cumulative Scenario, by changing this assumption and replacing it with the MODFLOW-generated water balance results for inflows to and outflows from Lake Merced. This change provides a more realistic estimation of

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groundwater-surface water interactions, especially for the proposed GSR and SFGW Project scenarios that do not necessarily have a historical precedent.

In light of the modeling strengths listed above and the better performance of the Lake-Level Model in simulating lake levels, the Lake-Level Model is considered to be a more appropriate modeling approach and is the primary tool for evaluating the effects of the GSR and SFGW Projects and the Cumulative Scenario on Lake Merced.

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Figures

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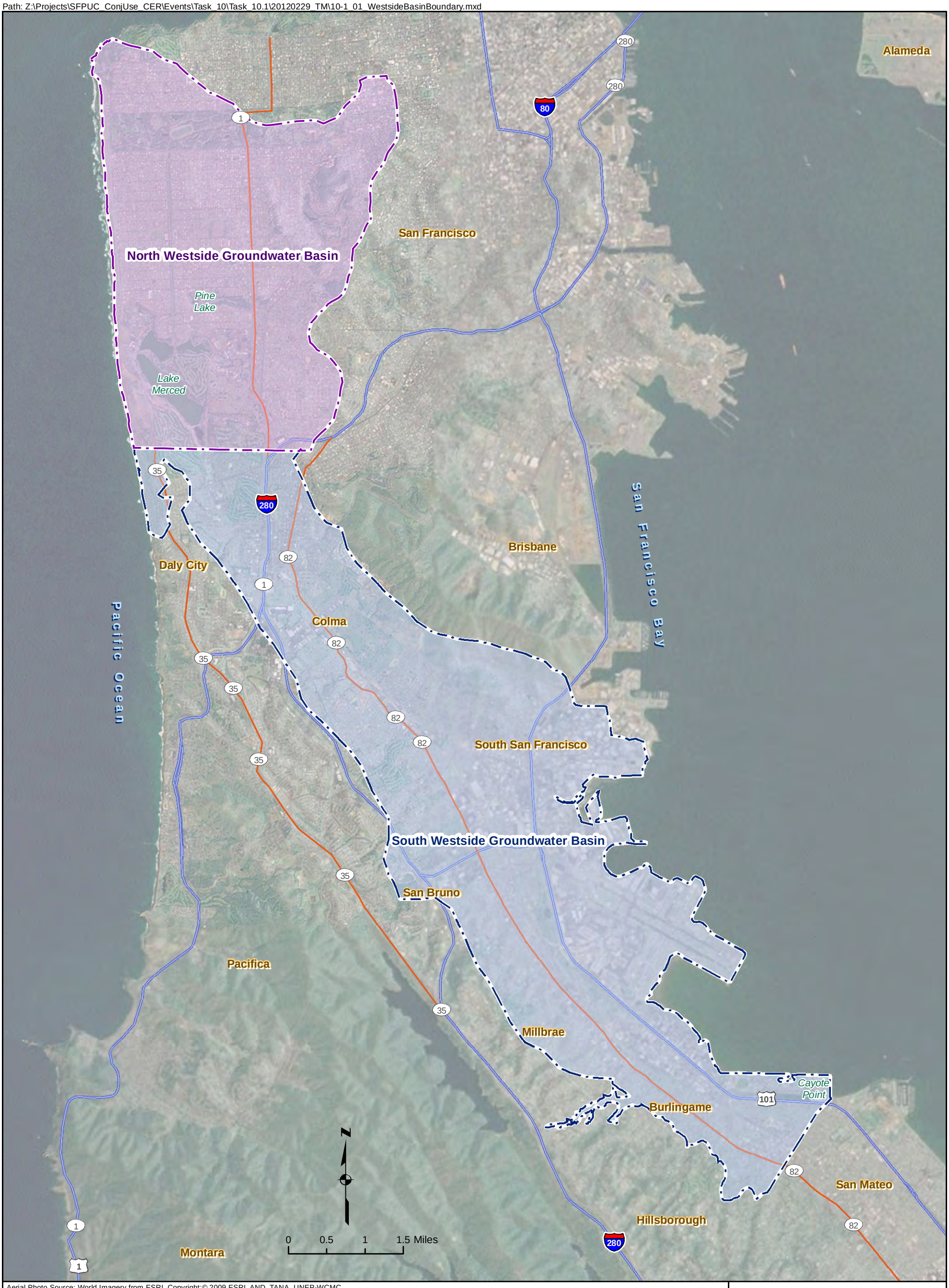

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CITY AND COUNTY OF SAN FRANCISCO
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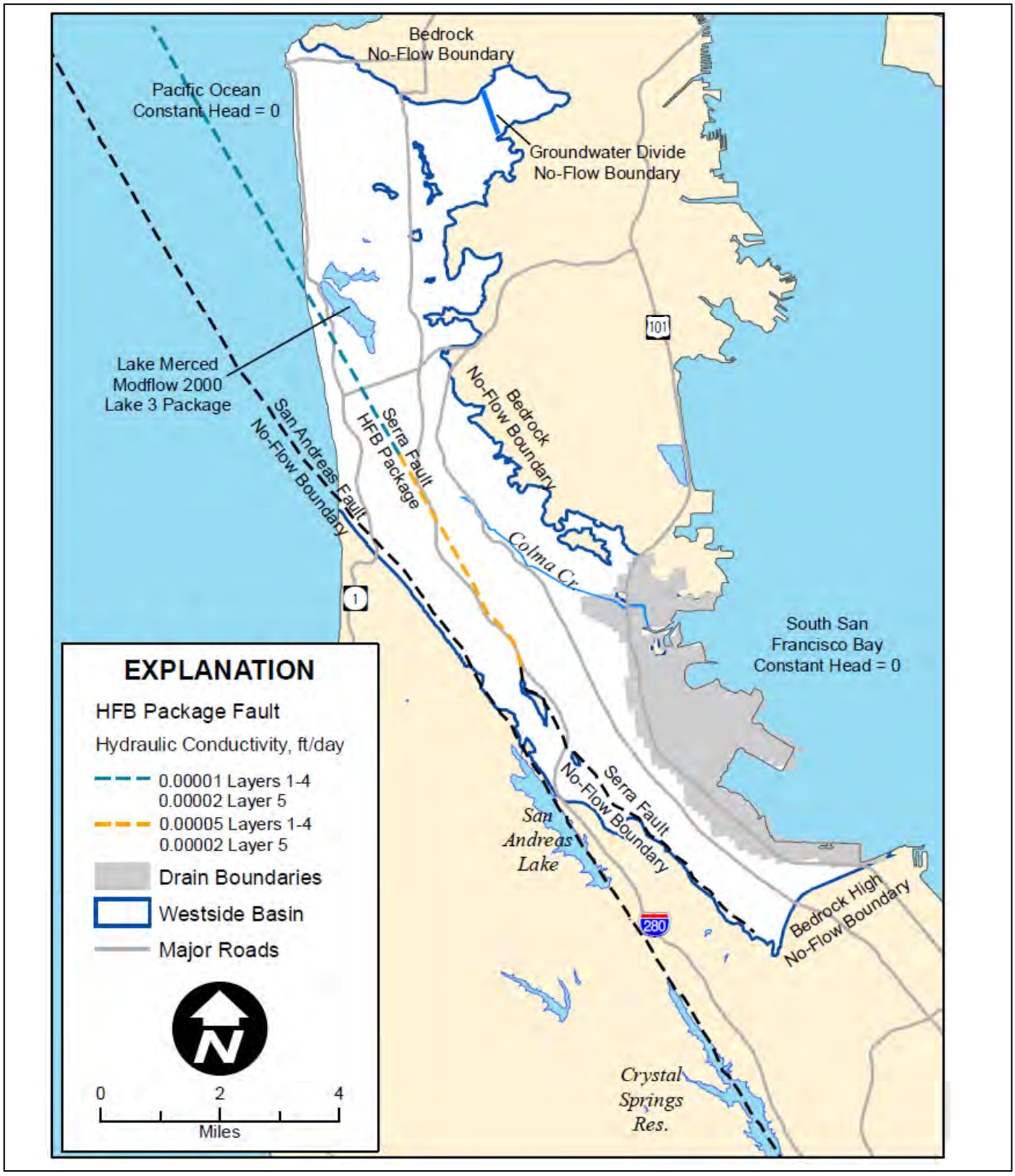
WESTSIDE GROUNDWATER BASIN BOUNDARY NORTH AND SOUTH WESTSIDE BASINS

Kennedy/Jenks Consultants 303 Second Street, Suite 300 South San Francisco, CA 94107	Figure **10.1-1**
Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project	Date April 2012



Source: Westside Basin Groundwater-Flow Model; Updated Model and 2008 No Project Simulation Results, HydroFocus, May 2011.

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San Francisco Public Utilities Commission

Westside Basin Groundwater-Flow Model Boundary

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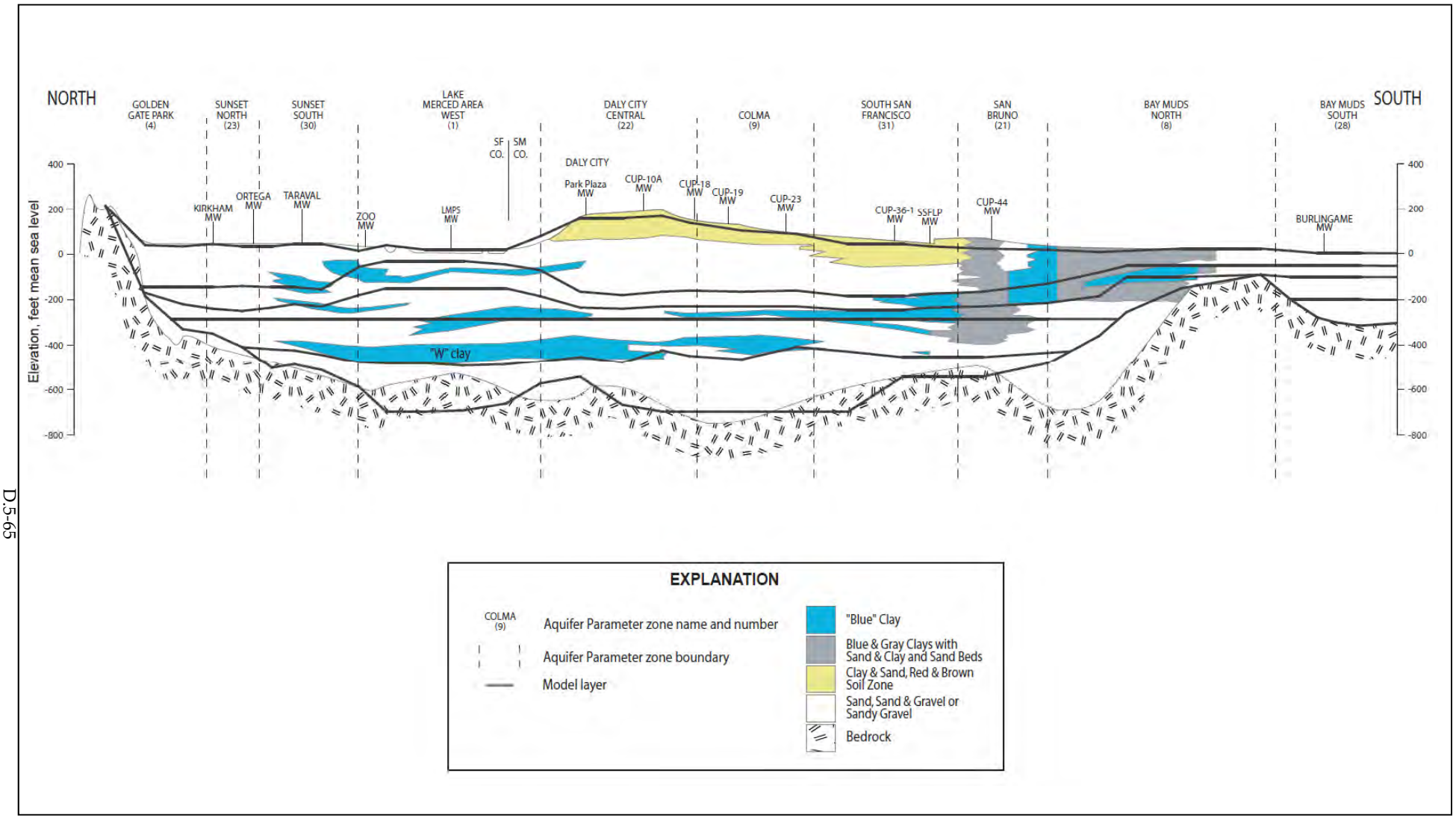
Figure 10.1-2



Source: Westside Basin Groundwater-Flow Model; Updated Model and 2008 No Project Simulation Results, HydroFocus, May 2011.
Note: Modification from North South Geologic Cross Section, Final Task 8B technical Memorandum No.1, Hydrologic Setting of the Westside Basin, LSCE, May 2010.

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Westside Basin Groundwater-Flow Model Layer Structure and Regional Subsurface Hydrogeology

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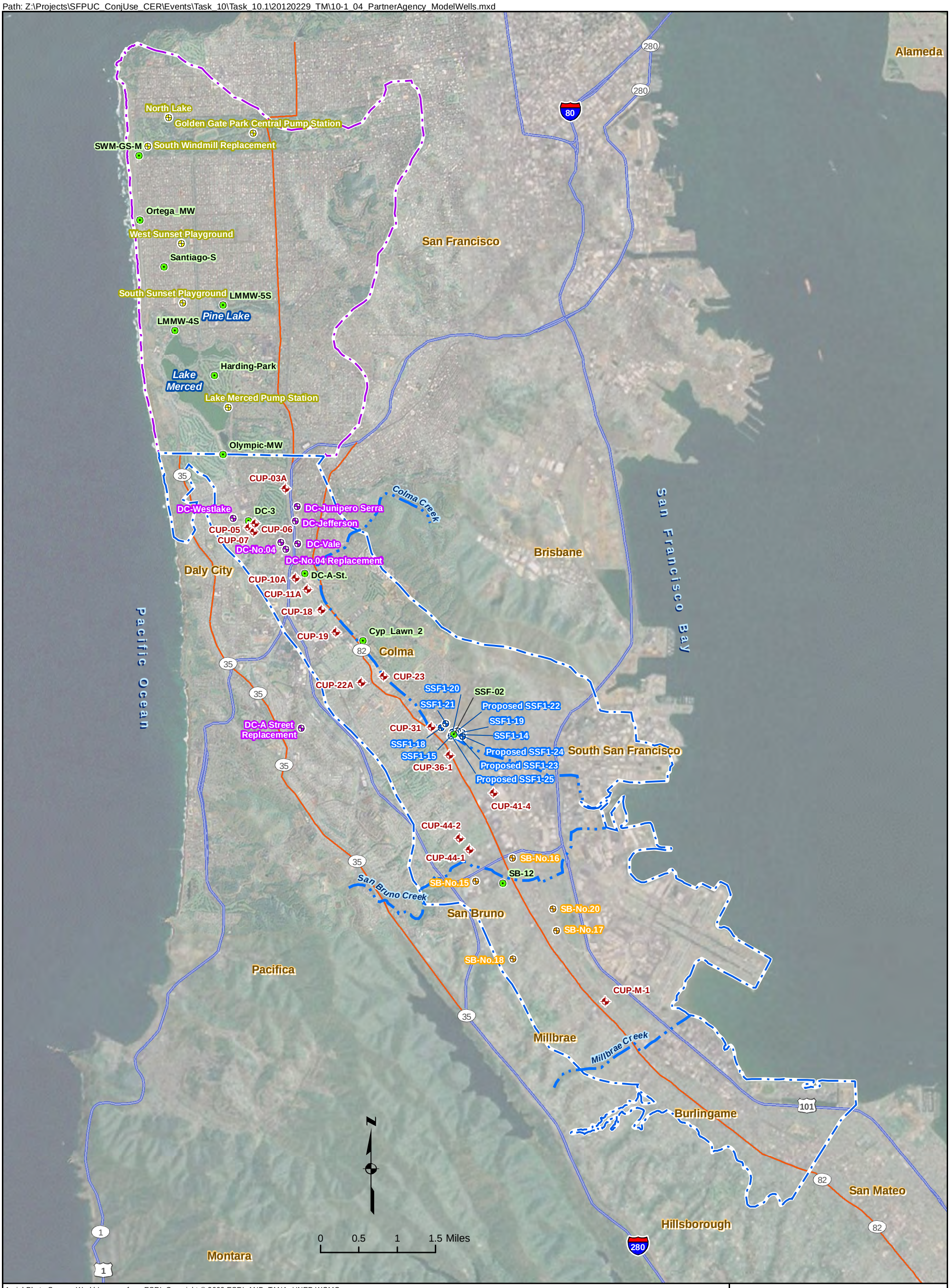
Figure 10.1-3

Path: Z:\Projects\SFPUC_ConjUse_CER\Events\Task_10\Task_10.1\20120229_TM\10-1_04_PartnerAgency_ModelWells.mxd



Aerial Photo Source: World Imagery from ESRI. Copyright:© 2009 ESRI, AND, TANA, UNEP-WCMC

Legend

- GSR Project Proposed Municipal Wells
- SFGW Project Proposed Municipal Wells
- Selected Representative Monitoring Wells
- Cal Water Municipal Wells
- Daly City Municipal Wells
- San Bruno Municipal Wells
- South Westside Groundwater Basin
- North Westside Groundwater Basin

CITY AND COUNTY OF SAN FRANCISCO
PUBLIC UTILITIES COMMISSION
ENGINEERING MANAGEMENT BUREAU

LOCATIONS OF PARTNER AGENCY WELLS, PROPOSED GSR AND SFGW PROJECT MUNICIPAL WELLS, AND SELECTED REPRESENTATIVE MONITORING WELLS WITH MODEL RESULTS

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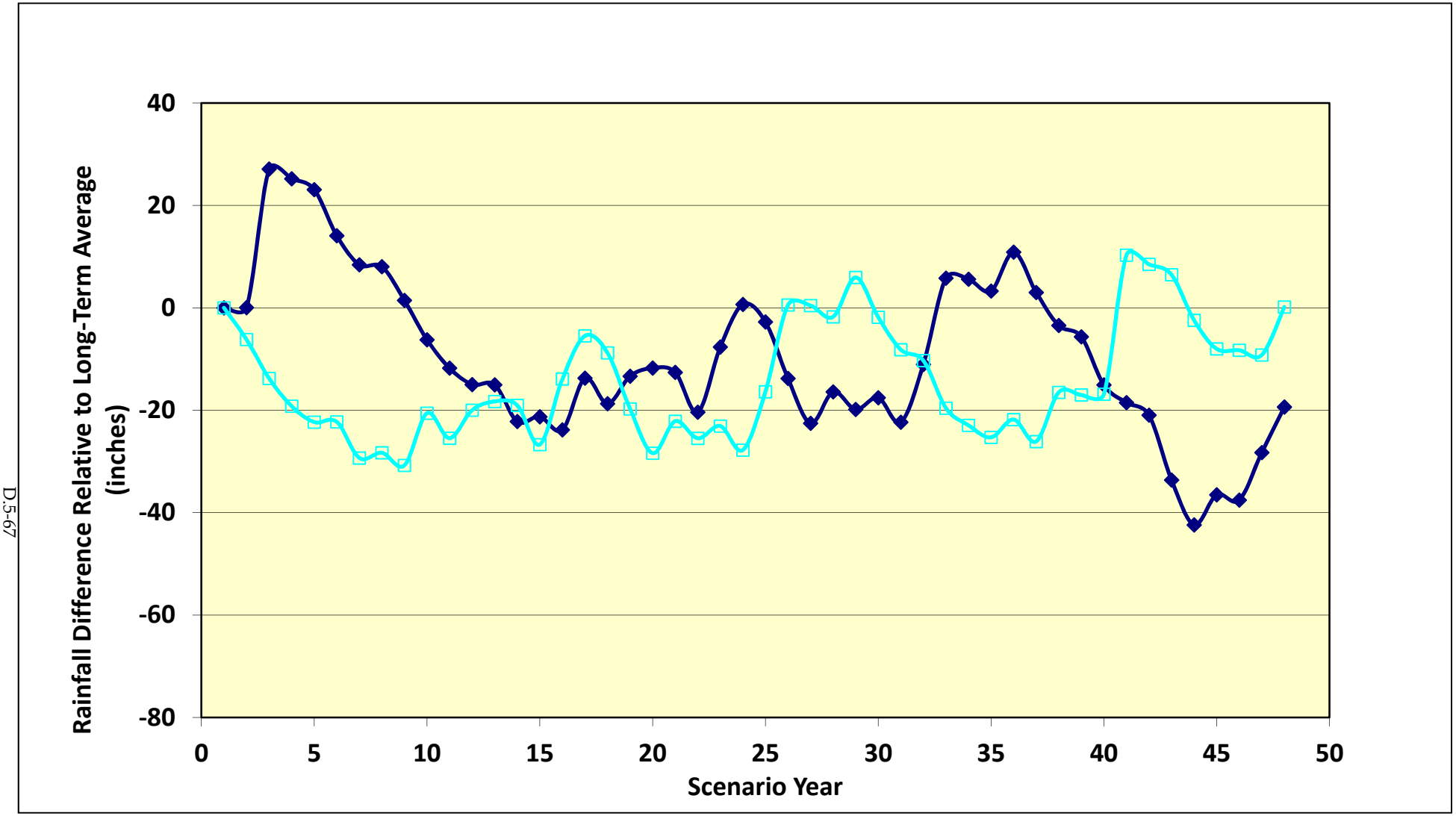
Regional Groundwater Storage and Recovery Project and San Francisco Groundwater Supply Project	Date April 2012



Cumulative Rainfall (inches):

Rearranged Hydrologic Sequence

Historical 1958 to 2005 Precipitation Data

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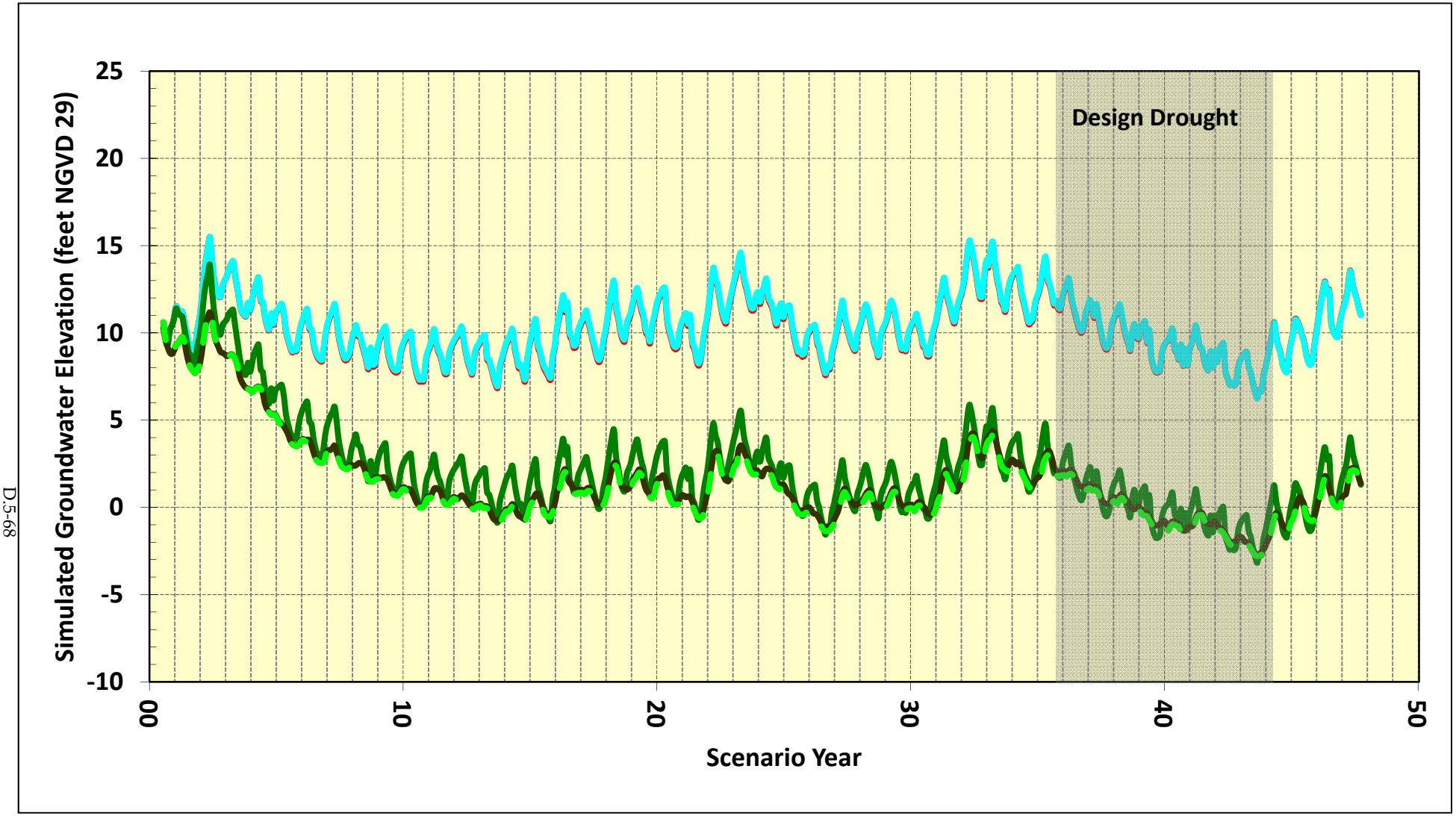
San Francisco Public Utilities Commission

Cumulative Rainfall Departure Curve Analysis for Historical and Rearranged Hydrological Sequence

K/J 0864001
April 2012
Figure 10.1-5



Model Heads:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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San Francisco Public Utilities Commission

Model-Simulated Groundwater Elevations at SWM-GS-M (Model Layer 1)

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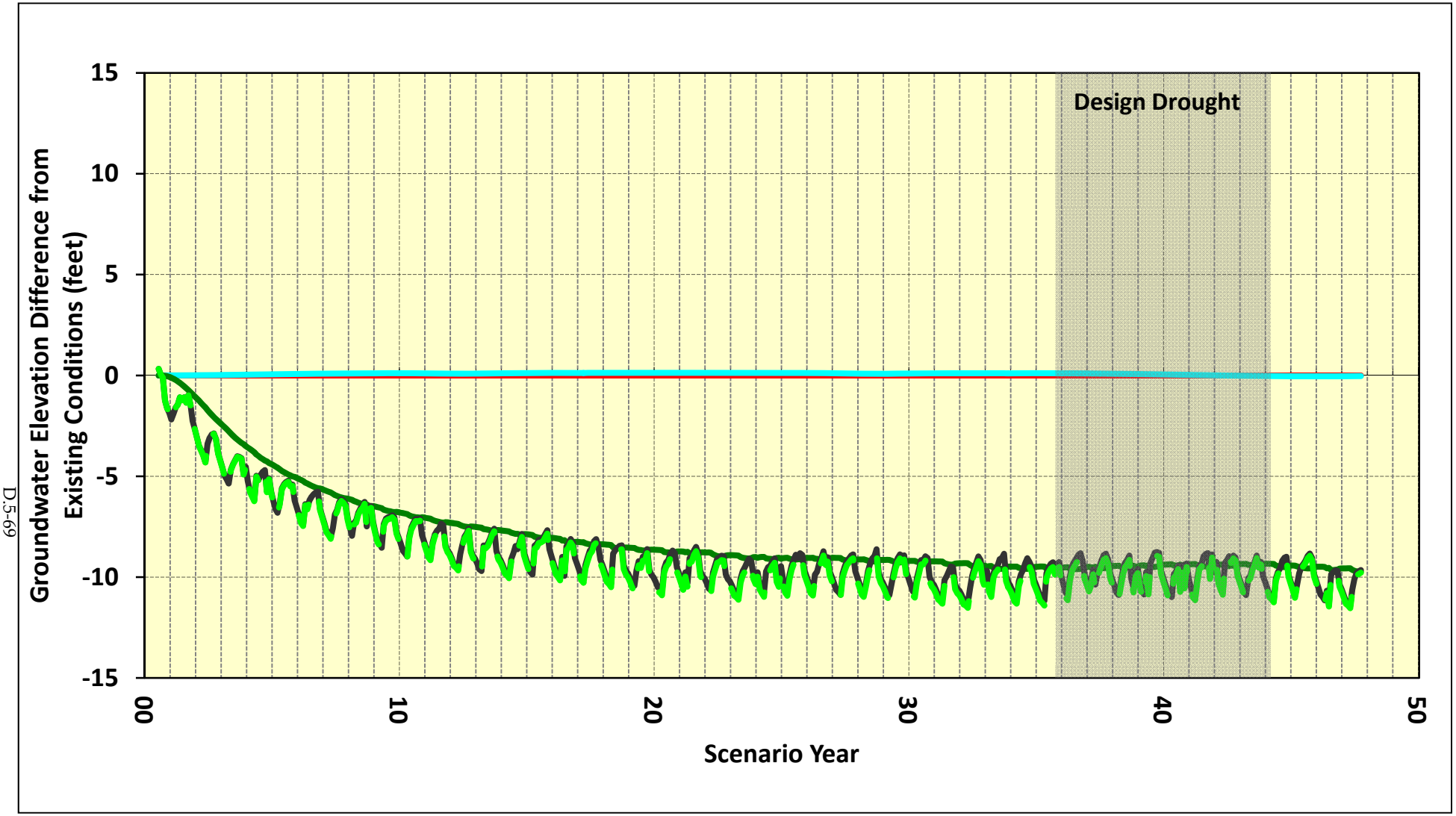
April 2012
Figure 10.1-6



Model Heads:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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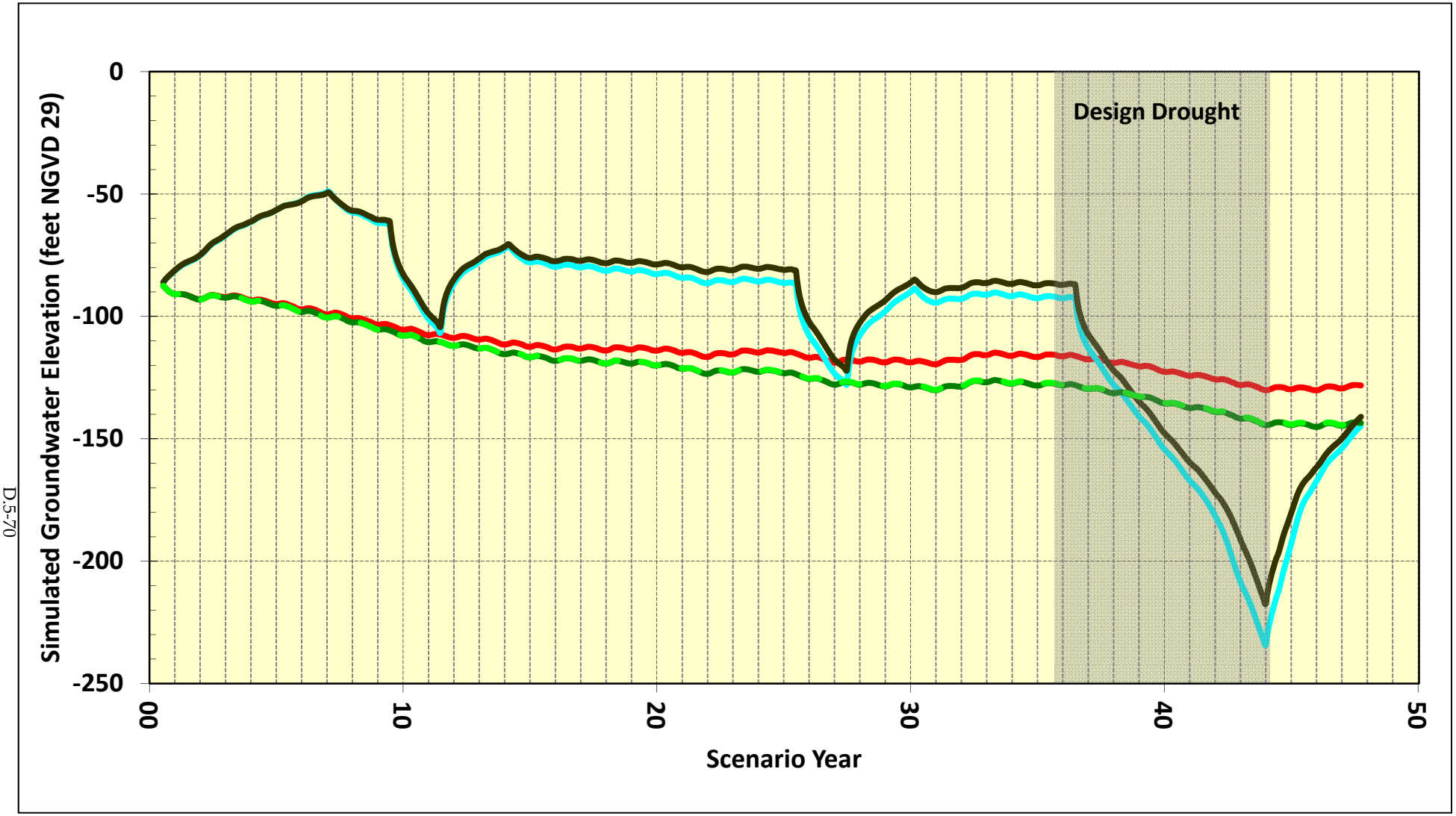
Model-Simulated Groundwater Elevations Relative to Existing Conditions at SWM-GS-M (Model Layer 1)

K/J 0864001
April 2012
Figure 10.1-7



Model Heads:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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Model-Simulated Groundwater Elevations at DC-A St (Model Layer 4)

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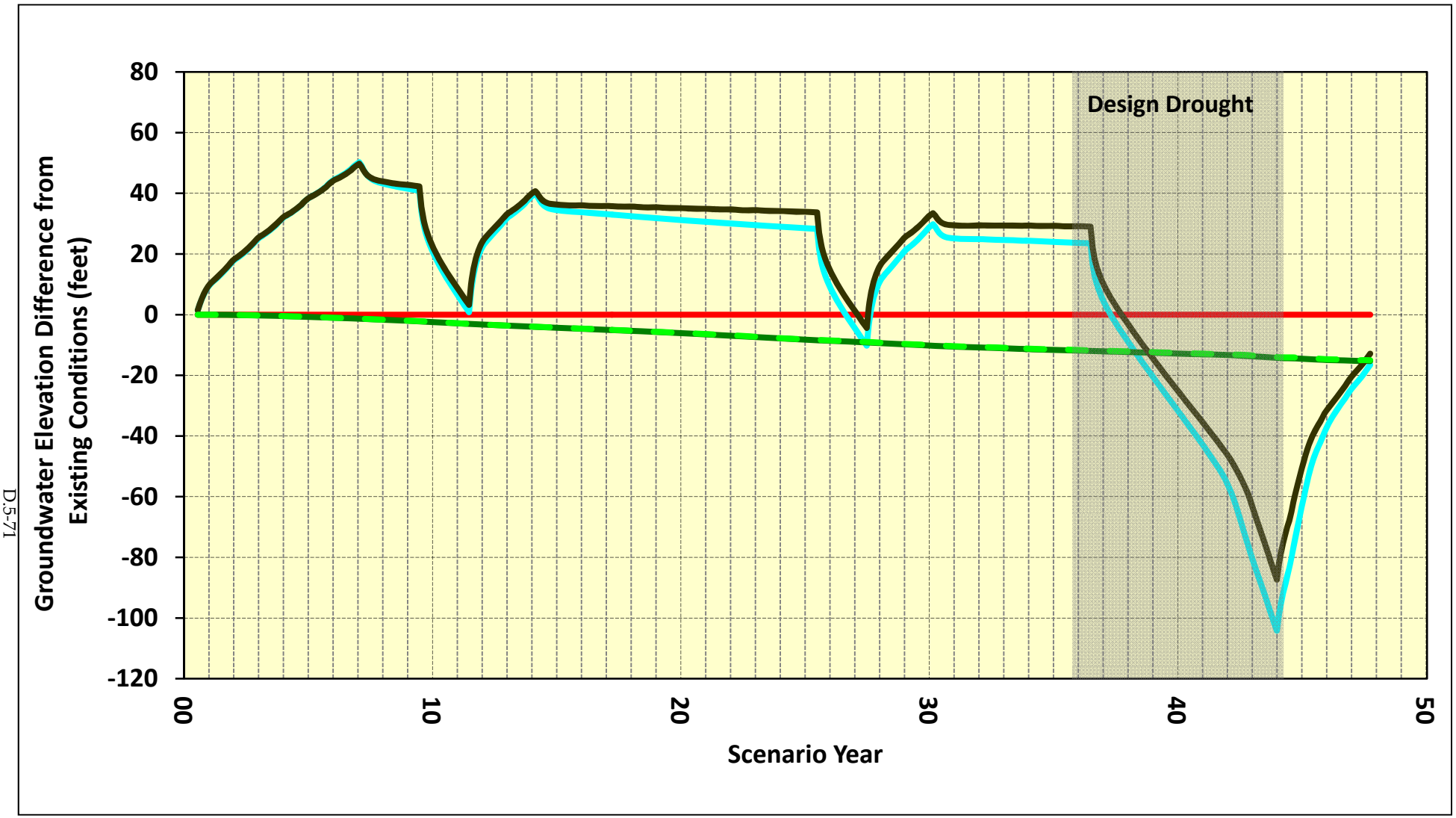
April 2012
Figure 10.1-8



Model Heads:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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Model-Simulated Groundwater Elevations Relative to Existing Conditions at DC-A St (Model Layer 4)

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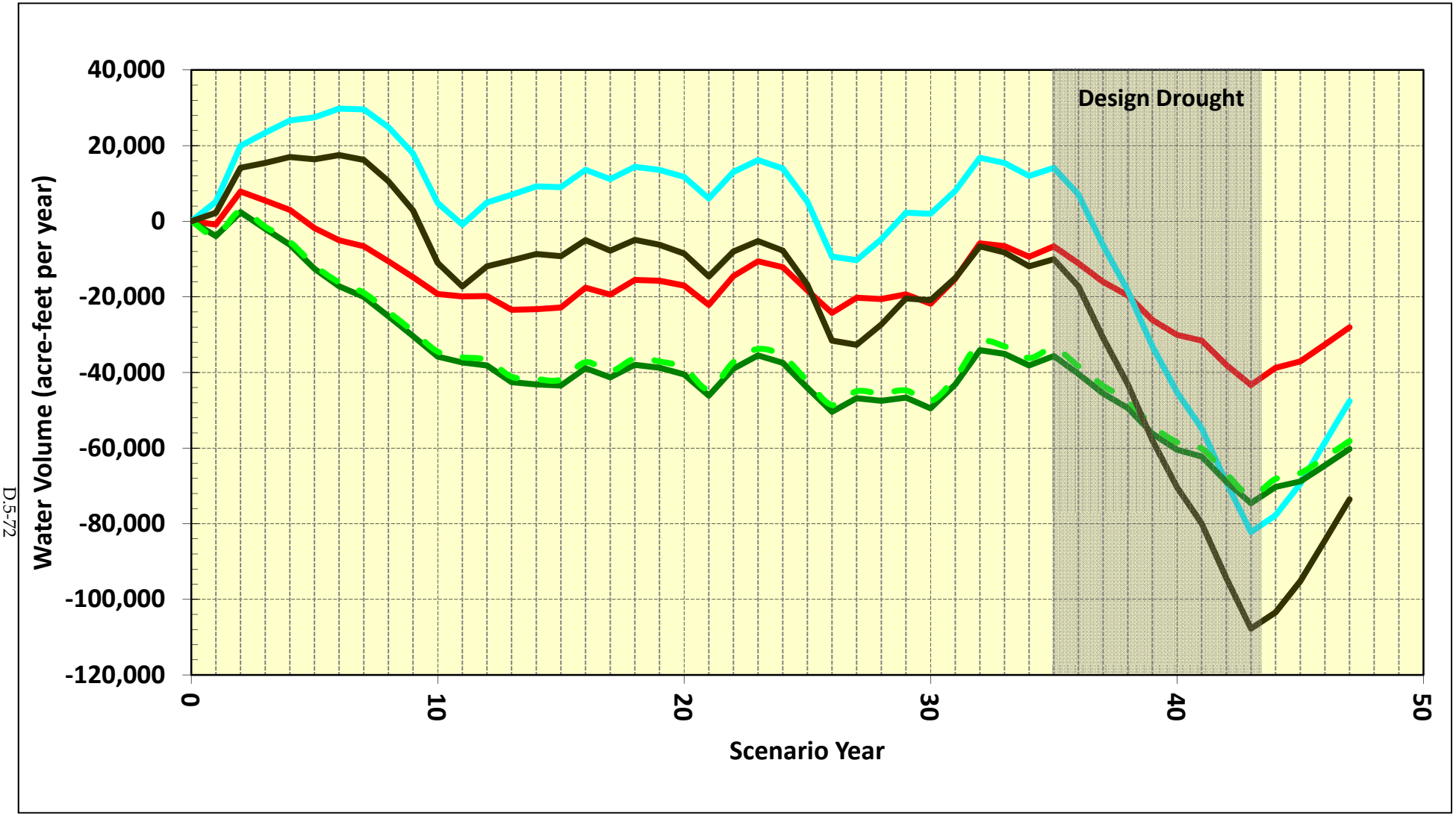
April 2012

Figure 10.1-9



Aggregate Storages:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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Model-Simulated Aggregate Change in Groundwater Storage

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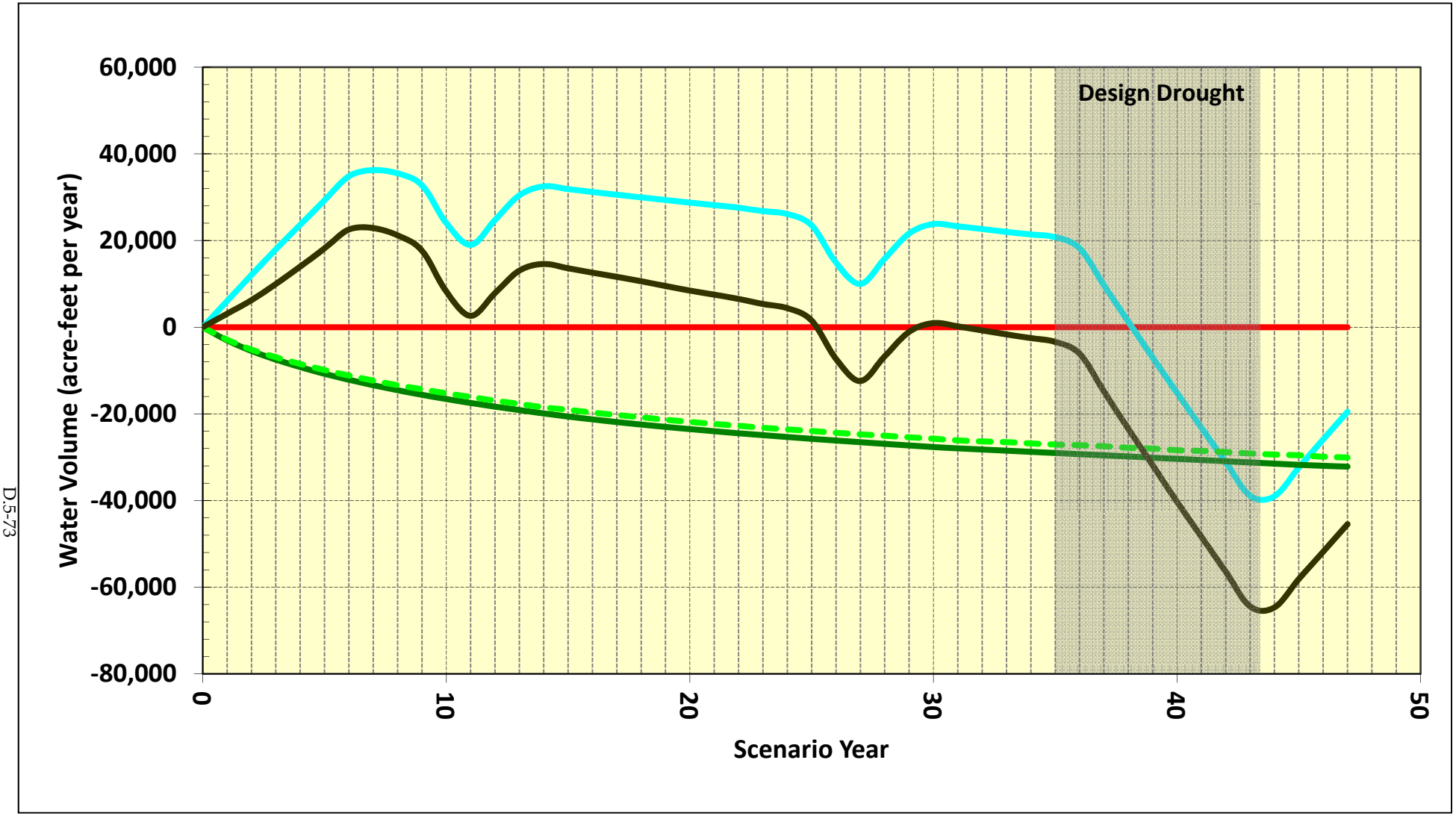
Figure 10.1-10



Aggregate Storages:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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Model-Simulated Aggregate Change in Groundwater Storage Relative to Existing Conditions

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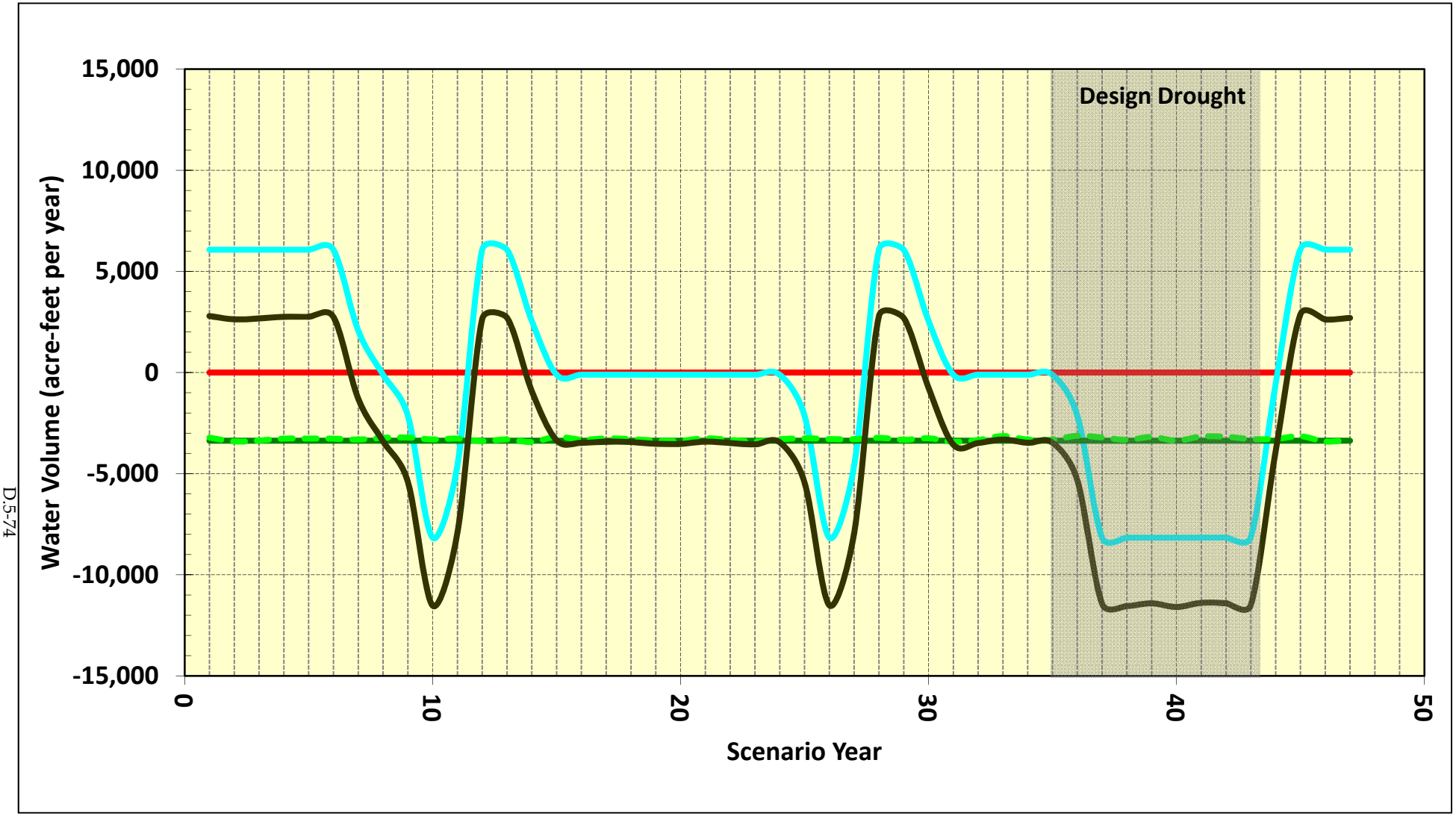
Figure 10.1-11



Pumping Relative to Existing Conditions:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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San Francisco Public Utilities Commission

Model-Simulated Net Change in Groundwater Pumping Relative to Existing Conditions

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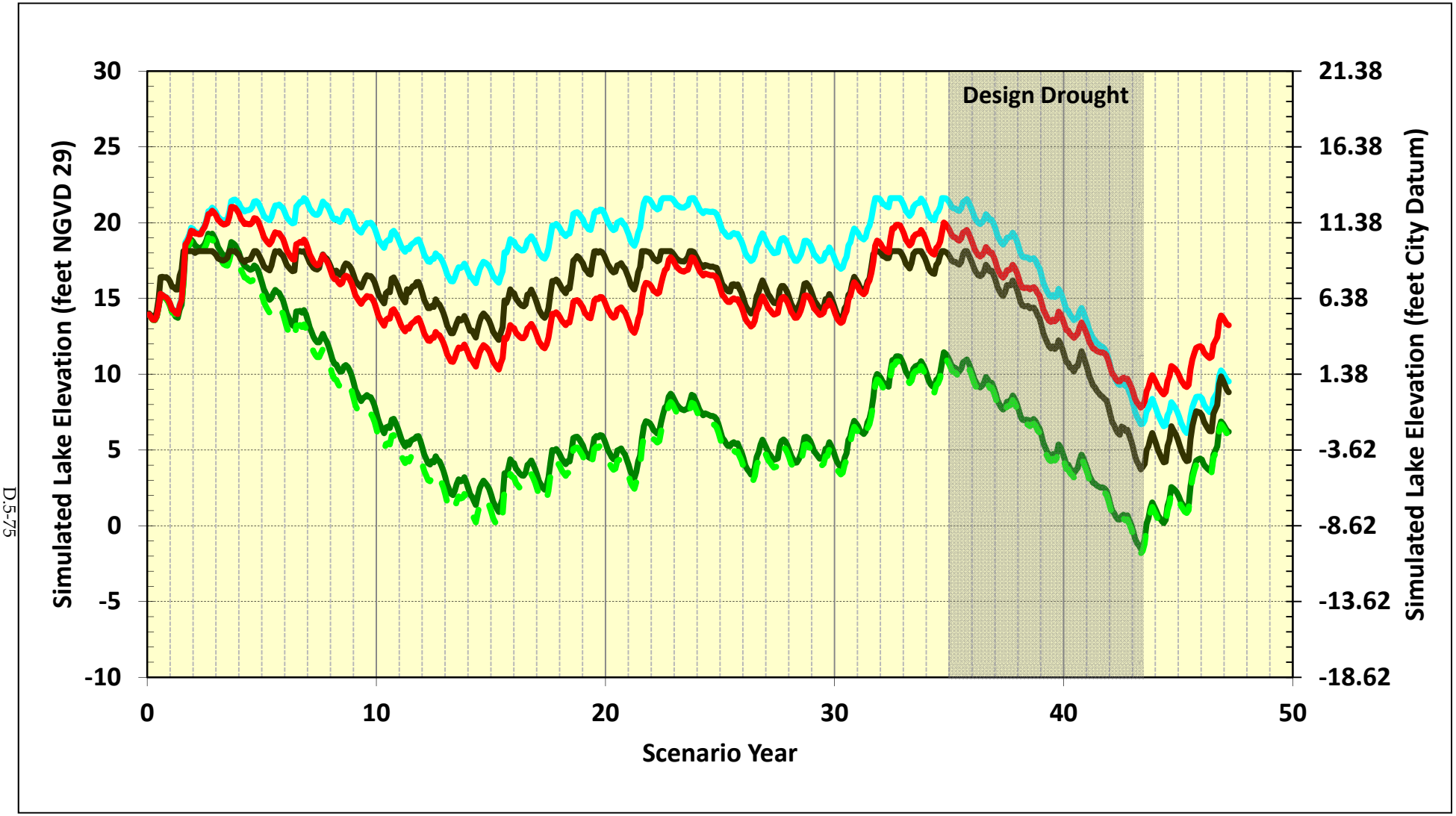
Figure 10.1-12



Model Lake Elevations:

Scenario 1 — Scenario 2 — Scenario 3a

Scenario 3b — Scenario 4

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Regional Groundwater Storage and Recovery Project
and San Francisco Groundwater Supply Project
San Francisco Public Utilities Commission

Model-Simulated Lake Merced Lake Elevations Based on Lake Merced Lake-Level Model

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Figure 10.1-13

Tables

Table 10.1-1: Summary of Model Scenario Descriptions

Ref No.	Assumption	Scenario 1 - Existing Conditions	Scenario 2 - GSR	Scenario 3a/3b - SFGW	Scenario 4 - Cumulative
1	Source Model	2008 No-Project Scenario (HydroFocus, May 2011, ver. 3.1) was used as the basis with changes made for Scenario 1, as listed below.	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
2	Hydrology	Use the following sequence of historical hydrology provided by SFPUC (personal comm. between David Cameron and Michael Maley, 2011). Total model Scenario duration is 47 years and 3 months, constructed as follows: - Jul 1996 to Sep 2003 - Oct 1958 to Nov 1992 - Dec 1975 to Jun 1978 (to form the last two years of the Design Drought) - Jul 2003 to Sept 2006 (recovery period after the Design Drought)	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
3	Initial Groundwater Conditions	Model simulated June 2009 groundwater levels from the HydroFocus Historical Model (May 2011, ver. 3.1). This is selected because the available field measured groundwater elevation data for June 2009 were too sparse to construct adequate new groundwater elevation maps of sufficient detail necessary for assigning initial model conditions to all model layers and model cells. Therefore, an approximation method was developed that used the model to generate the initial groundwater elevations.	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
4	Initial Lake Merced Conditions	Model simulated June 2009 Lake Merced levels (17.95 ft NGVD 1929 or 9.33 ft City Datum at South, North, and Impound Lakes) from the HydroFocus Historical Simulation (May 2011, ver. 3.1). The reason SFPUC is proposing to use the simulated rather than measured (observed) Lake Merced water level is because this change will improve the model performance. Specifically, the use of simulated starting conditions will ensure that the model is in equilibrium. It is appropriate to use simulated starting conditions because the intent of the Model is to evaluate relative change and trends (rather than absolute changes and trends).	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
5	Lake Merced Lake Package	Lake package was revised consistent with the revised hydrological sequence; No stormwater inputs.	Same as Scenario 1	Same as Scenario 1	Lake package was revised consistent with the new hydrological sequence. The groundwater models use the Daly City proposed scenario "75 cfs Scenario with Completed Wetlands" (which includes wetlands and a spillway at 9.5 feet City Datum).
6	Recharge Package	Soil Moisture Budget (SMB) and recharge package were revised consistent with the revised hydrological sequence.	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
7	Partner Agency Total Pumping	6.84 mgd total pumping, based on the median of each agency pumping from 1959-2009. Pumping distributed among individual wells based on HydroFocus 2008 No-Project Scenario. - Daly City: 3.78 mgd - San Bruno: 1.88 mgd - Cal Water: 1.18 mgd	6.9 mgd total pumping - the amount of pumping determined to result in no appreciable storage change in the South Westside Basin (HydroFocus, 2011). - Daly City: 3.43 mgd - San Bruno: 2.10 mgd - Cal Water: 1.37 mgd	Same as Scenario 1 - 6.84 mgd total pumping	Same as Scenario 2 - 6.9 mgd total pumping
8	Daly City Municipal Wells	Daly City Jefferson Daly City Vale Daly City Westlake Daly City Junipero Serra Daly City No.4	Daly City Jefferson Daly City Vale Daly City Westlake Daly City Junipero Serra Daly City No.4	Daly City Jefferson Daly City Vale Daly City Westlake Daly City Junipero Serra Daly City No.4	Daly City Jefferson Daly City Vale Daly City Westlake Daly City Junipero Serra Daly City No.4 Replacement Daly City A Street Replacement
9	Cal Water Municipal Wells	SSF1-14 SSF1-15 SSF 1-17 (inactive) SSF1-18 SSF1-19 SSF1-20 SSF1-21 SSF1-22 SSF1-23	SSF1-15 SSF1-19 SSF1-20 SSF1-21 SSF1-22 SSF1-23	SSF1-14 SSF1-15 SSF 1-17 (inactive) SSF1-18 SSF1-19 SSF1-20 SSF1-21 SSF1-22 SSF1-23	SSF1-20 SSF1-21 SSF1-22 SSF1-23 SSF1-24 SSF1-25
10	San Bruno Municipal Wells	San Bruno No.15 San Bruno No.16 San Bruno No.17 San Bruno No.18 San Bruno No.20	San Bruno No.15 San Bruno No.16 San Bruno No.17 San Bruno No.18 San Bruno No.20	San Bruno No.15 San Bruno No.16 San Bruno No.17 San Bruno No.18 San Bruno No.20	San Bruno No.15 San Bruno No.16 San Bruno No.17 San Bruno No.18 San Bruno No.20
11	Irrigation pumping except changes noted below from Ref No. 12 through 17.	SMB was revised and irrigation pumping rates updated as necessary based on the results of the SMB, except for specific values noted in Ref No. 12 through 17 below.	Same as Scenario 1	Same as Scenario 1, except changes noted below (see the GGP irrigation [Ref. No. 12] and Stern Grove well pumping [Ref. No. 16]).	Same as Scenario 1, except changes noted below (see the GGP irrigation [Ref. No. 12] and Holy Cross irrigation [Ref. No. 17]).
12	Golden Gate Park (GGP) irrigation wells - Elk Glen, South Windmill, and North Lake	Modified irrigation pumping, based on 2008 metered data, provided by SFPUC (personal comm. between Jeff Gilman and Sevim Onsoy, 2011). Total pumping of 1.14 mgd (or 1,279 afy). - Elk Glen: 0.081 mgd (91 afy) - South Windmill: 0.498 mgd (558 afy) - North Lake: 0.563 mgd (631 afy)	Same as Scenario 1	Scenario 3a assumes same pumping assumptions as Scenario 1; Scenario 3b assumes no irrigation pumping from the three GGP wells.	Assumes no irrigation pumping from the three GGP wells.
13	California Golf No. 02	Revised irrigation pumping from 198 afy to 215 afy (from 0.18 mgd to 0.19 mgd), based on pumping rates provided verbally by the California Golf Club (personal comm. between Rick Kavakoff and Pete Leffler,2009).	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
14	Edgewood Development Center	Revised irrigation pumping from 8 afy to 10 afy (from 0.007 mgd to 0.009 mgd), based on pumping rates provided by SFPUC (personal comm. between Jeff Gilman and Sevim Onsoy, 2009).	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
15	Zoo. No.5	Revised from 447 to 360 afy (from 0.399 mgd to 0.321 mgd), based on average of 2005 - 2009, based on inputs provided by SFPUC (personal comm. between Jeff Gilman and Sevim Onsoy, 2011).	Same as Scenario 1	Same as Scenario 1	Same as Scenario 1
16	Stern Grove Well	Reduced pumping from 47 afy to 4.8 afy (from 0.042 mgd to 0.0043 mgd) for this well to account for the new information available about the use of this well as a supplemental water source for Pine Lake, based on inputs provided by SFPUC (personal comm. between Jeff Gilman and Sevim Onsoy, 2010).	Same as Scenario 1	Pumping reduced from 47 afy to 13.6 afy (from 0.042 mgd to 0.012 mgd) for Scenario 3a, which is 8.8 acre-feet more than under Scenario 1. Similarly, pumping reduced from 47 afy to 14.8 afy (from 0.042 mgd to 0.013 mgd) for Scenario 3b, which is 10 acre-feet more than under Scenario 1. These pumping values are based on the supplemental water needed to maintain the water level in Pine Lake at 31.5 feet (City Datum), as discussed in the CDM report (January, 2011).	Same as Scenario 3b
17	Holy Cross	Irrigation pumping rates are based on the results of the revised SMB. The resulting annual average pumping is 0.19 mgd (212 afy).	Same as Scenario 1	Same as Scenario 1	Additional pumping of 45 afy (0.04 mgd) estimated based on the future projected buildout (personal comm. between Roger Appleby and Pete Leffler, 2010).

Key:
afy - acre-feet per year
SMB - Soil Moisture Budget
GGP - Golden Gate Park
GSR - Regional Groundwater Storage and Recovery
mgd - million gallons per day
SFGW - San Francisco Groundwater Supply

Table 10.1-2: Summary of Model Scenario Pumping Assumptions

Model Scenarios		Scenario 1 Existing Conditions	Scenario 2 GSR	Scenario 3a SFGW	Scenario 3b SFGW	Scenario 4 Cumulative
Establish Initial Conditions		Hydrologic Sequence	Hydrologic Sequence	Hydrologic Sequence	Hydrologic Sequence	Hydrologic Sequence
June 2009 Condition		√	√	√	√	√
Model Scenario Simulation Period						
47.25 years (including Design Drought) Hydrologic Sequence: July 1996 to September 2003 -> October 1958 to November 1992 -> December 1975 to June 1978 -> July 2003 - September 2006			√	√	√	√
Pumping Assumptions for Municipal Use						
PA Municipal Wells (mgd)						
"Take" Periods		6.84	6.90	6.84	6.84	6.90
"Put" Periods		6.84	1.38	6.84	6.84	1.38
"Hold" Periods		6.84	6.90	6.84	6.84	6.90
GSR Project Proposed Municipal Wells (mgd)						
"Take" Periods		0.0	7.23	0.0	0.0	7.23
"Put" Periods		0.0	0.04	0.0	0.0	0.04
"Hold" Periods		0.0	0.04	0.0	0.0	0.04
SFGW Project Proposed Municipal Wells (mgd)						
Year-Round Pumping		0.0	0.0	3.0	4.0	4.0
Total Municipal Pumping (PA + GSR + SFGW)						
"Take" Periods		***6.84***	***14.13***	***9.84***	***10.84***	***18.13***
"Put" Periods		***6.84***	***1.42***	***9.84***	***10.84***	***5.42***
"Hold" Periods		***6.84***	***6.94***	***9.84***	***10.84***	***10.94***
Irrigation and Other Non-Potable Pumping Assumptions (mgd)[1]						
Golden Gate Park	Elk Glen (GGP)	0.081	0.081	0.081	0.000	0.000
	South Windmill (GGP)	0.498	0.498	0.498	0.000	0.000
	North Lake (GGP)	0.563	0.563	0.563	0.000	0.000
	Sub-Total	***1.142***	***1.142***	***1.142***	***0.000***	***0.000***
Golf Courses	Burlingame Golf Club	0.150	0.150	0.150	0.150	0.150
	California Golf No. 02	0.192	0.192	0.192	0.192	0.192
	Green Hills No. 05	0.099	0.099	0.099	0.099	0.099
	Lake Merced Golf No. 01	0.004	0.004	0.004	0.004	0.004
	Lake Merced Golf No. 02	0.004	0.004	0.004	0.004	0.004
	Lake Merced Golf No. 03	0.010	0.010	0.010	0.010	0.010
	Olympic Club No. 09[2]	0.002	0.002	0.002	0.002	0.002
	SF Golf West	0.035	0.035	0.035	0.035	0.035
	Sub-Total	***0.495***	***0.495***	***0.495***	***0.495***	***0.495***
Cemeteries	Cypress Lawn No. 02	0.020	0.020	0.020	0.020	0.020
	Cypress Lawn No. 03	0.144	0.144	0.144	0.144	0.144
	Eternal Home	0.013	0.013	0.013	0.013	0.013
	Hills of Eternity No. 02	0.020	0.020	0.020	0.020	0.020
	Holy Cross No. 03[3]	0.190	0.190	0.190	0.190	0.230
	Home of Peace No. 02	0.039	0.039	0.039	0.039	0.039
	Italian Cemetery	0.033	0.033	0.033	0.033	0.033
	Olivet	0.098	0.098	0.098	0.098	0.098
	Woodlawn No. 02	0.085	0.085	0.085	0.085	0.085
	Sub-Total	***0.641***	***0.641***	***0.641***	***0.641***	***0.681***
Other	Hillsborough Residents No. 1-12	0.291	0.291	0.291	0.291	0.291
	Edgewood Development Ctr.	0.009	0.009	0.009	0.009	0.009
	Zoo No.05	0.321	0.321	0.321	0.321	0.321
	Stern Grove	0.004	0.004	0.012	0.013	0.013
	Sub-Total	***0.626***	***0.626***	***0.634***	***0.635***	***0.635***
Total Irrigation and Other Non-Potable Pumping		***2.90***	***2.90***	***2.91***	***1.77***	***1.81***

Key:
afy - acre-feet per year
mgd - million gallons per day
PA - Partner Agencies
GGP - Golden Gate Park
GSR - Regional Groundwater Storage and Recovery
SFGW - San Francisco Groundwater Supply
SFPUC - San Francisco Public Utilities Commission

Notes:
(1) Pumping wells that are listed identify the wells in the model scenarios whose pumping assumptions were modified compared to the 2008 No-Project Scenario by HydroFocus (May, 2011, ver. 3.1), as a result of revised Soil Moisture Budget (SMB). Pumping rates for the three wells in the GGP, California Golf No. 02, Edgewood Development Center, Zoo No. 05, and Stern Grove wells were further modified compared to the results of revised SMB.
(2) Olympic Club No. 09 values include pumping for both Olympic Golf Club wells.
(3) Holy Cross No. 3 well irrigation pumping for Scenarios 1, 2, 3a, and 3b is based on the results of revised SMB. Based on the projected future build-out at the Holy Cross cemetery, an additional pumping of 0.04 mgd (45 afy) was estimated to occur under Scenario 4 (Cumulative).

Table 10.1-3: Regional Groundwater Storage and Recovery Project Proposed Municipal Wells

Well No.	Well Site	NOP Well Site[1]	Location	Estimated Pumping Capacity (gpm)[2]
1	CUP-3A	1	Daly City	400
2	CUP-5	3	Daly City	300
3	CUP-6	2	Daly City	300
4	CUP-7	4	Daly City	300
5	CUP-10A	5	Daly City	400
6	CUP-11A	6	Daly City	400
7	CUP-18	7	Colma	400
8	CUP-19	8	Colma	400
9	CUP-22A	10	South San Francisco	330
10	CUP-23	9	South San Francisco	330
11	CUP-31	11	South San Francisco	220
12	CUP-36-1	12	South San Francisco	220
13	CUP-41-4	13	South San Francisco	220
14	CUP-44-1	15	San Bruno	330
15	CUP-44-2	14	San Bruno	330
16	CUP-M-1	16	Millbrae	160

Key:
gpm - gallons per minute
NOP - Notice of Preparation

Notes:
(1) NOP of the EIR for the Regional Groundwater Storage and Recovery Project dated June 24, 2009.
(2) Estimated pumping capacities based on the Final Conceptual Engineering Report prepared for the Regional Groundwater Storage and Recovery Project (MWH, 2008).

Table 10.1-4: Partner Agency Municipal Pumping Wells

Location	Well Name	Note
Daly City Municipal Wells		
Daly City	Daly City Jefferson	Existing
Daly City	Daly City Vale	Existing
Daly City	Daly City Westlake	Existing
Daly City	Daly City Junipero Serra	Existing
Daly City	Daly City No. 4	Existing
Daly City	Daly City No. 4 Replacement	Proposed Replacement
Daly City	Daly City A Street Replacement	Proposed Replacement
Cal Water Municipal Wells		
South San Francisco	SSF1-14	Existing
South San Francisco	SSF1-15	Existing
South San Francisco	SSF1-17 (inactive)	Existing
South San Francisco	SSF1-18	Existing
South San Francisco	SSF1-19	Existing
South San Francisco	SSF1-20	Existing
South San Francisco	SSF1-21	Existing
South San Francisco	SSF1-22	Proposed
South San Francisco	SSF1-23	Proposed
South San Francisco	SSF1-24 (redundant)	Proposed
South San Francisco	SSF1-25 (redundant)	Proposed
San Bruno Municipal Wells		
San Bruno	San Bruno No. 15	Existing
San Bruno	San Bruno No. 16	Existing
San Bruno	San Bruno No. 17	Existing
San Bruno	San Bruno No. 18	Existing
San Bruno	San Bruno No. 20	Existing

Table 10.1-5: SFPUC Supplemental Surface Water Deliveries

Date	Cal Water (af)	Daly City (afy)	San Bruno (af)
October-2002	0.0	189.2	0.0
November-2002	0.0	241.5	0.0
December-2002	0.0	250.2	0.0
January-2003	0.0	258.5	72.1
February-2003	77.9	225.7	183.6
March-2003	86.3	248.7	203.3
April-2003	83.5	240.9	196.7
May-2003	86.3	248.3	203.3
June-2003	83.5	240.7	196.7
July-2003	86.3	248.2	203.3
August-2003	86.3	248.9	198.1
September-2003	83.5	239.7	196.7
October-2003	86.3	250.9	190.2
November-2003	41.7	0.0	24.2
December-2003	0.0	0.0	0.0
January-2004	0.0	0.0	0.0
February-2004	0.0	0.0	0.0
March-2004	0.0	0.0	0.0
April-2004	86.3	250.9	150.8
May-2004	83.5	259.2	203.3
June-2004	86.3	280.2	144.3
July-2004	83.5	289.8	203.3
August-2004	86.3	291.4	203.3
September-2004	86.3	282.6	196.7
October-2004	83.5	324.6	203.3
November-2004	86.3	267.0	196.7
December-2004	83.5	286.8	203.3
January-2005	86.3	0.0	203.3
February-2005	86.3	251.6	137.7
March-2005	77.9	285.7	0.0
April-2005	86.3	252.4	0.0
May-2005	83.5	285.8	0.0
June-2005	86.3	276.3	0.0
July-2005	83.5	286.6	0.0
August-2005	86.3	287.4	0.0
September-2005	86.3	278.8	0.0
October-2005	83.5	288.0	0.0
November-2005	86.3	280.1	0.0
December-2005	83.5	297.7	0.0
January-2006	86.3	286.7	0.0
February-2006	86.3	261.4	0.0
March-2006	77.9	289.2	0.0
April-2006	86.3	277.9	0.0
May-2006	83.5	0.0	0.0
June-2006	86.3	0.0	0.0
July-2006	83.5	318.4	0.0
August-2006	86.3	264.9	0.0
September-2006	86.3	259.2	0.0
October-2006	83.5	264.9	0.0
November-2006	86.3	275.4	0.0
December-2006	83.5	286.0	0.0
January-2007	86.3	284.9	0.0
February-2007	0.0	250.7	0.0
March-2007	0.0	251.8	0.0
April-2007	0.0	235.1	0.0
May-2007 to Dec-2009	No supplemental water deliveries		
Total	***3,685***	***12,541***	***3,914***

Source: Data provided by SFPUC.

Key: af - acre-feet

Note: This table contains SFPUC's monthly supplemental water deliveries to Daly City, Cal Water, and San Bruno from October 2002 to December 31, 2009. The supplemental water deliveries account for the SFPUC Storage Account of 20,000 acre-feet of water stored in the basin through the In-Lieu Demonstration Study.

Table 10.1-6: San Francisco Groundwater Supply Project Proposed Municipal Wells

Well No.	Well Name	Normal Design Pumping Capacity		Average Pumping Rate Based on 4.0 mgd Total[(1)]	
		gpm	mgd	gpm	mgd
1	Lake Merced Pump Station	600 (17 hour/day)	0.61	299	0.43
2	South Sunset Playground	500	0.72	317	0.46
3	West Sunset Playground	650	0.94	412	0.59
4	GGP Central Pump Station	1,500	2.16	951	1.37
5	South Windmill Replacement	1,000	1.44	451	0.65
6	North Lake	500	0.72	347	0.50
	Total	***-***	***6.59***	***-***	***4.00***

Key:
gpm - gallons per minute
mgd - million gallons per day
GGP - Golden Gate Park

Notes:
(1) Six SFGW Project wells included in the table would be pumping for project target pumping rate at 4.0 mgd.

Table 10.1-7: Proposed Pumping Rate Assumptions for Regional Groundwater Storage and Recovery Project Proposed Municipal Wells and Partner Agency Municipal Wells

		Scenario 1 Scenario 3a/3b - SFGW	Scenario 2 GSR				Scenario 4 Cumulative			
Location	**Well Site/ Well Name**	**Pumping Year Round (mgd)**	**Pumping During "Take" Periods (mgd)**	**Pumping During "Put" Periods (mgd)**	**Pumping During "Hold" Periods (mgd)**	**In-Lieu Recharge During "Put" Periods (mgd)**	**Pumping During "Take" Periods (mgd)**	**Pumping During "Put" Periods (mgd)**	**Pumping During "Hold" Periods (mgd)**	**In-Lieu Recharge During "Put" Periods (mgd)**
Regional Groundwater Storage and Recovery Project Proposed Municipal Wells										
Daly City	CUP-3A	-	0.57	0.003	0.003	-	0.57	0.003	0.003	-
Daly City	CUP-5	-	0.43	0.002	0.002	-	0.43	0.002	0.002	-
Daly City	CUP-6	-	0.43	0.002	0.002	-	0.43	0.002	0.002	-
Daly City	CUP-7	-	0.43	0.002	0.002	-	0.43	0.002	0.002	-
Daly City	CUP-10A	-	0.57	0.003	0.003	-	0.57	0.003	0.003	-
Daly City	CUP-11A	-	0.57	0.003	0.003	-	0.57	0.003	0.003	-
Colma	CUP-18	-	0.57	0.003	0.003	-	0.57	0.003	0.003	-
Colma	CUP-19	-	0.57	0.003	0.003	-	0.57	0.003	0.003	-
South San Francisco	CUP-22A	-	0.47	0.003	0.003	-	0.47	0.003	0.003	-
South San Francisco	CUP-23	-	0.47	0.003	0.003	-	0.47	0.003	0.003	-
South San Francisco	CUP-31	-	0.32	0.002	0.002	-	0.32	0.002	0.002	-
South San Francisco	CUP-36-1	-	0.32	0.002	0.002	-	0.32	0.002	0.002	-
South San Francisco	CUP-41-4	-	0.32	0.002	0.002	-	0.32	0.002	0.002	-
San Bruno	CUP-44-1	-	0.47	0.003	0.003	-	0.47	0.003	0.003	-
San Bruno	CUP-44-2	-	0.47	0.003	0.003	-	0.47	0.003	0.003	-
Millbrae	CUP-M-1	-	0.23	0.001	0.001	-	0.23	0.001	0.001	-
Sub-Total			***7.23***	***0.04***	***0.04***	-	***7.23***	***0.04***	***0.04***	-
Partner Agency Municipal Wells										
Daly City Municipal Wells										
Daly City	Daly City Jefferson	0.72	0.65	0.13	0.65	0.52	0.57	0.11	0.57	0.46
Daly City	Daly City Vale	0.98	0.89	0.18	0.89	0.71	0.57	0.11	0.57	0.46
Daly City	Daly City Westlake	0.76	0.69	0.14	0.69	0.55	0.57	0.11	0.57	0.46
Daly City	Daly City Junipero Serra	0.95	0.86	0.17	0.86	0.69	0.57	0.11	0.57	0.46
Daly City	Daly City No. 4	0.38	0.34	0.07	0.34	0.27	-	-	-	-
Daly City	Daly City No.4 Replacement	-	-	-	-	-	0.57	0.11	0.57	0.46
Daly City	Daly City A Street Replacement	-	-	-	-	-	0.57	0.1	0.6	0.5
Sub-Total		***3.78***	***3.43***	***0.69***	***3.43***	***2.74***	***3.43***	***0.69***	***3.43***	***2.74***
Cal Water Municipal Wells										
South San Francisco	SSF1-14	0.13	-	-	-	-	-	-	-	-
South San Francisco	SSF1-15	0.09	0.0	0.0	0.0	0.0	-	-	-	-
South San Francisco	SSF1-17 (inactive)	0.00	-	-	-	-	-	-	-	-
South San Francisco	SSF1-18	0.23	-	-	-	-	-	-	-	-
South San Francisco	SSF1-19	0.23	0.17	0.03	0.17	0.14	-	-	-	-
South San Francisco	SSF1-20	0.22	0.16	0.03	0.16	0.13	0.26	0.05	0.26	0.21
South San Francisco	SSF1-21	0.28	0.22	0.04	0.22	0.18	0.29	0.06	0.29	0.23
South San Francisco	SSF1-22	0.00	0.48	0.10	0.48	0.38	0.48	0.10	0.48	0.38
South San Francisco	SSF1- 23	0.00	0.34	0.07	0.34	0.27	0.34	0.07	0.34	0.27
South San Francisco	SSF1-24 (redundant)	-	-	-	-	-	Per Cal Water letter to SFPUC dated Jan 19, 2011, this well is shown redundant			
South San Francisco	SSF1-25 (redundant)	-	-	-	-	-	Per Cal Water letter to SFPUC dated Jan 19, 2011, this well is shown redundant			
Sub-Total		***1.18***	***1.37***	***0.27***	***1.37***	***1.10***	***1.37***	***0.27***	***1.37***	***1.10***
San Bruno Municipal Wells										
San Bruno	San Bruno No. 15	0.23	0.25	0.05	0.25	0.20	0.25	0.05	0.25	0.20
San Bruno	San Bruno No. 16	0.49	0.55	0.11	0.55	0.44	0.55	0.11	0.55	0.44
San Bruno	San Bruno No. 17	0.24	0.27	0.05	0.27	0.22	0.27	0.05	0.27	0.22
San Bruno	San Bruno No. 18	0.26	0.29	0.06	0.29	0.24	0.29	0.06	0.29	0.24
San Bruno	San Bruno No. 20	0.66	0.73	0.15	0.73	0.59	0.73	0.15	0.73	0.59
Sub-Total		***1.88***	***2.10***	***0.42***	***2.10***	***1.68***	***2.10***	***0.42***	***2.10***	***1.68***
Total Partner Agency Pumping		***6.84***	***6.90***	***1.38***	***6.90***	***5.52***	***6.90***	***1.38***	***6.90***	***5.52***

Key:
GSR - Regional Groundwater Storage and Recovery
mgd - million gallons per day
Shaded cells identify municipal pumping wells that are not applicable and not considered for a given model scenario.

Table 10.1-8: Depth Distribution of Pumping by Model Layers

Location	Well Site/Well Name	Depth Distribution of Pumping (Fraction in Model Layer 1 - 5)					Total
		Layer 1	Layer 2	Layer 3	Layer 4	Layer 5	
Regional Groundwater Storage and Recovery Project Proposed Municipal Wells							
Daly City	CUP-3A	0.00	0.00	1.00	0.00	0.00	1.00
Daly City	CUP-5	0.00	0.00	0.10	0.60	0.30	1.00
Daly City	CUP-6	0.00	0.00	0.10	0.70	0.20	1.00
Daly City	CUP-7	0.00	0.00	0.15	0.55	0.30	1.00
Daly City	CUP-10A	0.00	0.00	0.50	0.50	0.00	1.00
Daly City	CUP-11A	0.00	0.00	0.40	0.50	0.10	1.00
Colma	CUP-18	0.00	0.00	0.35	0.55	0.10	1.00
Colma	CUP-19	0.00	0.00	0.20	0.60	0.20	1.00
South San Francisco	CUP-22A	0.00	0.00	0.20	0.80	0.00	1.00
South San Francisco	CUP-23	0.00	0.00	0.20	0.80	0.00	1.00
South San Francisco	CUP-31	0.00	0.00	0.00	0.70	0.30	1.00
South San Francisco	CUP-36-1	0.00	0.00	0.00	0.75	0.25	1.00
South San Francisco	CUP-41-4	0.00	0.00	0.00	0.80	0.20	1.00
San Bruno	CUP-44-1	0.00	0.00	0.00	0.80	0.20	1.00
San Bruno	CUP-44-2	0.00	0.00	0.05	0.75	0.20	1.00
Millbrae	CUP-M-1	0.00	0.00	0.50	0.50	0.00	1.00
Daly City Municipal Wells							
Daly City	Daly City Jefferson	0.00	0.00	0.12	0.73	0.15	1.00
Daly City	Daly City Vale	0.00	0.00	0.15	0.70	0.15	1.00
Daly City	Daly City Westlake	0.00	0.00	0.15	0.56	0.29	1.00
Daly City	Daly City Junipero Serra	0.00	0.43	0.57	0.00	0.00	1.00
Daly City	Daly City No. 4	0.00	0.50	0.32	0.18	0.00	1.00
Daly City	Daly City No. 4 Replacement	0.00	0.50	0.32	0.18	0.00	1.00
Daly City	Daly City A Street Replacement	0.00	0.06	0.29	0.65	0.00	1.00
Cal Water Municipal Wells							
South San Francisco	SSF1-19	0.00	0.19	0.12	0.50	0.19	1.00
South San Francisco	SSF1-20	0.00	0.00	0.00	0.48	0.52	1.00
South San Francisco	SSF1-21	0.00	0.00	0.00	0.50	0.50	1.00
South San Francisco	SSF1-22	0.00	0.00	0.00	0.50	0.50	1.00
South San Francisco	SSF1-23	0.00	0.00	0.00	0.50	0.50	1.00
South San Francisco	SSF1-24	0.00	0.00	0.00	0.50	0.50	1.00
South San Francisco	SSF1-25	0.00	0.00	0.00	0.50	0.50	1.00
San Bruno Municipal Wells							
San Bruno	San Bruno No. 15	0.00	0.16	0.16	0.54	0.14	1.00
San Bruno	San Bruno No. 16	0.00	0.00	0.00	0.80	0.20	1.00
San Bruno	San Bruno No. 17	0.00	0.00	0.00	0.72	0.28	1.00
San Bruno	San Bruno No. 18	0.00	0.11	0.44	0.34	0.11	1.00
San Bruno	San Bruno No. 20	0.00	0.00	0.00	0.55	0.45	1.00
San Francisco Groundwater Supply Project Proposed Municipal Wells							
San Francisco	Lake Merced Pump Station	0.00	0.00	0.00	1.00	0.00	1.00
San Francisco	South Sunset Playground	0.21	0.38	0.16	0.26	0.00	1.00
San Francisco	West Sunset Playground	0.60	0.34	0.06	0.00	0.00	1.00
San Francisco	GGP Central Pump Station(1)	1.00	0.00	0.00	0.00	0.00	1.00
San Francisco	South Windmill Replacement	0.45	0.54	0.01	0.00	0.00	1.00
San Francisco	North Lake	0.44	0.17	0.39	0.00	0.00	1.00

Key:
GGP - Golden Gate Park

Note:
(1) All pumping assigned to Layer 1 because the HydroFocus Model (May 2011, ver. 3.1) assumes only one model layer in this vicinity.

Table 10.1-9: Put/Take/Hold Sequence for Model Scenarios

Scenario Year	No. of Months	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
0	3										put	put	put
1	15	put	put	put	put	put	put	put	put	put	put	put	put
2	27	put	put	put	put	put	put	put	put	put	put	put	put
3	39	put	put	put	put	put	put	put	put	put	put	put	put
4	51	put	put	put	put	put	put	put	put	put	put	put	put
5	63	put	put	put	put	put	put	put	put	put	put	put	put
6	75	put	put	put	put	put	put	put	put	put	put	put	put
7	87	put	put	put	put	hold	hold	hold	hold	hold	hold	hold	hold
8	99	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
9	111	hold	hold	hold	hold	hold	hold	hold	hold	hold	take	take	take
10	123	take	take	take	take	take	take	take	take	take	take	take	take
11	135	take	take	take	take	take	take	take	take	take	put	put	put
12	147	put	put	put	put	put	put	put	put	put	put	put	put
13	159	put	put	put	put	put	put	put	put	put	put	put	put
14	171	put	put	put	put	put	hold	hold	hold	hold	hold	hold	hold
15	183	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
16	195	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
17	207	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
18	219	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
19	231	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
20	243	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
21	255	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
22	267	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
23	279	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
24	291	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
25	303	hold	hold	hold	hold	hold	hold	hold	hold	hold	take	take	take
26	315	take	take	take	take	take	take	take	take	take	take	take	take
27	327	take	take	take	take	take	take	take	take	take	put	put	put
28	339	put	put	put	put	put	put	put	put	put	put	put	put
29	351	put	put	put	put	put	put	put	put	put	put	put	put
30	363	put	put	put	put	put	hold	hold	hold	hold	hold	hold	hold
31	375	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
32	387	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
33	399	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
34	411	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
35	423	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold	hold
36	435	hold	hold	hold	hold	hold	hold	hold	hold	hold	take	take	take
37	447	take	take	take	take	take	take	take	take	take	take	take	take
38	459	take	take	take	take	take	take	take	take	take	take	take	take
39	471	take	take	take	take	take	take	take	take	take	take	take	take
40	483	take	take	take	take	take	take	take	take	take	take	take	take
41	495	take	take	take	take	take	take	take	take	take	take	take	take
42	507	take	take	take	take	take	take	take	take	take	take	take	take
43	519	take	take	take	take	take	take	take	take	take	take	take	take
44	531	take	take	take	hold	hold	hold	hold	hold	hold	put	put	put
45	543	put	put	put	put	put	put	put	put	put	put	put	put
46	555	put	put	put	put	put	put	put	put	put	put	put	put
47	567	put	put	put	put	put	put	put	put	put	put	put	put

Table 10.1-10: Pumping Rate Assumptions for San Francisco Groundwater Supply Project Proposed Municipal Wells

Well No.	Well Name	Pumping Rates		Pumping Proportion Relative to Total
		mgd	afy	
Scenario 3a[1], [2]				
1	Lake Merced Pump Station	0.43	482	0.14
2	South Sunset Playground	0.48	544	0.16
3	West Sunset Playground	0.63	707	0.21
4	GGP Central Pump Station	1.45	1,631	0.48
5	South Windmill Replacement[3]	-	-	-
6	North Lake [3]	-	-	-
	Total	***3.00***	***3,363***	***1.00***
Scenario 3b [1]				
1	Lake Merced Pump Station	0.43	482	0.11
2	South Sunset Playground	0.46	512	0.11
3	West Sunset Playground	0.59	665	0.15
4	GGP Central Pump Station	1.37	1,536	0.34
5	South Windmill Replacement	0.65	729	0.16
6	North Lake	0.50	561	0.13
	Total	***4.00***	***4,484***	***1.00***

Key:
afy - acre-feet per year
mgd - million gallons per day
GGP - Golden Gate Park

Notes:
(1) For Scenarios 3a and 3b, the pumping rate for each of the SFGW Project wells is provided by SFPUC.
(2) Four of the SFGW Project wells would be pumping for municipal purposes for the SFGW Project under Scenario 3a.
(3) For Scenario 3a, South Windmill Replacement and North Lake wells would remain as irrigation wells and not be used for municipal pumping as part of the SFGW Project. Irrigation pumping rates by South Windmill Replacement and North Lake wells would be the same as in Scenario 1, and they are accounted for in the irrigation pumping assumptions presented in Table 10.1-2.

Table 10.1-11: Monthly Pumping Rate Assumptions for San Francisco Groundwater Supply Project
Proposed Municipal Wells

Scenario 3a							
Month	**Lake Merced Pump Station (af)**	**South Sunset Playground (af)**	**West Sunset Playground (af)**	**GGP Central Pump Station (af)**	**South Windmill Replacement (af)**	**North Lake (af)**	**Total Pumping (af)**
January	457	515	670	1,545	0	0	3,186
February	485	547	711	1,642	0	0	3,386
March	451	509	662	1,527	0	0	3,150
April	464	523	680	1,570	0	0	3,237
May	500	564	733	1,691	0	0	3,486
June	523	590	767	1,770	0	0	3,651
July	541	610	793	1,830	0	0	3,774
August	524	590	768	1,771	0	0	3,653
September	500	564	734	1,693	0	0	3,491
October	482	543	707	1,630	0	0	3,362
November	433	488	635	1,464	0	0	3,020
December	424	478	622	1,435	0	0	2,959
Annual Average (af)	***482***	***544***	***707***	***1,631***	***0***	***0***	***3,363***
Annual Average (mgd)	***0.43***	***0.48***	***0.63***	***1.45***	***0.00***	***0.00***	***3.0***
Scenario 3b							
	Lake Merced Pump Station (af)	**South Sunset Playground (af)**	**West Sunset Playground (af)**	**GGP Central Pump Station (af)**	**South Windmill Replacement (af)**	**North Lake (af)**	**Total Pumping (af)**
January	457	485	630	1,455	690	531	4,249
February	485	515	670	1,546	734	564	4,515
March	451	479	623	1,438	682	525	4,200
April	464	493	641	1,478	701	540	4,316
May	500	531	690	1,592	755	581	4,648
June	523	556	722	1,667	791	608	4,868
July	541	574	747	1,723	818	629	5,032
August	524	556	723	1,668	792	609	4,871
September	500	531	691	1,594	756	582	4,655
October	482	512	665	1,535	728	560	4,483
November	433	460	597	1,379	654	503	4,026
December	424	450	586	1,351	641	493	3,946
Annual Average (af)	***482***	***512***	***665***	***1,536***	***729***	***561***	***4,484***
Annual Average (mgd)	***0.4***	***0.5***	***0.6***	***1.4***	***0.7***	***0.5***	***4.0***

Key:
af - acre-feet
GGP - Golden Gate Park
mgd - million gallons per day

Table 10.1-12: Summary of Westside Basin Annual Water Balance

Scenarios		Inflow from Bay & Ocean (afy)[1]	Seepage from GGP Lakes (afy)[1]	Rain + Irrigation (afy)[1]	Seepage from Lake Merced (afy)[1]	Outflow to Bay & Ocean (afy)[2]	Wells - Pumping (afy)[2]	Seepage to Lake Merced (afy)[2]	Drains (afy)[2]	Change in Groundwater Storage (afy)[3]
Scenario 1	**Average**	12	551	14,034	846	-4,172	-10,814	-960	-94	-597
	Maximum	31	558	24,922	1,171	-3,057	-10,230	-634	-68	9,340
	Minimum	5	545	7,618	456	-5,439	-11,398	-1,383	-129	-6,468
Scenario 2	**Average**	11	551	14,034	640	-4,418	-10,926	-784	-122	-1,013
	Maximum	65	558	24,922	1,498	-2,948	-4,227	-522	-71	14,744
	Minimum	4	545	7,618	351	-5,526	-19,363	-1,453	-176	-14,738
Scenario 3a	**Average**	403	551	14,034	940	-1,982	-14,189	-946	-93	-1,282
	Maximum	1,123	558	24,922	1,105	-1,115	-13,604	-534	-68	9,072
	Minimum	5	545	7,618	485	-4,731	-14,773	-1,246	-128	-6,755
Scenario 3b	**Average**	312	626	14,034	950	-2,012	-14,106	-949	-93	-1,237
	Maximum	937	628	24,922	1,116	-1,114	-13,655	-531	-68	9,102
	Minimum	5	618	7,618	485	-4,703	-14,544	-1,257	-128	-6,666
Scenario 4	**Average**	186	626	14,034	760	-2,181	-14,264	-603	-122	-1,565
	Maximum	681	628	24,922	1,390	-866	-7,671	-325	-71	11,867
	Minimum	5	618	7,618	336	-4,735	-22,607	-1,156	-177	-14,852

Key:
afy - acre-feet per year

Notes:
(1) Positive values define inflows to groundwater basin.
(2) Negative values define outflows from groundwater basin.
(3) Positive change in storage values define increase in groundwater storage; negative change in storage values define decline in groundwater storage.

Attachment 10.1-A

Key Proposed Elements of GSR Project Operating Agreement for EIR Analysis

SUMMARY OF DRAFT GSR PROJECT OPERATING AGREEMENT
February 29, 2012

Under a proposed agreement between the SFPUC and the Partner Agencies for operation of groundwater pumping by these entities from the South Westside Groundwater Basin, the SFPUC would "store" water in the South Westside Groundwater Basin through the mechanism of in-lieu recharge by providing surface water as a substitute for groundwater pumping by the Partner Agencies. As part of its annual April 15 estimate of water supply available to the Regional Water System, the SFPUC would determine and give notice to the Partner Agencies of the availability, anticipated quantities and timing of the in-lieu water deliveries, thereby requiring the Partner Agencies to accept delivery of surface water in lieu of groundwater pumped using their existing wells (generally during wet and normal water years). This determination would take into consideration the amount of groundwater that the Partner Agencies must continue to pump due to water quality blending, distribution system constraints, well maintenance, and other requirements.

During these times when water would be stored in the groundwater basin (Put Periods[1]), the SFPUC could require the Partner Agencies to take delivery of up to 5.52 mgd of in-lieu water using their existing turnouts on SFPUC transmission pipelines in lieu of pumping a like amount of groundwater from their existing facilities. As a result of the in-lieu deliveries, up to 60,500 acre feet of groundwater storage or "put" credits could accrue to the SFPUC Storage Account described below. During shortages of SFPUC system water due to drought, emergencies or scheduled maintenance, the Partner Agencies would return to pumping from their existing wells. In addition, the SFPUC and the Partner Agencies would extract groundwater from the SFPUC Storage Account using the new wells installed by the SFPUC as part of the Project, at a maximum annual volume of 8,100 acre feet withdrawn at an average rate of 7.2 mgd. The SFPUC will not direct pumping during these periods (Take Periods[2]) unless a positive balance exists in the SFPUC Storage Account as described below.

An accounting of the additional storage volumes (the SFPUC Storage Account) accrued during Put Periods would be maintained by the SFPUC as a book account tracking the amount of water that has been stored during normal and wet years and the amount of water pumped from the SFPUC Storage Account during Take Periods. Accruals in the SFPUC Storage Account would be recorded based on metered, in-lieu surface water deliveries and corresponding metered decreases in groundwater pumping below "designated quantities" agreed to by the Partner Agencies. An operating committee would be formed to monitor and track the SFPUC Storage Account, including any losses from the system, and establish annual pumping schedules for Project wells.

As discussed in Section 3.3, the Partner Agencies would continue to maintain and operate their existing wells and associated infrastructure, and could install new or replacement wells in the future if necessary. The Partner Agencies would agree to limit pumping from their existing wells and any new wells to the designated quantities totaling 6.9 mgd over a 5 year averaging period, the estimated modeled volume of municipal pumping that the South Westside Basin can sustain without causing a decline in groundwater levels on an annual average basis and the amounts identified in the respective Partner Agencies Urban Water Management Plans, allocated in the initial year as follows:

[1] Put Periods may also be referred to as Storage Periods in the operating agreement and other documentation concerning the Project.
[2] Take Periods may also be referred to as Recovery Periods in the operating agreement and other documentation concerning the Project.

- Daly City: 3.43 mgd/ 3,840 acre feet per year
- Cal Water: 1.37 mgd/ 1,534 acre feet per year
- San Bruno: 2.1 mgd/ 2,350 acre feet per year

Pumping from the Partner Agency existing facilities during years when the SFPUC has not directed take of water from the SFPUC Storage Account and years where the SFPUC has neither directed take nor put of in lieu groundwater (Hold Periods) could not exceed 7.6 mgd in any year of the 5 year averaging period. This 10% increase over 6.9 mgd could occur as a result of transfer of designated quantities between Partner Agencies, which would be permitted under the operating agreement provided such adjustment received unanimous approval of the operating committee based on actual operating experience that demonstrates that such an increase is consistent with sustainable groundwater basin management. If a Partner Agency engages in over production, then that agency would be required to (1) take steps to pump less during future years to bring pumping back within the 6.9 mgd aggregate designated quantity; (2) provide a source of water that has the effect of replacing water lost from the Basin due to the over production; or (3) take other actions that may be recommended by the operating committee.

During normal and wet years, Project wells would be operated by the SFPUC or the Partner Agencies only periodically to exercise the wells for maintenance purposes at a rate of approximately 0.04 mgd and the Partner Agencies' would pump their existing wells at a rate of approximately 1.38 mgd to 1.9 mgd. In circumstances where the SFPUC determines that delivery of in-lieu water cannot be made due to a dry year, emergencies, system rehabilitation, scheduled maintenance or malfunctioning of the water system, or upon recommendation of the operating committee established by the operating agreement for purposes of Basin management, the SFPUC may direct the Partner Agencies to extract groundwater from the SFPUC Storage Account using Project wells, in addition to continued pumping from the Partner Agencies' existing wells to meet the remainder of their water supply needs. Pumping from the SFPUC Storage Account by the Partner Agencies and the SFPUC would only occur if a positive balance exists in the SFPUC Storage Account as a result of previous in lieu recharge.

During droughts, Project wells would be operated beginning in the second consecutive year of a multi-year drought, following implementation of the Shortage Allocation Plan. Partner Agency pumping from the SFPUC Storage Account using Project wells during droughts, combined with the remaining reduced surface water deliveries from the Regional Water System to the Partner Agencies, would be limited to the total quantity of water allocated to each Partner Agency under Tier 2 of the Shortage Allocation Plan[3]. Partner Agency pumping during droughts using their existing wells would be limited to their respective Designated Quantities, which in total equal an aggregate volume of 7,724 acre feet per year, extracted at an annual cumulative rate of 6.9 mgd and computed on a 5 year rolling average basis. The specific volumes to be pumped during a drought shown in Figure 3-2 (see Section 3.3.1 above) are based on the Project Operations, but actual volumes in any given year could vary depending on factors including: (1) the final location and capacity of the Project well facilities, (2) the volume of water in the SFPUC Storage Account, and (3) direction from the operating committee regarding which wells should be used, based on the need to avoid well interference and other basin management considerations.

[3] In the July 2009 WSA, the SFPUC and its wholesale customers adopted a Water Shortage Allocation Plan to allocate water between retail and wholesale customers during system wide shortages of 20% or less (the Tier 1 plan). The specific amount of rationing required by each wholesale customer, including the Participating Pumpers, is determined either by agreement of the wholesale customers themselves (the Tier 2 Plan) or, in the absence of such agreement, by the SFPUC after discussion with the wholesale customers.

The SFPUC would own the Project well facilities, and there would be no change to the Partner Agencies' ownership and operation of their existing and any new well facilities, except to the extent of their agreement regarding cessation and resumption of groundwater pumping as agreed to under a proposed operating agreement. The SFPUC and the Partner Agencies would operate and maintain Project wells connected to their respective water systems. The Partner Agencies may be allowed to use Project facilities for non-Project purposes but only under certain specified conditions where necessary, with approval of the operating committee and only for periods not to exceed 30 days duration. In the event of a sudden, non-drought event such as an earthquake or other catastrophic event, the operating committee may allow Partner Agency use of Project facilities for the duration of the emergency.

Project Operation

As described above, the Project would use vacated storage space in the South Westside Groundwater Basin filled through in lieu recharge during normal and wet years. Neither Project wells nor Partner Agency wells would be pumped in these Put Periods, apart from volumes needed to periodically exercise the wells. Water would accrue in the SFPUC Storage Account based on the metered reduction in each Partner Agency's designated quantity described in section 3.8.1.

When the SFPUC Storage Account is full, defined as 60,500 acre feet, but there is no shortage requiring the SFPUC to pump groundwater from Project wells (Hold Periods), the Project wells installed by the SFPUC would remain inactive apart from well exercising. Existing Partner Agency wells would be pumped at rates not to exceed an annual amount of 6.9 mgd (or up to 7.6 mgd in the event of a 10% increase) in any year of the 5 year periods as described in Section 3.8.1. The Partner Agencies would continue to be able to take delivery of their entitlements to surface water from the SFPUC (their "Individual Supply Guarantees") during these Hold Periods, as the SFPUC Storage Account would remain full.

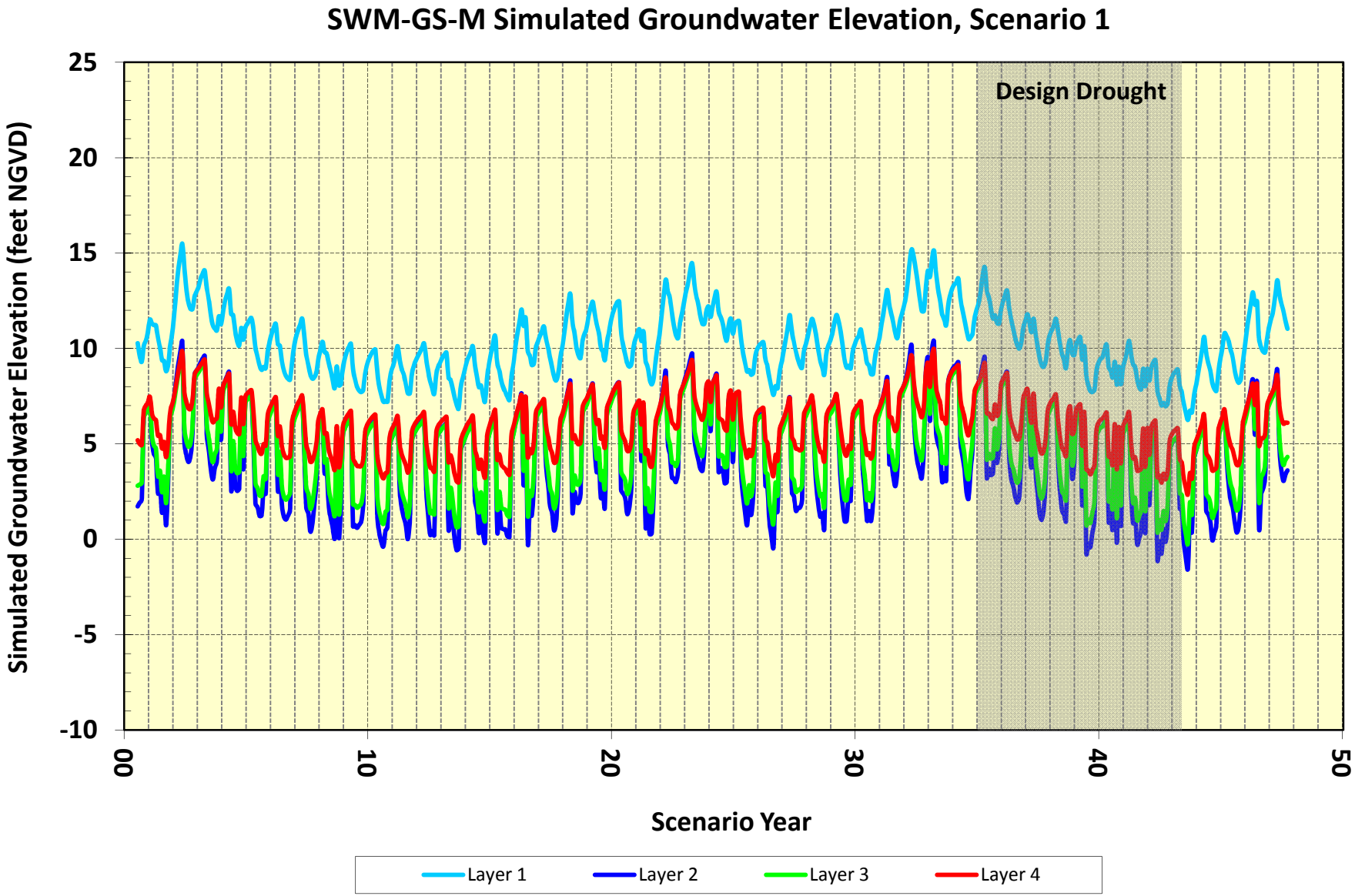
New Project wells installed by the SFPUC would be operated under the following circumstances:

- Beginning in the second dry year of a multiple year drought
- During emergencies
- During system rehabilitation, scheduled maintenance or malfunctioning of the water system
- Upon recommendation of the operating committee established by the operating agreement for purposes of Basin management

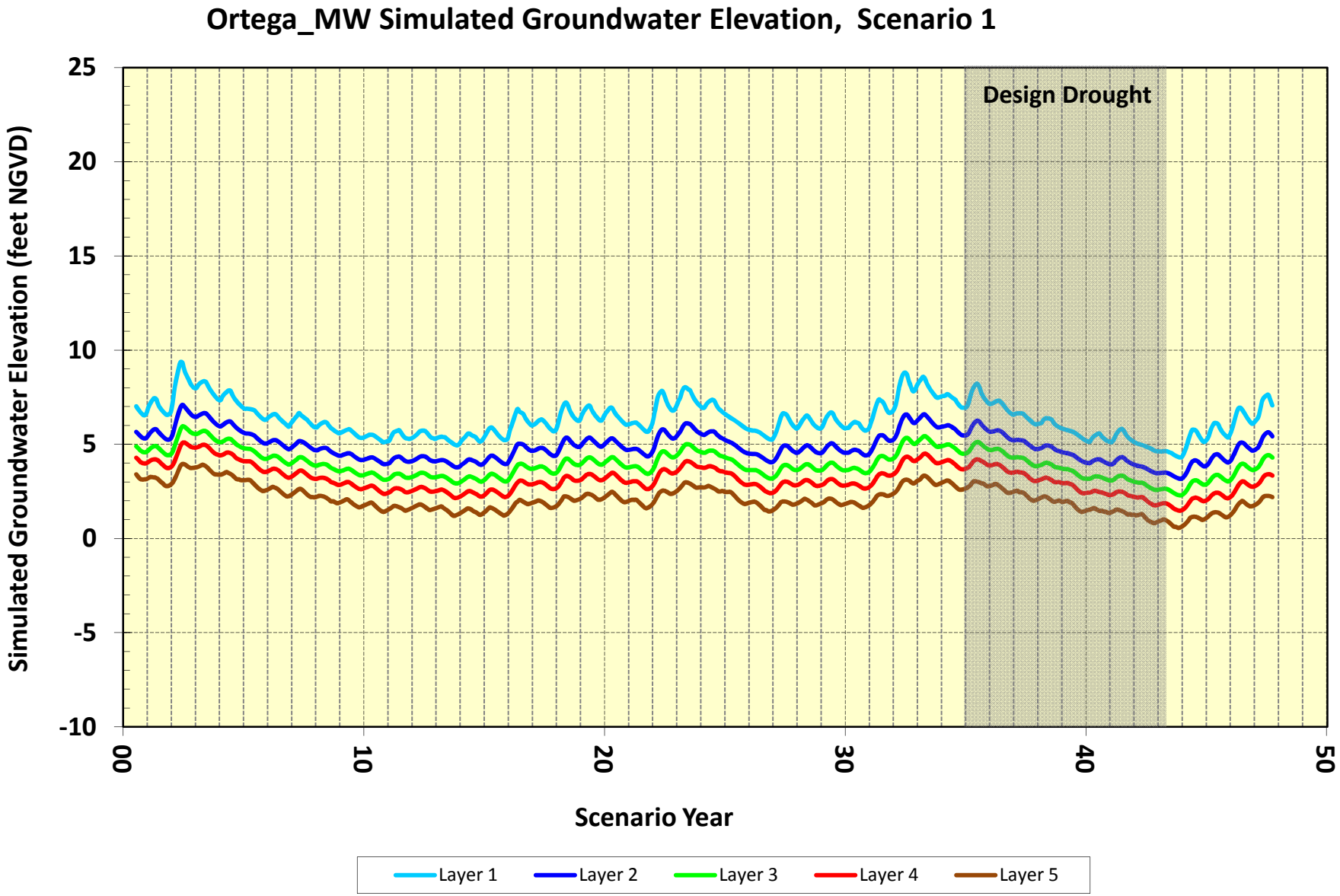
In these circumstances, new Project wells could be operated continuously or for shorter intervals, depending on the need for water. The primary purpose of the Project is to provide a dry year water supply during a multiple year drought. During these Take Periods, when groundwater is pumped to provide a dry year supply, pumping would reduce the balance of water in the SFPUC Storage Account. Project wells would be operated by the Partner Agencies and the SFPUC, depending on whether the water is sent to the Partner Agencies' retail water distribution systems or the SFPUC regional water transmission system. Project wells would only be pumped in Take Periods if there is a positive balance in the SFPUC Storage Account, and that pumping may not exceed 8,100 acre-feet per "supply year," defined as the period from July 1 to June 30 of the following year. Existing Partner Agency wells would be pumped at up to the rates indicated above during Hold Periods and the combined (reduced) deliveries of SFPUC surface water to the Partner Agencies and water pumped by the Partner Agencies from the SFPUC Storage Account using new Project wells would not exceed the Partner Agencies' individual Tier 2 allocations under the Shortage Allocation Plan.

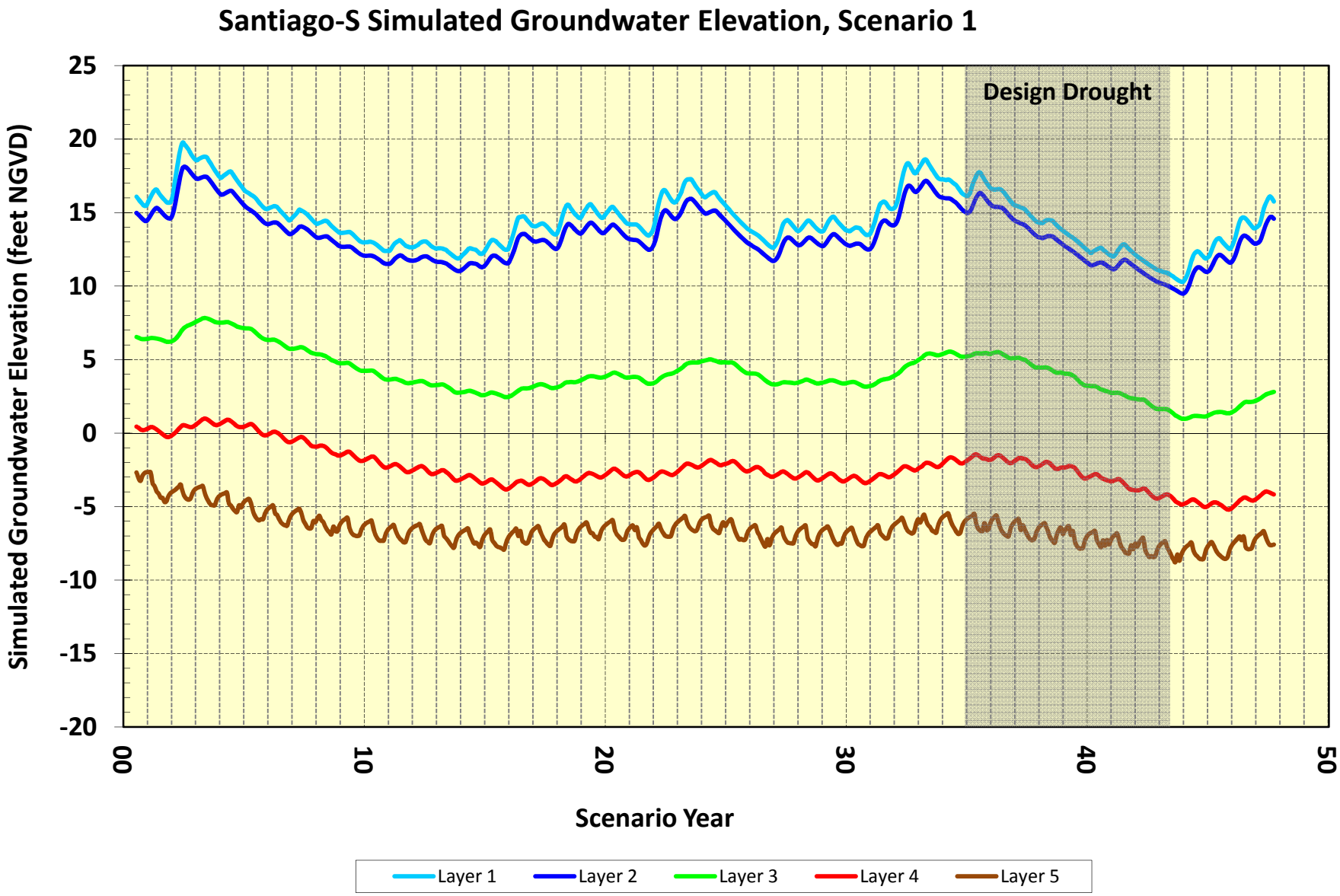
Attachment 10.1-B

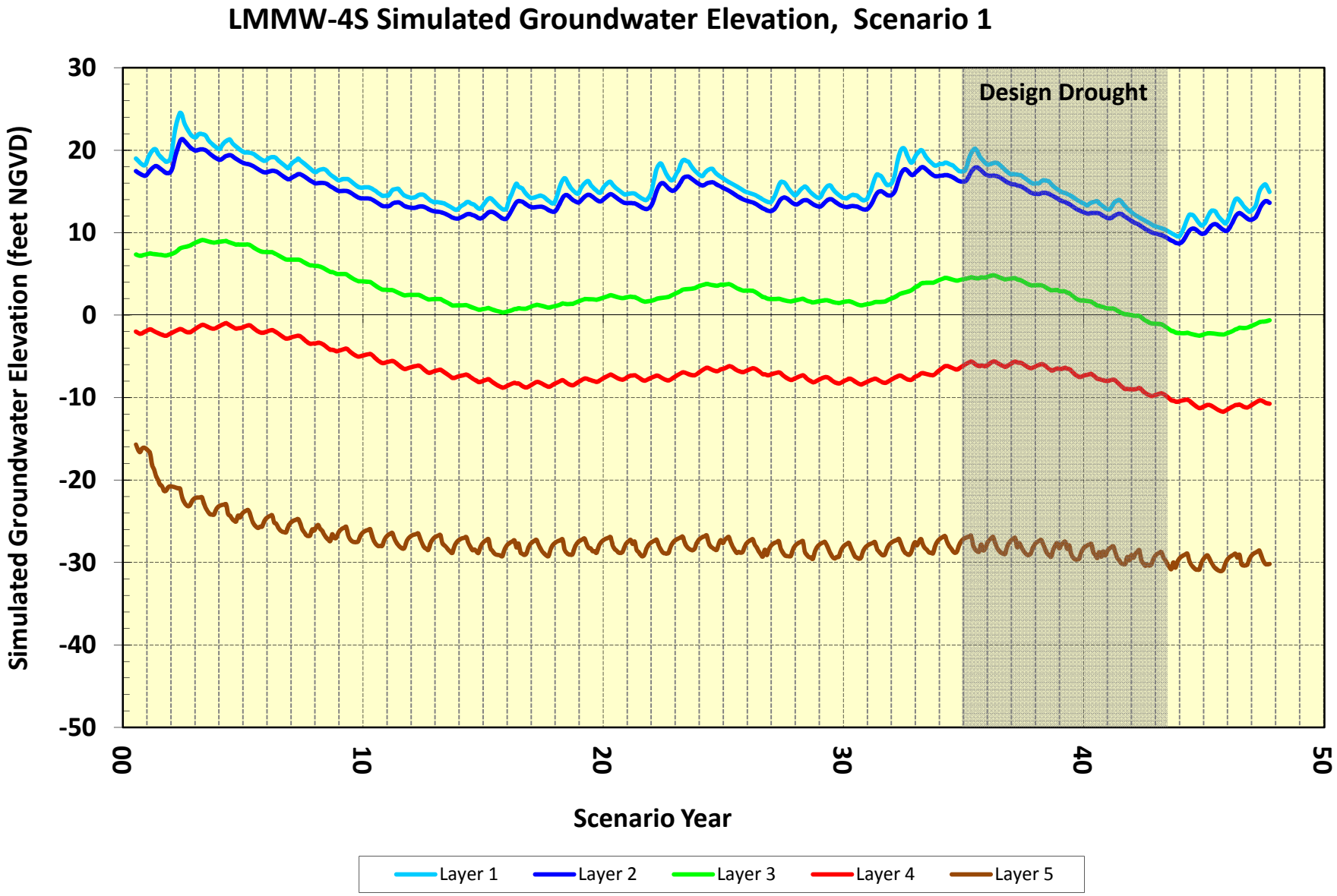
Model Scenario Hydrographs for Selected Locations

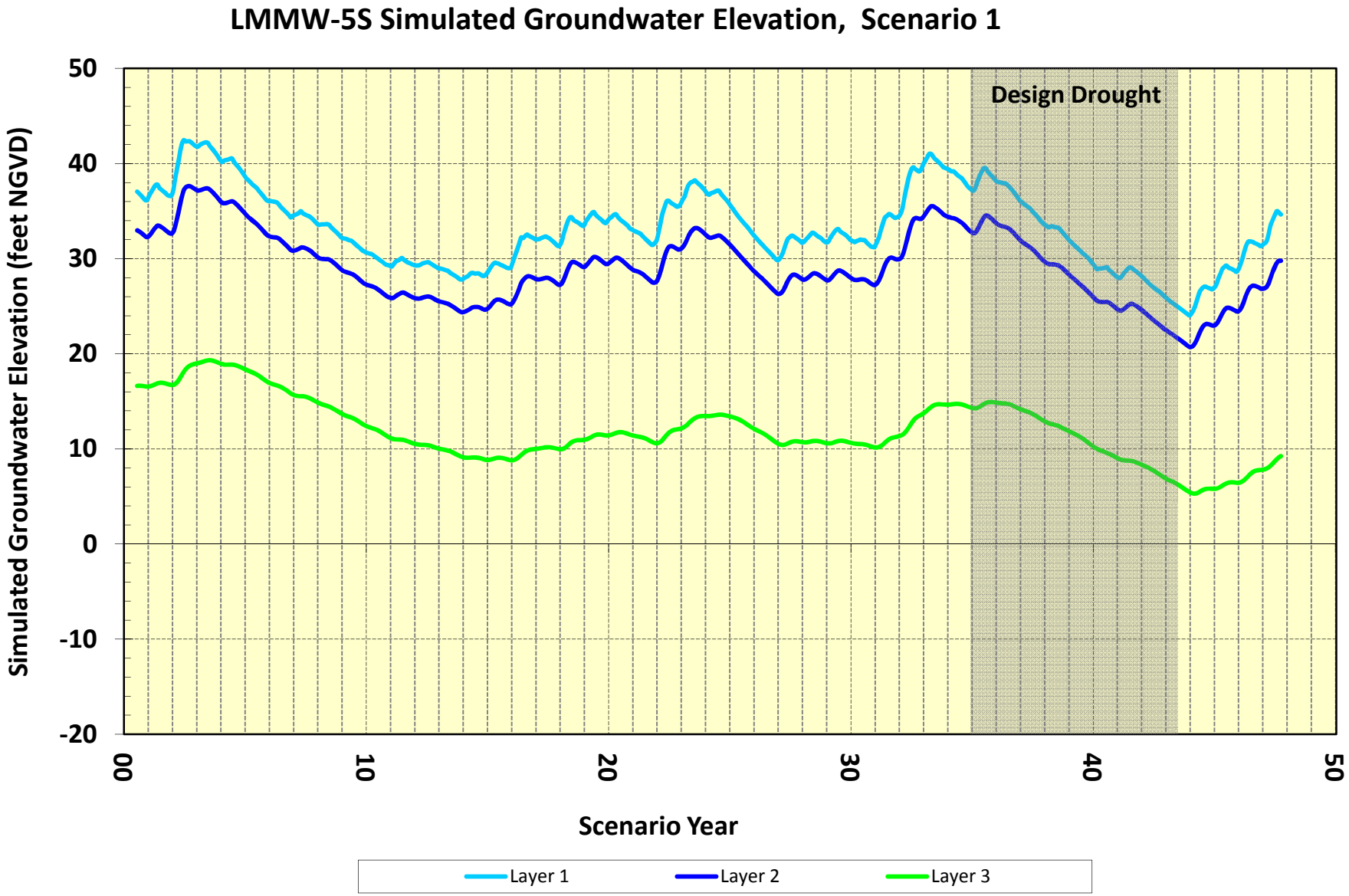


Note: At the location of SWM-GS-M, the model does not contain Model Layer 5.

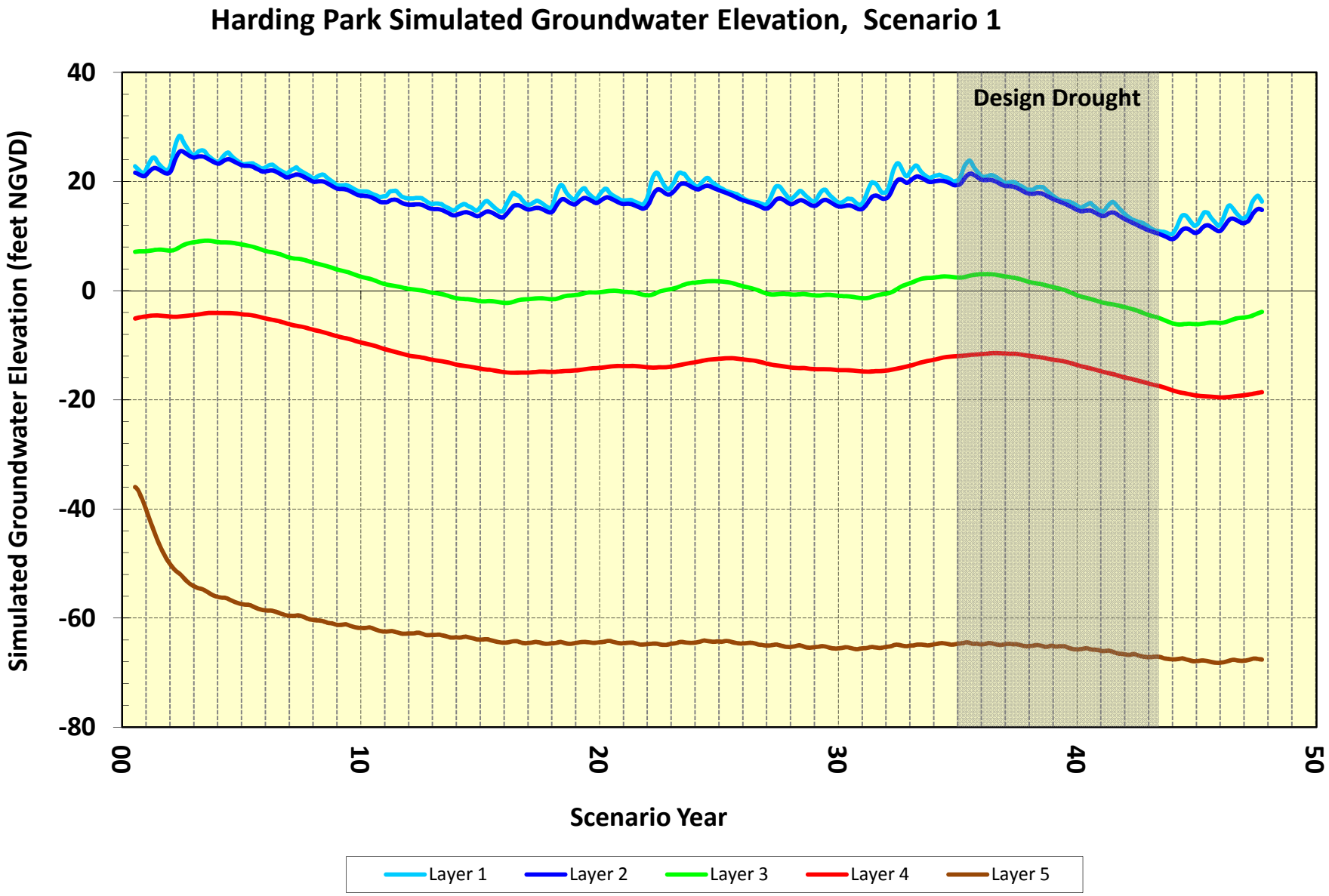

Ortega_MW Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

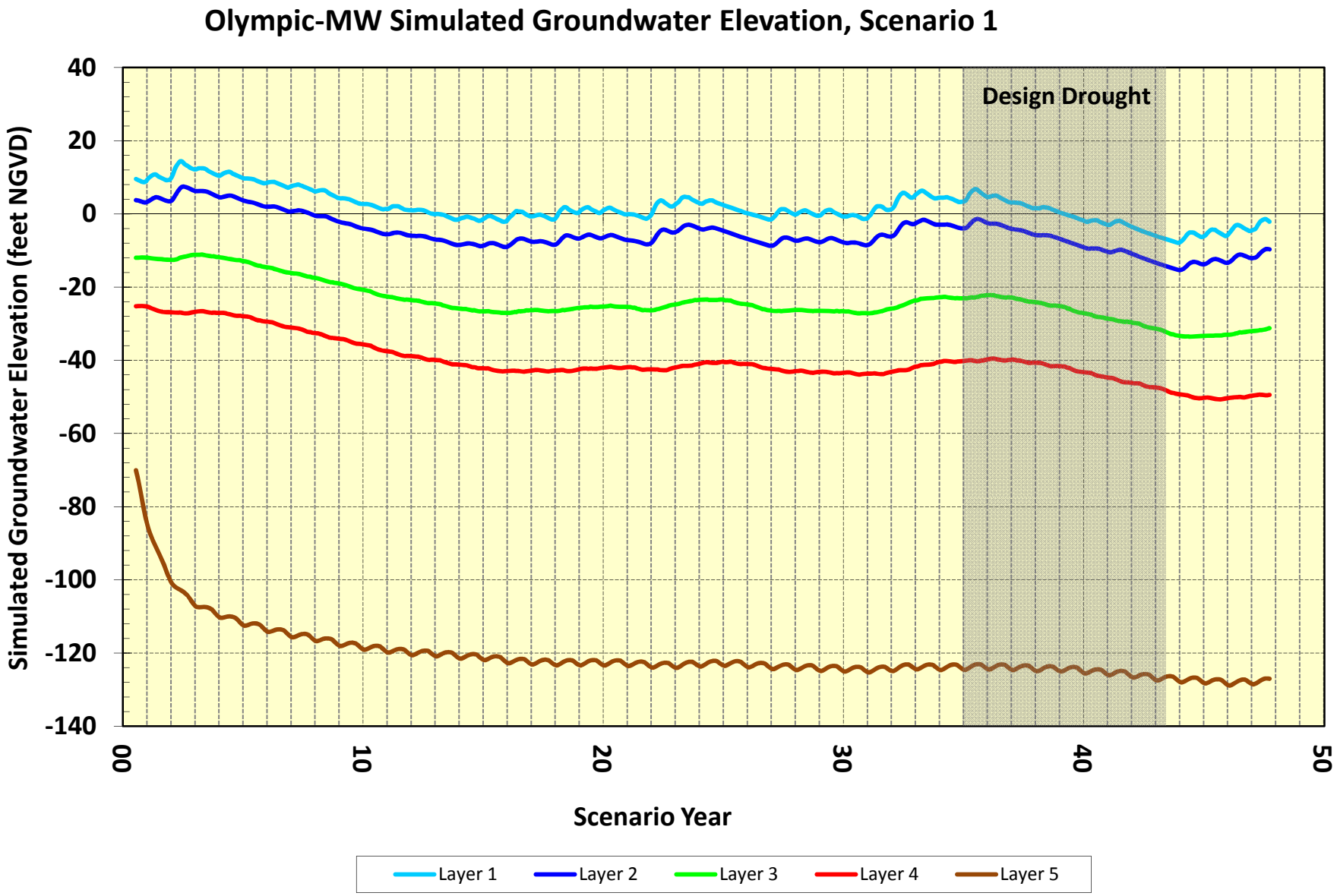

Santiago-S Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
-15
-20
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

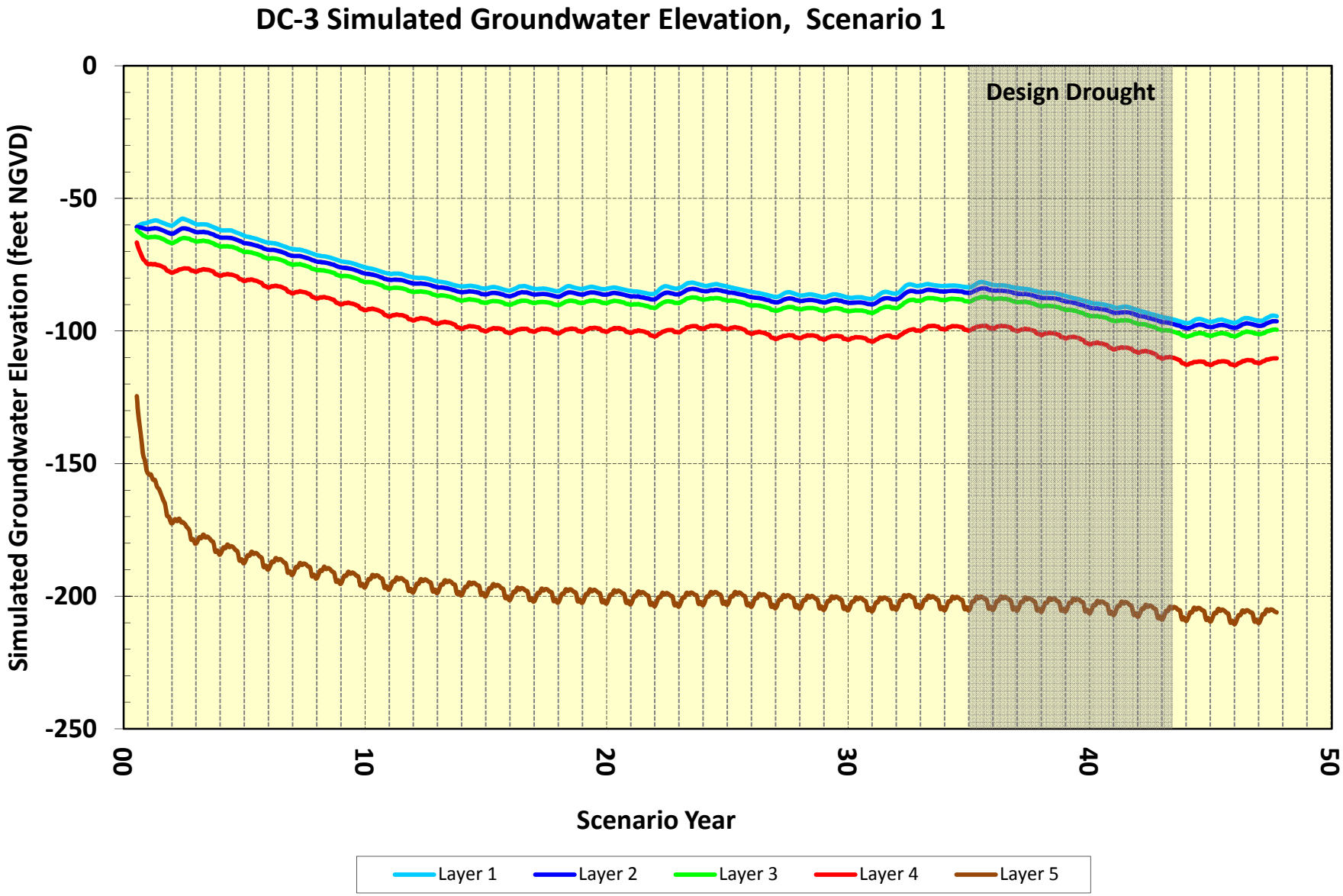

LMMW-4S Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
30
20
10
0
-10
-20
-30
-40
-50
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

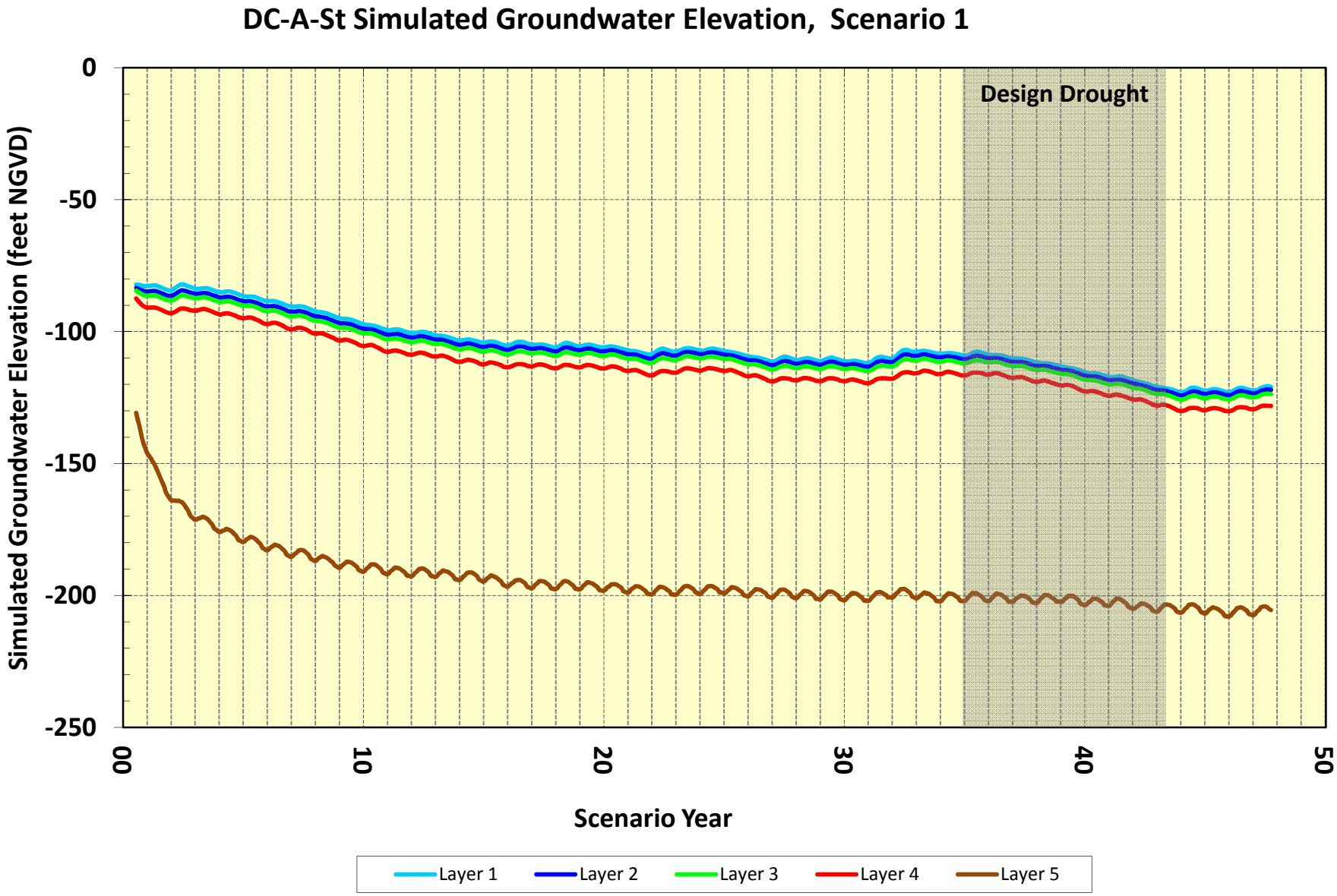


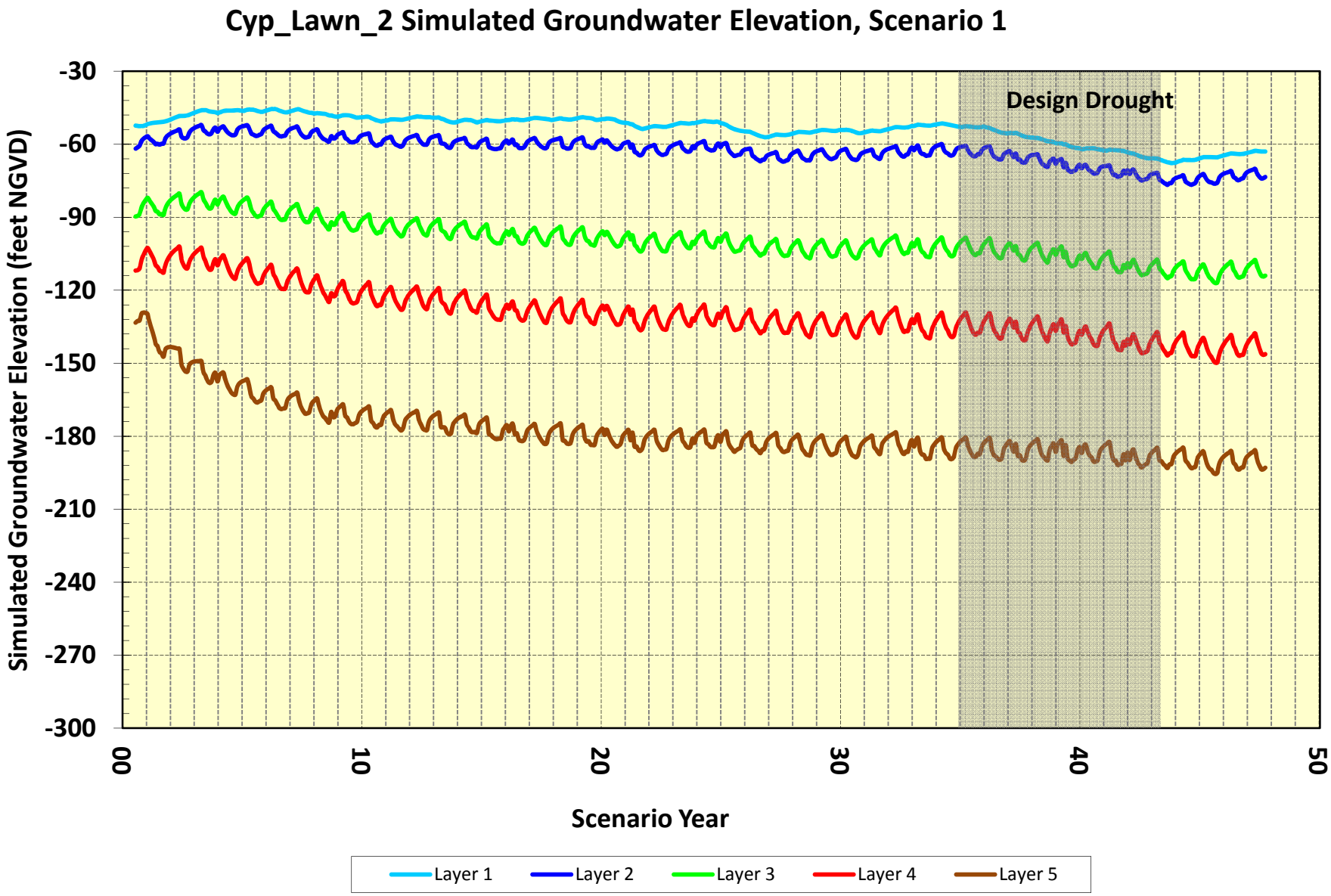
Note: At the location of LMMW-5S, the model does not contain Model Layers 4 and 5.

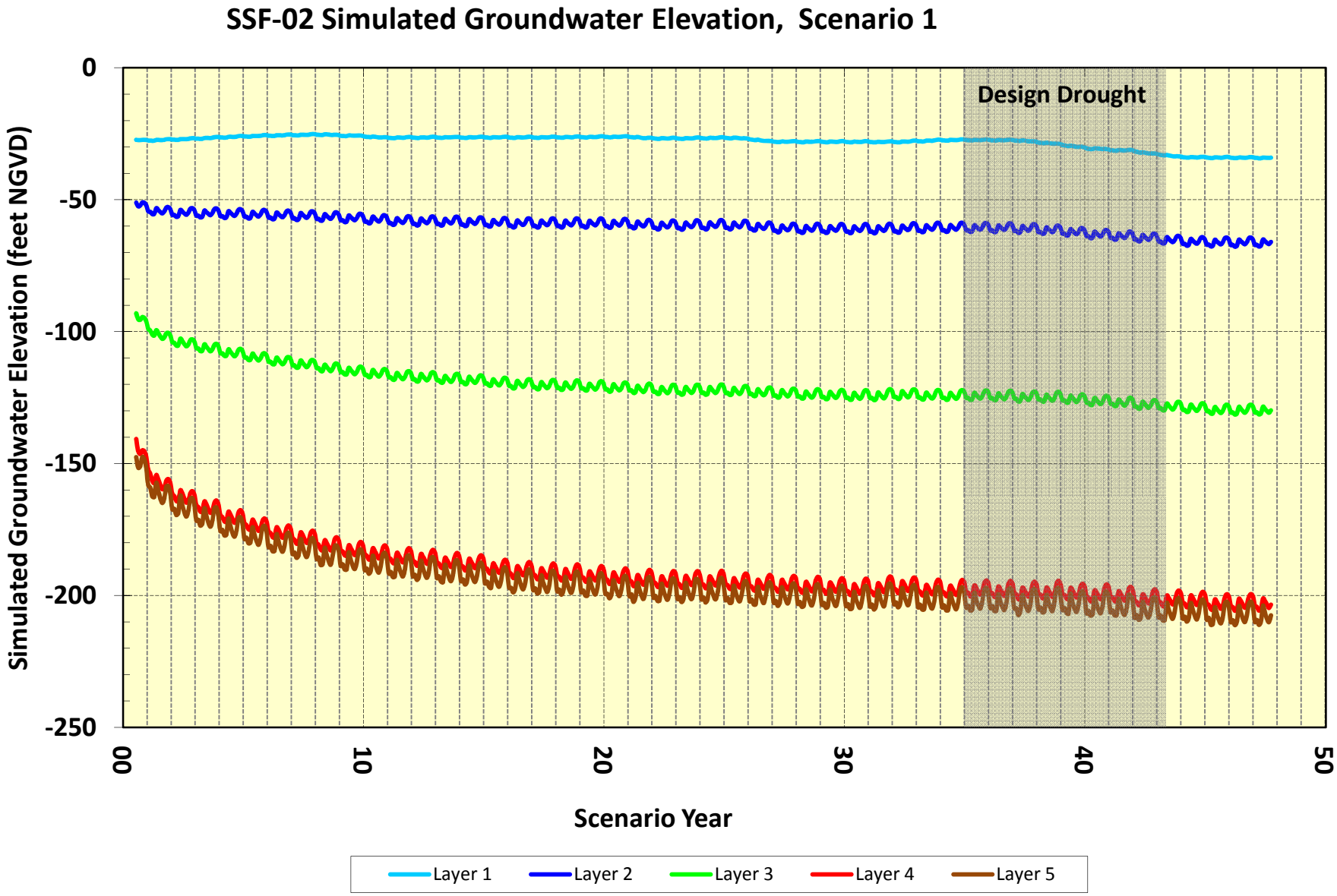

Harding Park Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

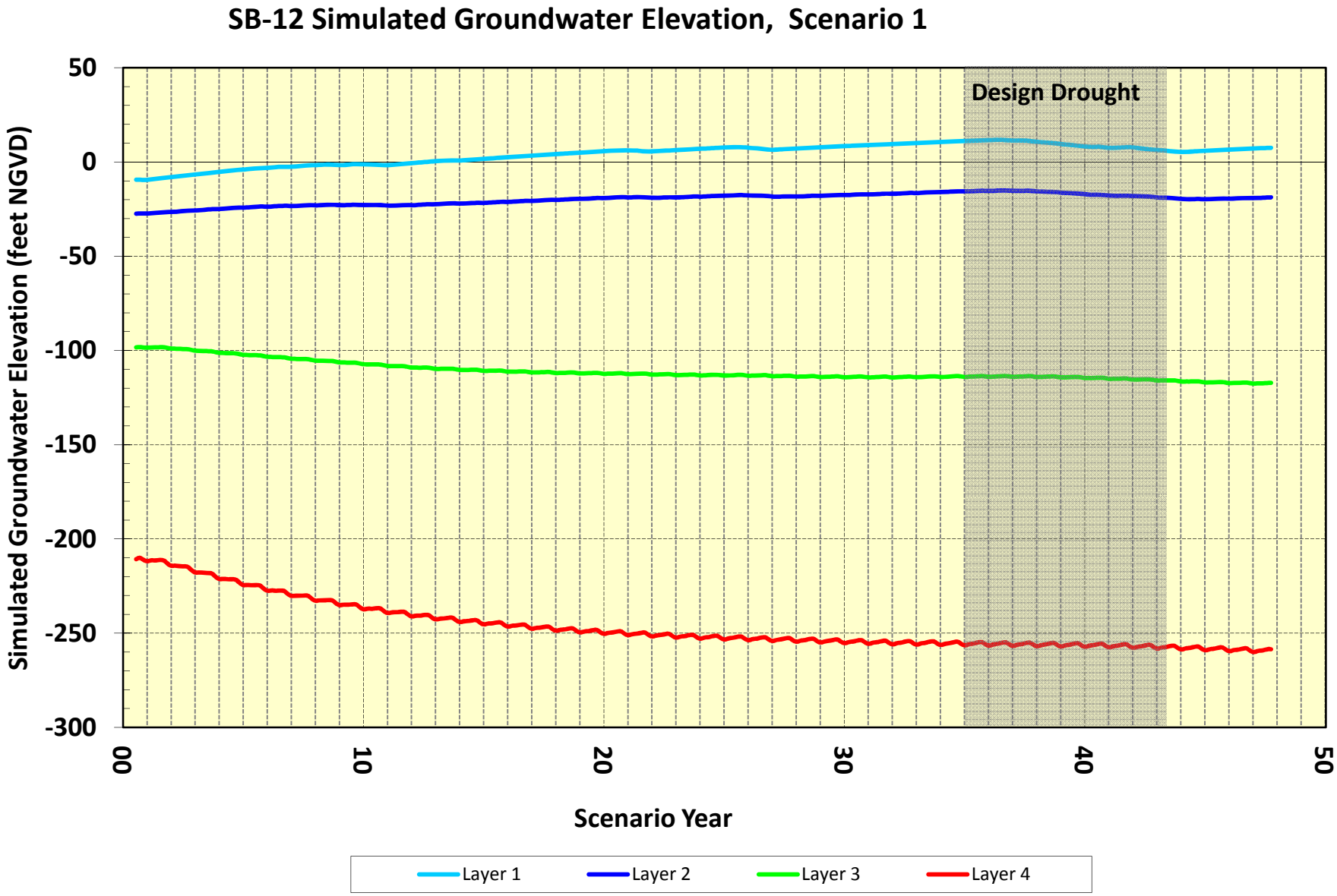

Olympic-MW Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
-100
-120
-140
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


DC-3 Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

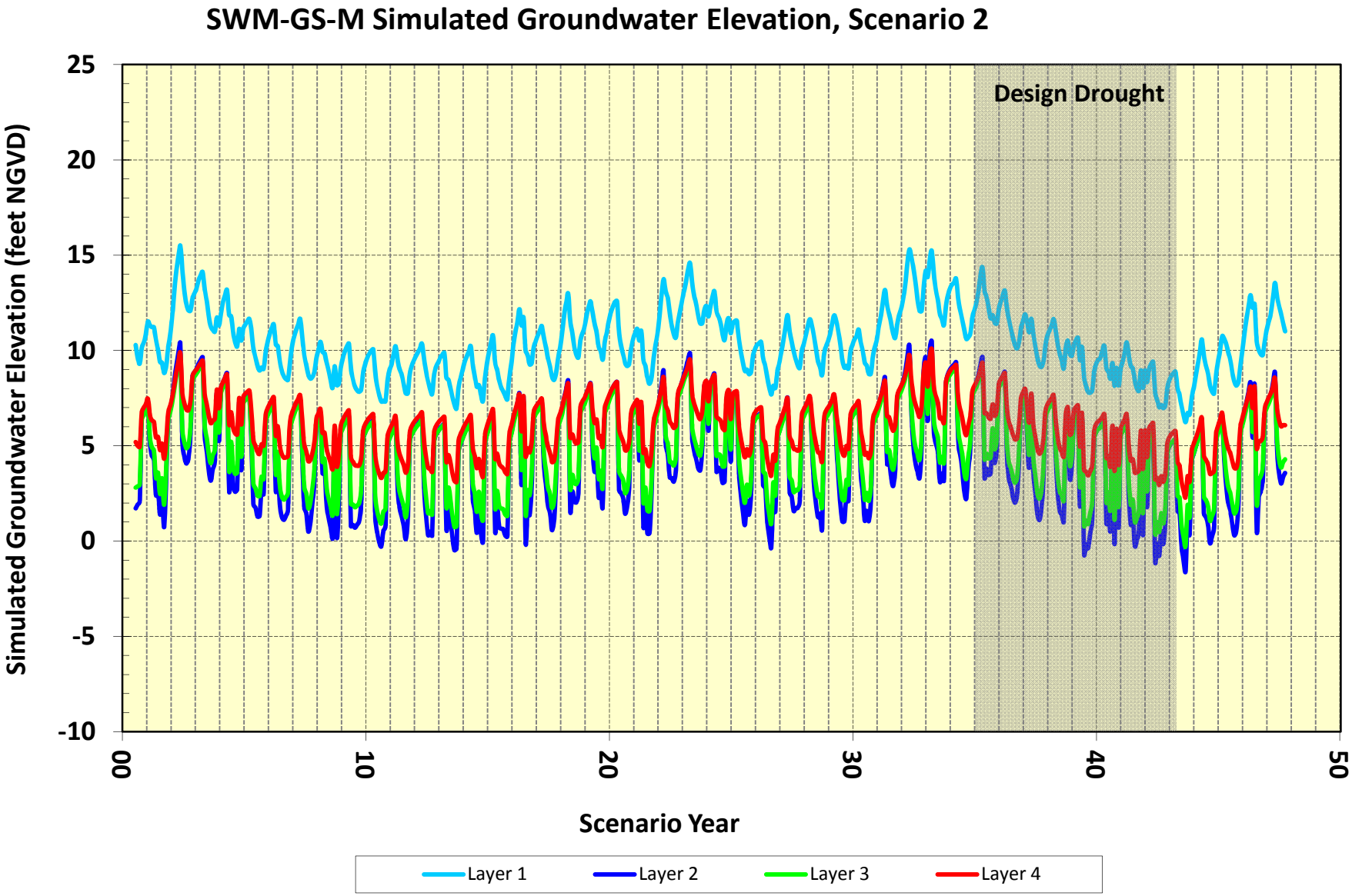

DC-A-St Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


Cyp_Lawn_2 Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
-30
-60
-90
-120
-150
-180
-210
-240
-270
-300
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

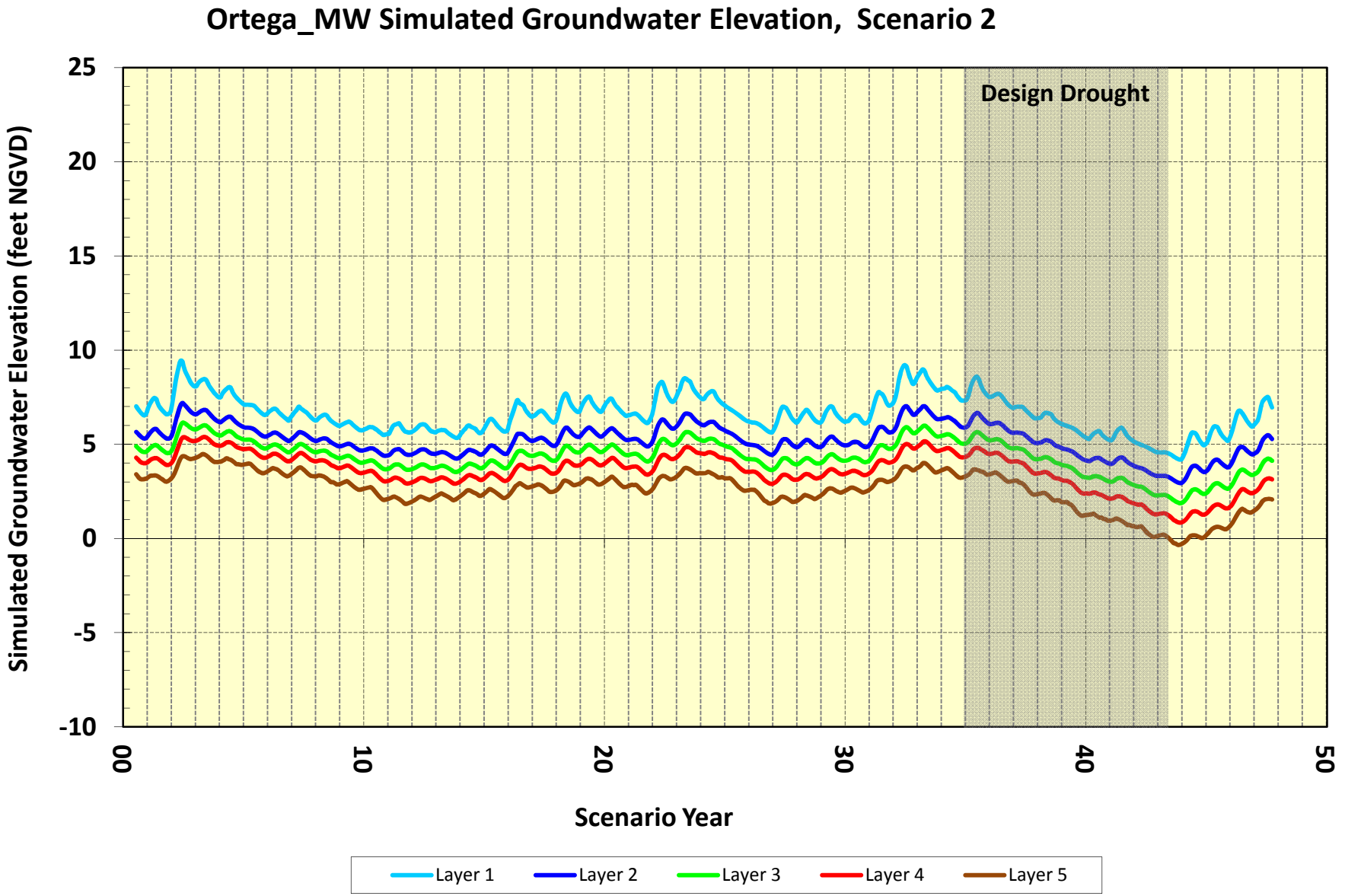

SSF-02 Simulated Groundwater Elevation, Scenario 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

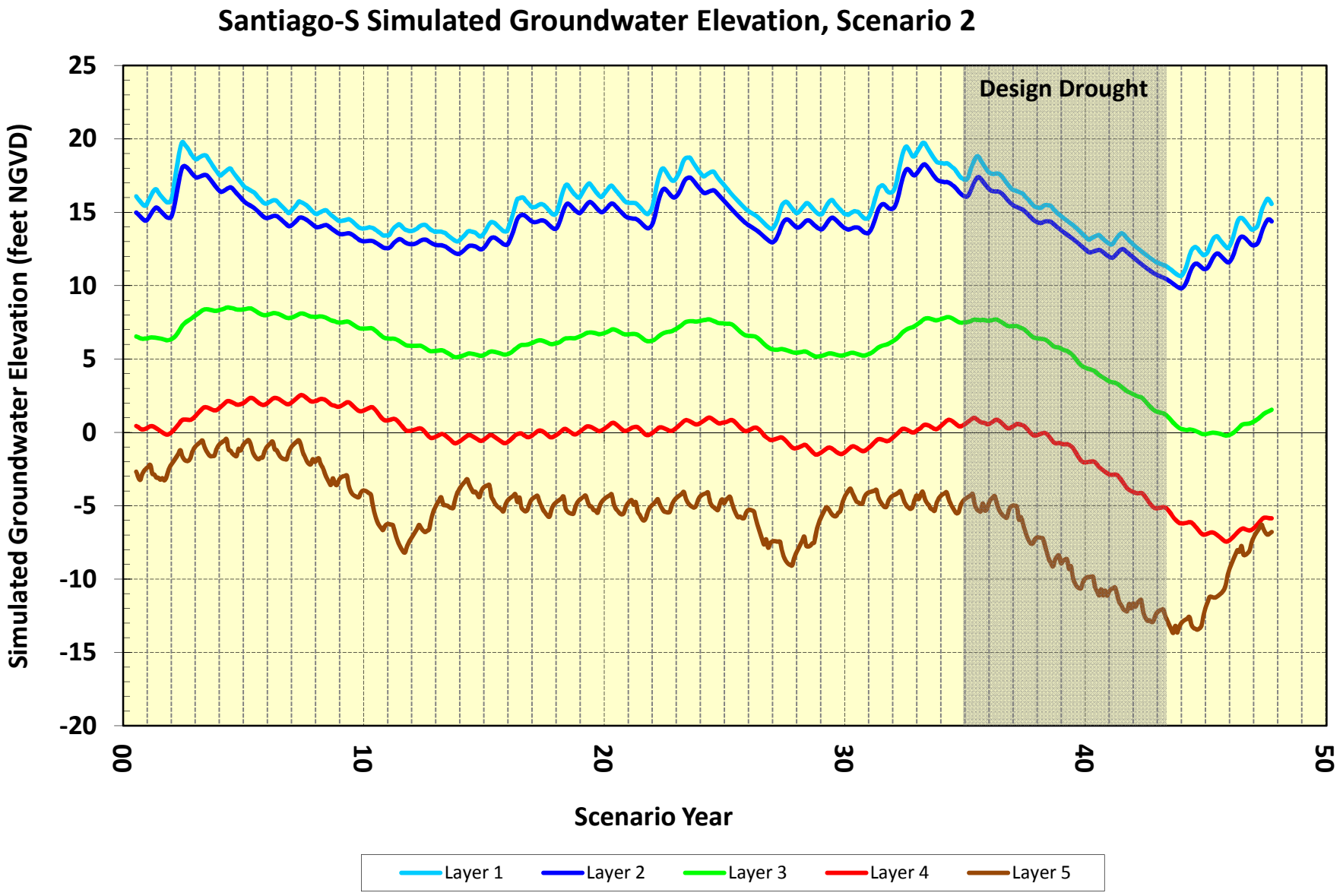


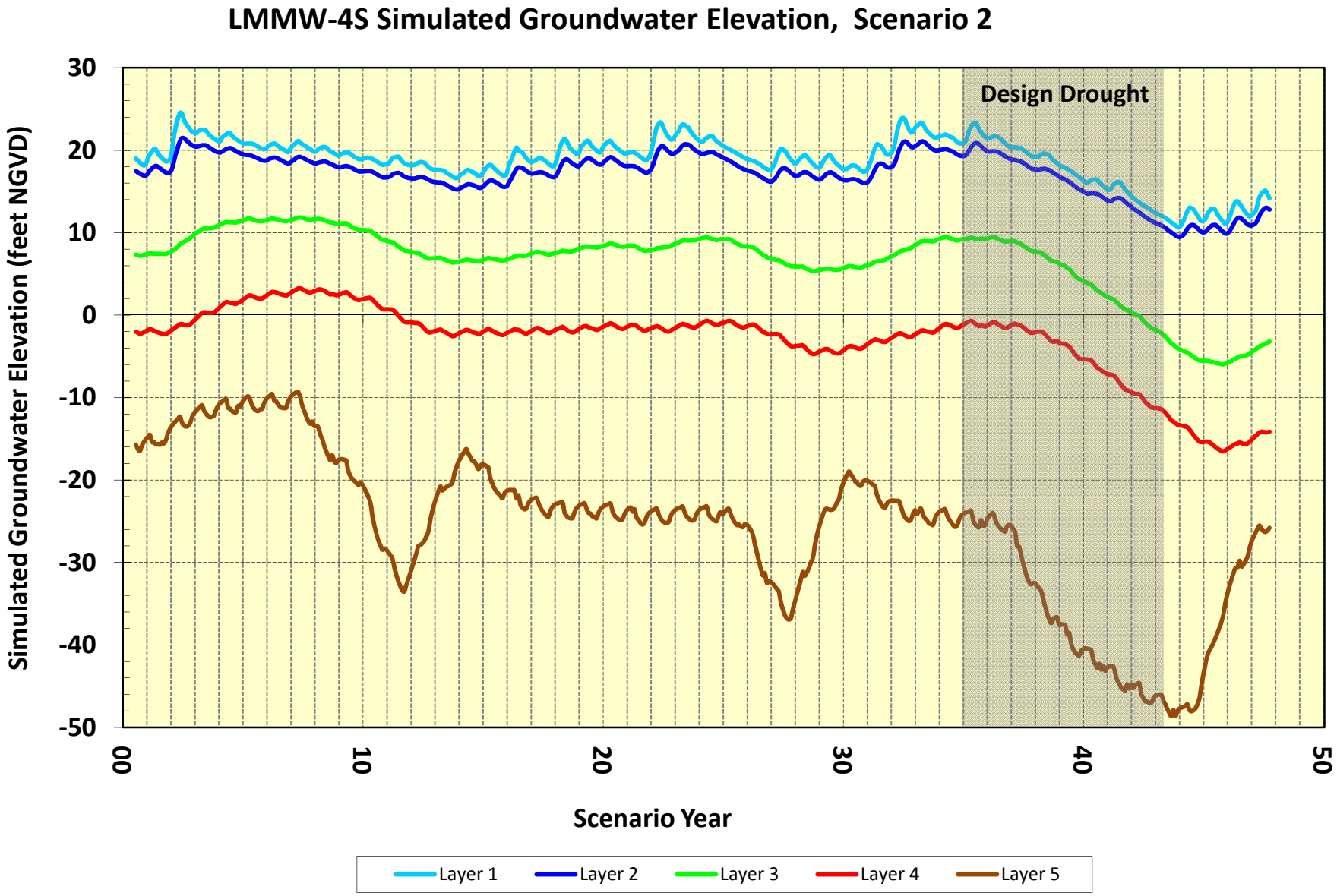
Note: At the location of SB-12, the model does not contain Model Layer 5.

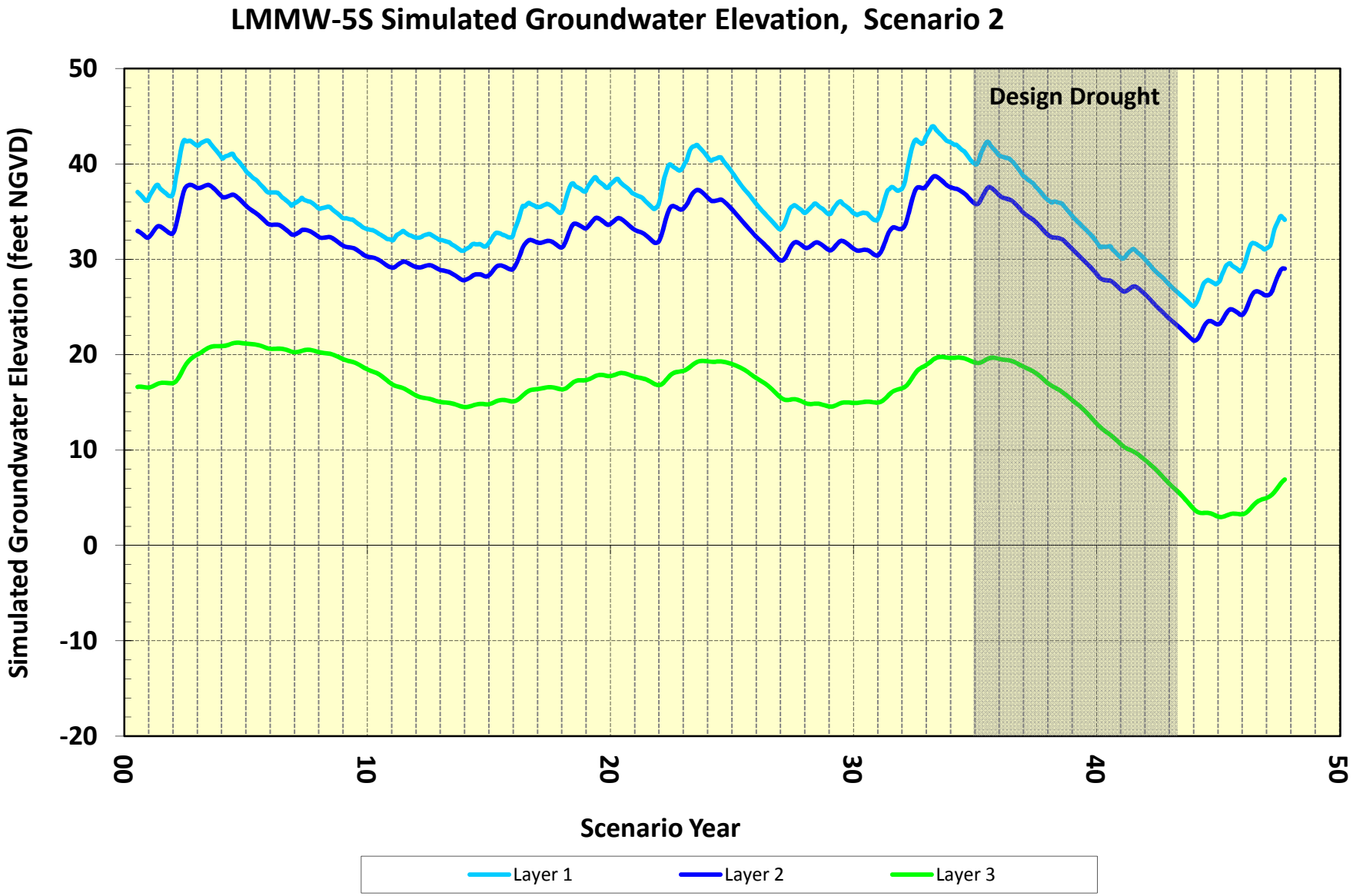


Note: At the location of SWM-GS-M, the model does not contain Model Layer 5.

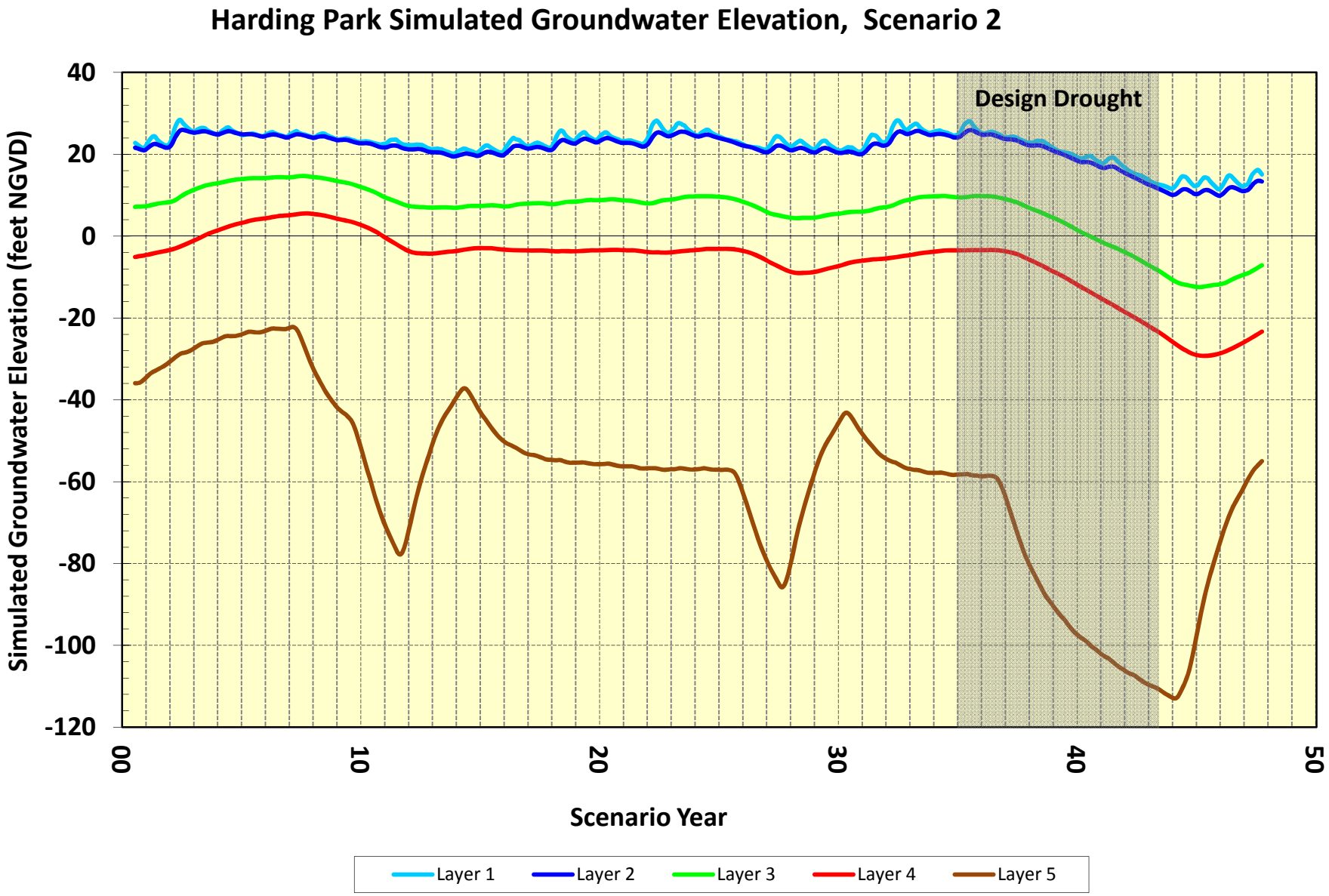

Ortega_MW Simulated Groundwater Elevation, Scenario 2
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

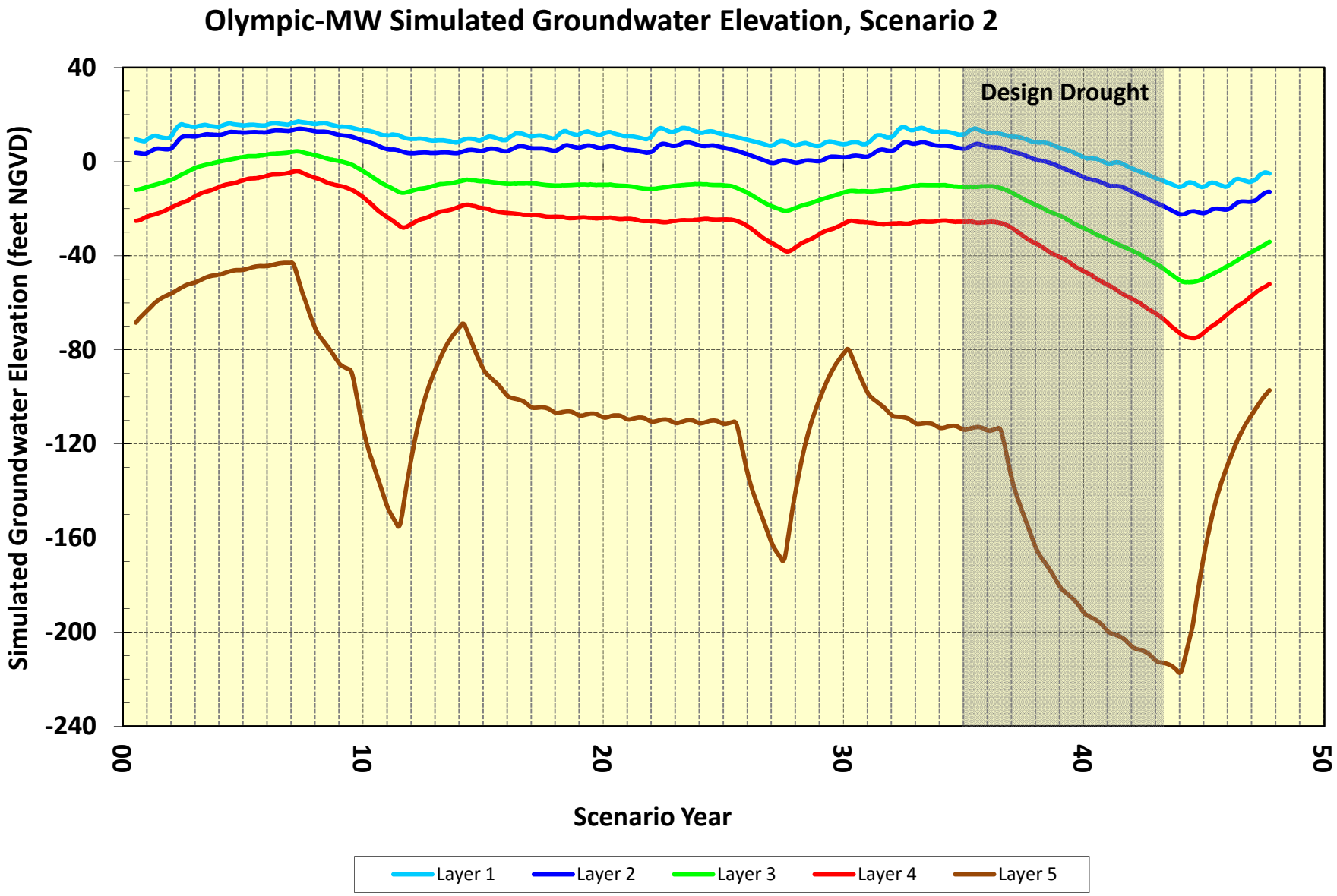

Santiago-S Simulated Groundwater Elevation, Scenario 2
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
-15
-20
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

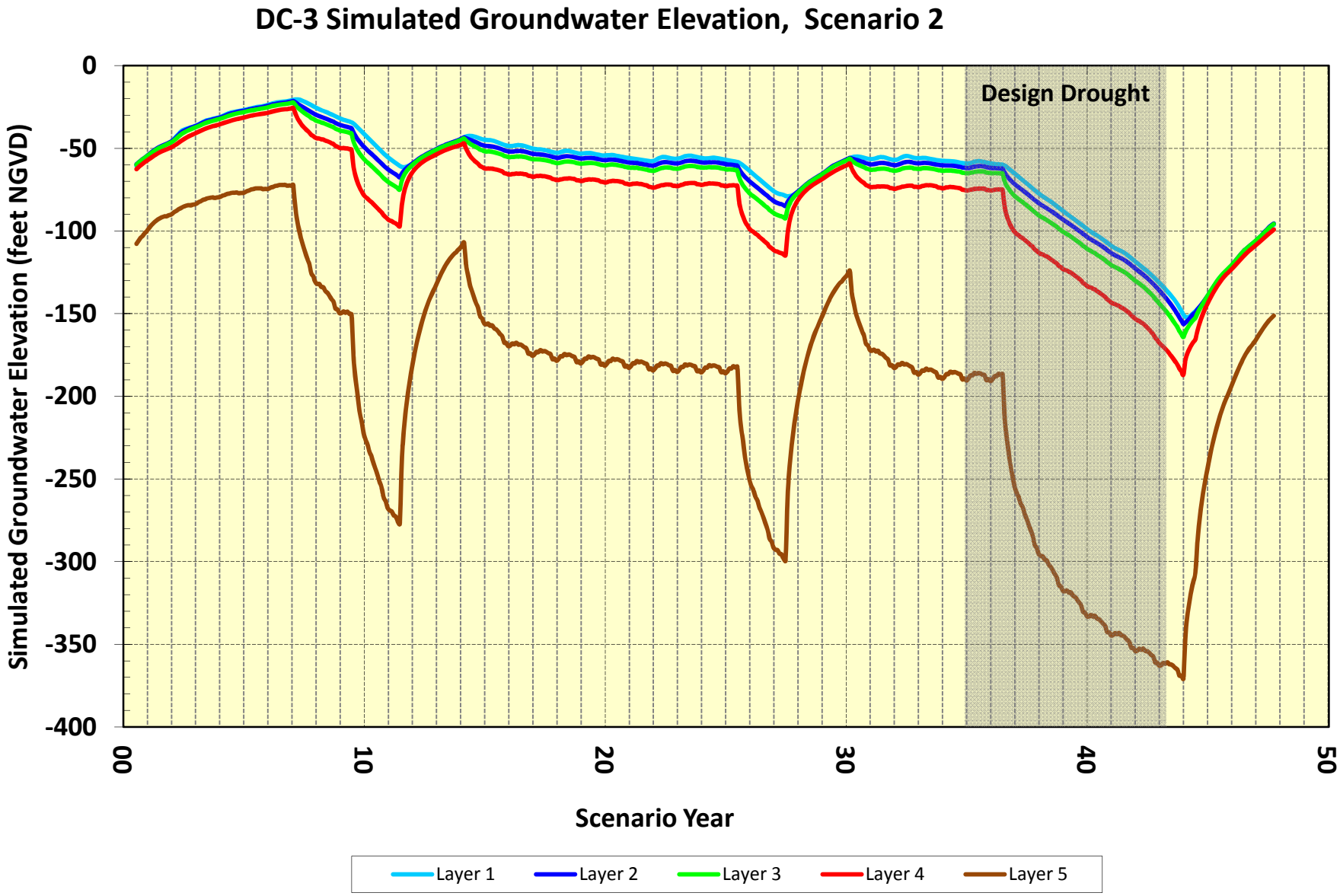

LMMW-4S Simulated Groundwater Elevation, Scenario 2
Design Drought
Simulated Groundwater Elevation (feet NGVD)
30
20
10
0
-10
-20
-30
-40
-50
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

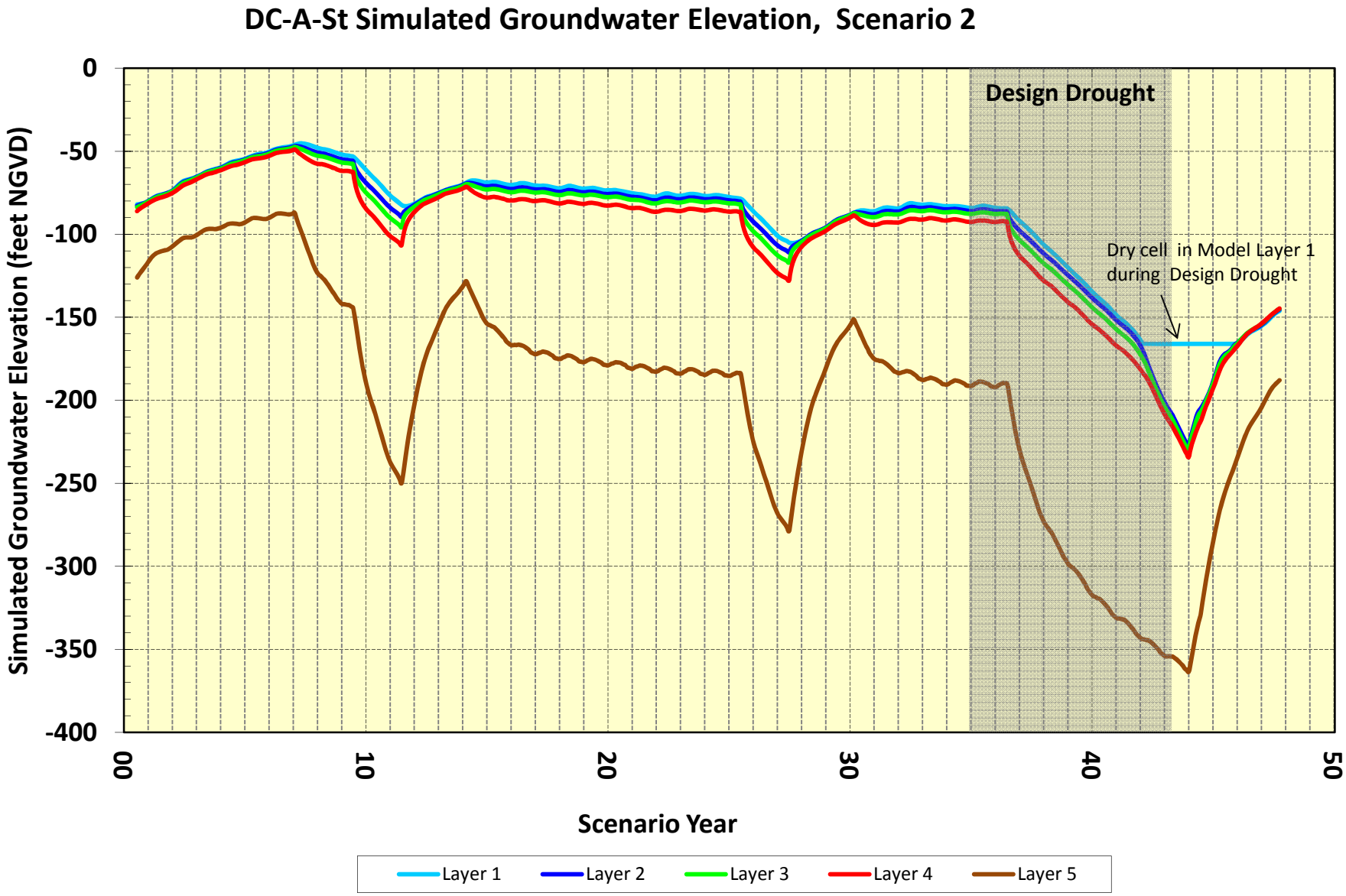


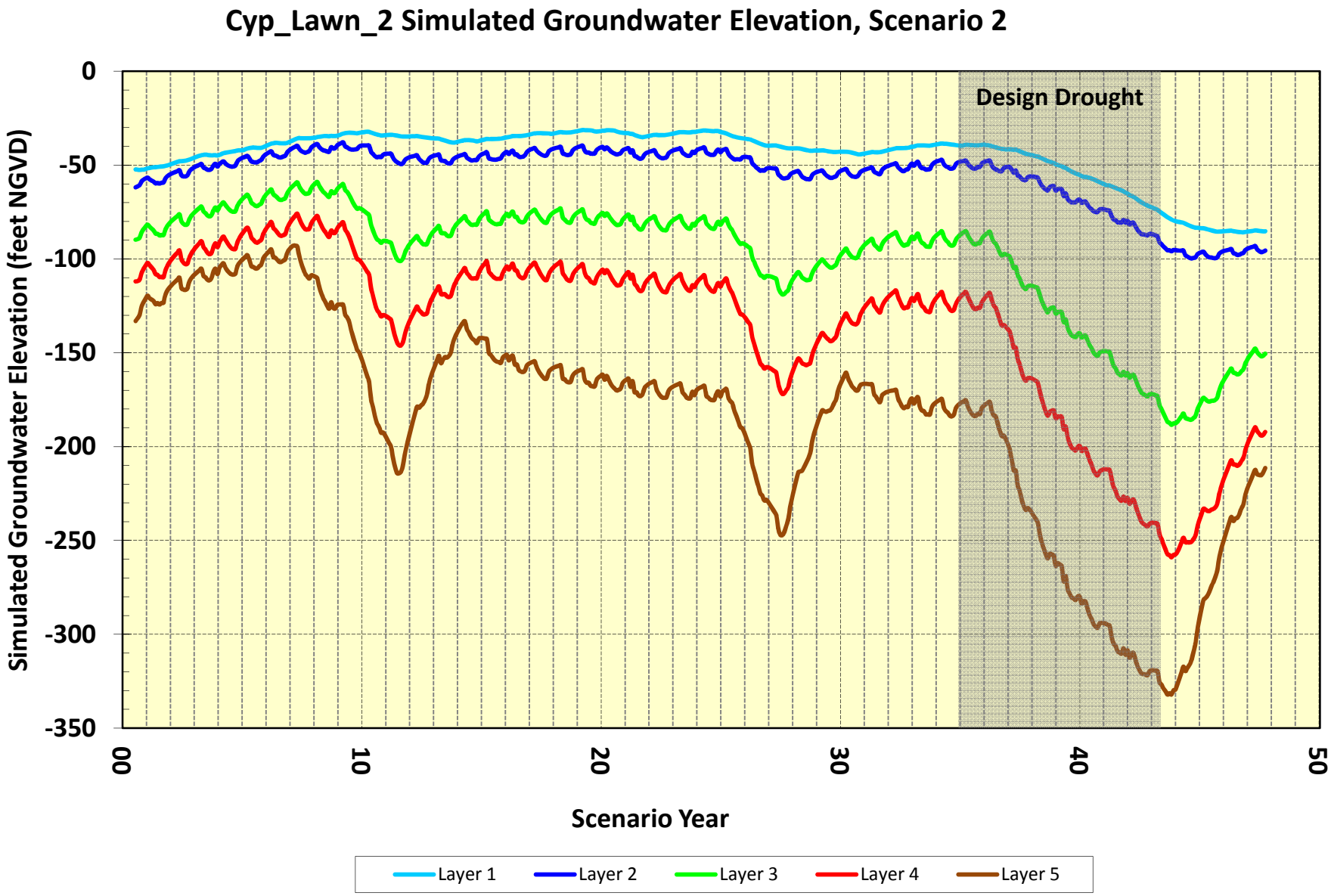
Note: At the location of LMMW-5S, the model does not contain Model Layers 4 and 5.

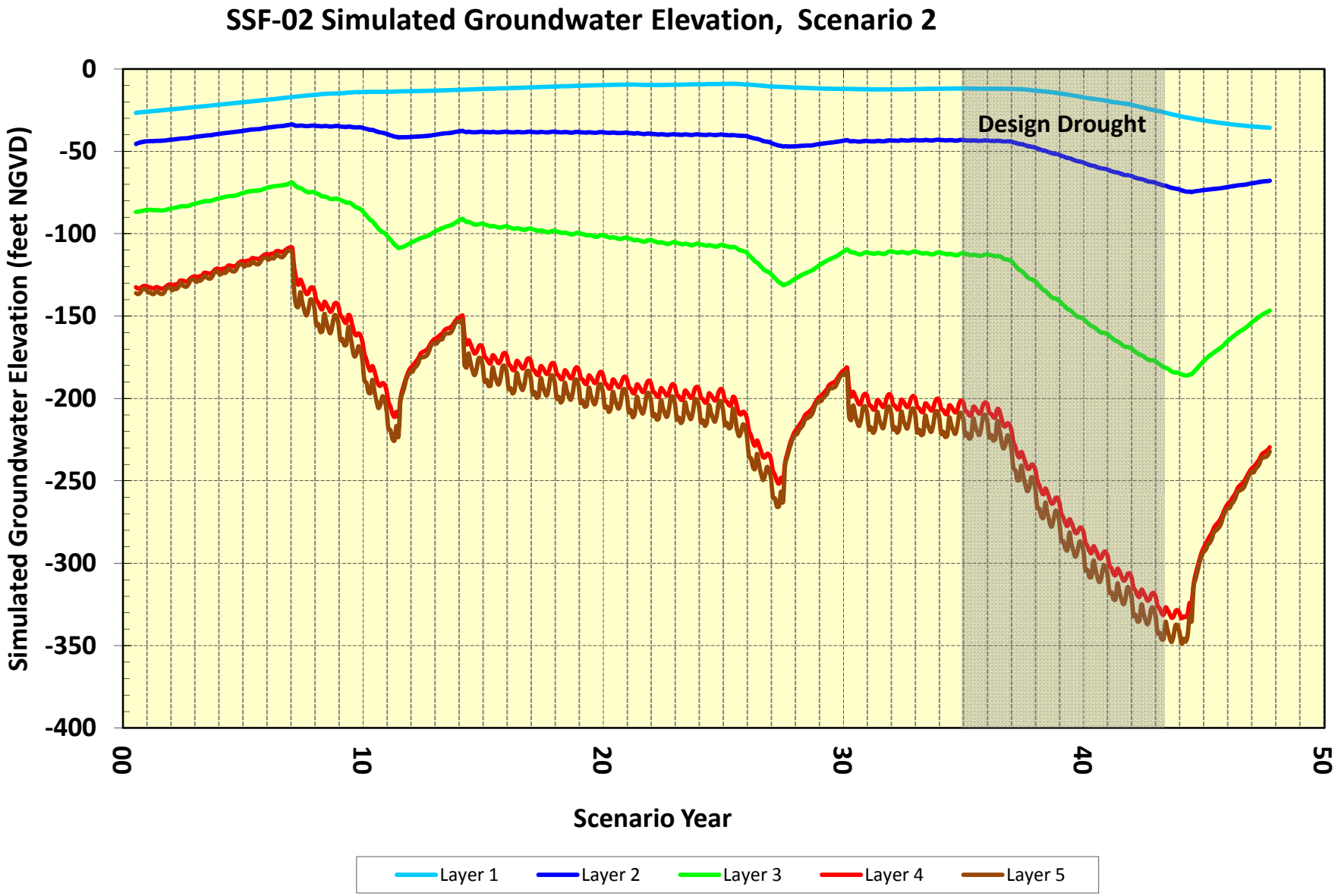

Harding Park Simulated Groundwater Elevation, Scenario 2
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
-100
-120
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

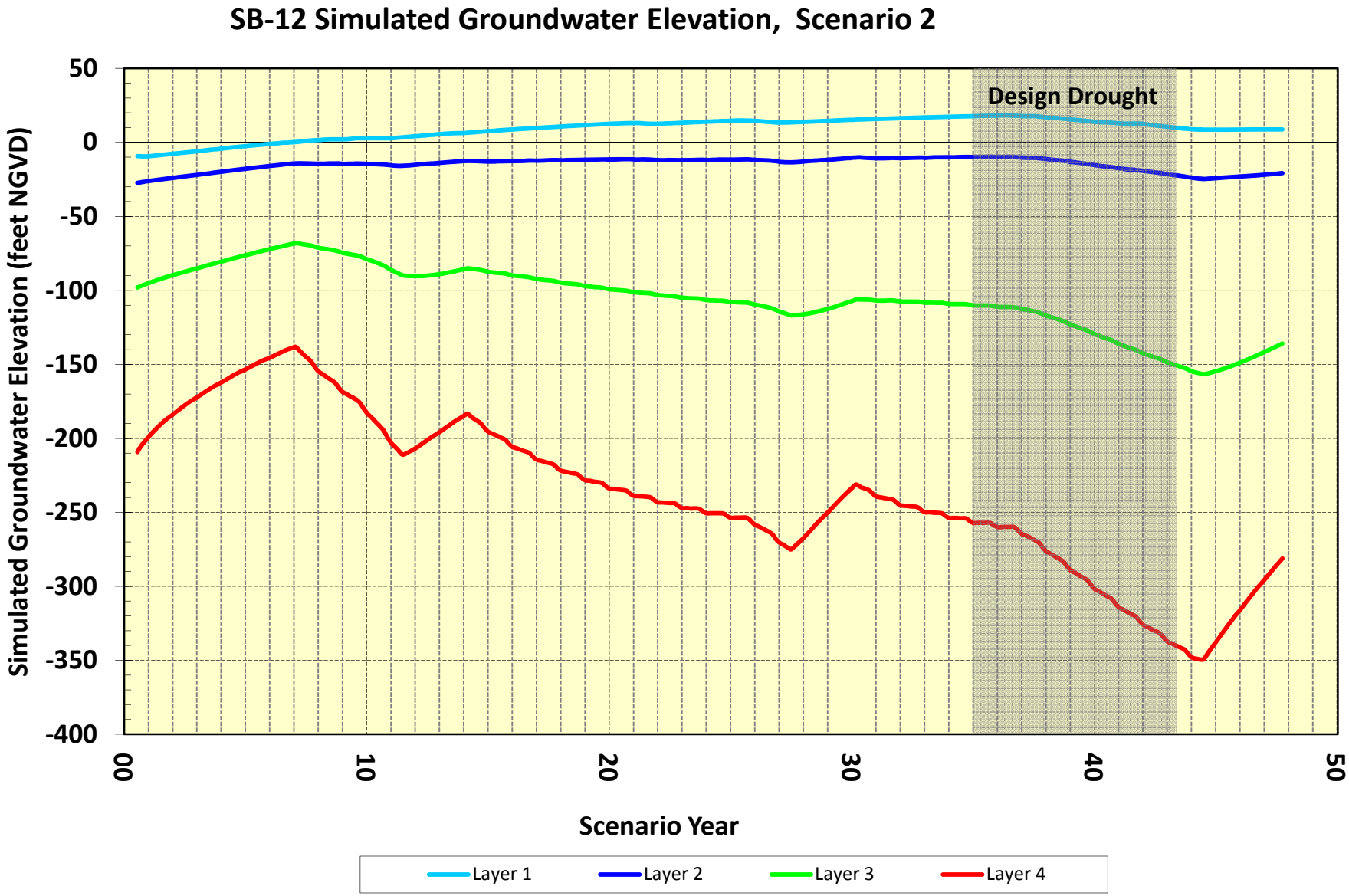

Olympic-MW Simulated Groundwater Elevation, Scenario 2
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
0
-40
-80
-120
-160
-200
-240
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


DC-3 Simulated Groundwater Elevation, Scenario 2
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
-400
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

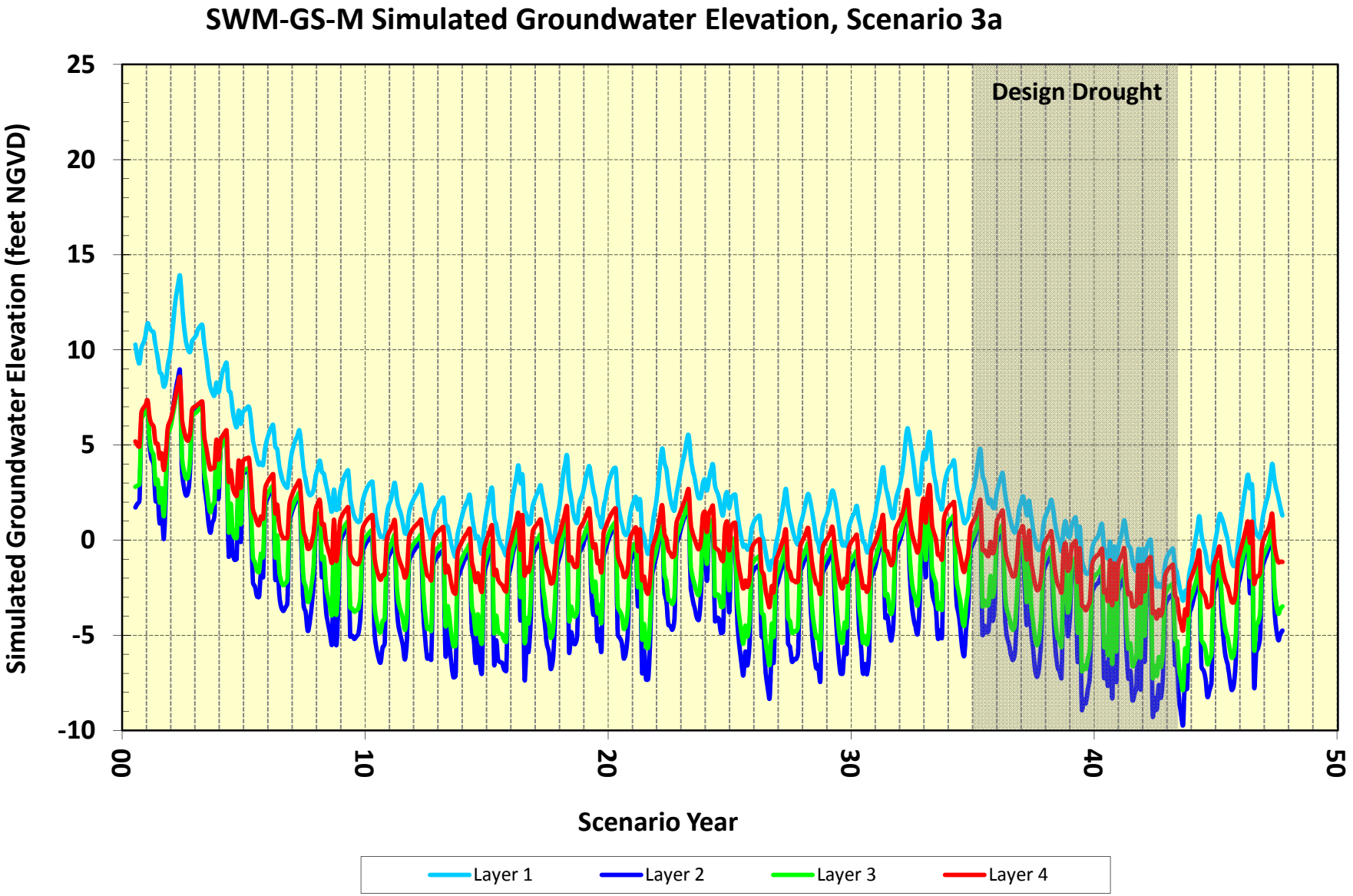

DC-A-St Simulated Groundwater Elevation, Scenario 2
Design Drought
Dry cell in Model Layer 1 during Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
-400
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


Cyp_Lawn_2 Simulated Groundwater Elevation, Scenario 2
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

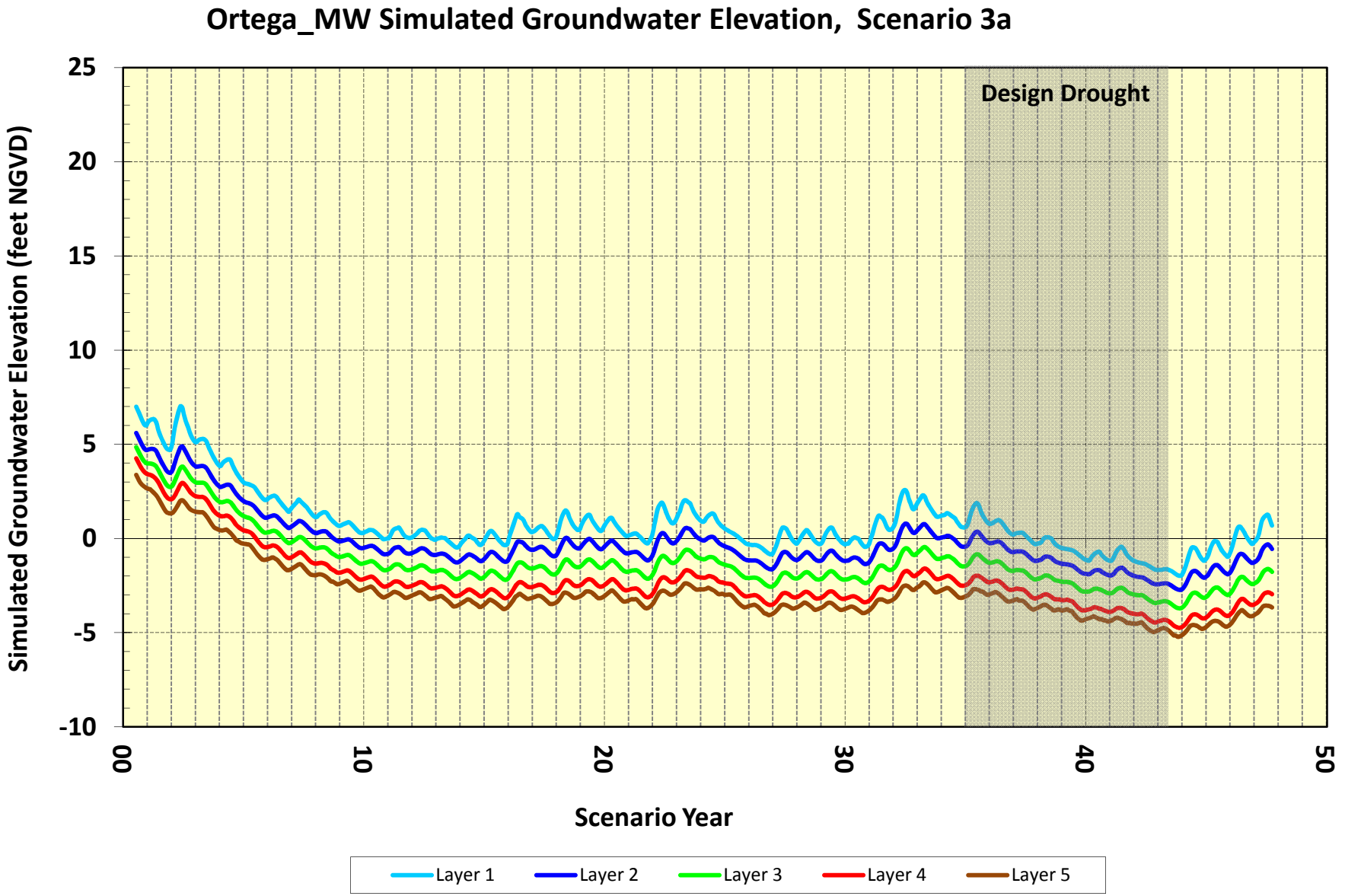

SSF-02 Simulated Groundwater Elevation, Scenario 2
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
-400
Design Drought
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

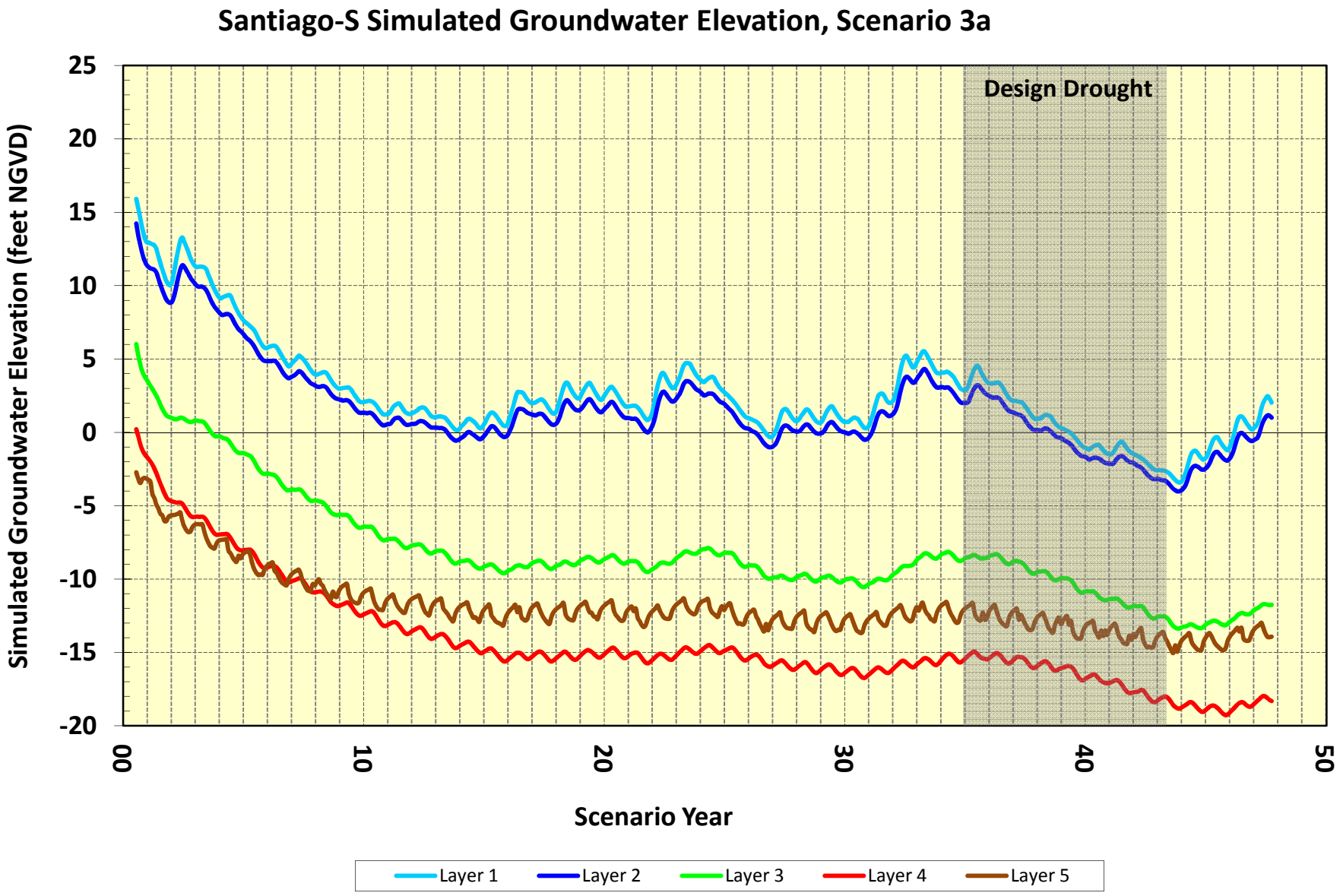


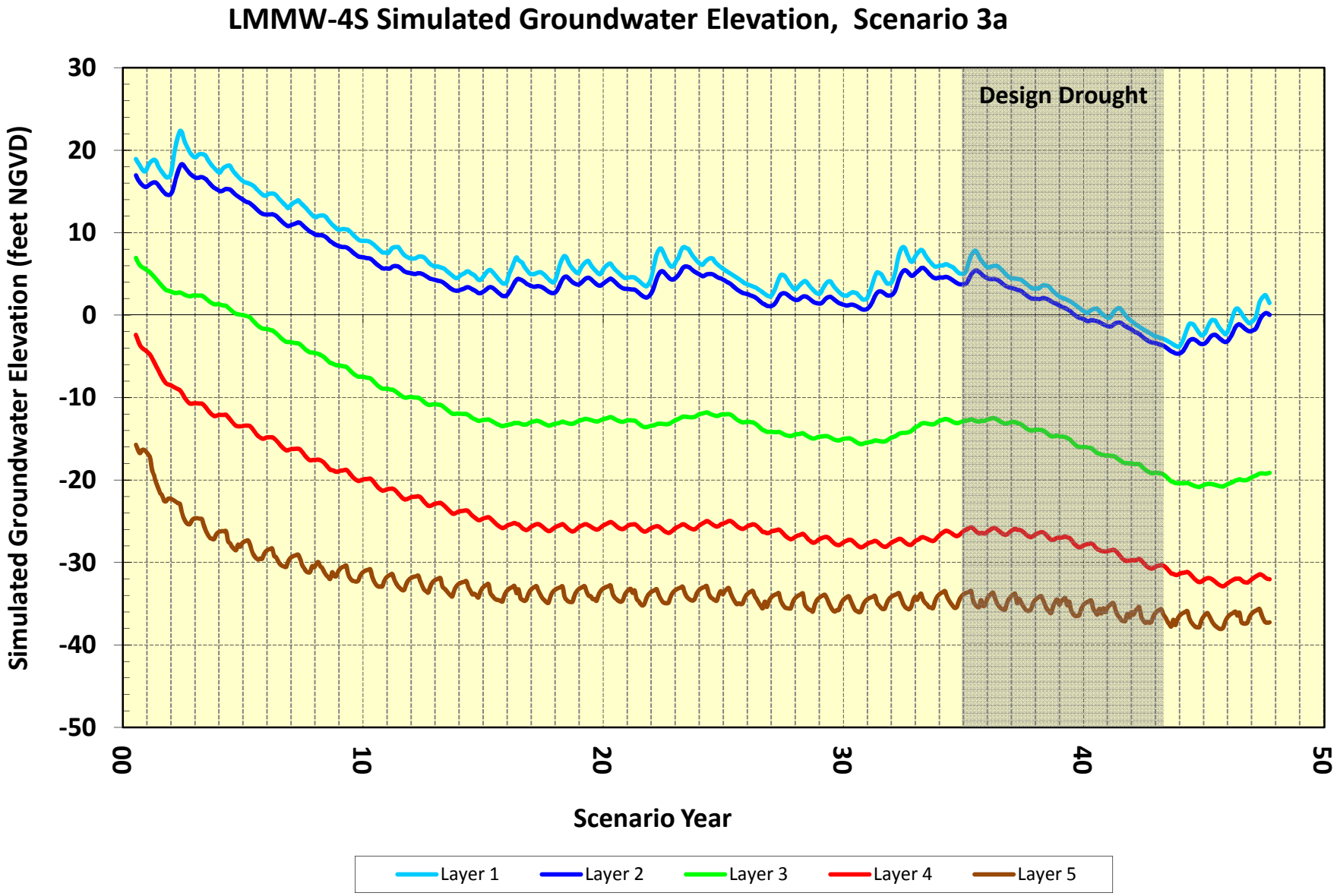
Note: At the location of SB-12, the model does not contain Model Layer 5.



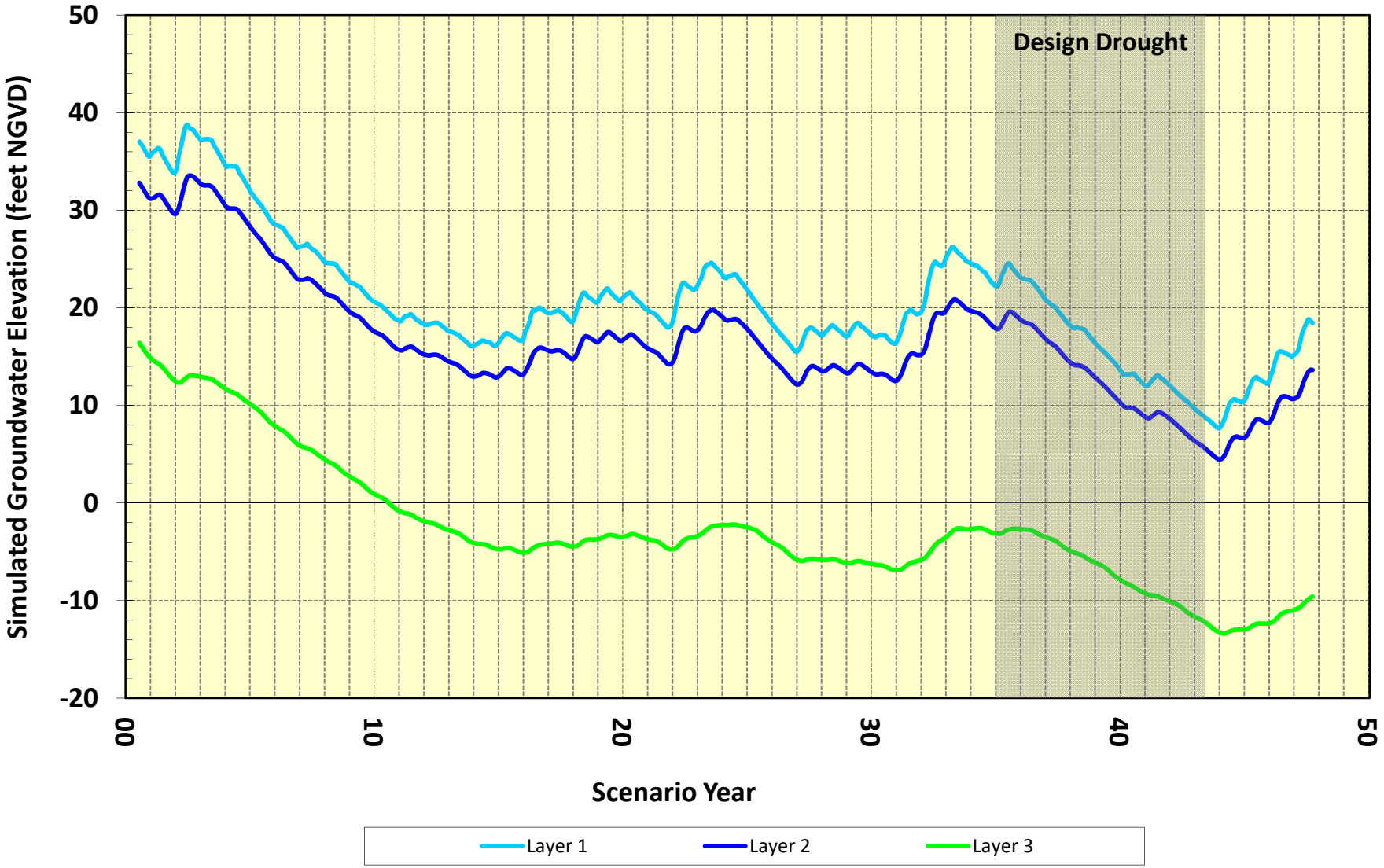
Note: At the location of SWM-GS-M, the model does not contain Model Layer 5.


Ortega_MW Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

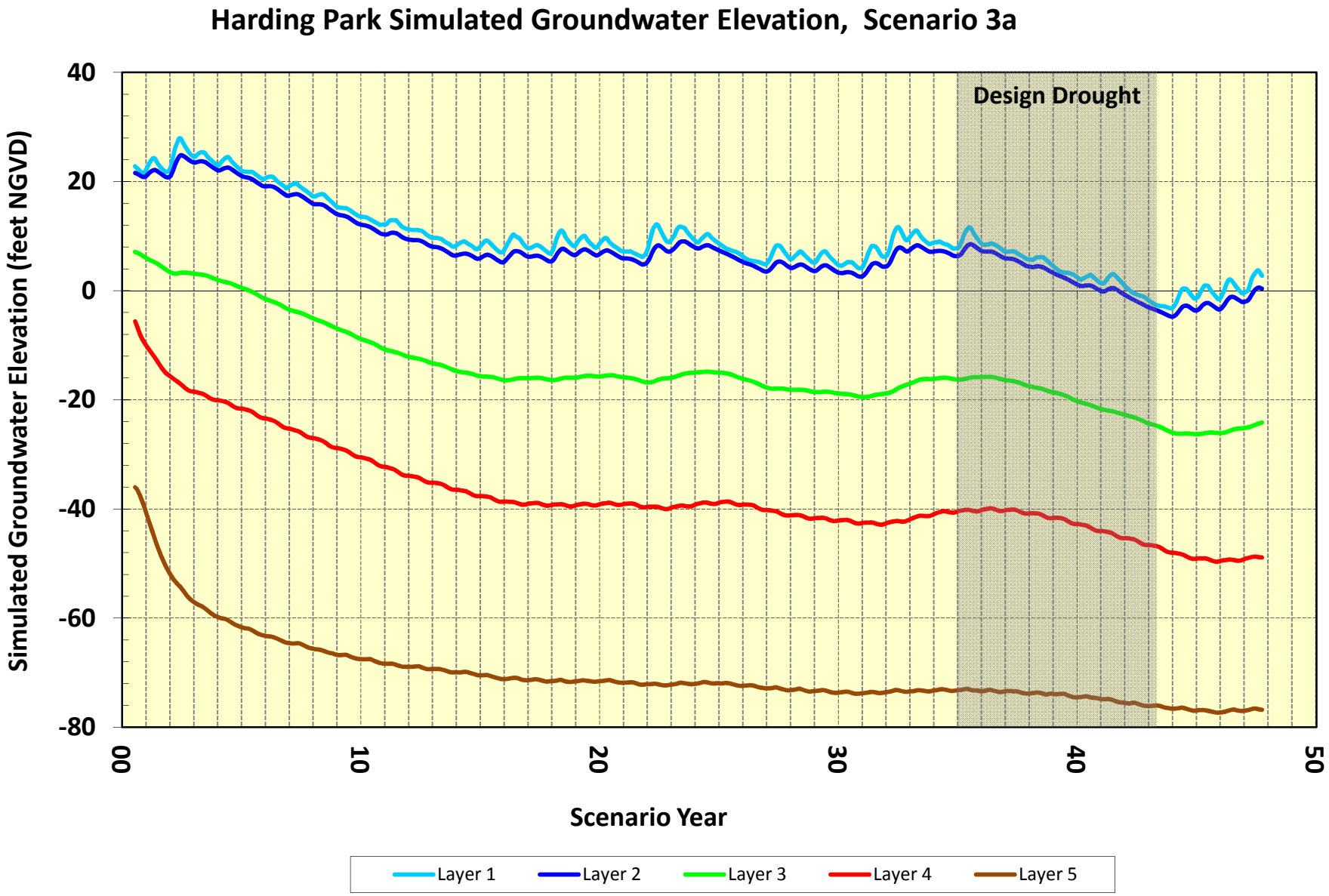

Santiago-S Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
-15
-20
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

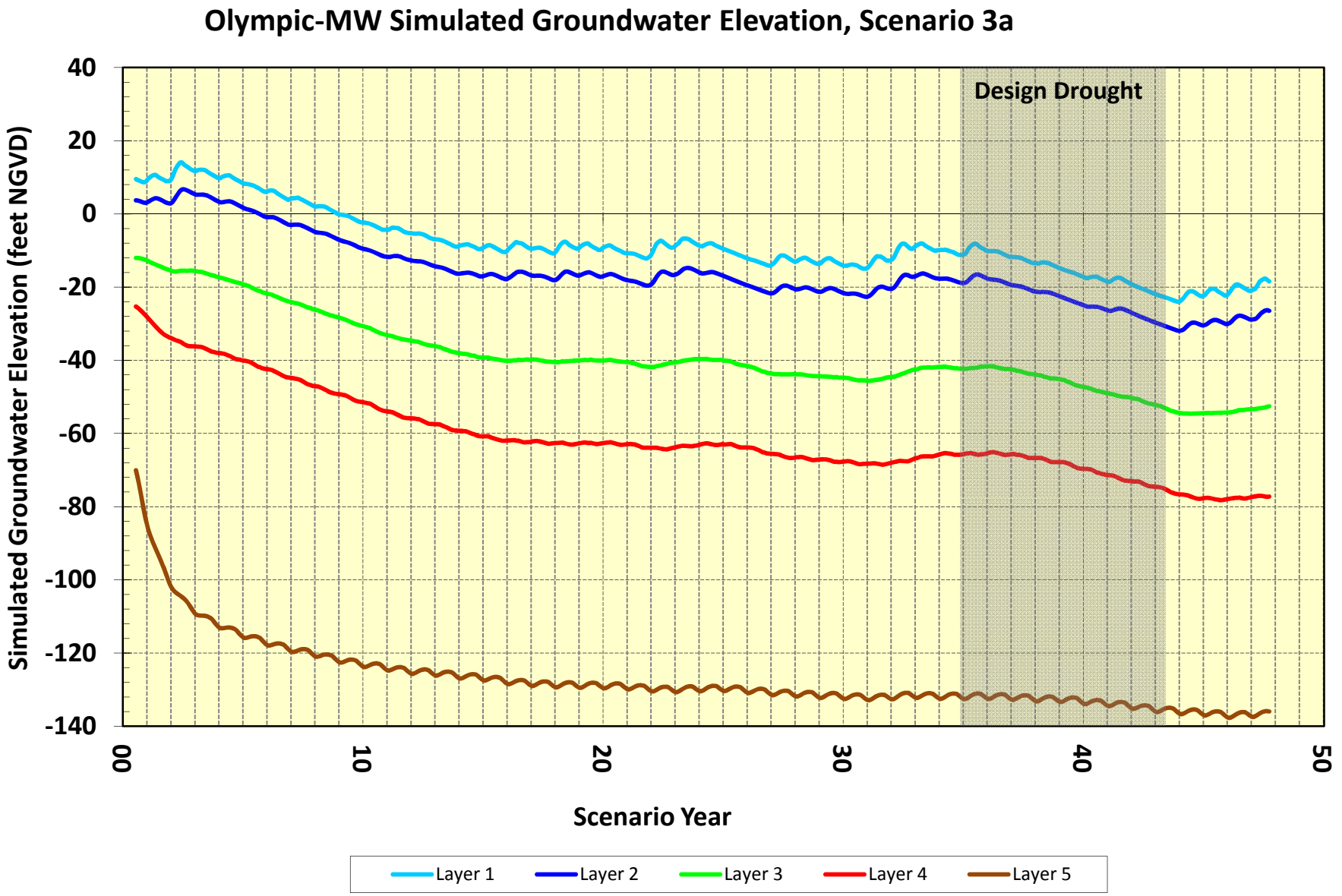

LMMW-4S Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
30
20
10
0
-10
-20
-30
-40
-50
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

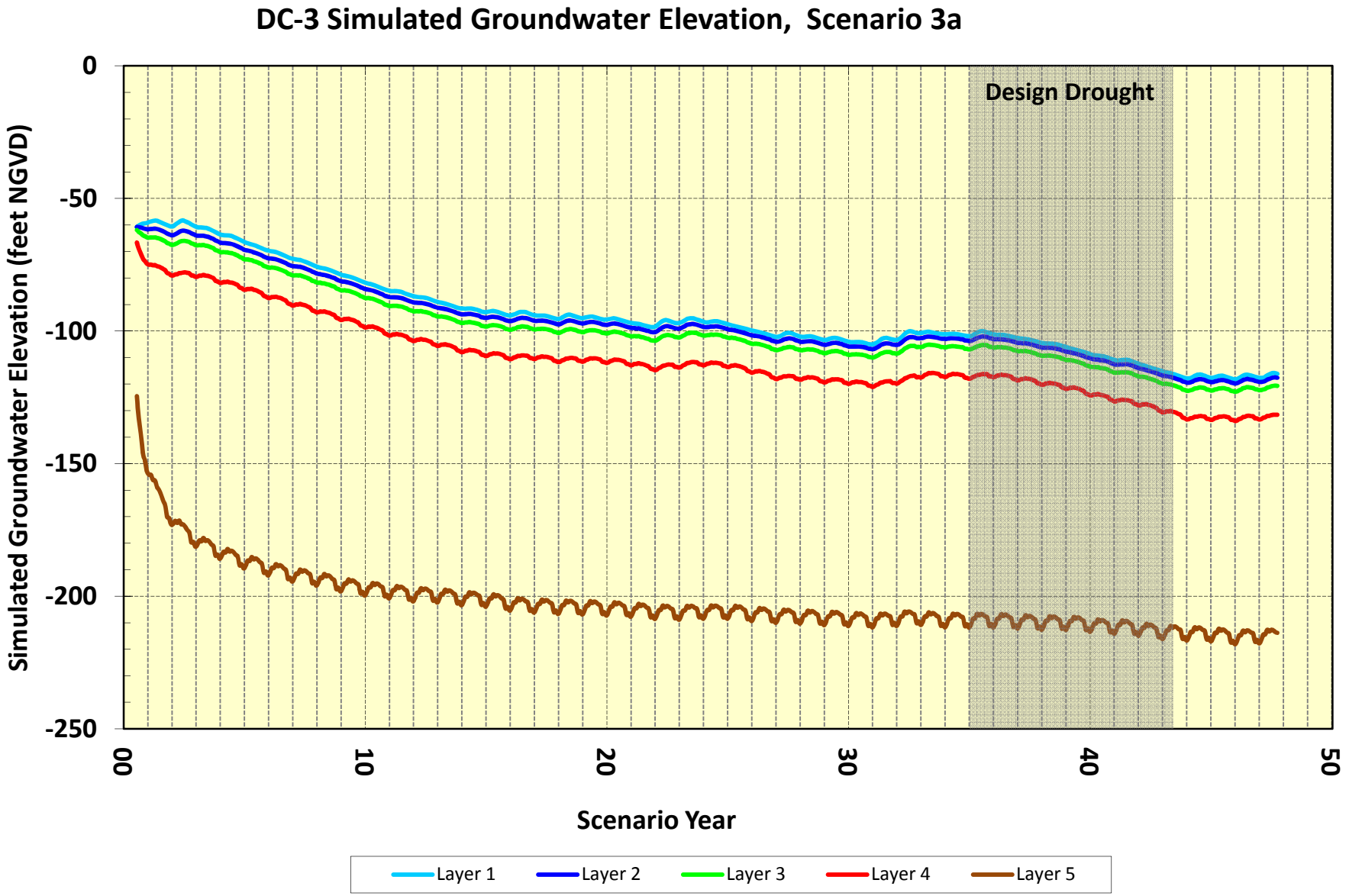
LMMW-5S Simulated Groundwater Elevation, Scenario 3a

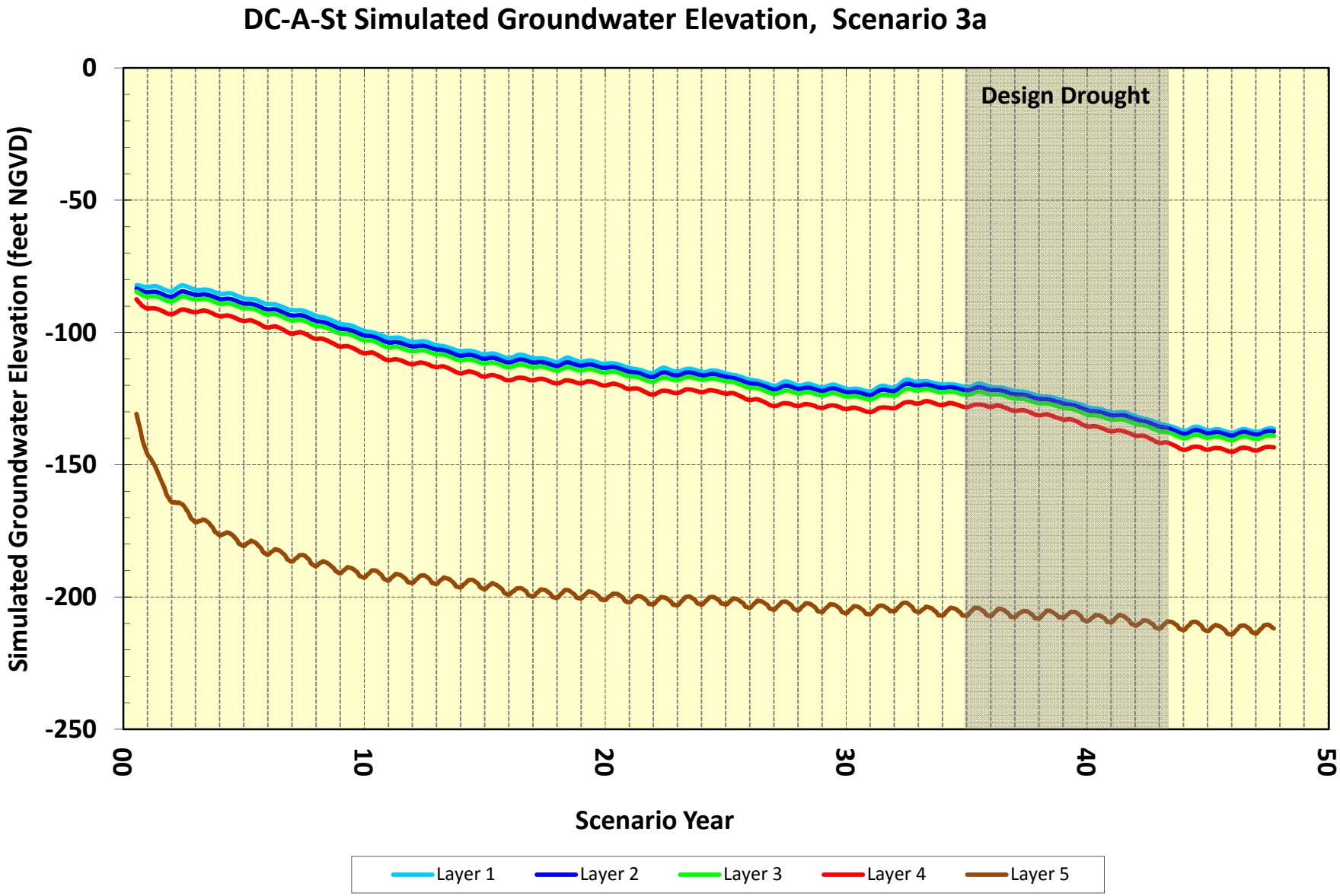


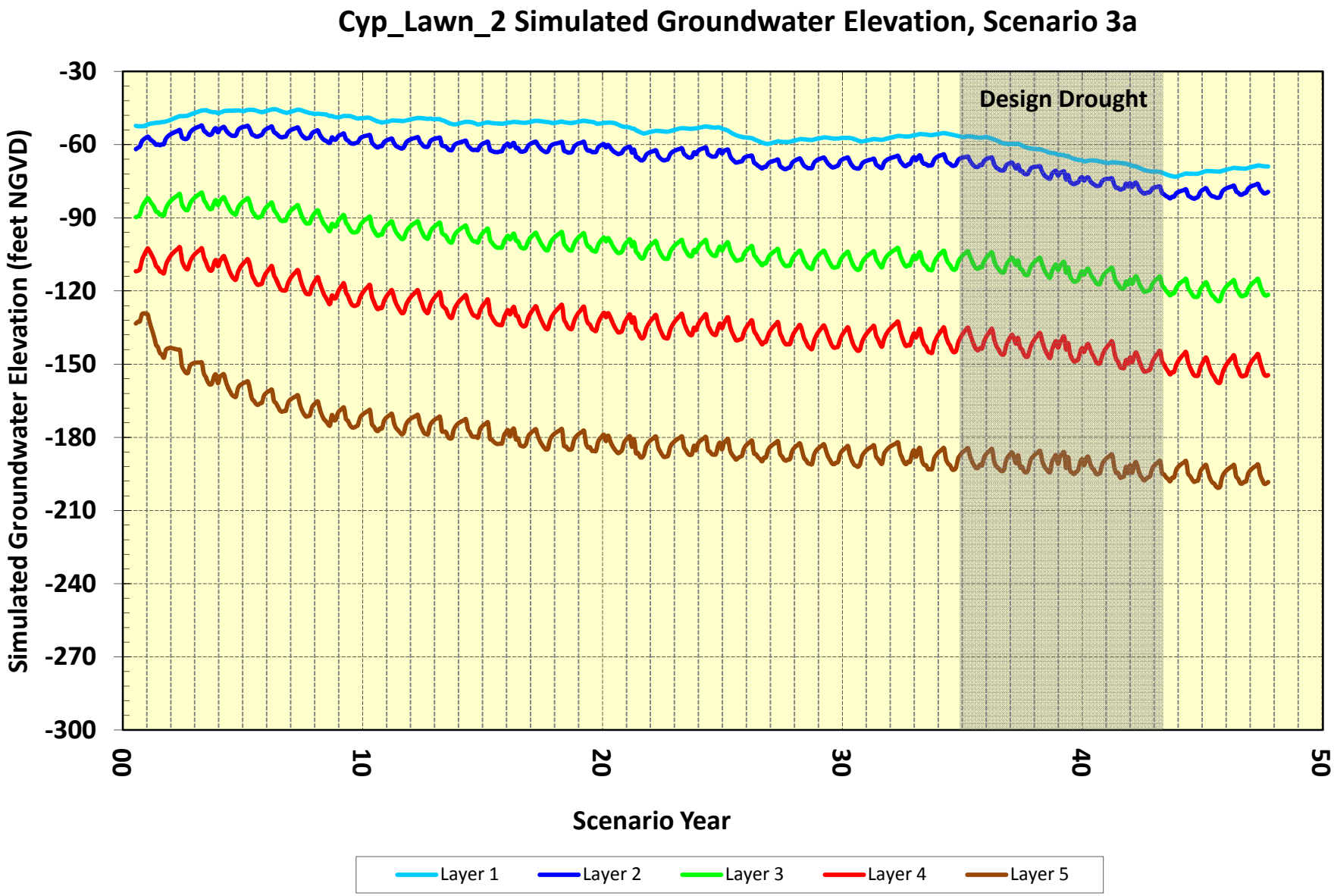
Note: At the location of LMMW-5S, the model does not contain Model Layers 4 and 5.

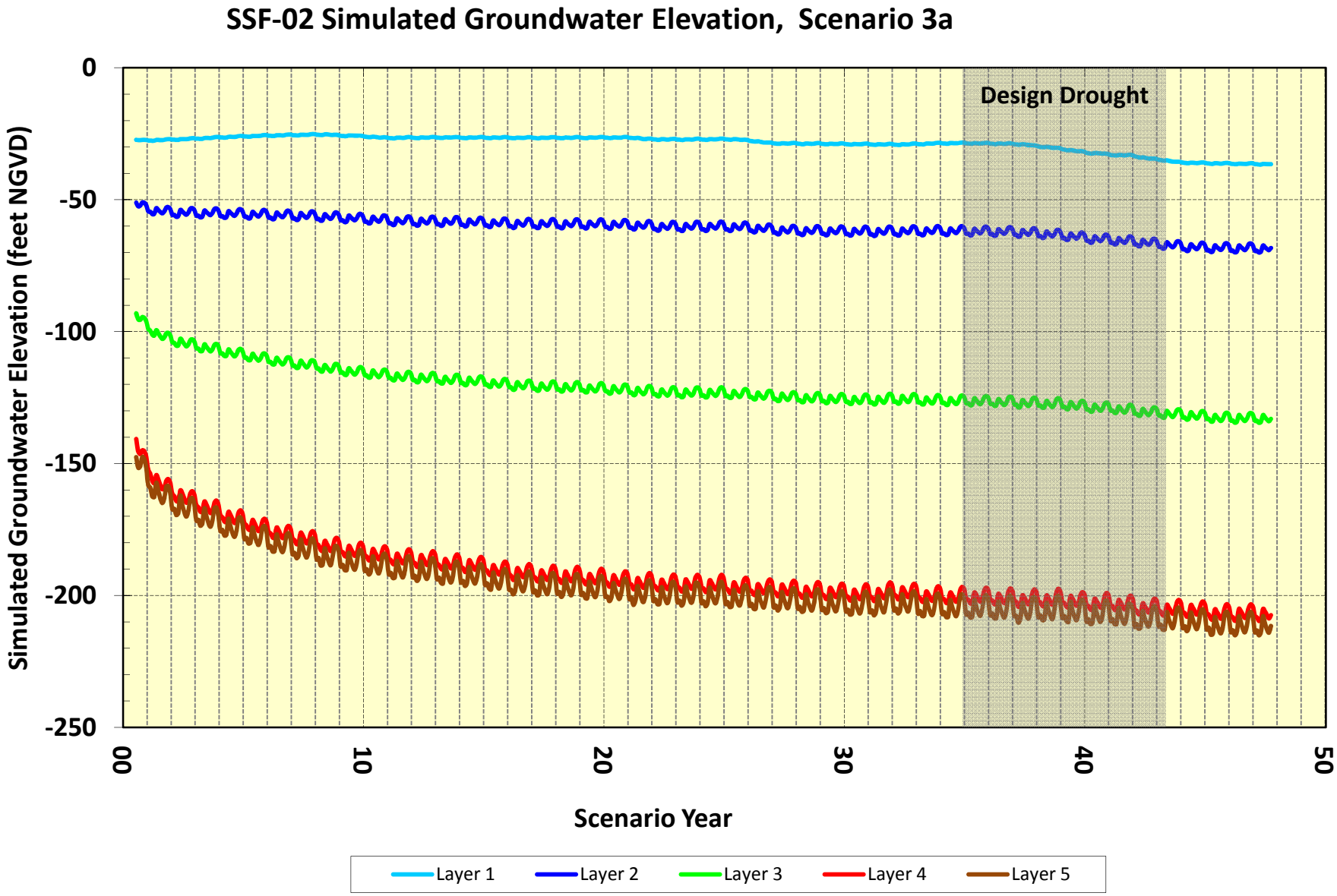

Harding Park Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

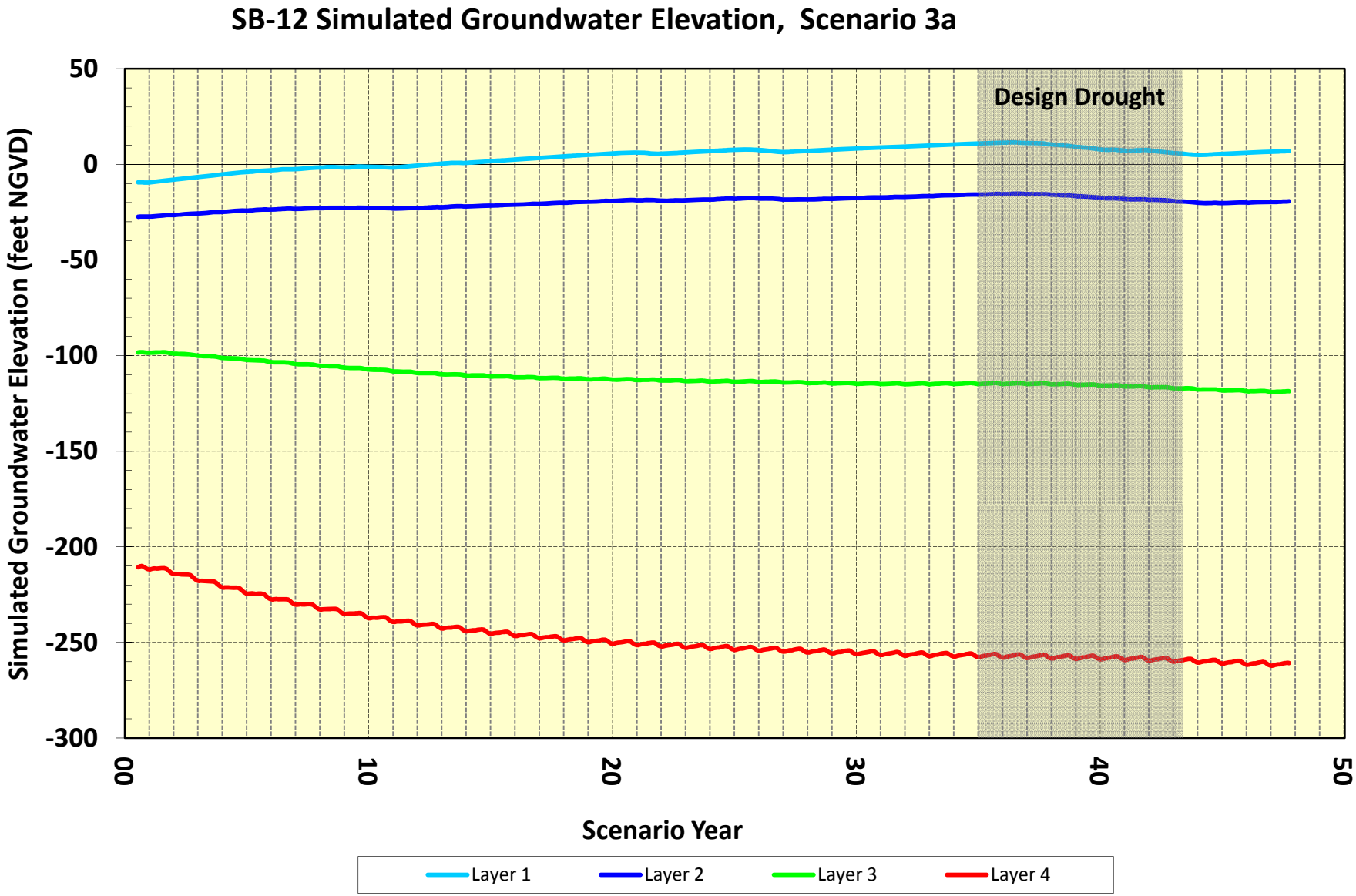

Olympic-MW Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
-100
-120
-140
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


DC-3 Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

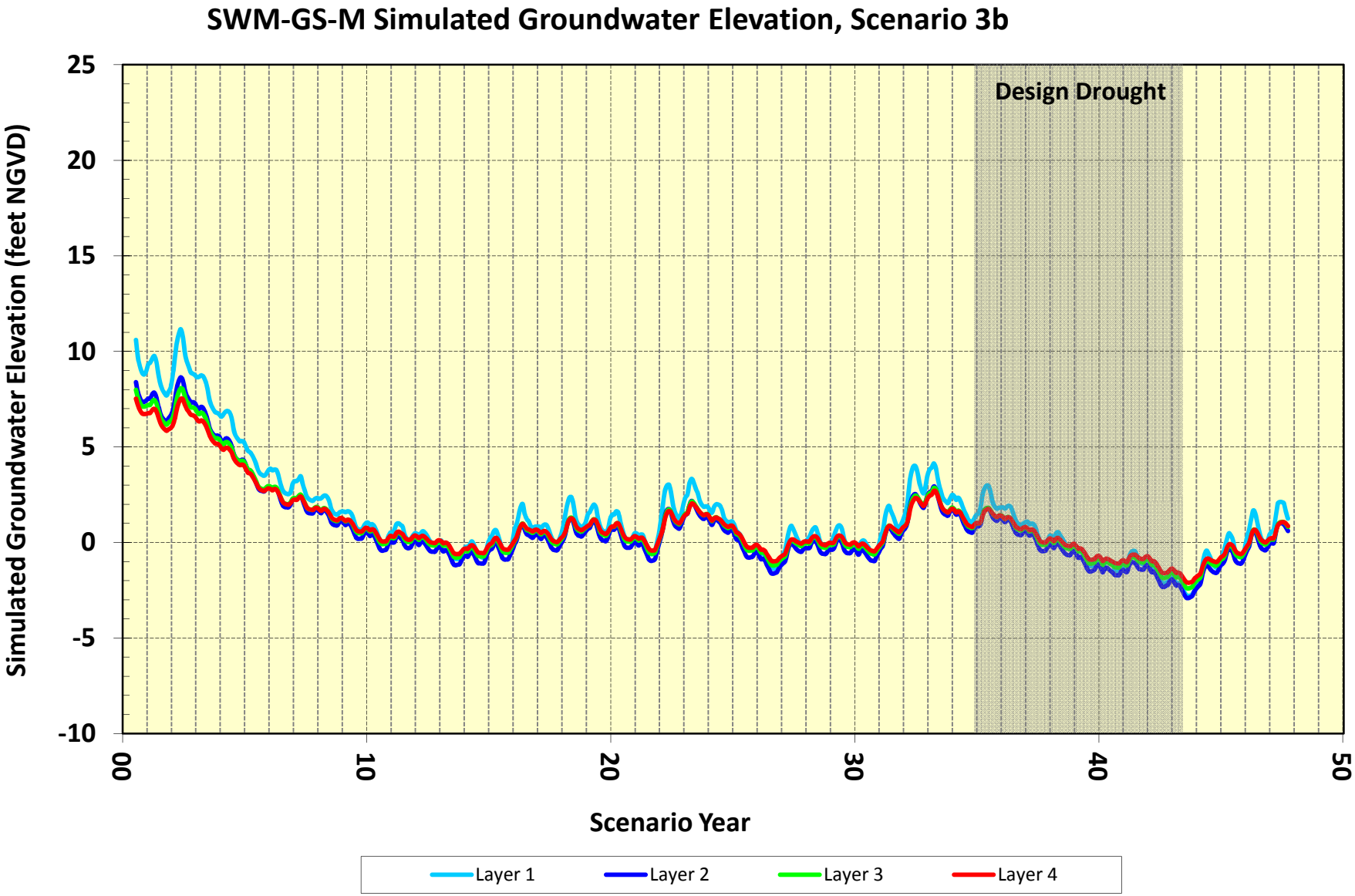

DC-A-St Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


Cyp_Lawn_2 Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
-30
-60
-90
-120
-150
-180
-210
-240
-270
-300
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

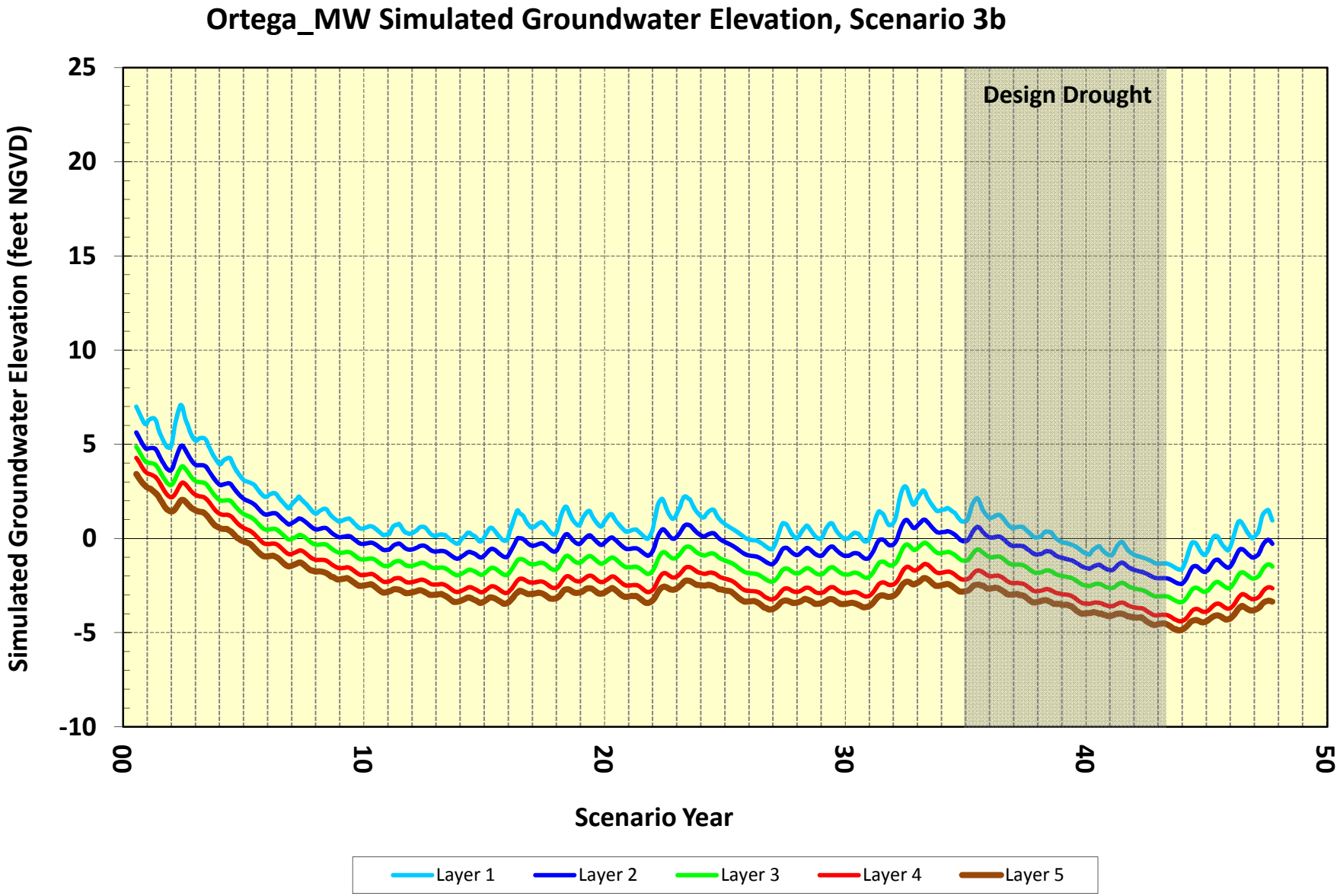

SSF-02 Simulated Groundwater Elevation, Scenario 3a
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

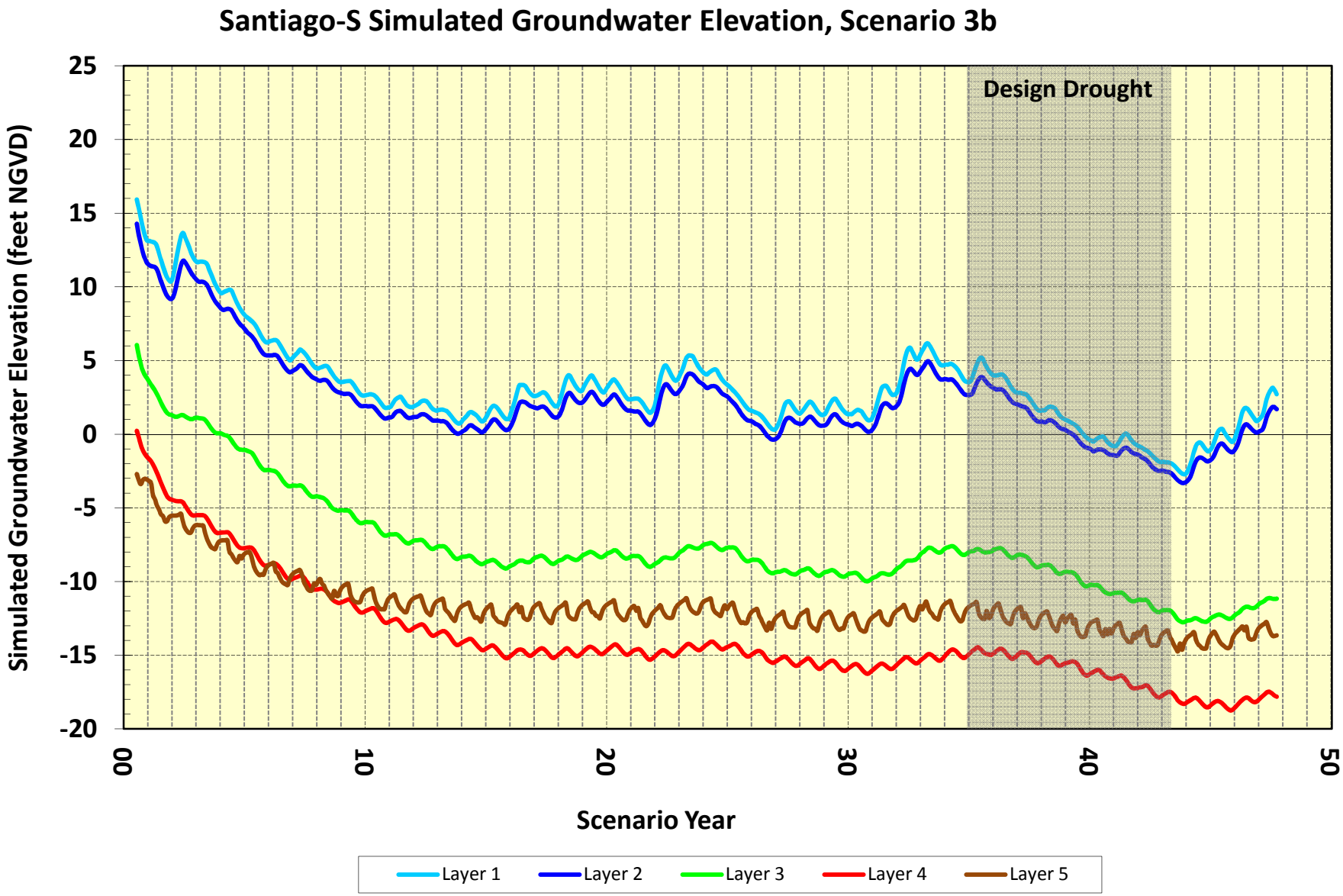


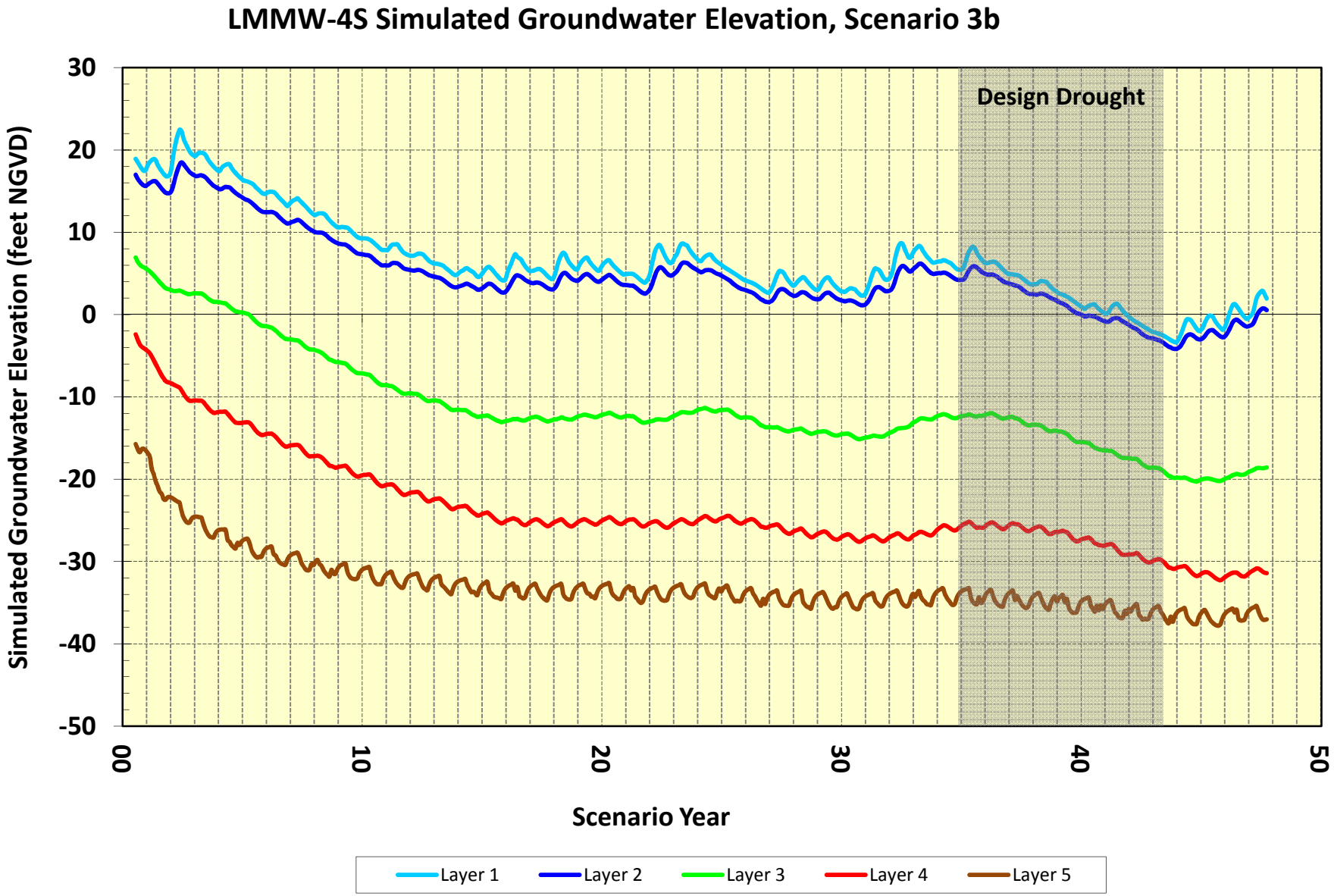
Note: At the location of SB-12, the model does not contain Model Layer 5.

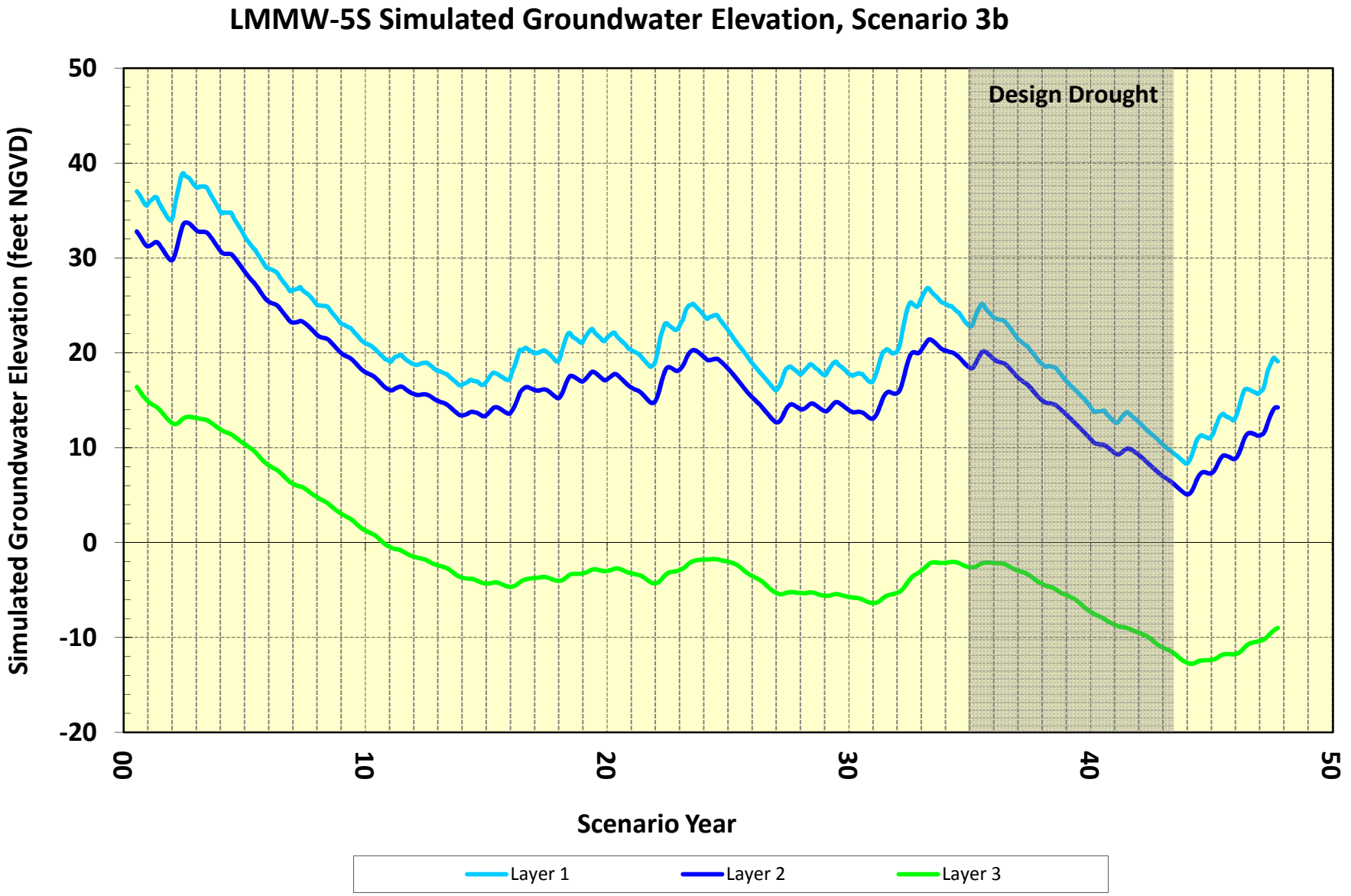


Note: At the location of SWM-GS-M, the model does not contain Model Layer 5.

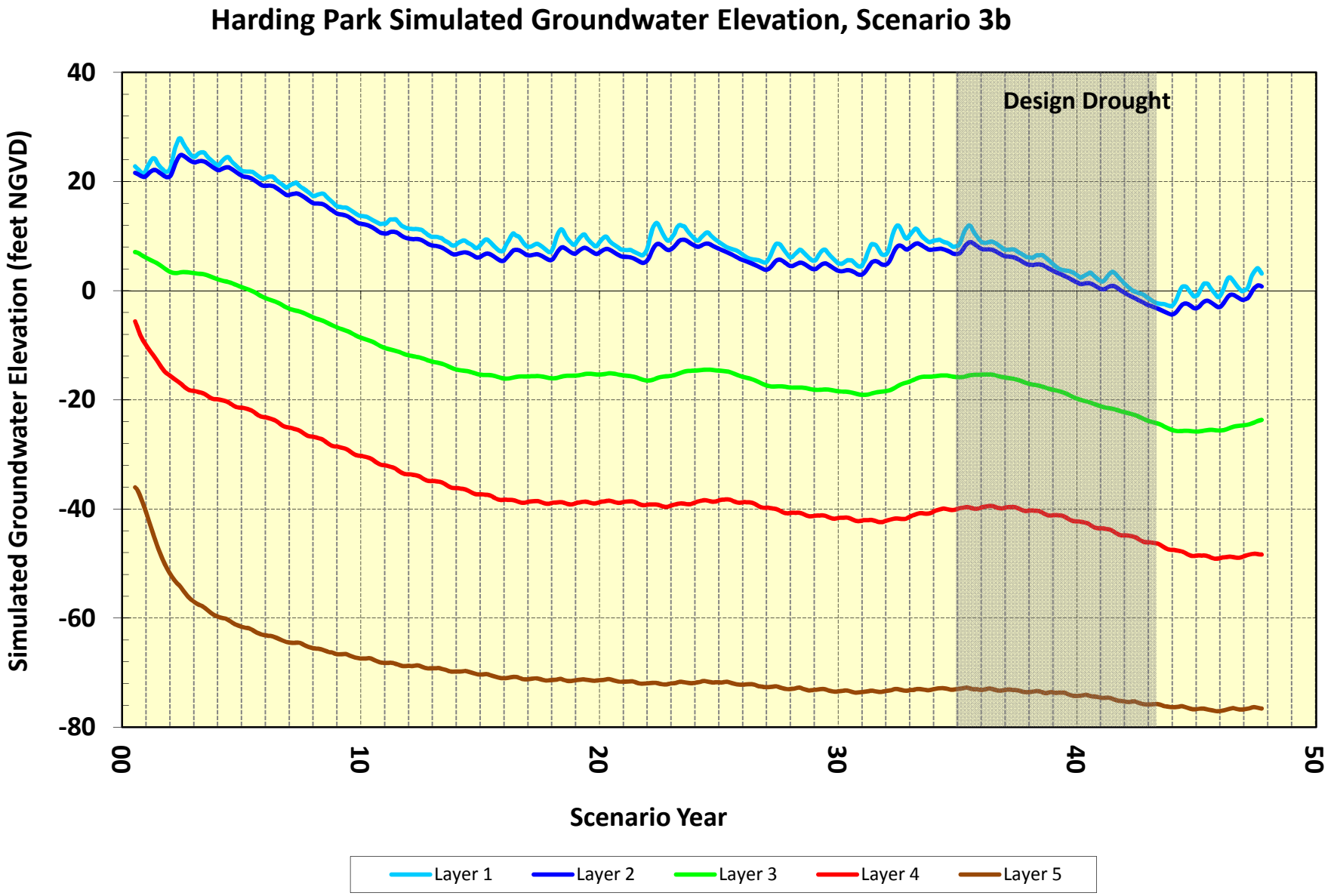

Ortega_MW Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

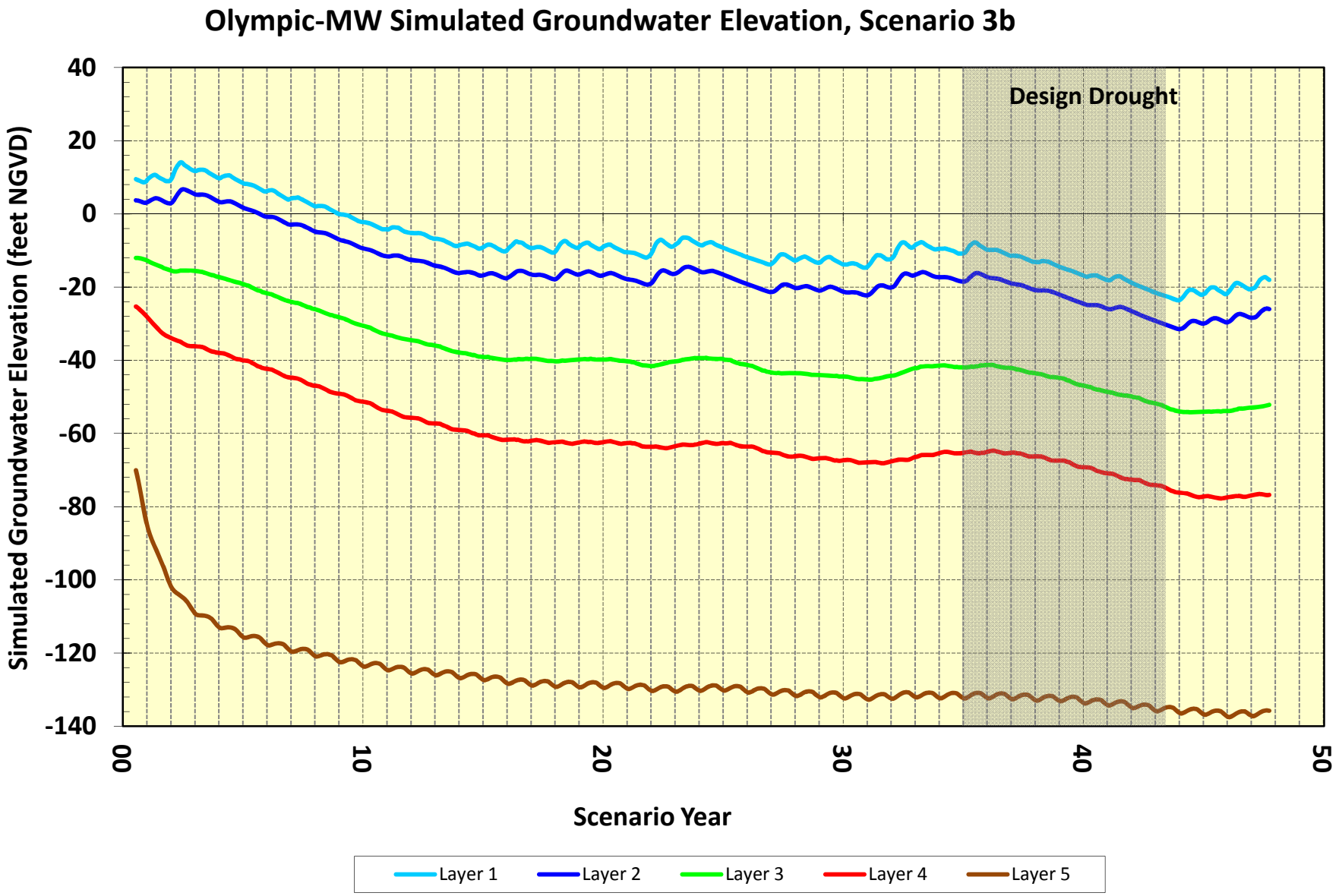

Santiago-S Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
-15
-20
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

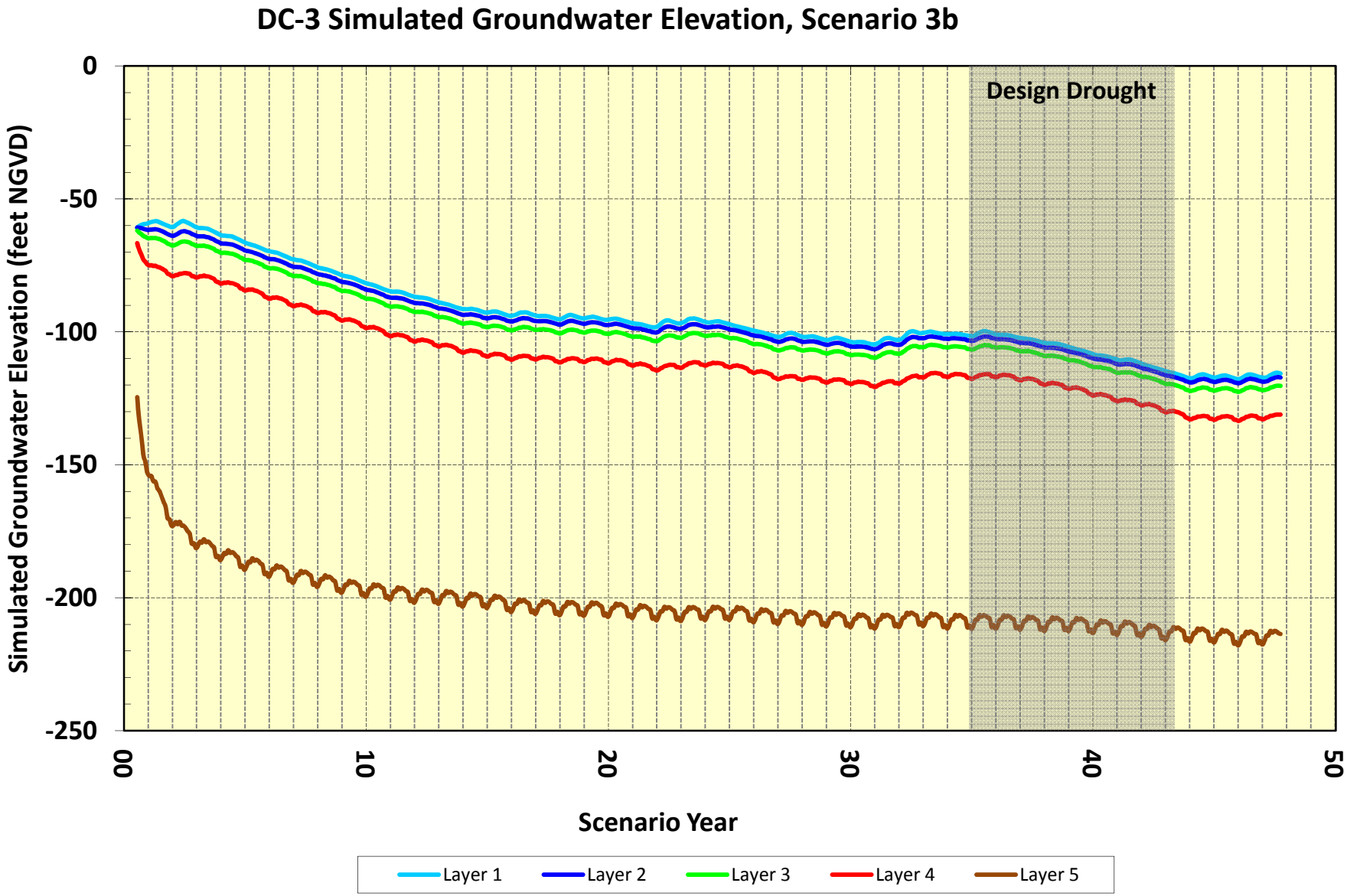

LMMW-4S Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
30
20
10
0
-10
-20
-30
-40
-50
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

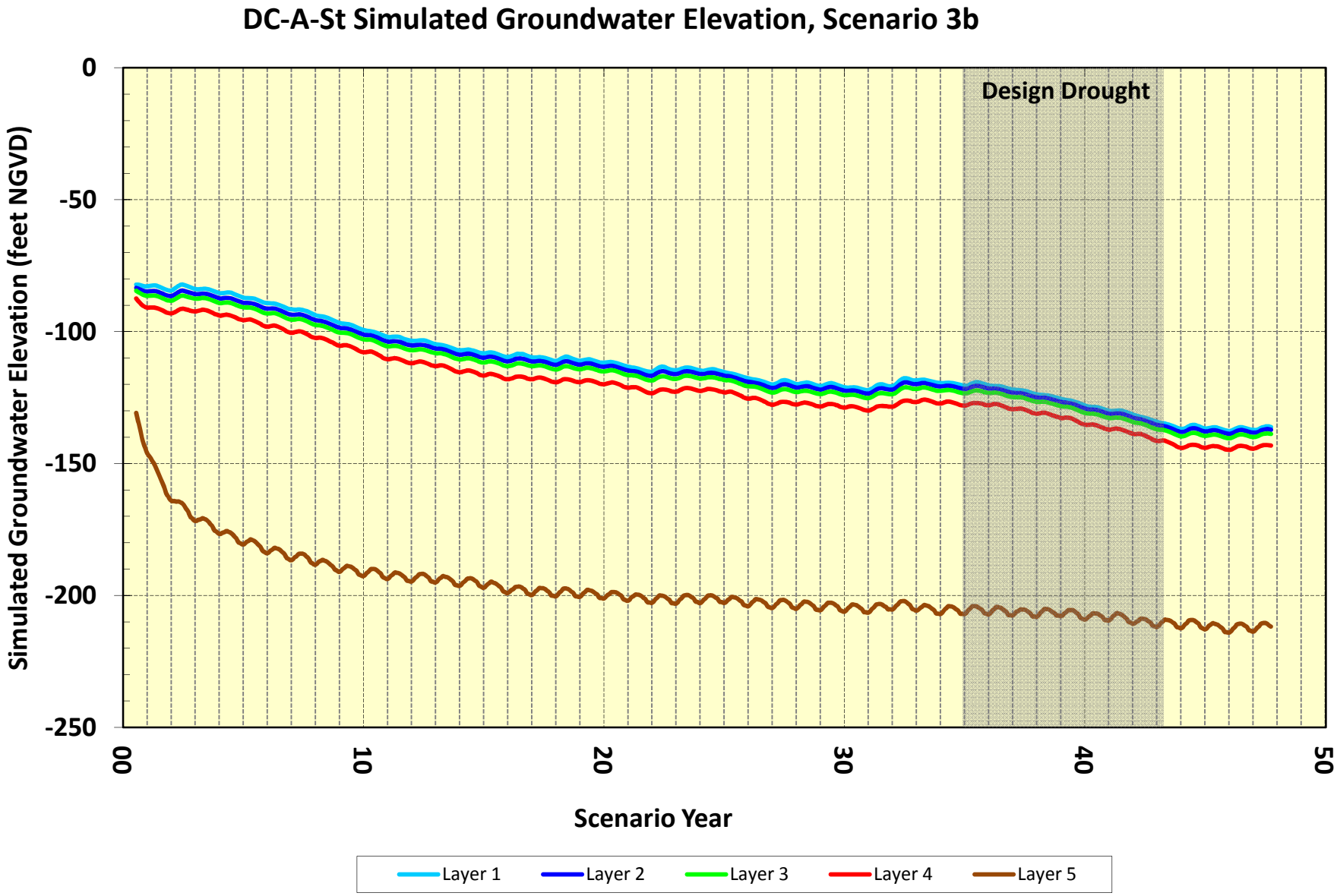


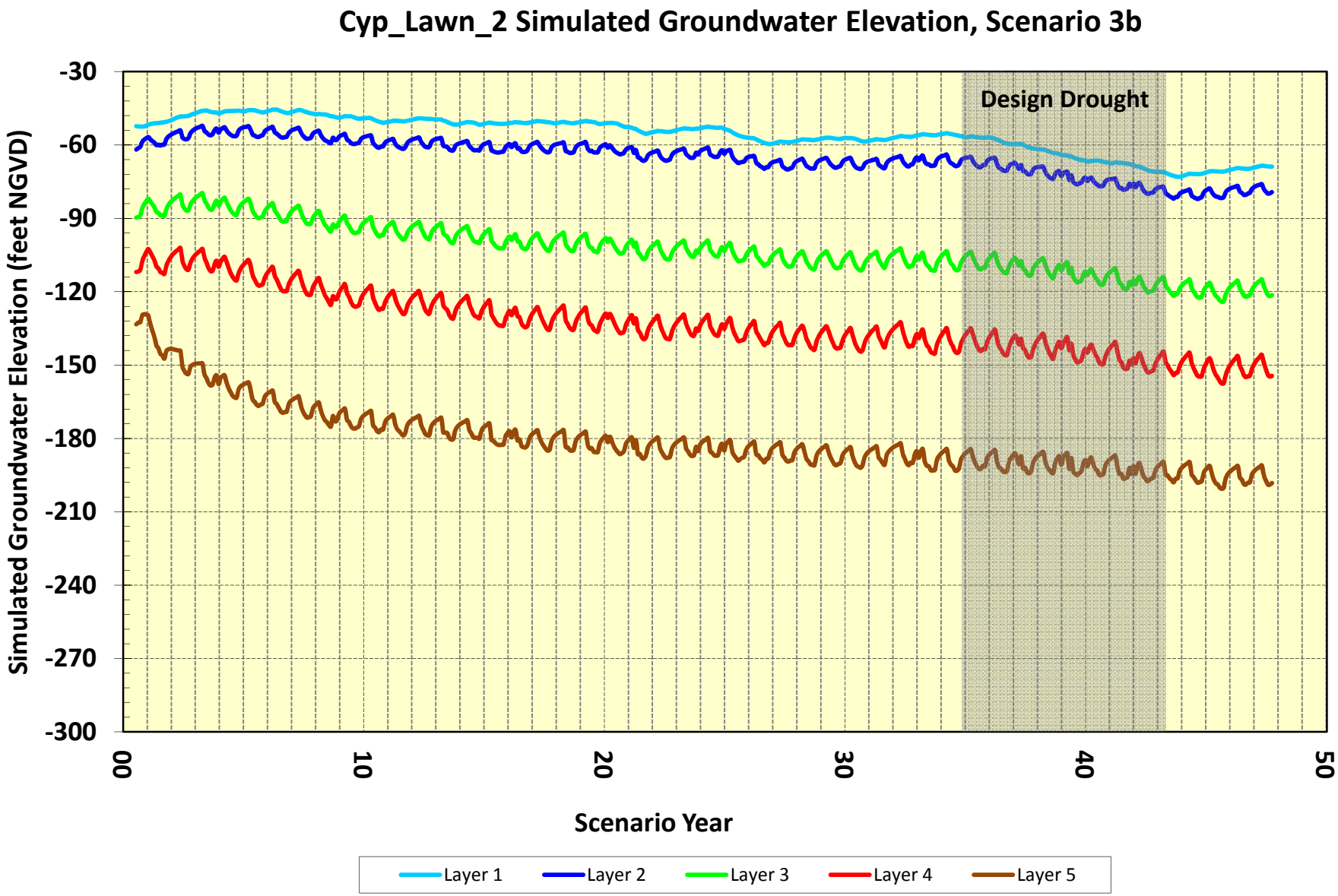
Note: At the location of LMMW-5S, the model does not contain Model Layers 4 and 5.

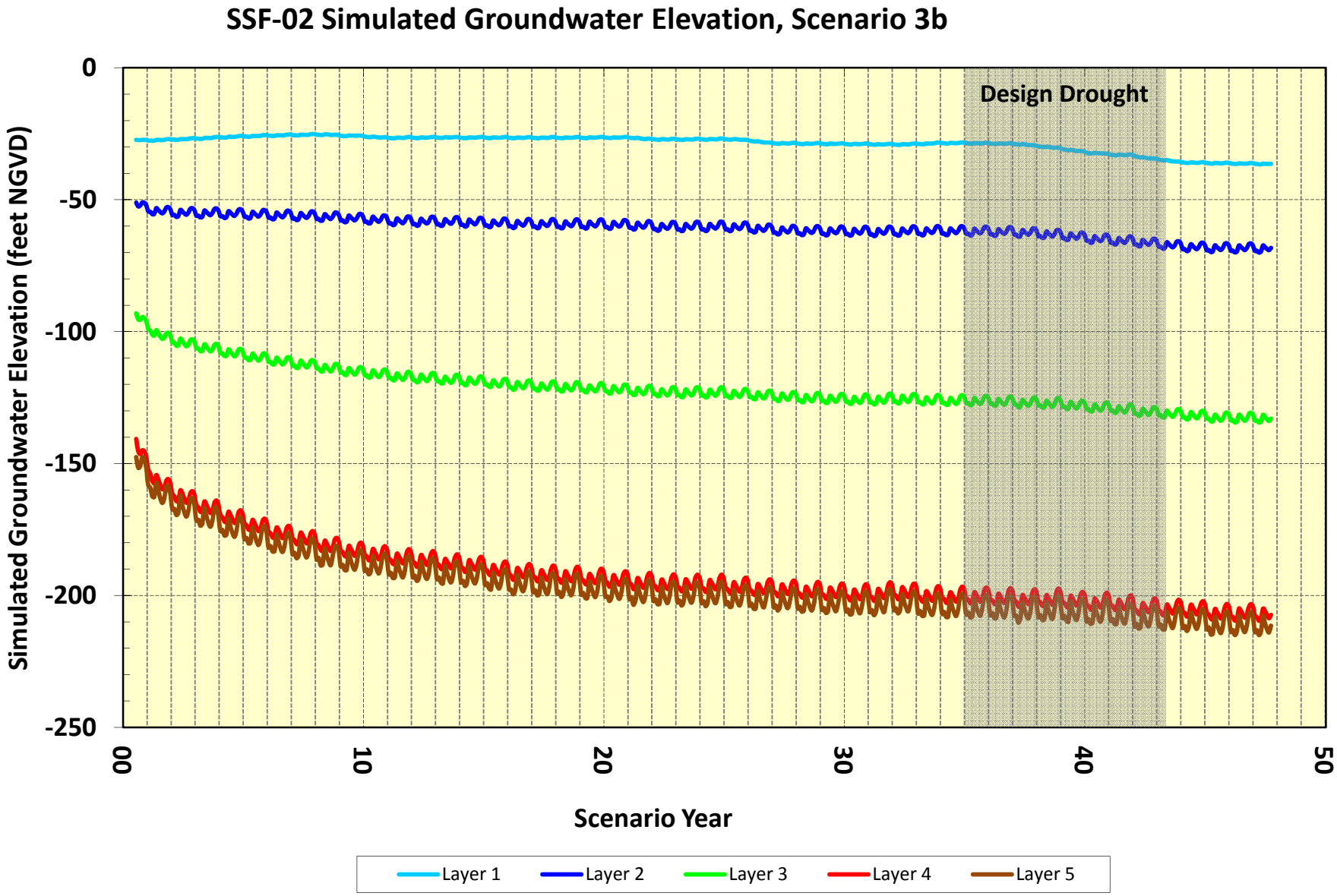

Harding Park Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

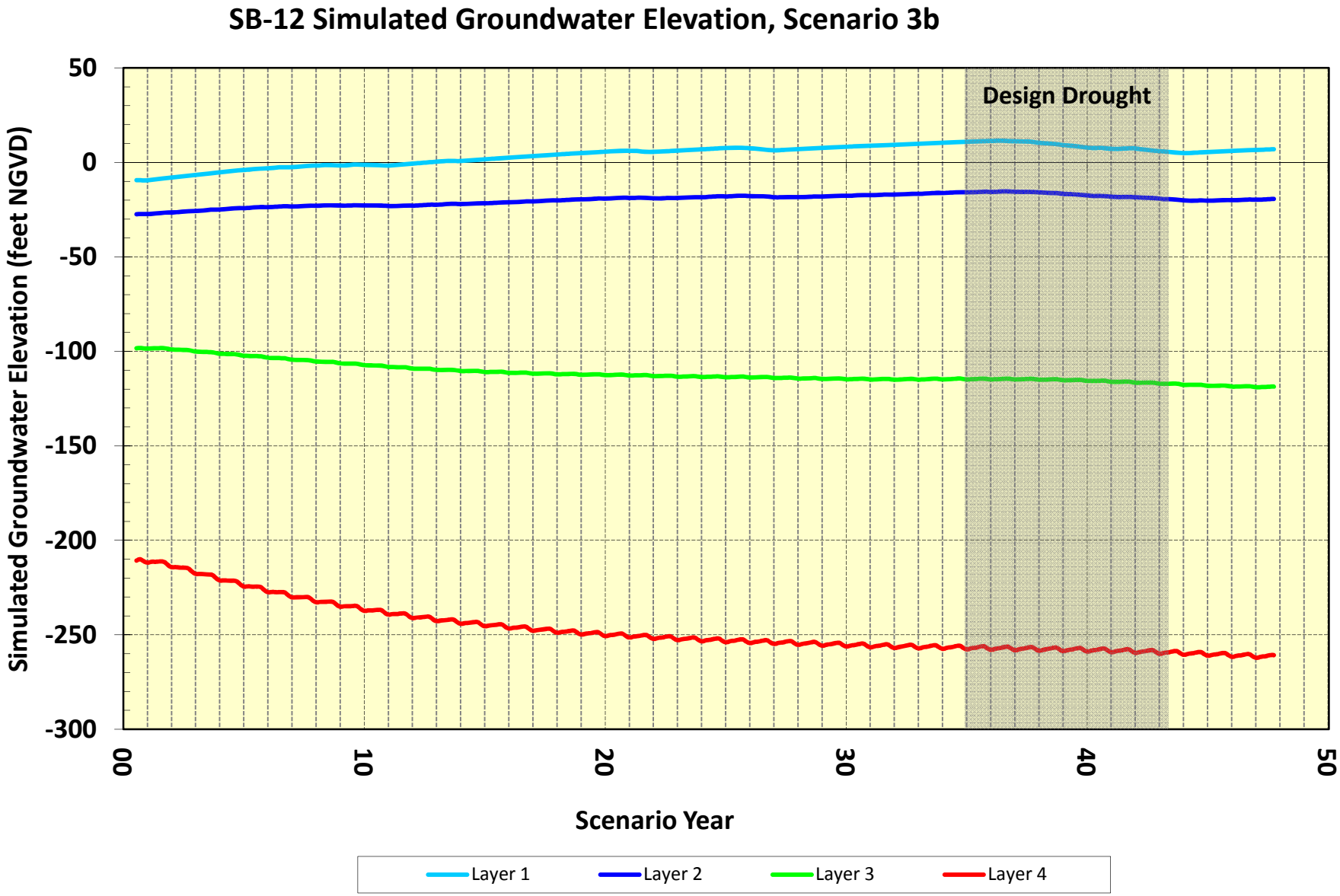

Olympic-MW Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
-100
-120
-140
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


DC-3 Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

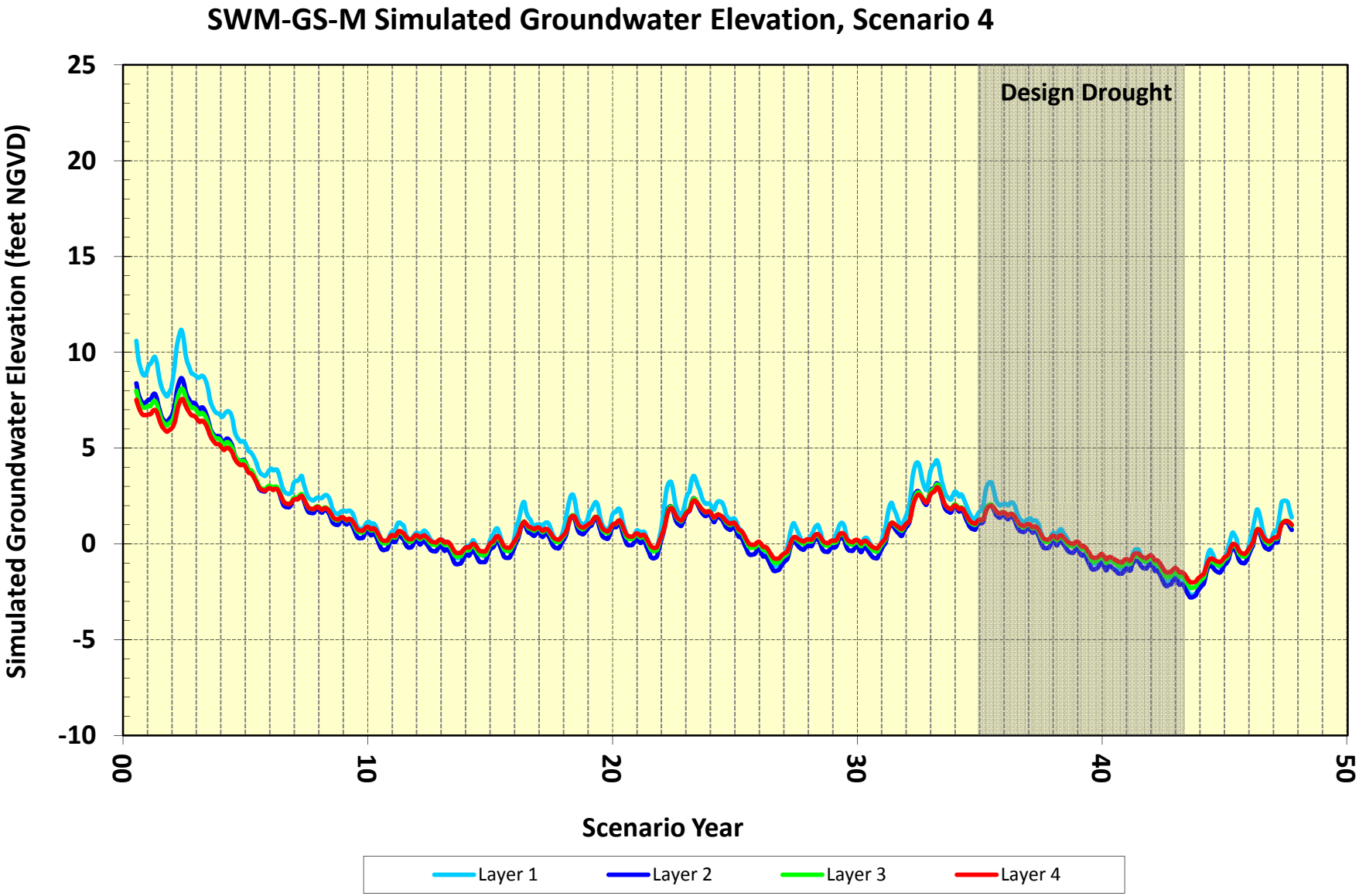

DC-A-St Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


Cyp_Lawn_2 Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
-30
-60
-90
-120
-150
-180
-210
-240
-270
-300
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

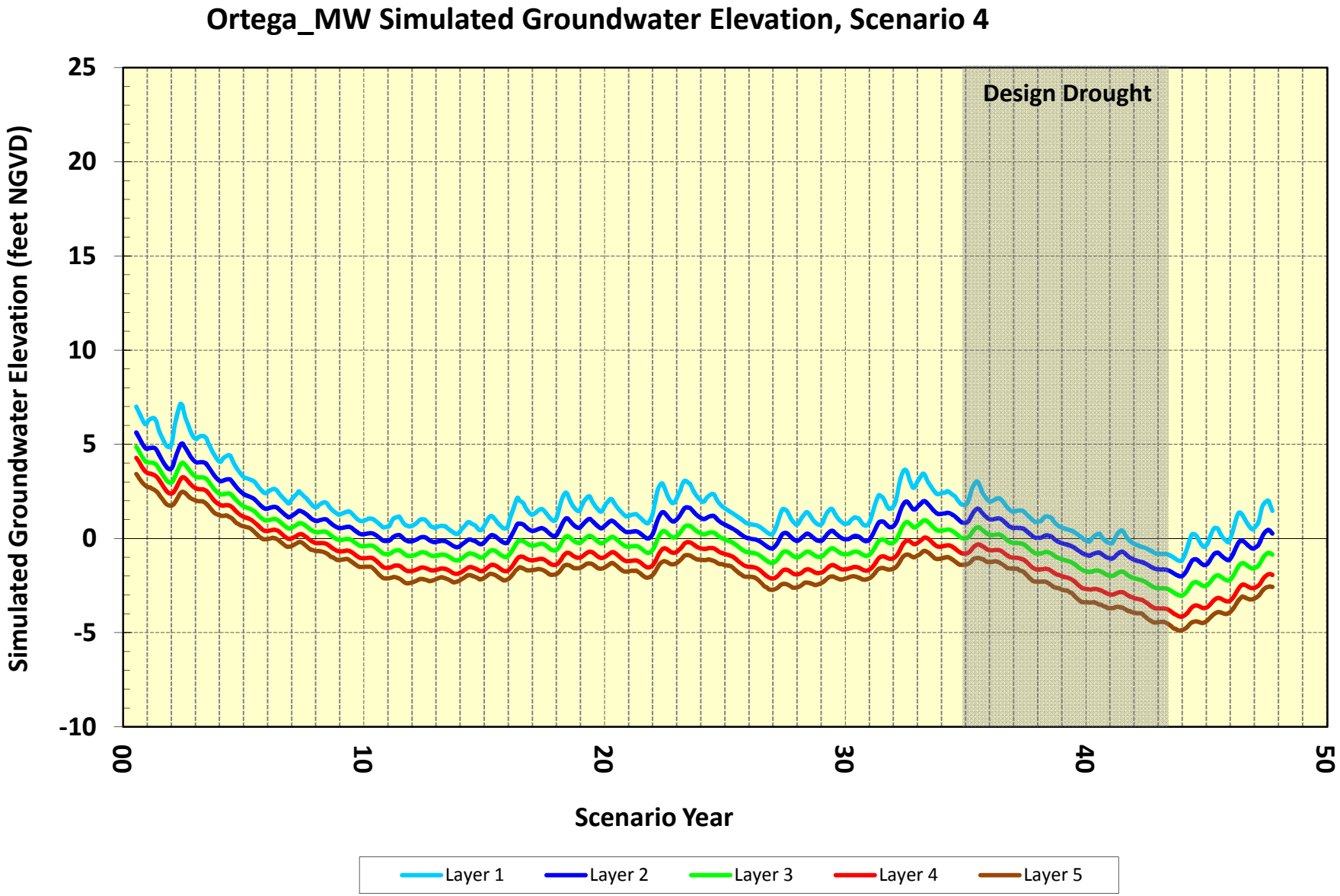

SSF-02 Simulated Groundwater Elevation, Scenario 3b
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

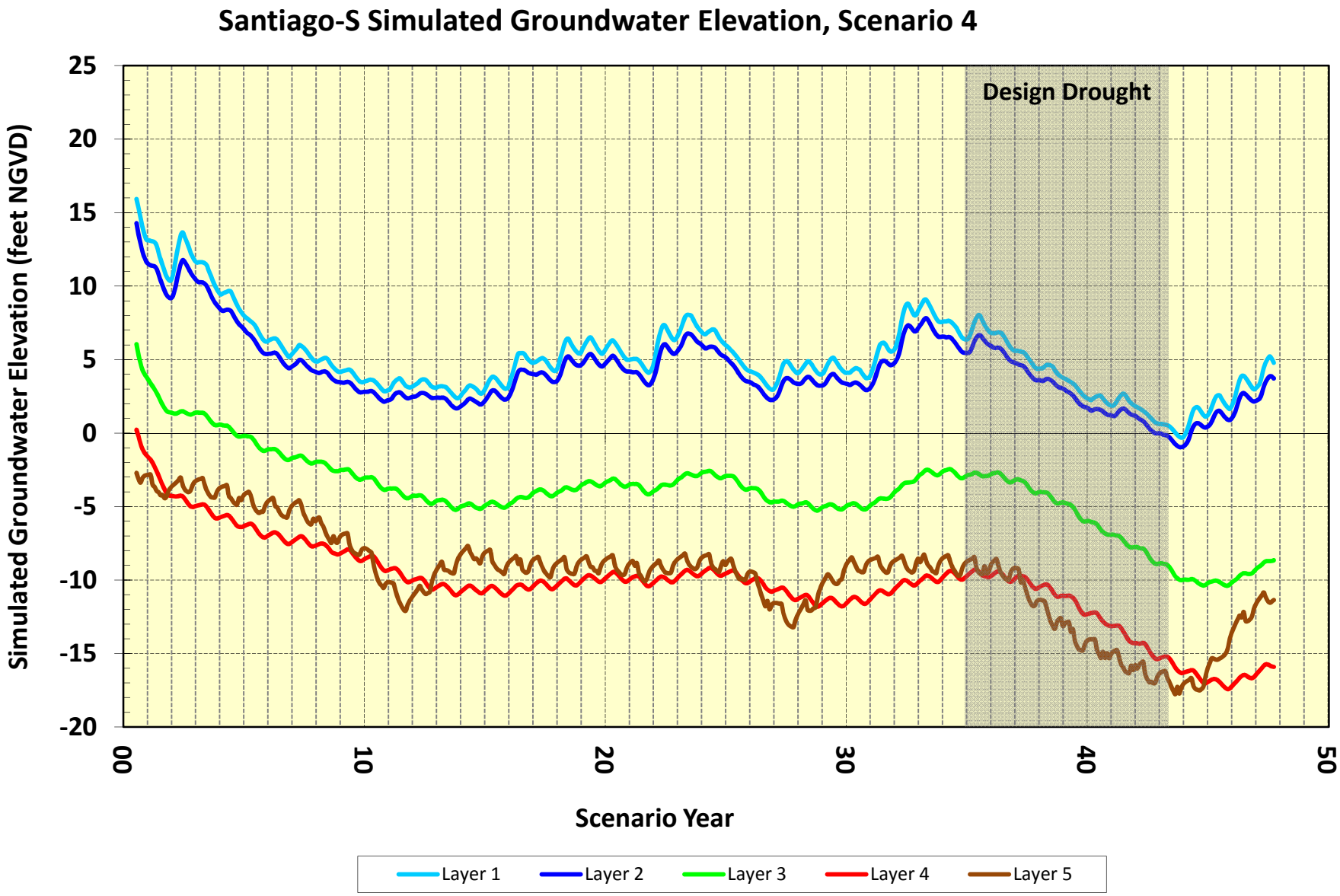


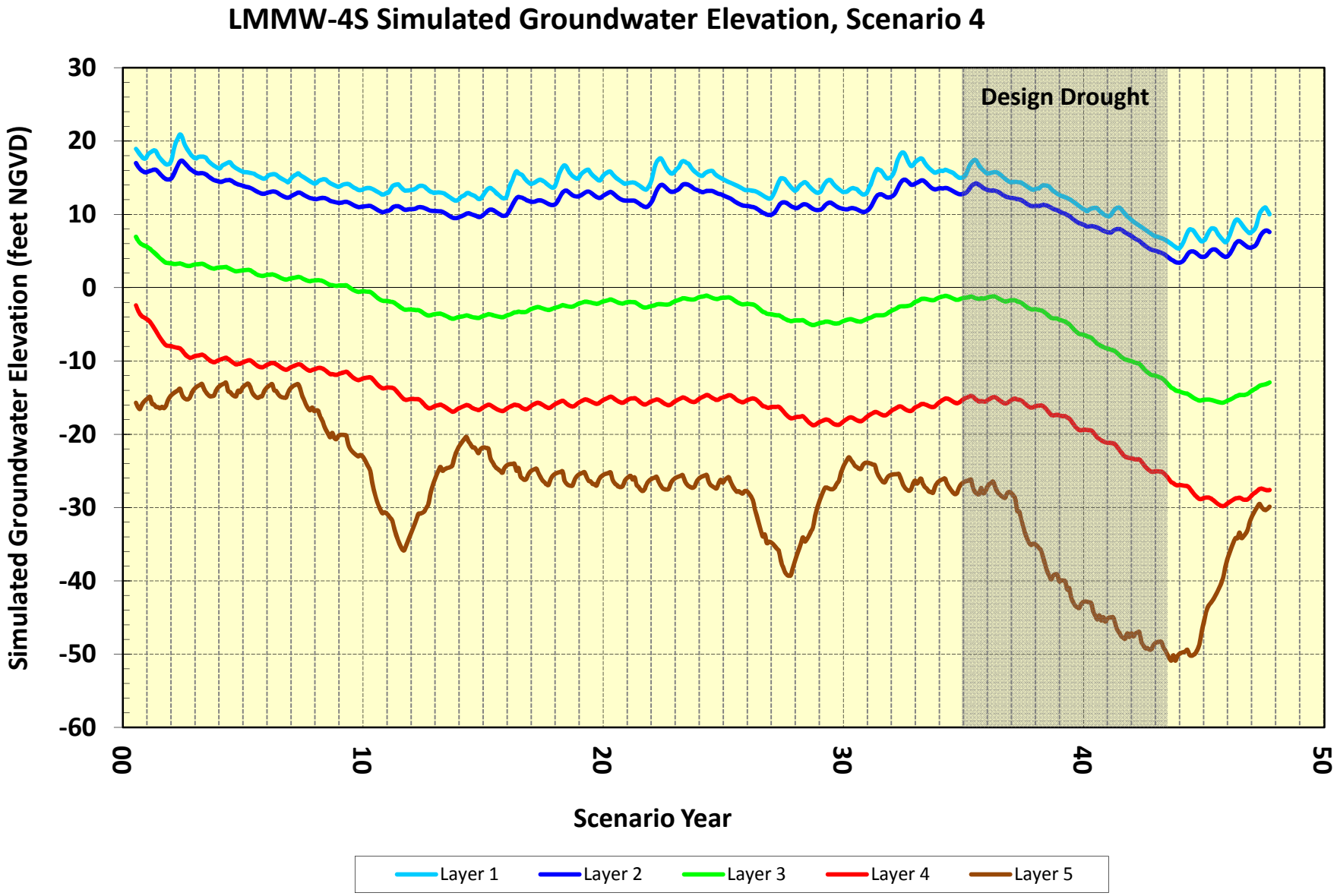
Note: At the location of SB-12, the model does not contain Model Layer 5.

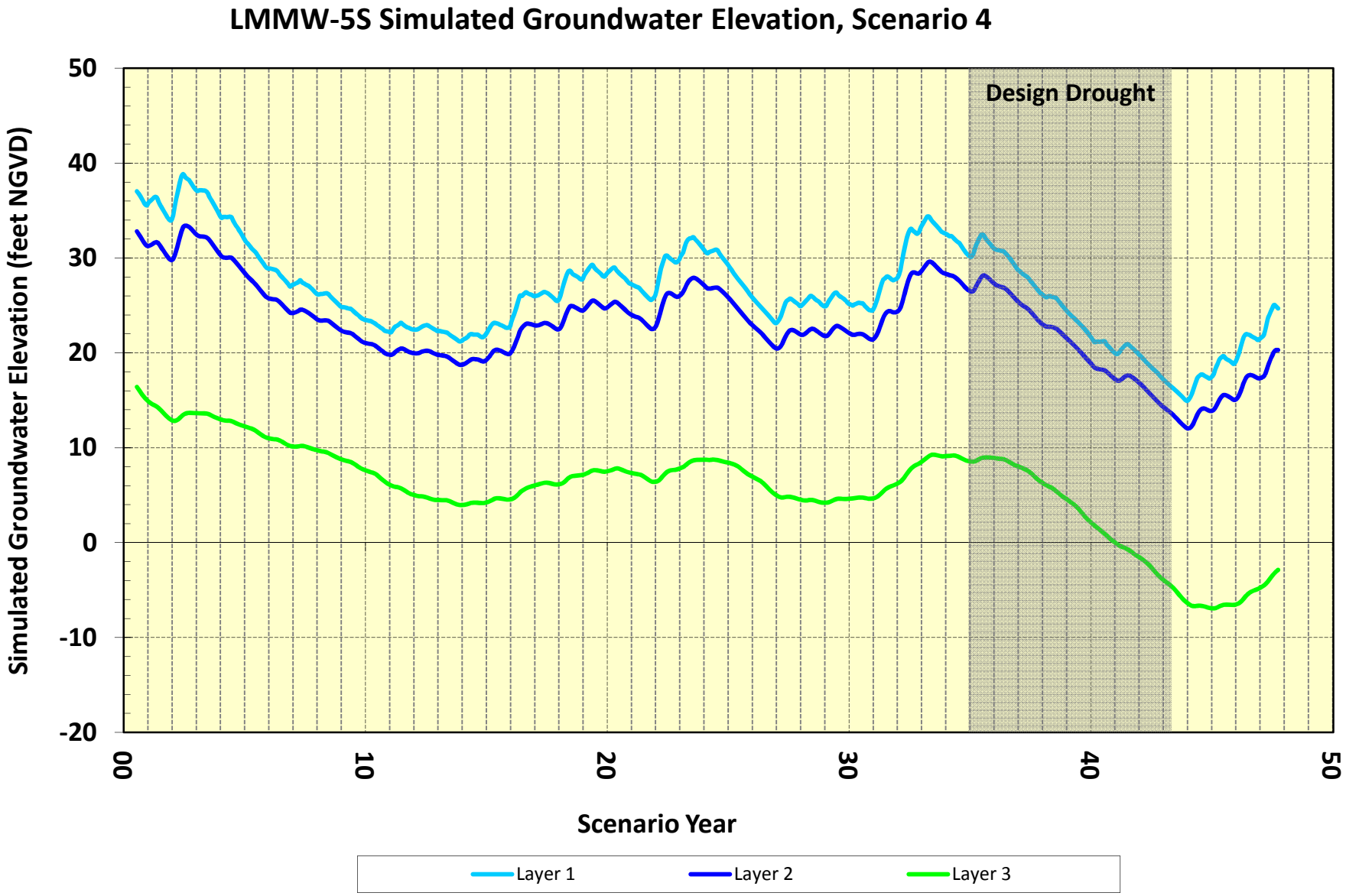


Note: At the location of SWM-GS-M, the model does not contain Model Layer 5.

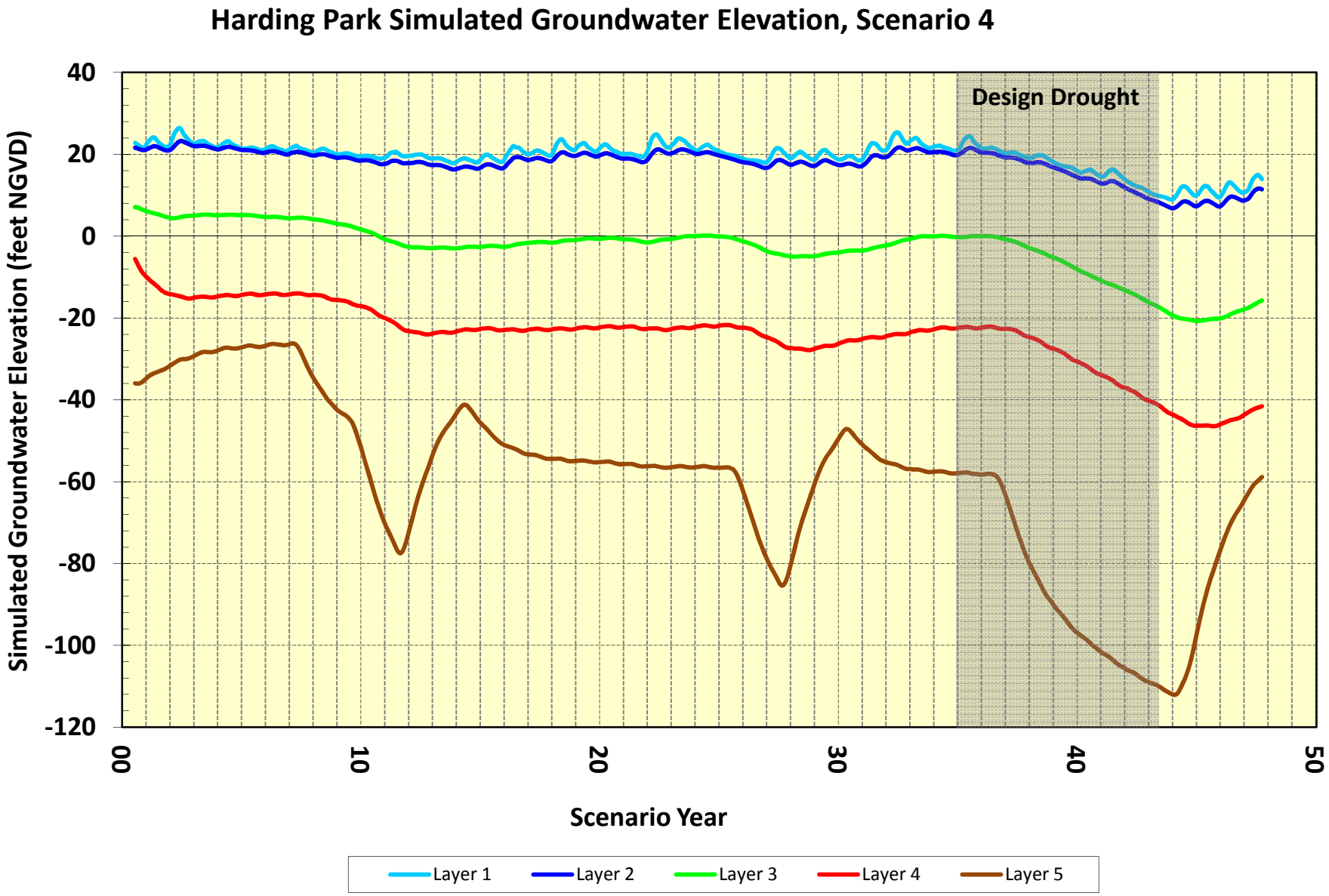

Ortega_MW Simulated Groundwater Elevation, Scenario 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

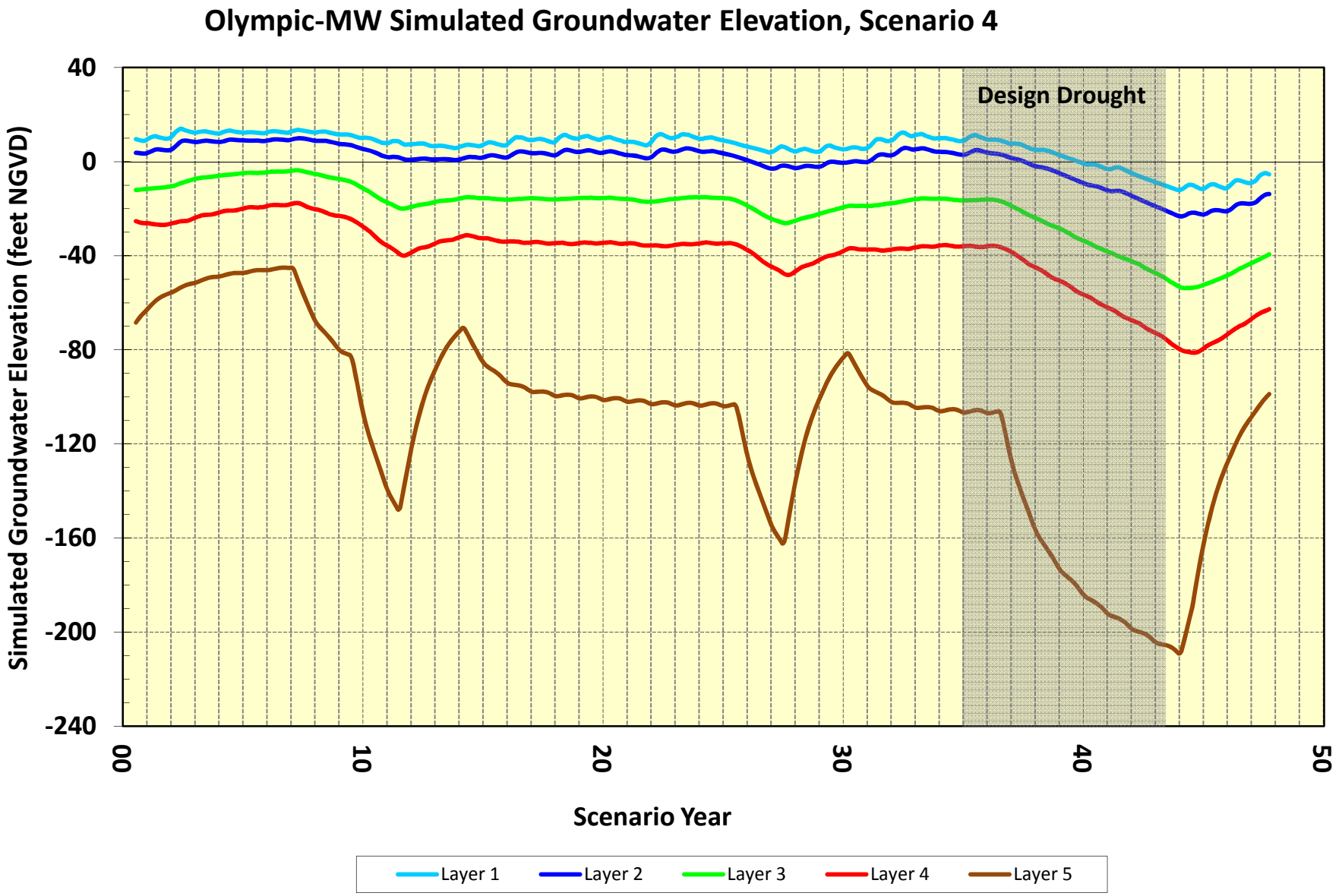

Santiago-S Simulated Groundwater Elevation, Scenario 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
-15
-20
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

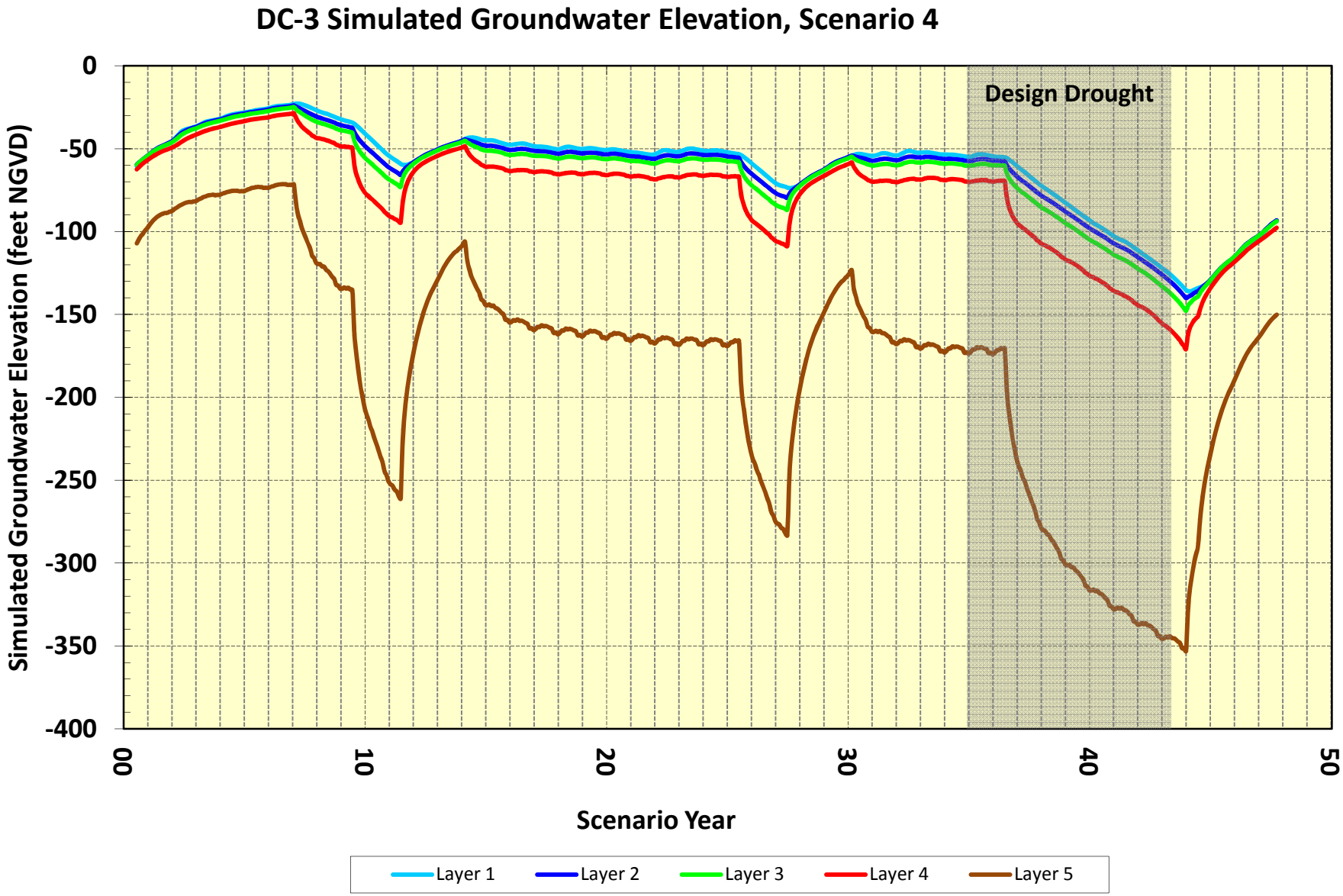

LMMW-4S Simulated Groundwater Elevation, Scenario 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
30
20
10
0
-10
-20
-30
-40
-50
-60
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

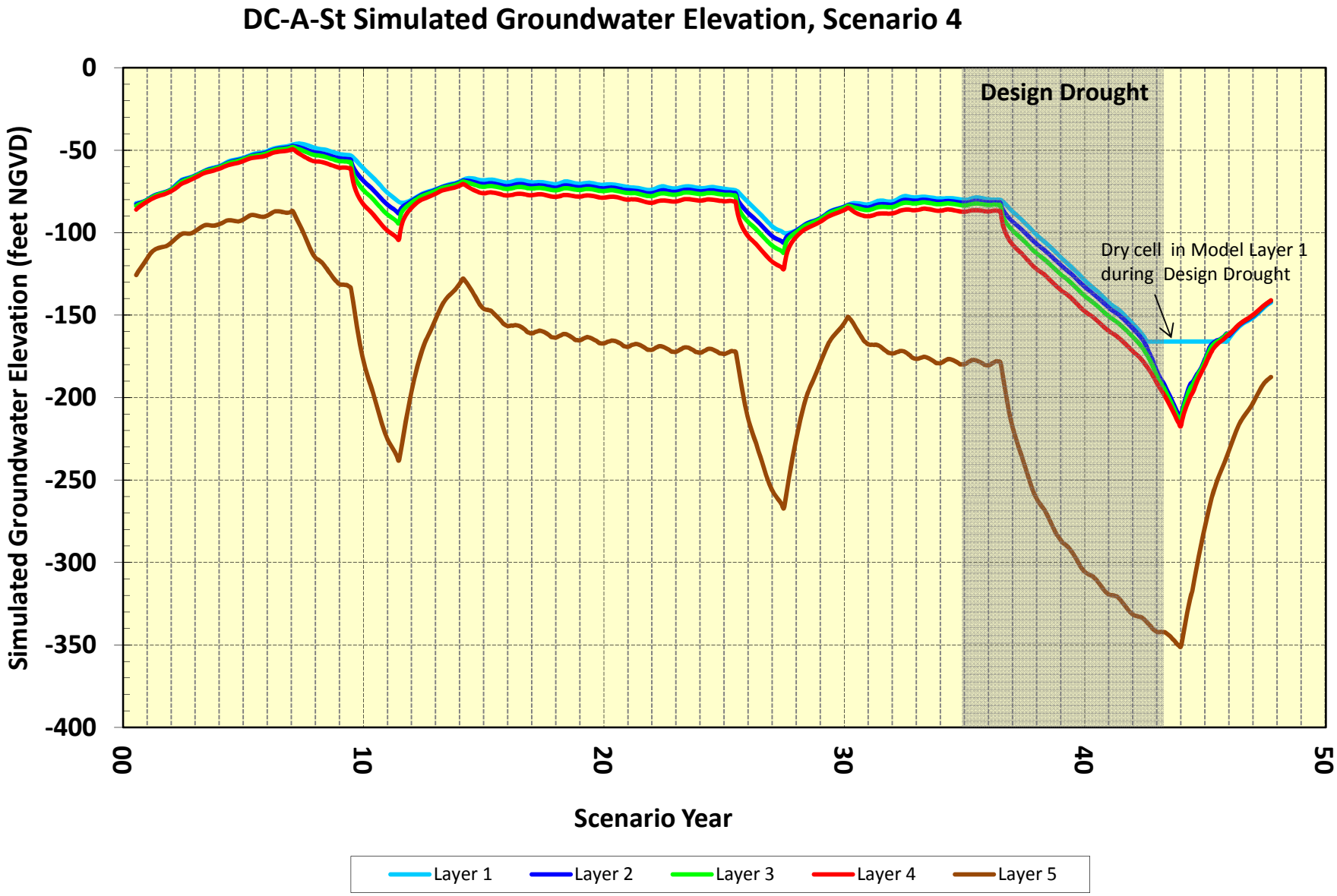


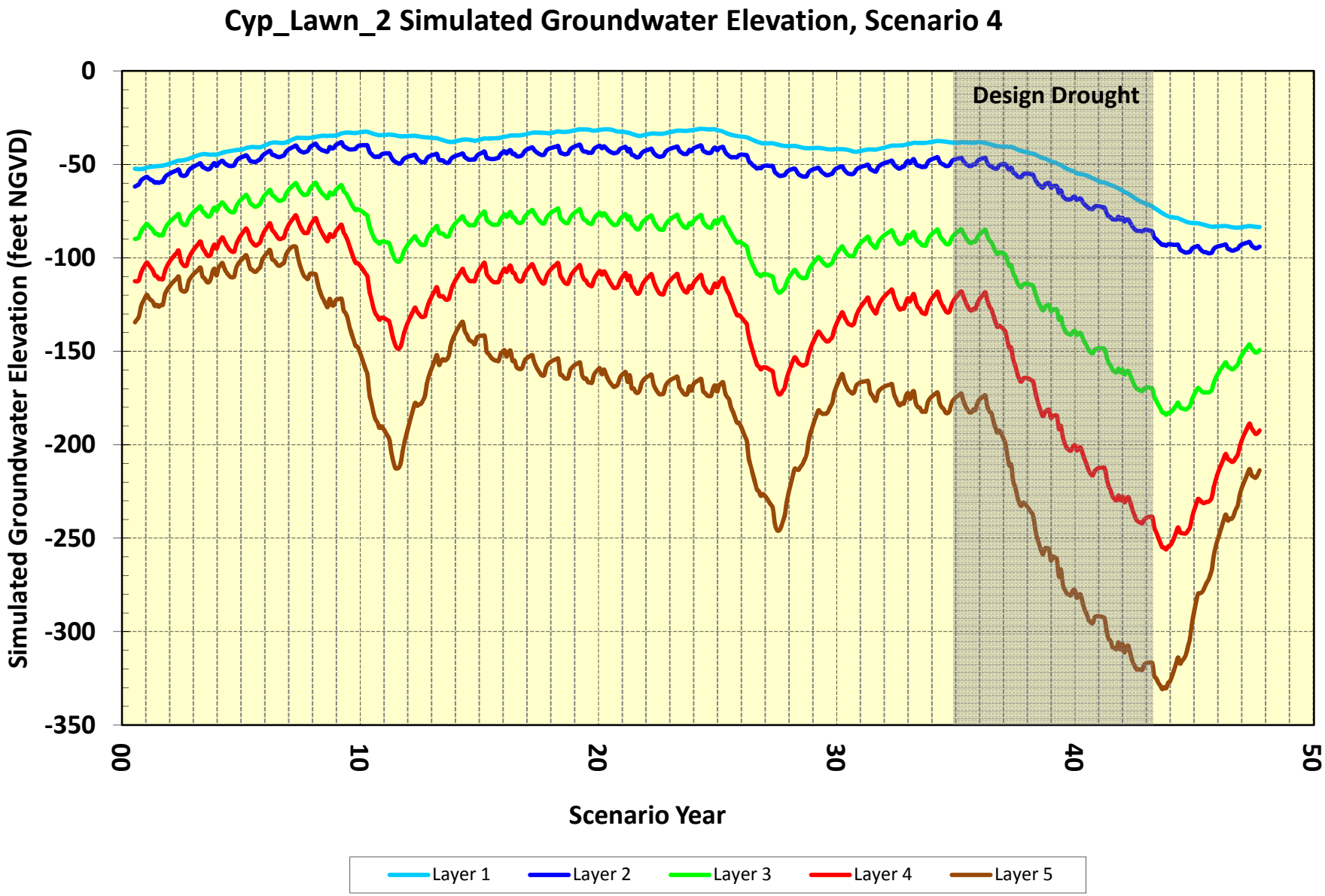
Note: At the location of LMMW-5S, the model does not contain Model Layers 4 and 5.

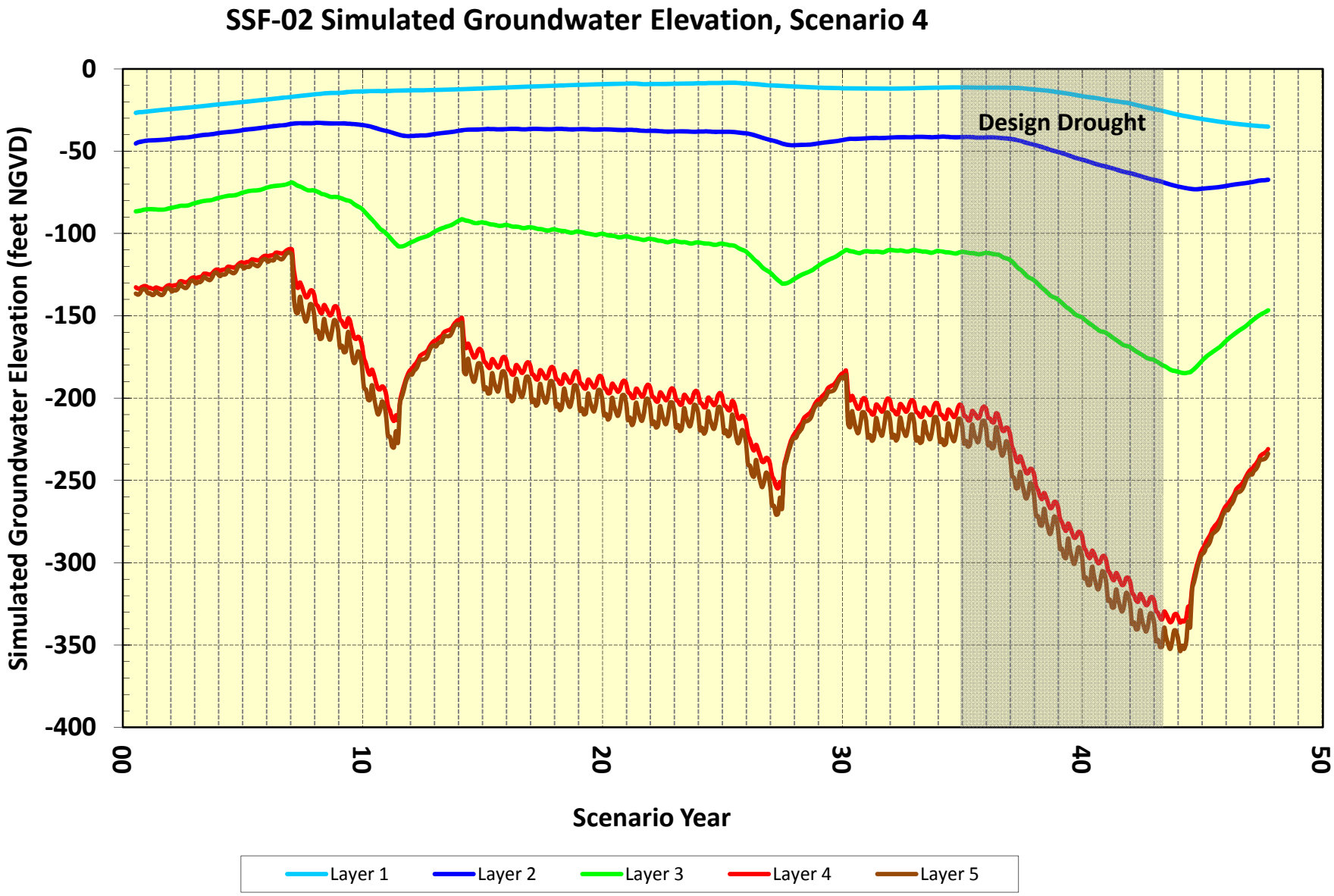

Harding Park Simulated Groundwater Elevation, Scenario 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
-100
-120
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

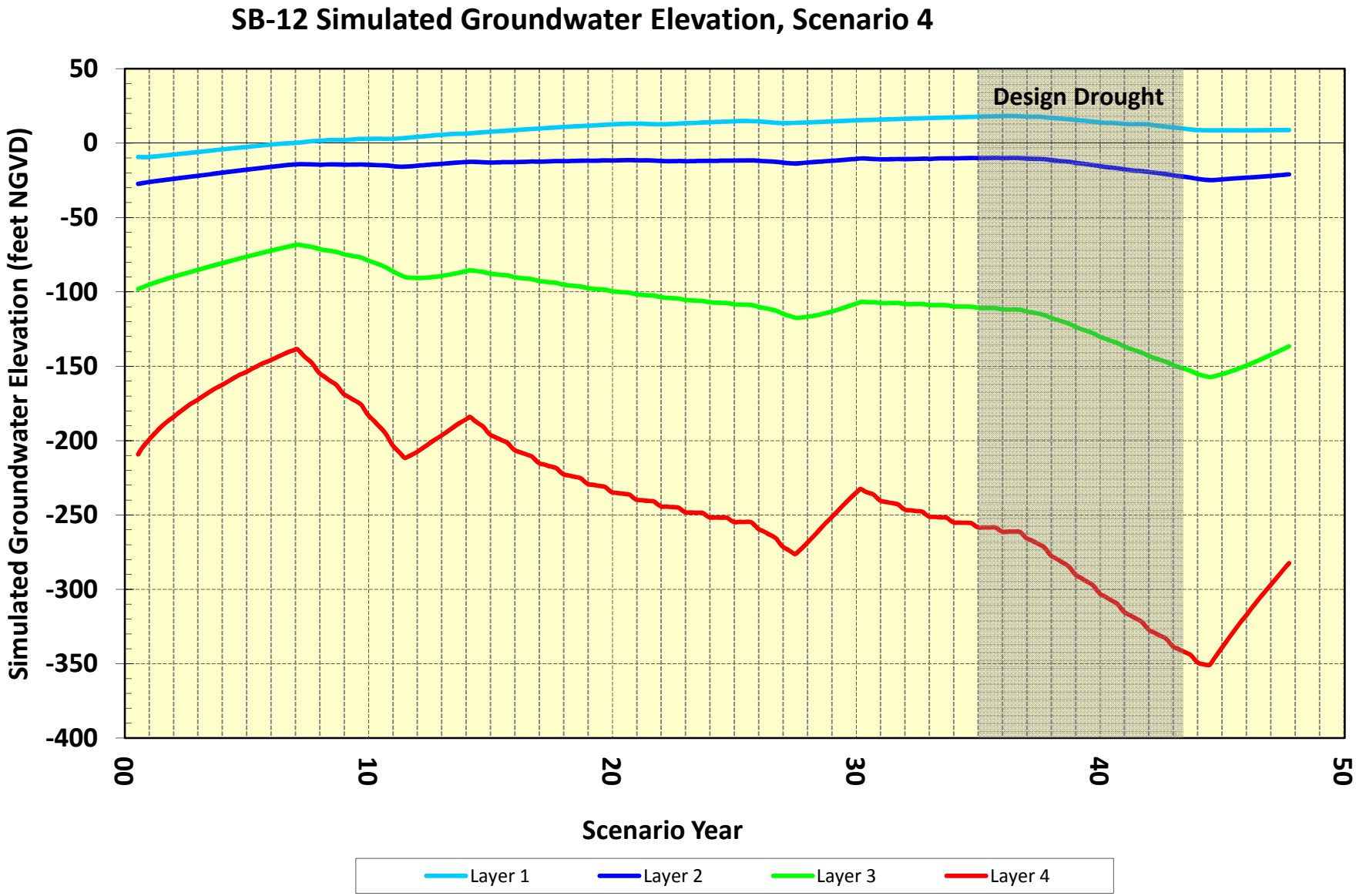

Olympic-MW Simulated Groundwater Elevation, Scenario 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
0
-40
-80
-120
-160
-200
-240
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5


DC-3 Simulated Groundwater Elevation, Scenario 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
-400
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

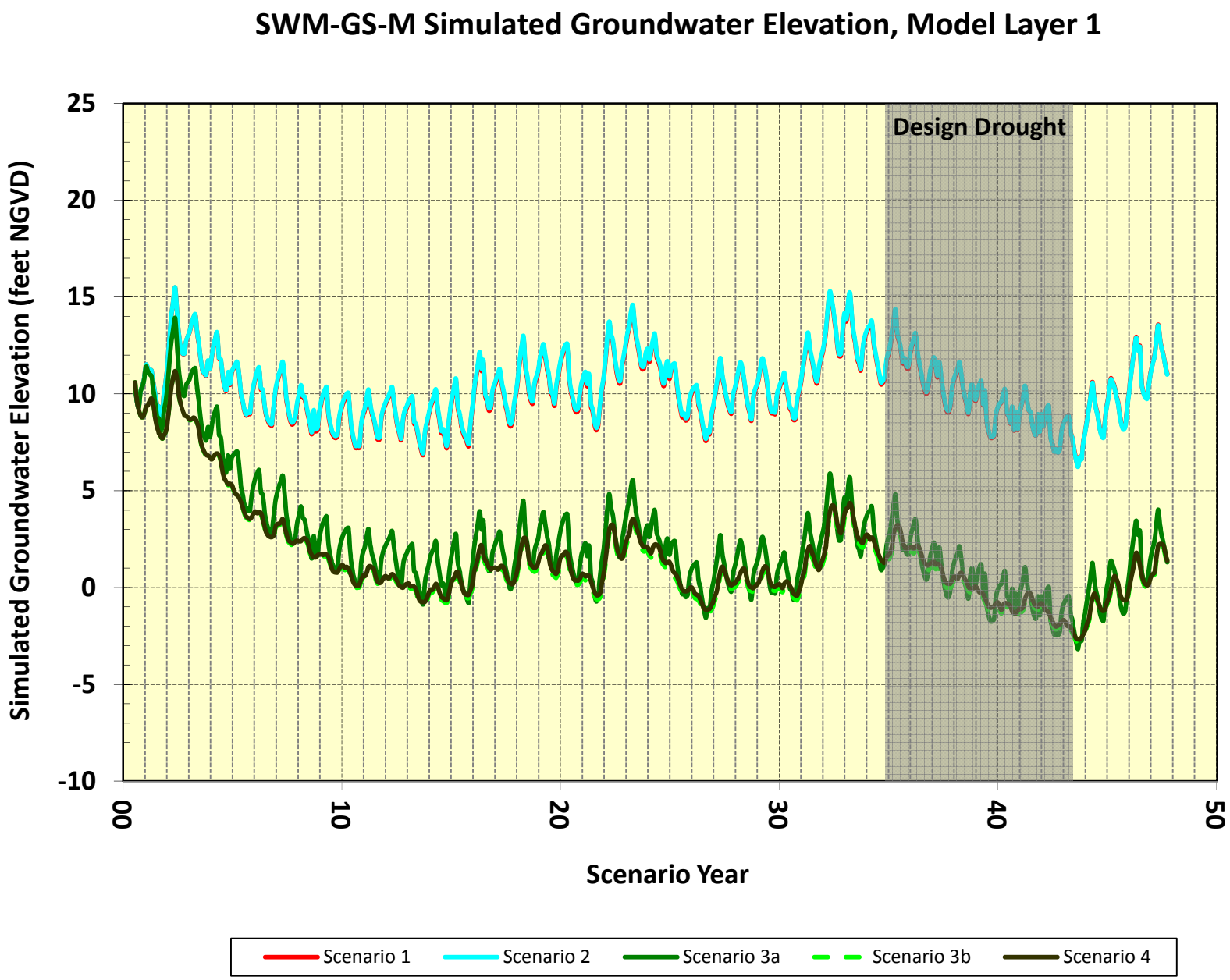

DC-A-St Simulated Groundwater Elevation, Scenario 4
Design Drought
Dry cell in Model Layer 1 during Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
-400
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

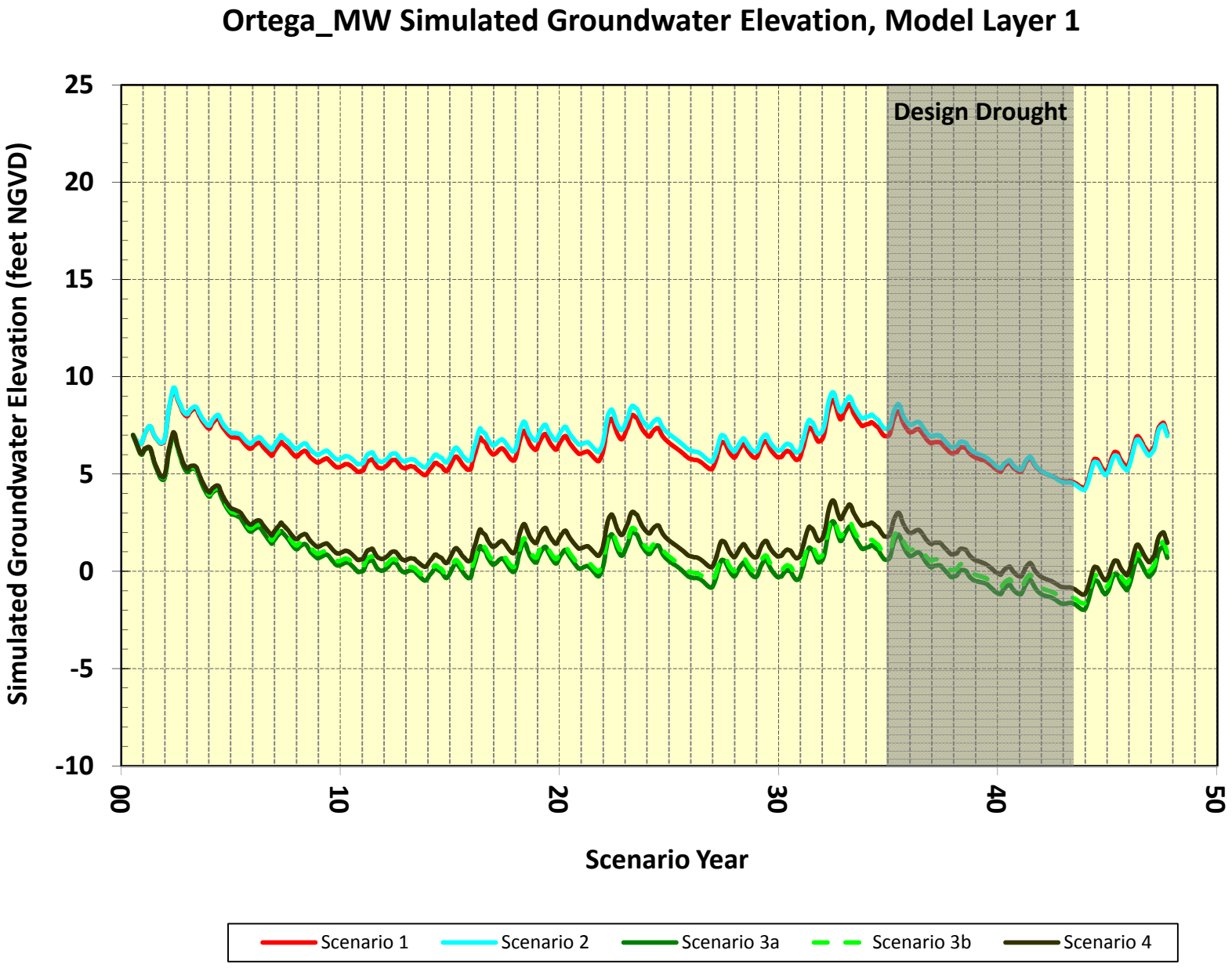

Cyp_Lawn_2 Simulated Groundwater Elevation, Scenario 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

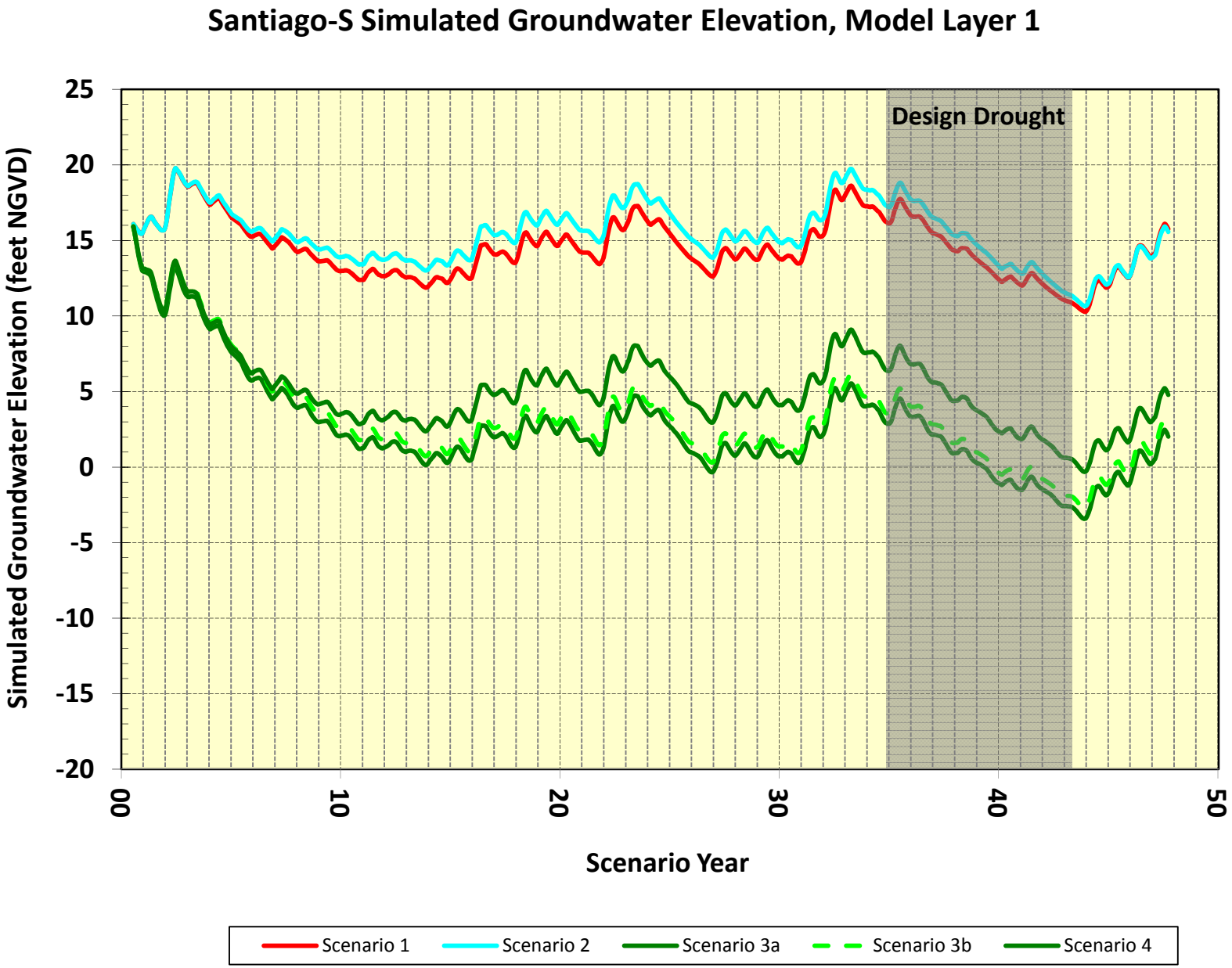

SSF-02 Simulated Groundwater Elevation, Scenario 4
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
-400
Design Drought
00
10
20
30
40
50
Scenario Year
Layer 1
Layer 2
Layer 3
Layer 4
Layer 5

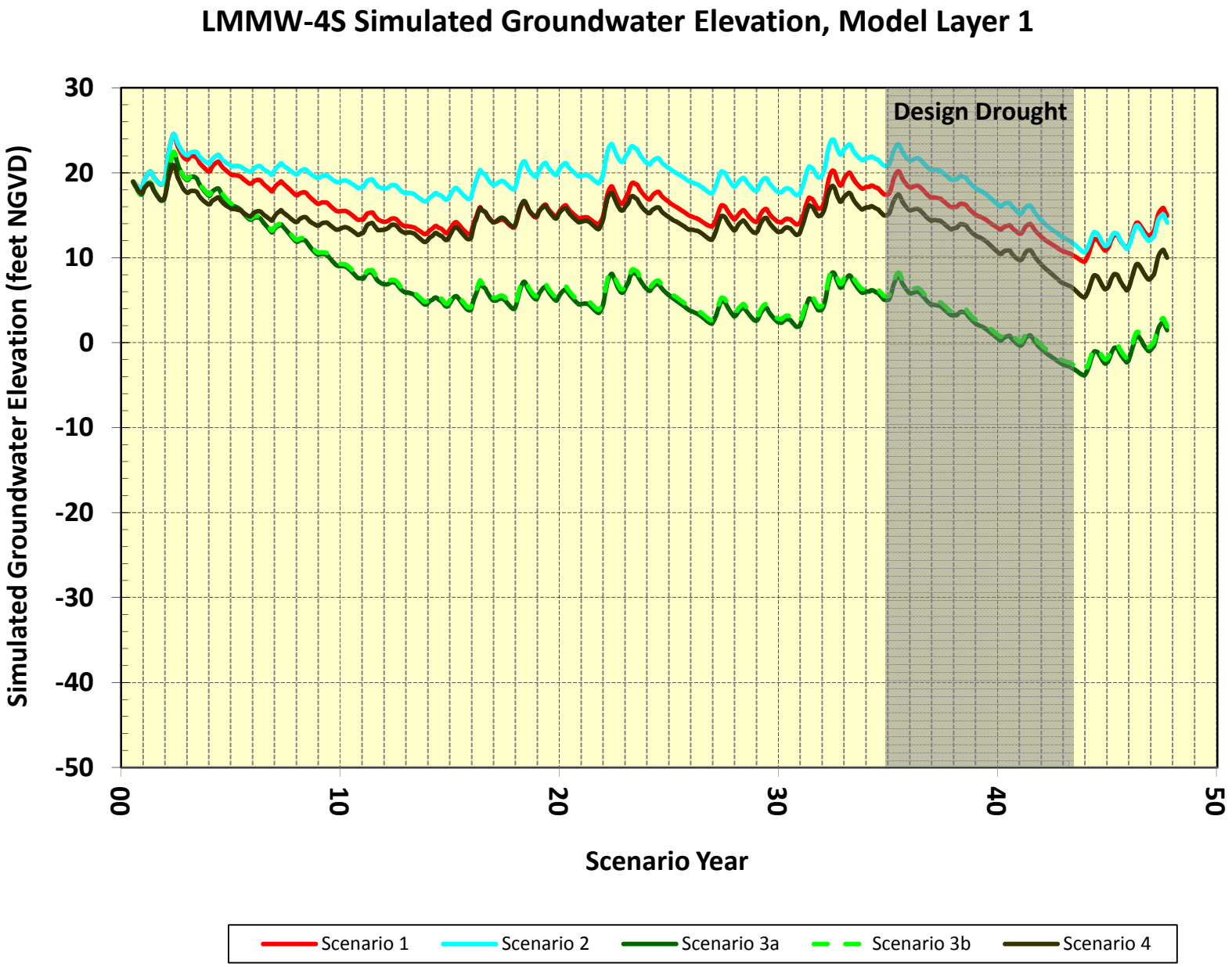


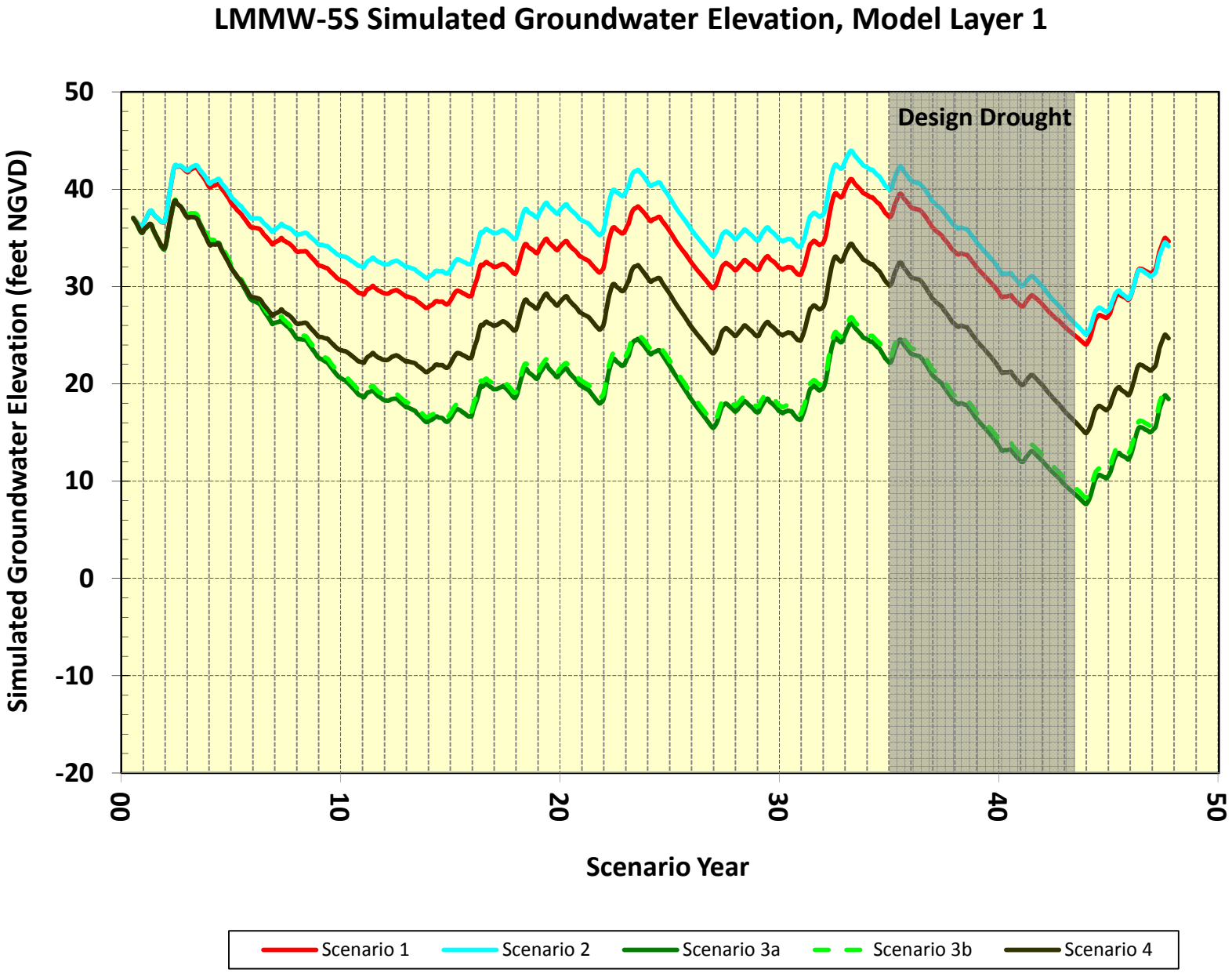
Note: At the location of LMMW-5S, the model does not contain Model Layers 4 and 5.

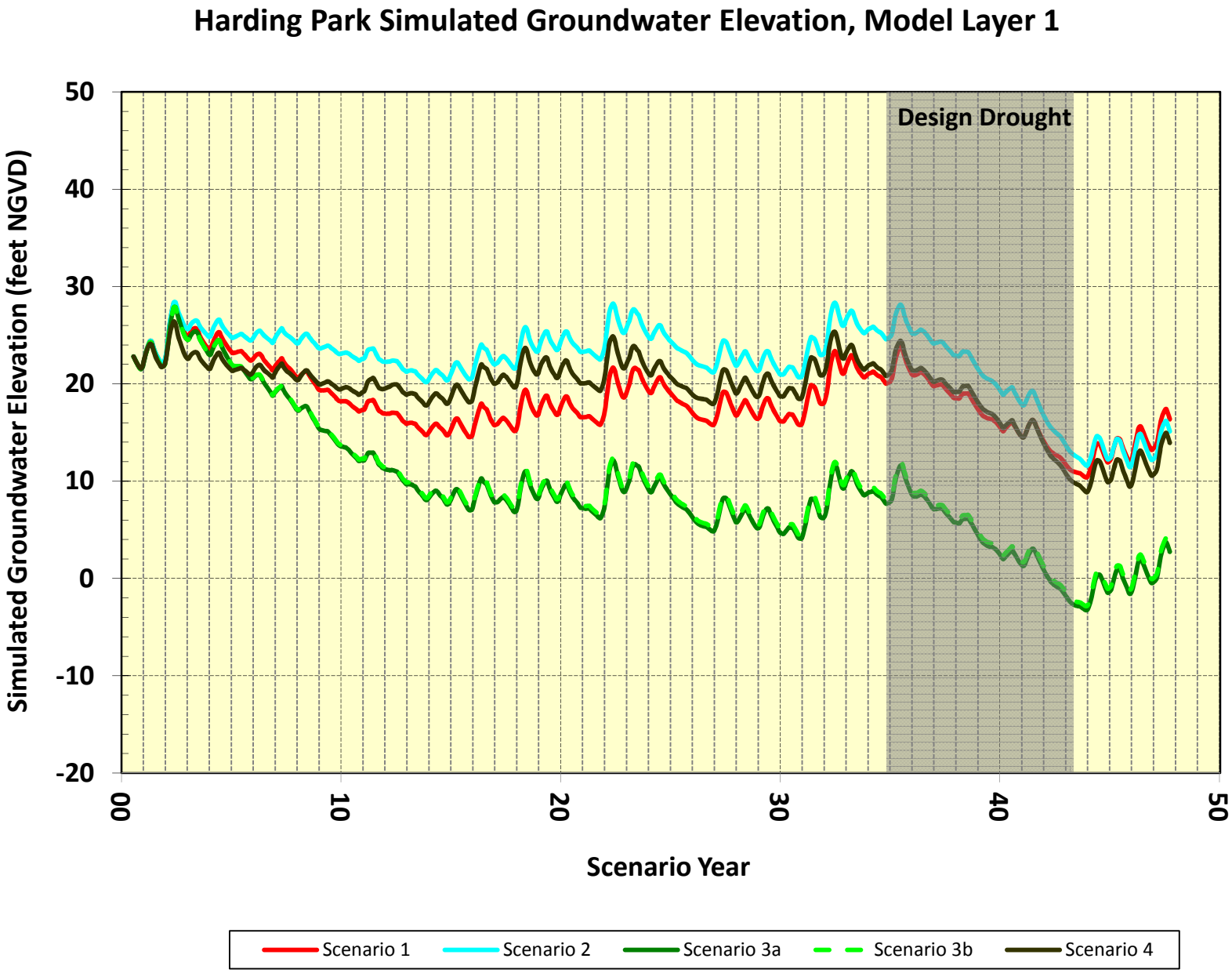

SWM-GS-M Simulated Groundwater Elevation, Model Layer 1
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
Design Drought
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

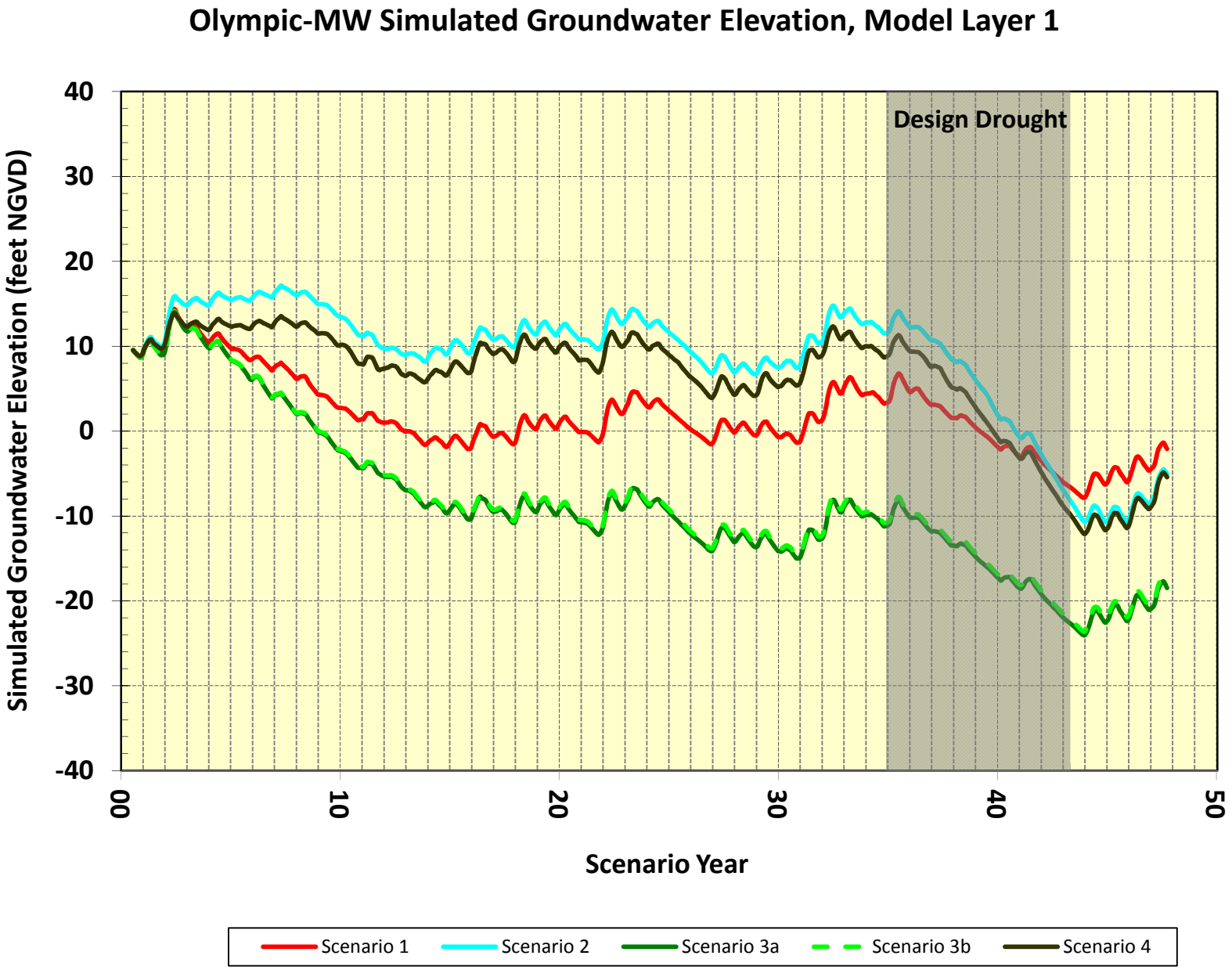

Ortega_MW Simulated Groundwater Elevation, Model Layer 1
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
Design Drought
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

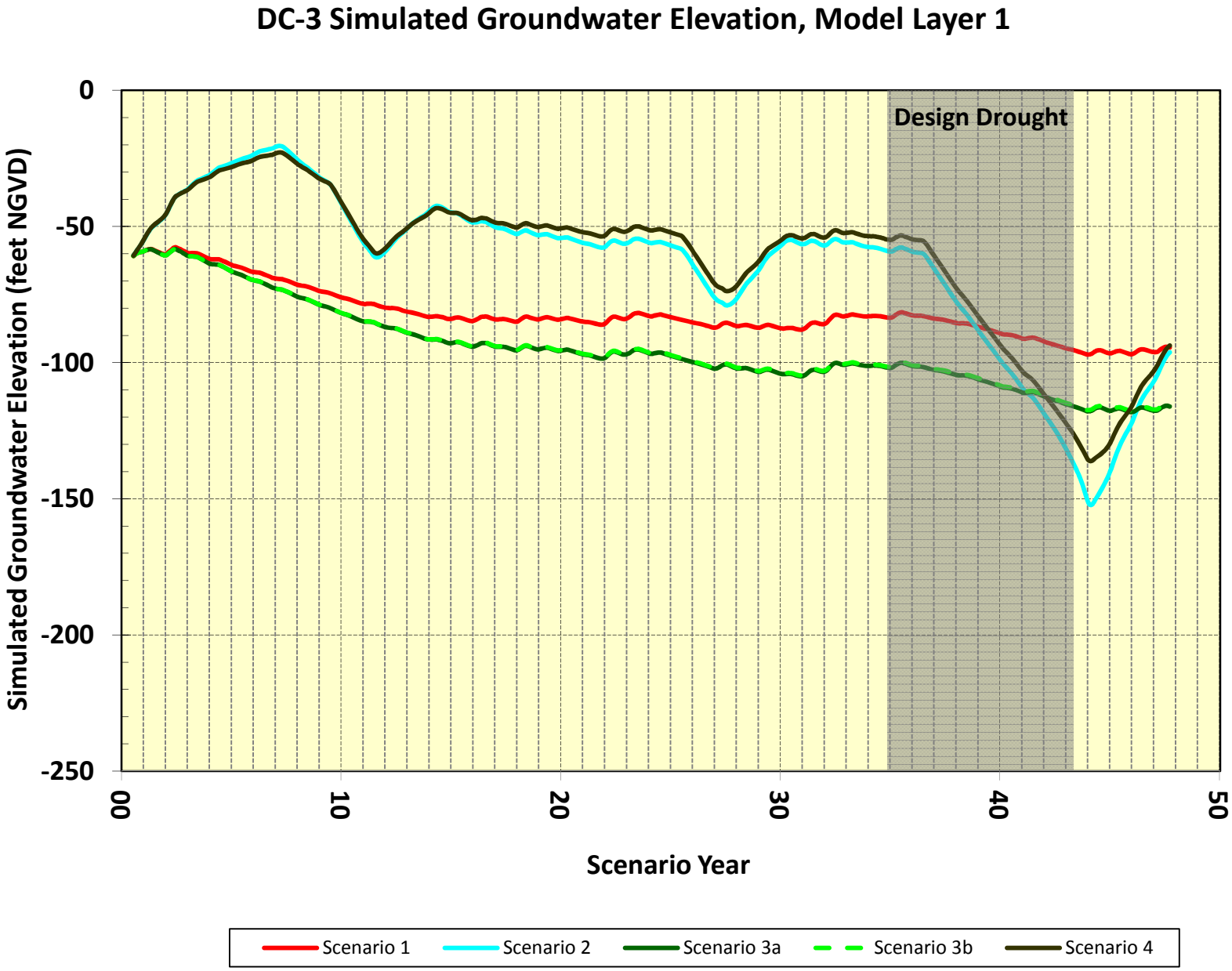

Santiago-S Simulated Groundwater Elevation, Model Layer 1
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
-15
-20
Design Drought
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

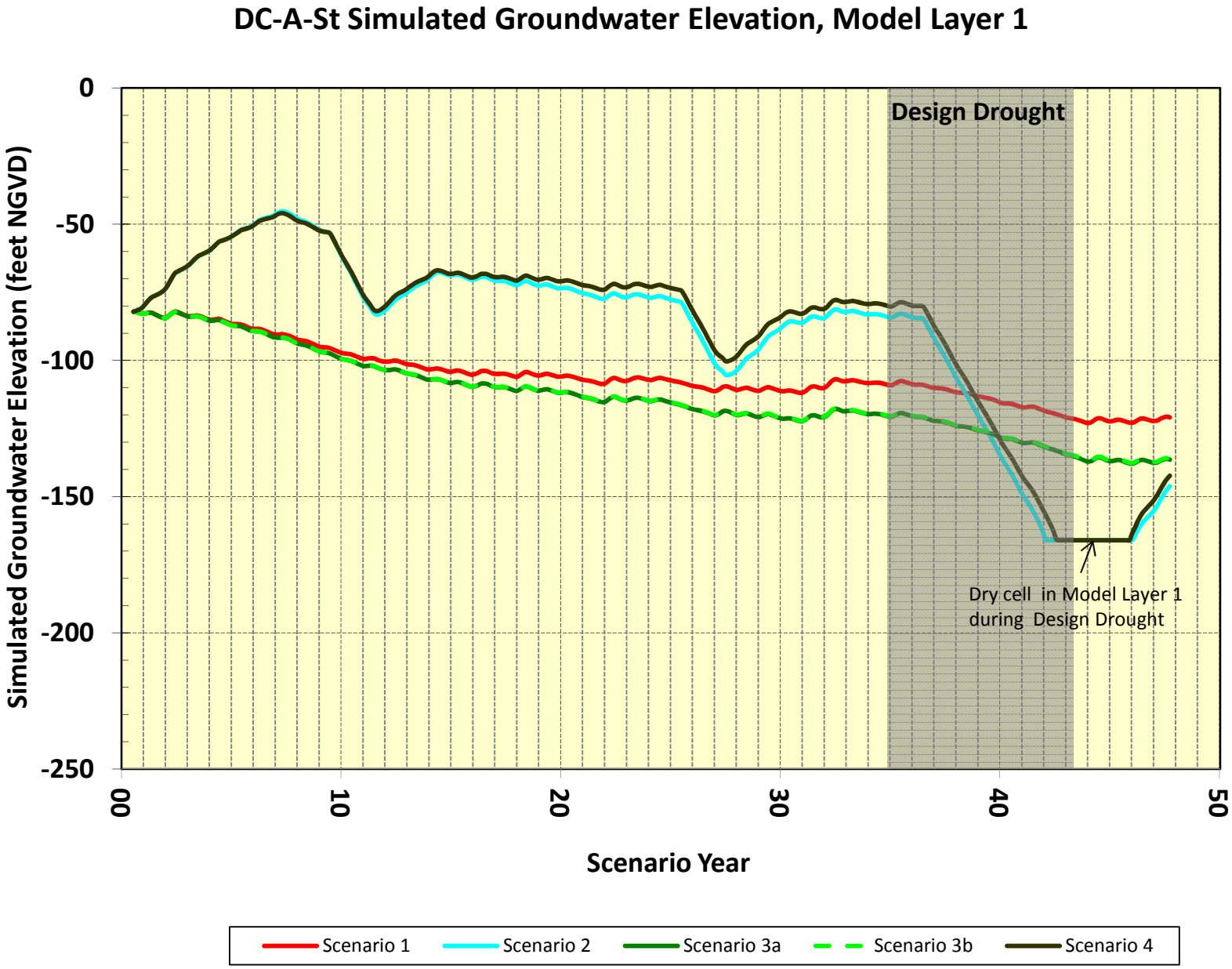

LMMW-4S Simulated Groundwater Elevation, Model Layer 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
30
20
10
0
-10
-20
-30
-40
-50
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

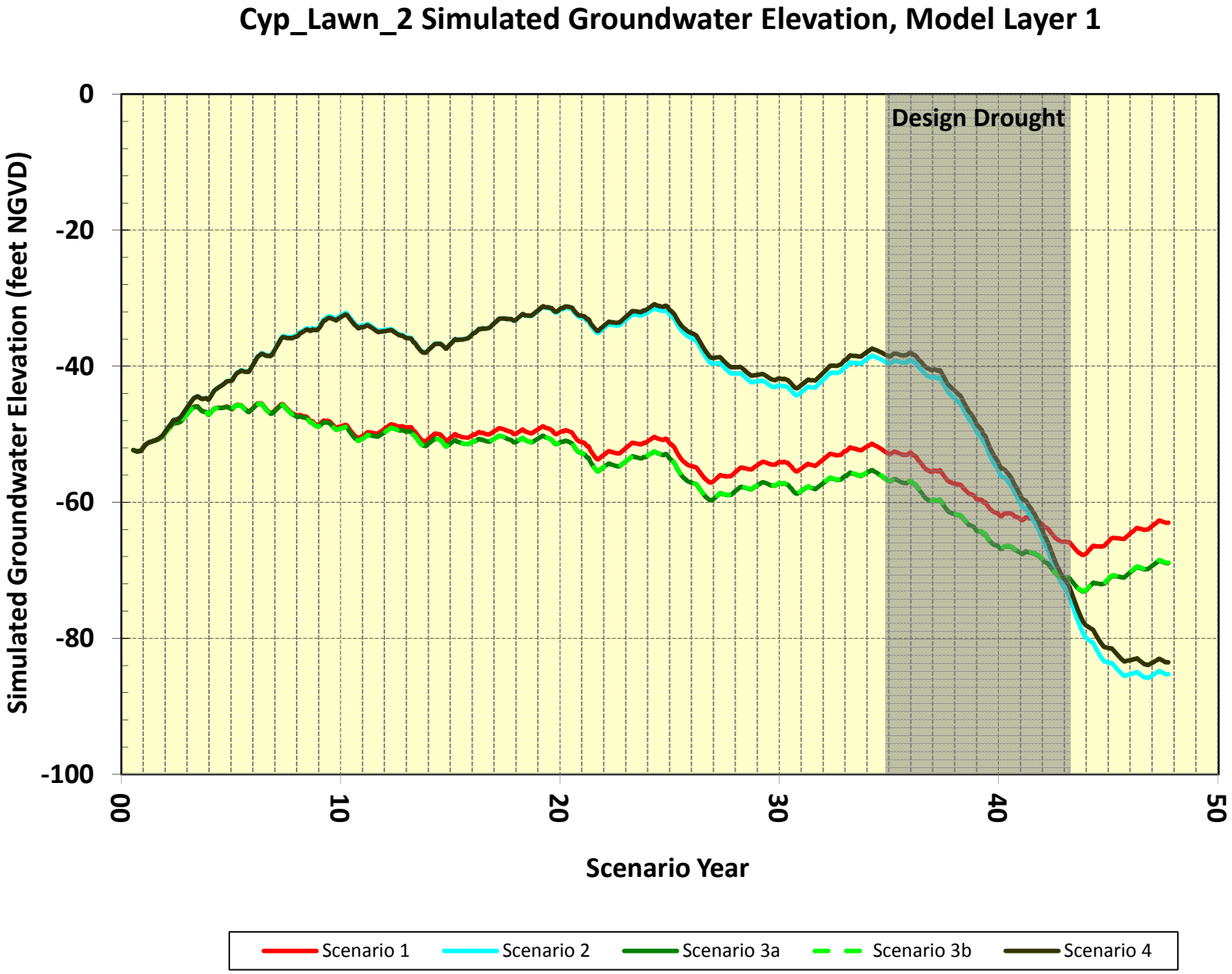

LMMW-5S Simulated Groundwater Elevation, Model Layer 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
50
40
30
20
10
0
-10
-20
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

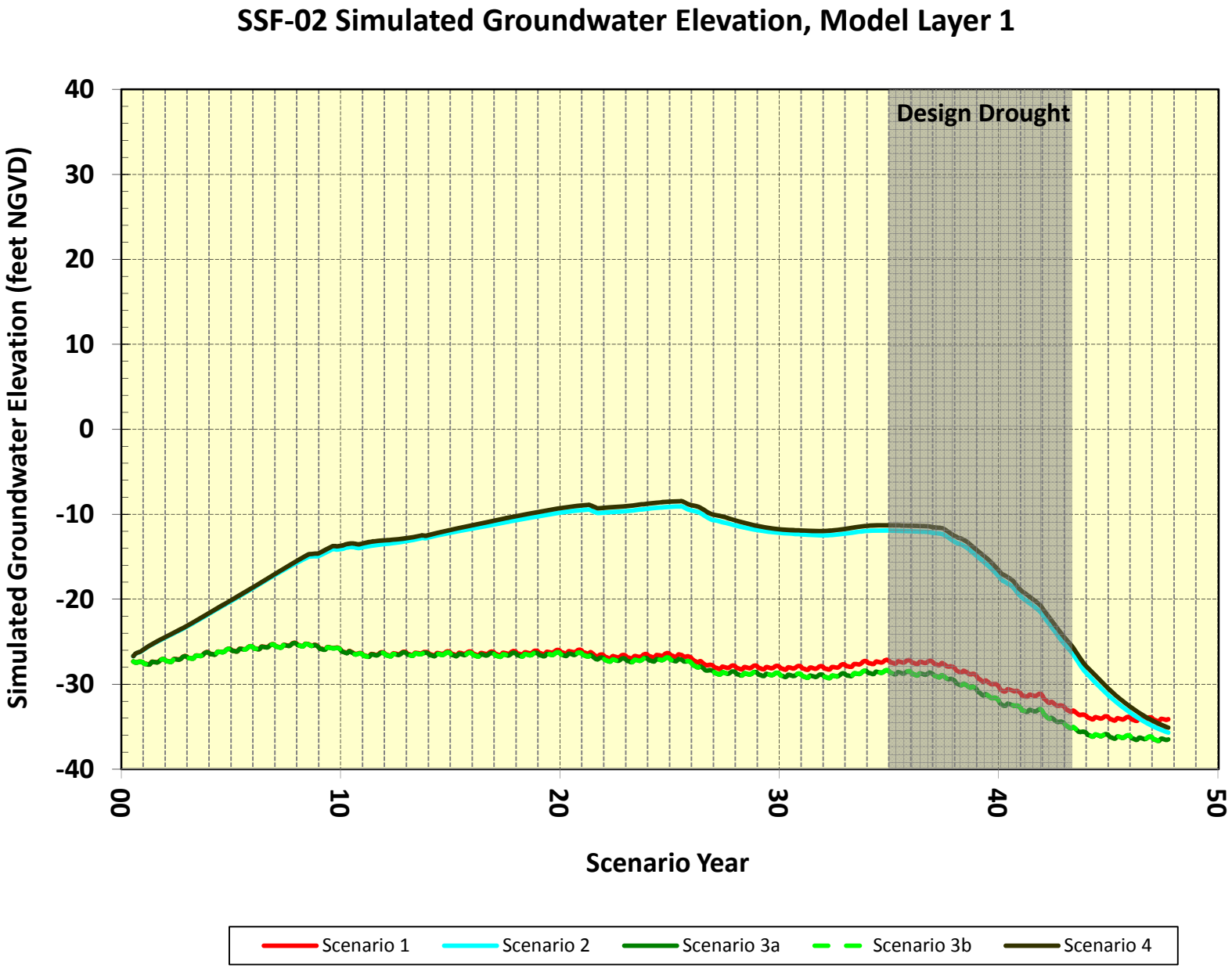

Harding Park Simulated Groundwater Elevation, Model Layer 1
Simulated Groundwater Elevation (feet NGVD)
50
40
30
20
10
0
-10
-20
Design Drought
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

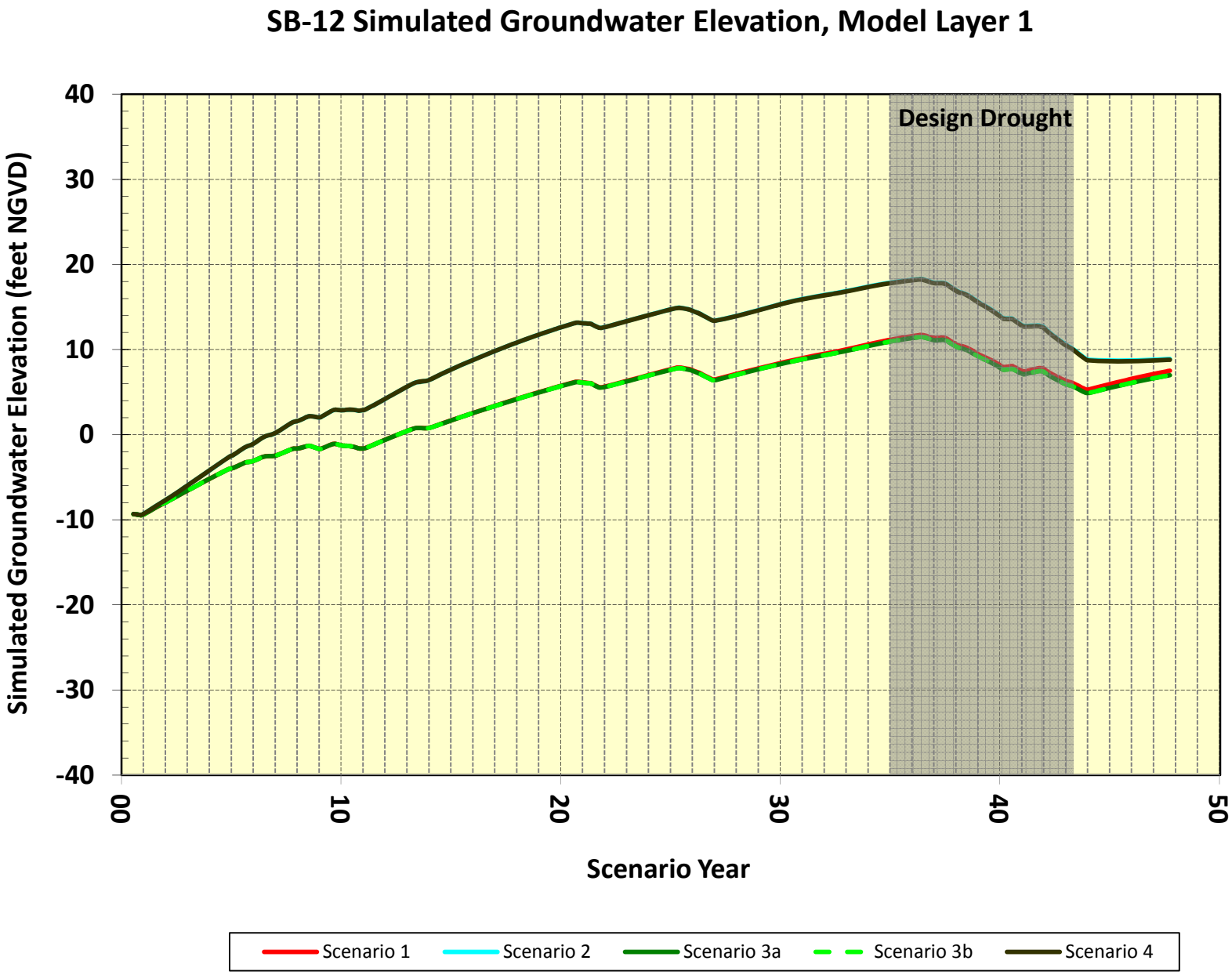

Olympic-MW Simulated Groundwater Elevation, Model Layer 1
Simulated Groundwater Elevation (feet NGVD)
40
30
20
10
0
-10
-20
-30
-40
Design Drought
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

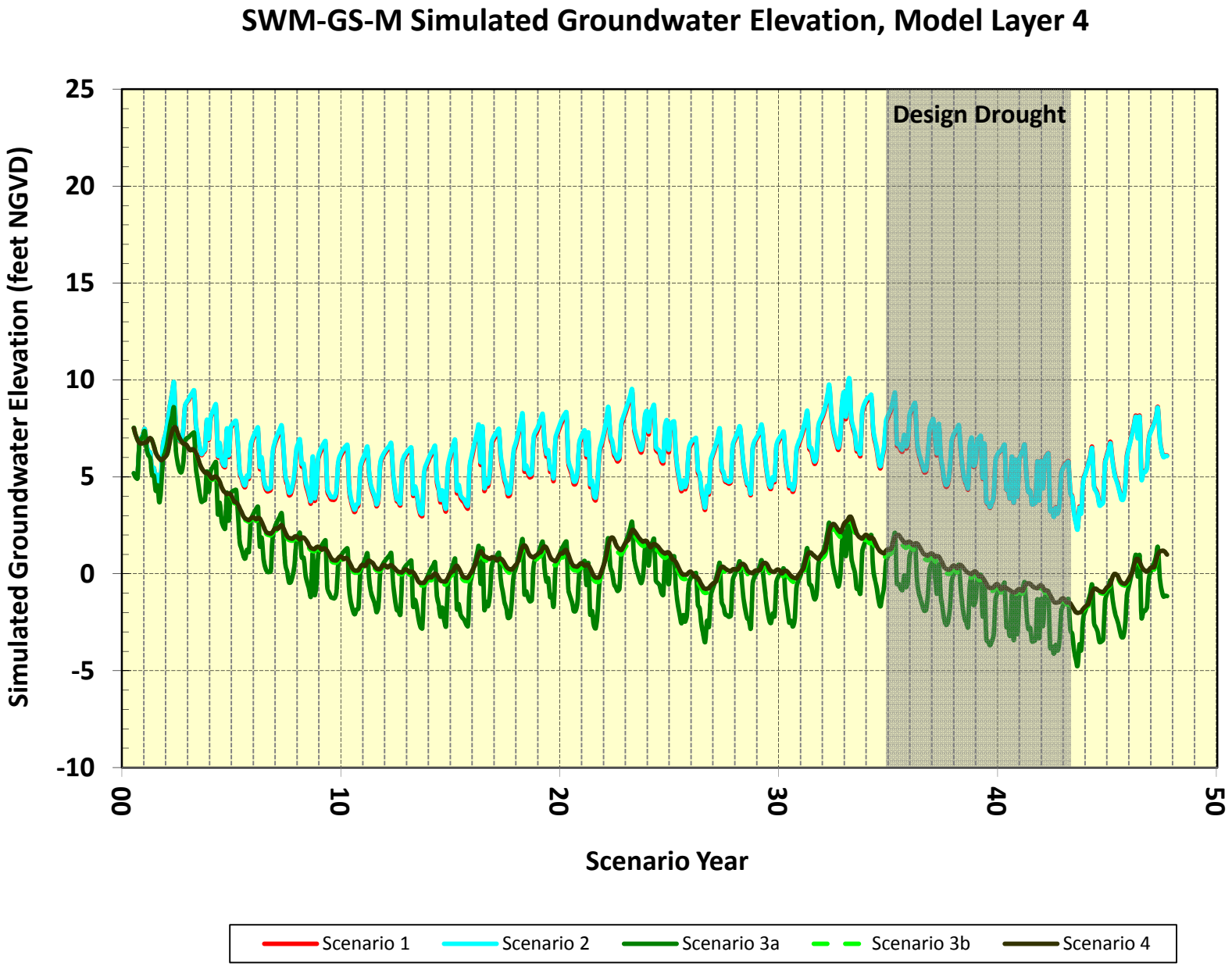

DC-3 Simulated Groundwater Elevation, Model Layer 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

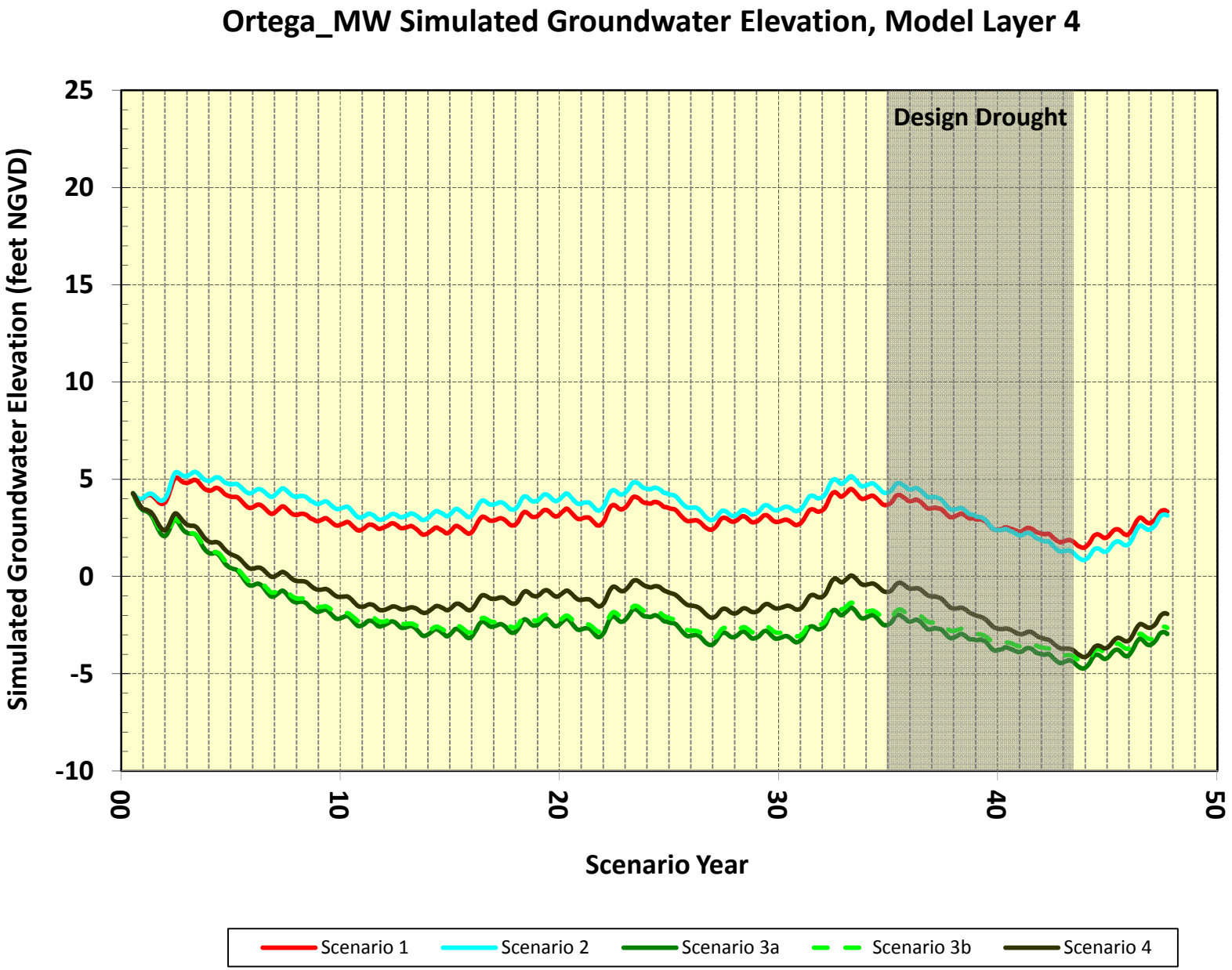

DC-A-St Simulated Groundwater Elevation, Model Layer 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Dry cell in Model Layer 1
during Design Drought
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

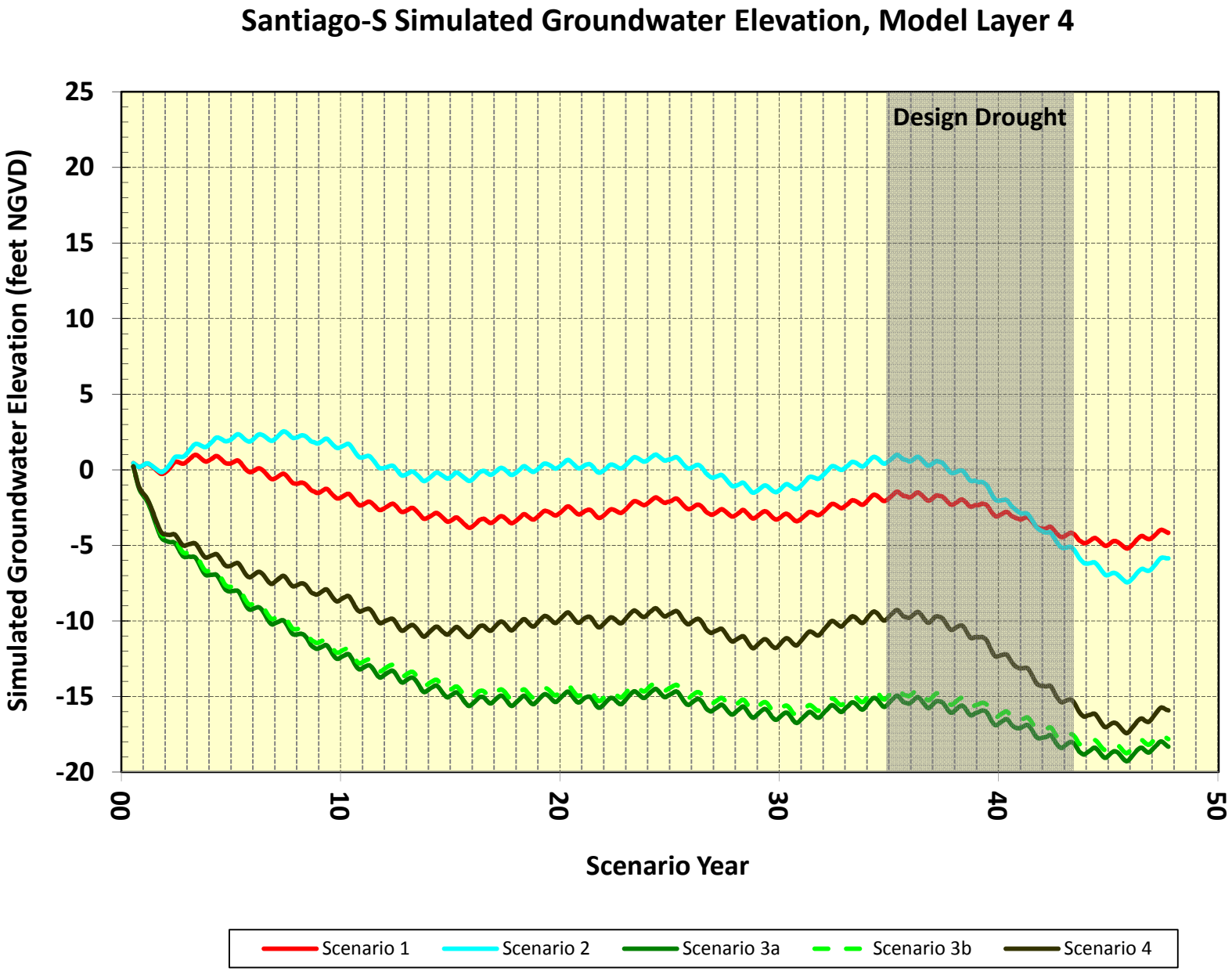

Cyp_Lawn_2 Simulated Groundwater Elevation, Model Layer 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-20
-40
-60
-80
-100
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

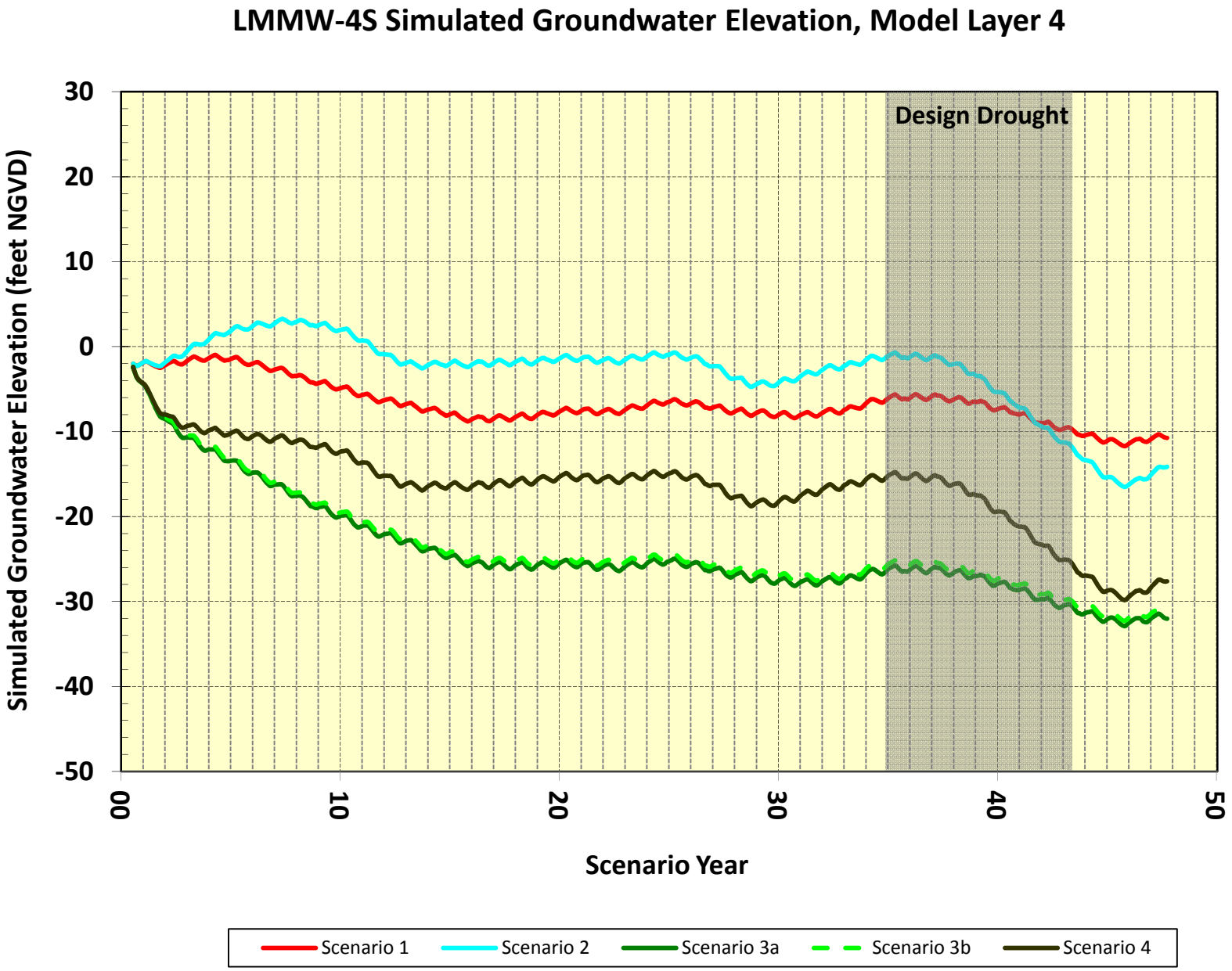

SSF-02 Simulated Groundwater Elevation, Model Layer 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
30
20
10
0
-10
-20
-30
-40
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4


SB-12 Simulated Groundwater Elevation, Model Layer 1
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
30
20
10
0
-10
-20
-30
-40
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

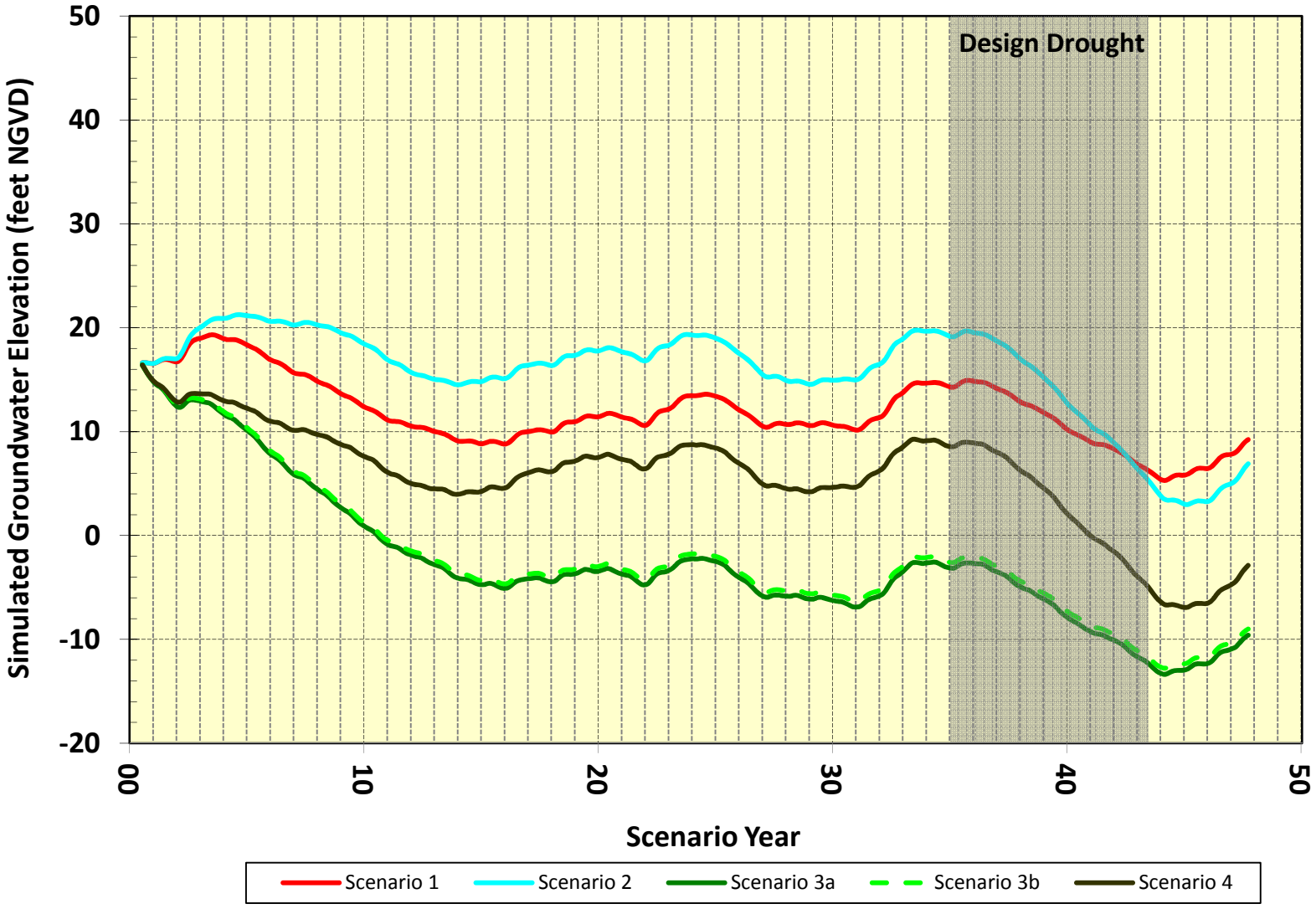

SWM-GS-M Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4


Ortega_MW Simulated Groundwater Elevation, Model Layer 4
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
Design Drought
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

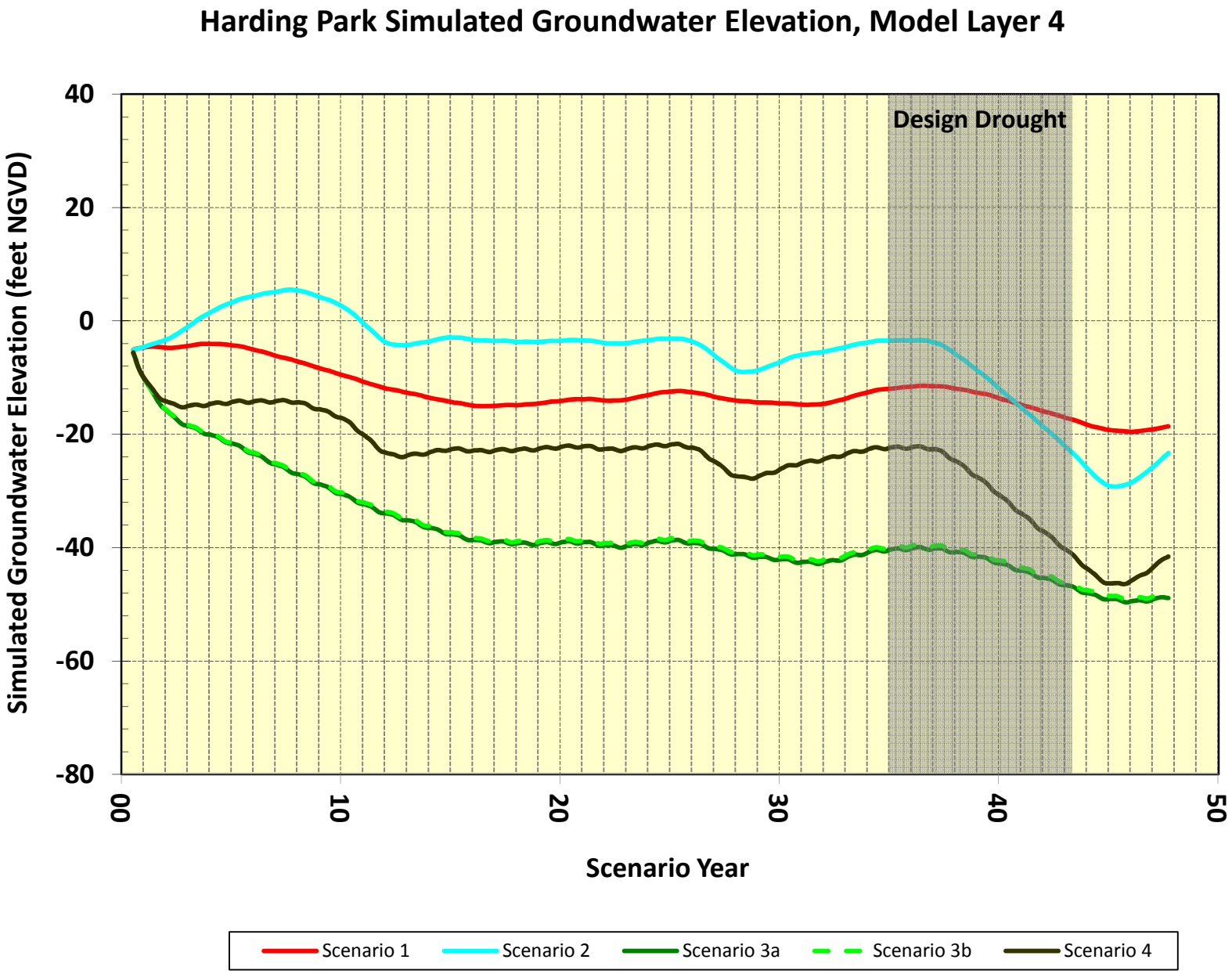

Santiago-S Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
25
20
15
10
5
0
-5
-10
-15
-20
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

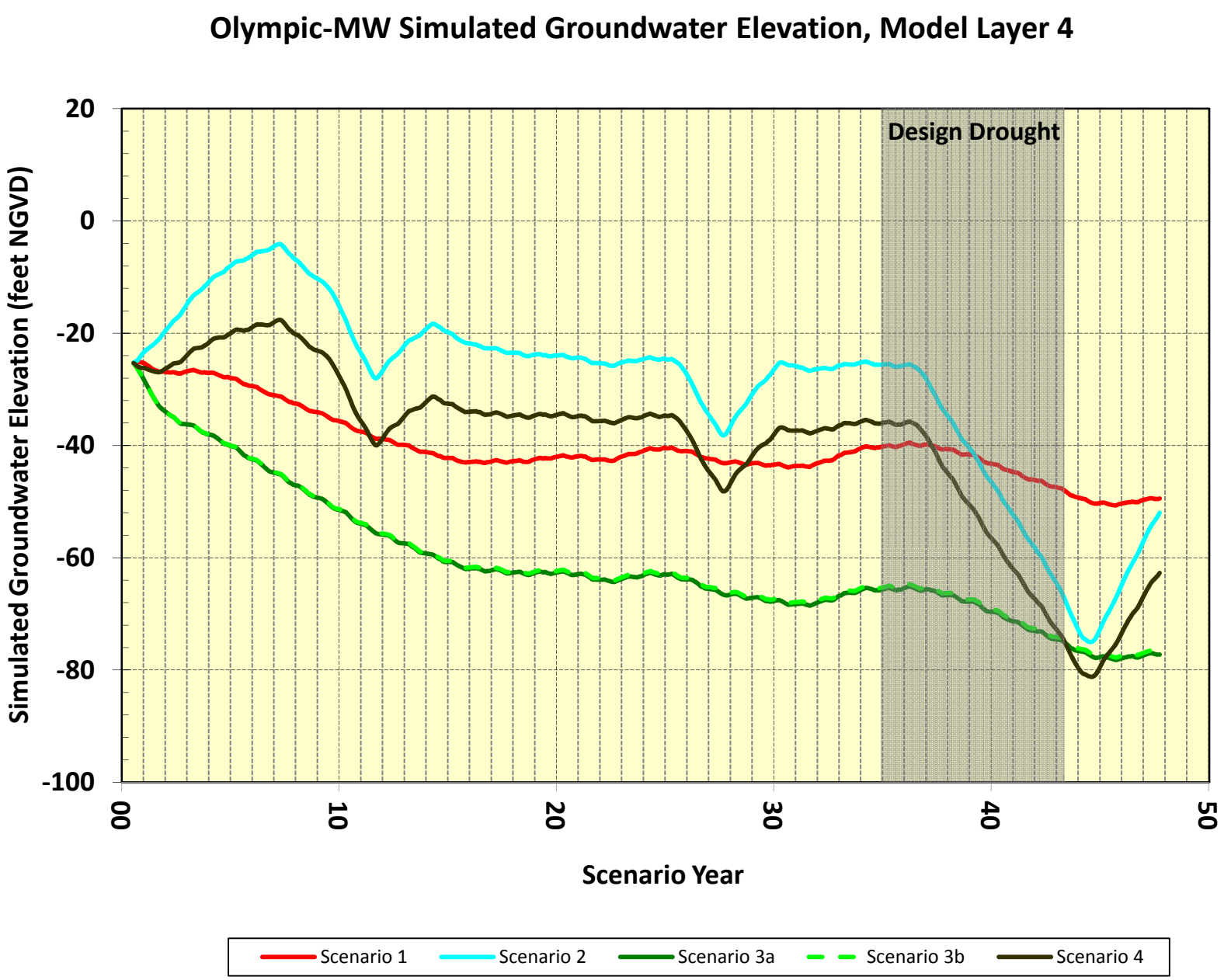

LMMW-4S Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
30
20
10
0
-10
-20
-30
-40
-50
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

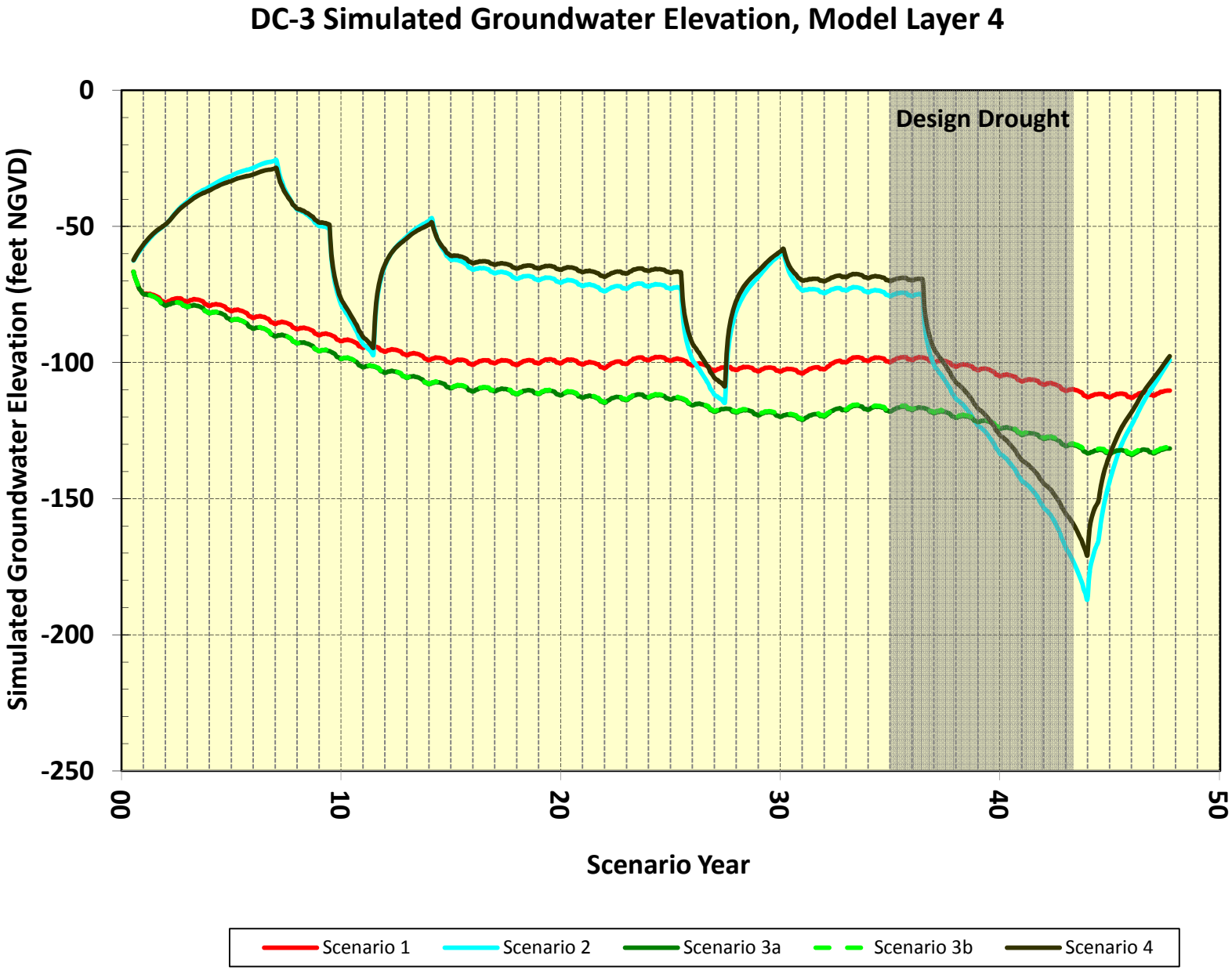
LMMW-5S Simulated Groundwater Elevation, Model Layer 3

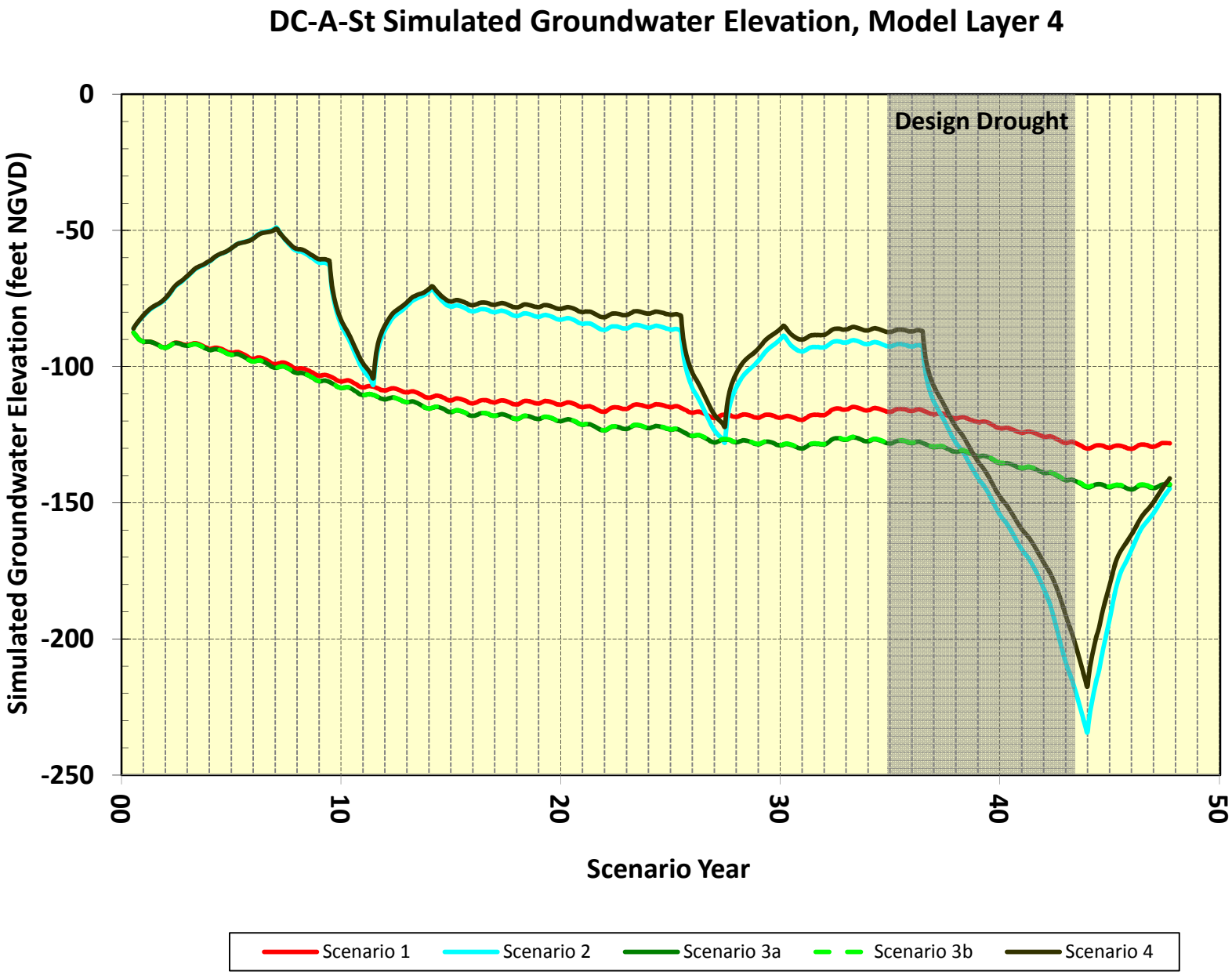


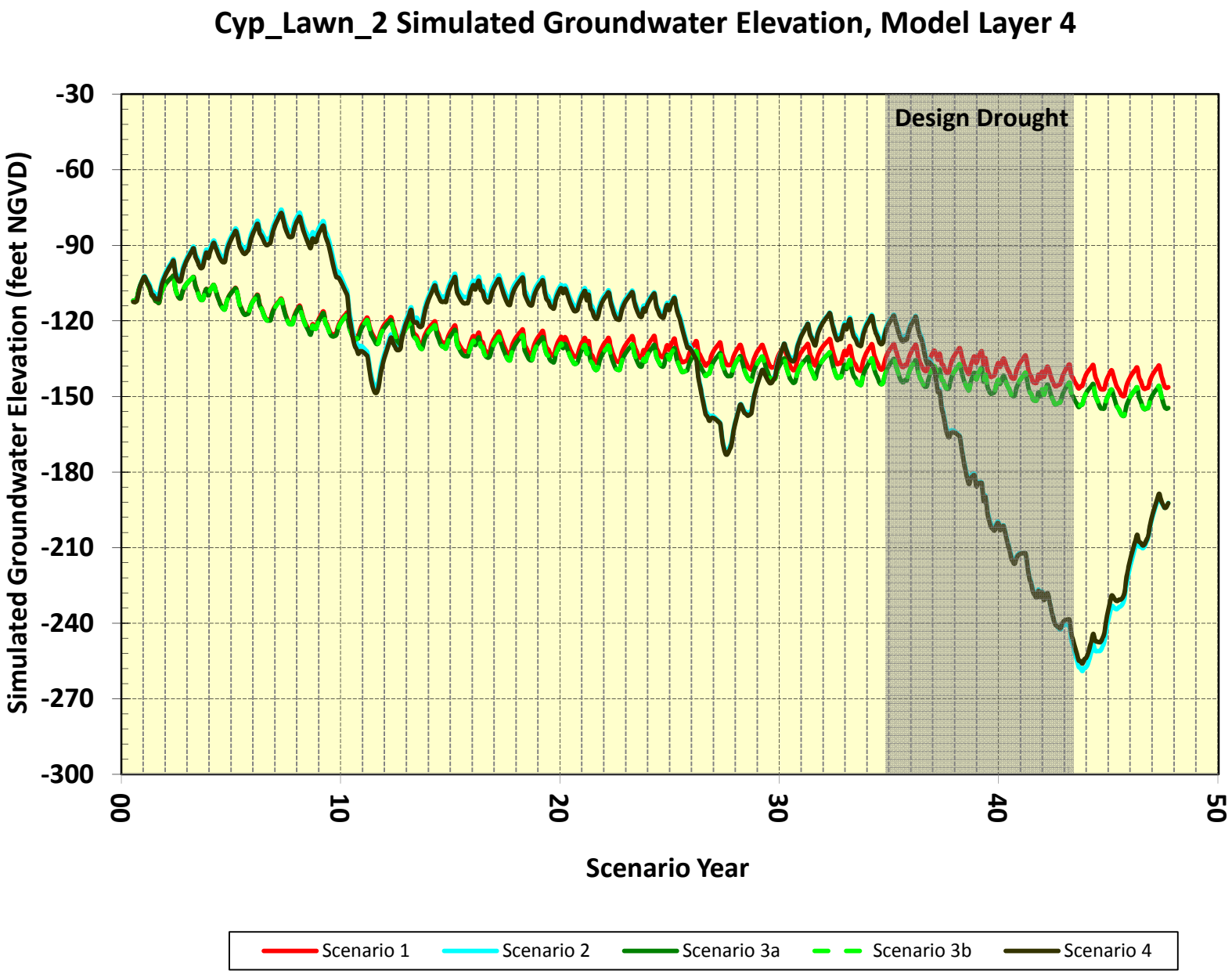
Note: At the location of LMMW-5S, the model does not contain layer 4. Layer 3 is presented in order to show the deepest layer response.

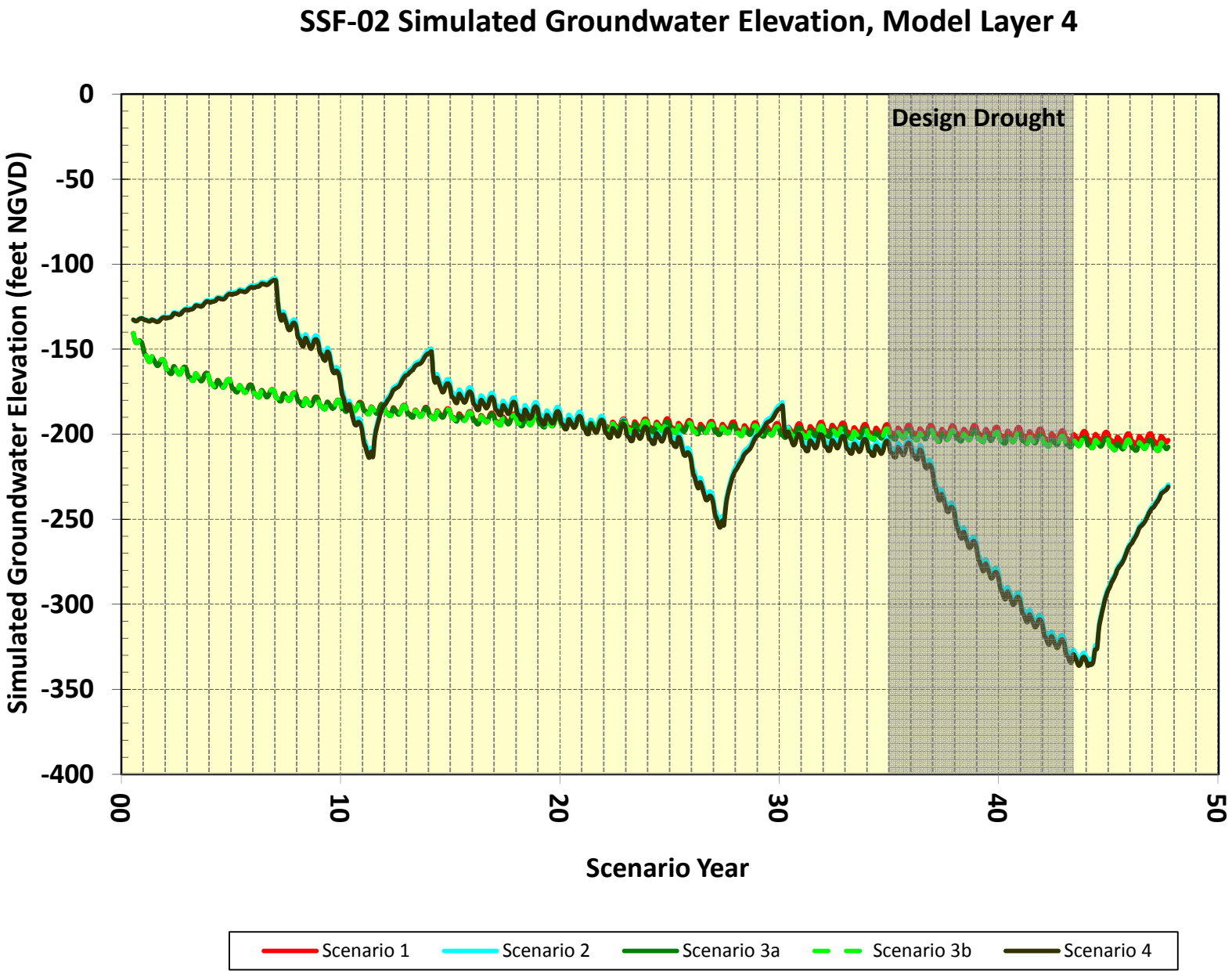

Harding Park Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
40
20
0
-20
-40
-60
-80
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4

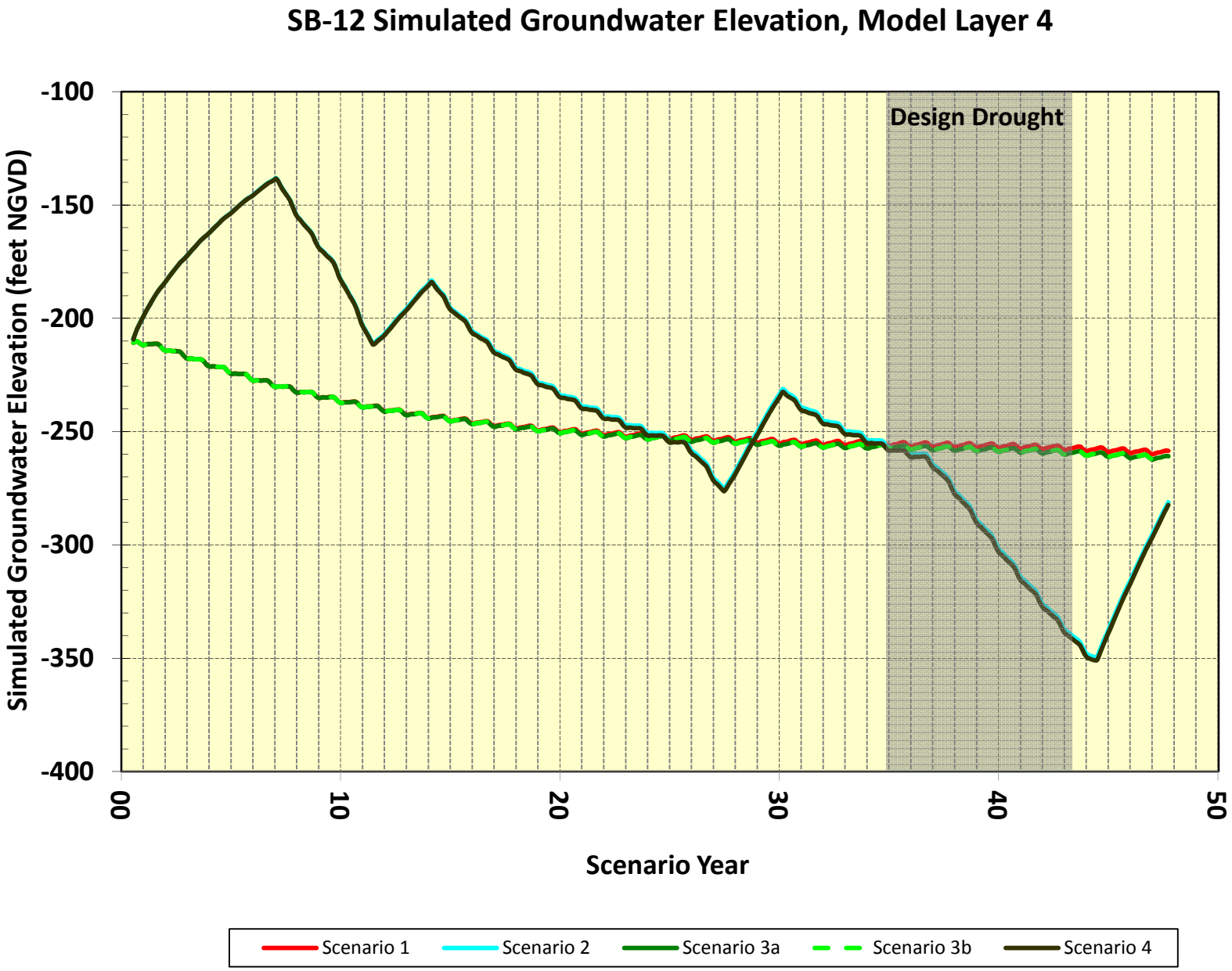

Olympic-MW Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
20
0
-20
-40
-60
-80
-100
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4


DC-3 Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4


DC-A-St Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4


Cyp_Lawn_2 Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
-30
-60
-90
-120
-150
-180
-210
-240
-270
-300
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4


SSF-02 Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
0
-50
-100
-150
-200
-250
-300
-350
-400
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4


SB-12 Simulated Groundwater Elevation, Model Layer 4
Design Drought
Simulated Groundwater Elevation (feet NGVD)
-100
-150
-200
-250
-300
-350
-400
00
10
20
30
40
50
Scenario Year
Scenario 1
Scenario 2
Scenario 3a
Scenario 3b
Scenario 4