SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Final Environmental Impact Report
Volume 1 of 2

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

December 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 Date:	April 18, 2013
FEIR Certification Meeting Date:	December 19, 2013

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Planning Commission Motion No. 19050

HEARING DATE: December 19, 2013

DEIR and RTC can be found at http://www.sf-planning.org/index.aspx?page=1829

Hearing Date:	December 19, 2013
Case No.:	**2008.1122E**
Project:	**San Francisco Groundwater Supply Project**
Project Location:	**Various Locations in San Francisco County**
Project Sponsor:	San Francisco Public Utilities Commission 525 Golden Gate Avenue San Francisco, CA 94102
Staff Contact:	Timothy Johnston – (415) 575-9035 Timothy.Johnston@sfgov.org

ADOPTING FINDINGS RELATED TO THE CERTIFICATION OF A FINAL ENVIRONMENTAL IMPACT REPORT FOR THE PROPOSED SAN FRANCISCO GROUNDWATER SUPPLY PROJECT.

MOVED, that the San Francisco Planning Commission (hereinafter "Commission") hereby CERTIFIES the Final Environmental Impact Report identified as Case No. 2008.1122E, San Francisco Groundwater Supply Project (hereinafter, "Project"), located San Francisco, based upon the following findings:

1. The City and County of San Francisco, acting through the Planning Department ("Department") fulfilled all procedural requirements of the California Environmental Quality Act (Cal. Pub. Res. Code Section 21000 *et seq.*, hereinafter "CEQA"), the State CEQA Guidelines (Cal. Admin. Code Title 14, Section 15000 *et seq.*, (hereinafter "CEQA Guidelines") and Chapter 31 of the San Francisco Administrative Code (hereinafter "Chapter 31").

   A. The Department determined that an Environmental Impact Report ("EIR") was required for the Project and provided public notice of that determination by publication in a newspaper of general circulation, and in accordance with CEQA Guidelines Section 15082, prepared and circulated a Notice of Preparation ("NOP") to local, State, and federal agencies and to other interested parties on December 30, 2009. In accordance with CEQA Guidelines Section 15083, the Department conducted a scoping meeting on January 20, 2010, in the Project vicinity. The purpose of the meeting was to present the proposed Project to the public and receive public input regarding the proposed scope of the EIR analysis. The Department accepted public comments between December 30, 2009, through January 29, 2010. Subsequently, the San Francisco Public Utilities Commission ("SFPUC") made certain changes to the proposed Project, and the

Department published a revised NOP for the revised Project in a newspaper of general circulation on March 2, 2011. The Department circulated the revised NOP to local, State, and federal agencies and to other interested parties on March 2, 2011, initiating a public comment period that extended through April 1, 2011. A scoping report was prepared to summarize the public scoping process and the comments received in response to the NOP, and the report is included in Appendix A of the Draft EIR.

B. On March 13, 2013, the Department published the Draft Environmental Impact Report ("DEIR") and provided public notice in a newspaper of general circulation of the availability of the DEIR for public review and comment for a 45-day period, and of the date and time of the Planning Commission public hearing on the DEIR; this notice was mailed to the Department's list of persons requesting such notice and other interested parties.

C. Notices of availability of the DEIR and of the date and time of the public hearing were posted near the Project site by Department staff on March 13, 2013. The Notice of Availability was also made available at public libraries in San Francisco.

D. On March 13, 2013, copies of the DEIR were mailed or otherwise delivered to a list of persons requesting it, to those noted on the distribution list in the DEIR, to adjacent property owners, and to government agencies, the latter both directly and through the State Clearinghouse. The DEIR was posted on the Department's website.

E. A Notice of Completion was filed with the State Secretary of Resources via the State Clearinghouse on March 13, 2013.

2. The Planning Commission held a duly-advertised public hearing on the DEIR to accept written or oral comments on April 18, 2013. The public hearing transcript is in the Project record. The period for acceptance of written comments ended on April 29, 2013.

3. The Department prepared responses to comments on environmental issues received at the public hearing and in writing during the 45-day public review period for the DEIR, prepared revisions to the text of the DEIR in response to comments received or based on additional information that became available during the public review period. The Department provided additional, updated information and clarification on issues raised by commenters, as well as SFPUC and the Planning Department, to address Project updates since publication of the DEIR. This material was presented in a Responses to Comments document ("RTC"), published on October 30, 2013, distributed to the Commission and all parties who commented on the DEIR, and made available to others upon request at the Department and on the Department's website.

4. A Final Environmental Impact Report ("FEIR") has been prepared by the Department, consisting of the Draft Environmental Impact Report, any consultations and comments received during the review process, any additional information that became available, and the RTC document, all as required by law.

5. Project files on the FEIR have been made available for review by the Commission and the public. These files, are available for public review at the Department at 1650 Mission Street, and are part of the record before the Commission. Jonas Ionin is the custodian of the records. Copies of the DEIR and associated reference materials, as well as the RTC document, are also available for review at public libraries in San Francisco, as well as on the Department's website.

6. The Commission, in certifying the completion of said FEIR, hereby does find that the Project described in the FEIR, will not have Project-specific significant effects on the environment that could not be mitigated to a less than significant level with implementation of mitigation measures.

7. The Commission further finds, in certifying the completion of said FEIR, that the Project described in the FEIR is a component of the SFPUC's adopted Water Supply Improvement Program ("WSIP") for which the Planning Commission certified a Program Environmental Impact Report on October 30, 2008 (Case No. 2005.0159E) and the SFPUC approved by Resolution No. 08-0200; as part of the WSIP, the Commission finds that the Project will contribute to a significant and unavoidable impact related to indirect growth-inducement impacts in the SFPUC service area.

8. On November 14, 2013, the Commission reviewed and considered the FEIR and hereby does find that the contents of said report and the procedures through which the FEIR was prepared, publicized, and reviewed comply with the provisions of CEQA, the CEQA Guidelines, and Chapter 31 of the San Francisco Administrative Code.

9. The Planning Commission hereby does find that the Final Environmental Impact Report concerning File No. 2008.1122E, San Francisco Groundwater Supply Project, reflects the independent judgment and analysis of the City and County of San Francisco, is adequate, accurate and objective, and that the Responses to Comments document contains no significant revisions to the DEIR or information that would necessitate recirculation of the FEIR under CEQA Guidelines Section 15088.5, and hereby does CERTIFY THE COMPLETION of said Final Environmental Impact Report in compliance with CEQA and the CEQA Guidelines.

I hereby certify that the foregoing Motion was ADOPTED by the Planning Commission at its regular meeting of December 19, 2013.

Jonas Ionin
Commission Secretary

AYES: Antonini, Borden, Hills, Moore, Sugaya, Wu

NOES: none

ABSENT: Fong

ADOPTED: December 19, 2013

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Changes from the Draft EIR text are indicated by a dot (●) in the left margin

TABLE OF CONTENTS

SFPUC San Francisco Groundwater Supply Project Final EIR – Case No. 2008.1122E

Page

Volume 1

● **Acronyms, Abbreviations, and Glossary** **xi**

1. Summary **1-1**
- 1.1 Introduction and Purpose of the Project 1-1
- 1.2 Overview of the SFPUC Regional Water System 1-1
  - 1.2.1 Existing Regional Water System 1-1
  - 1.2.2 SFPUC Water System Improvement Program 1-2
- 1.3 Project Objectives 1-6
- 1.4 Project Description 1-7
  - ● 1.4.1 Project Components 1-7
  - ● 1.4.2 Project Location 1-8
  - 1.4.3 Project Construction 1-9
  - 1.4.4 Project Operations 1-10
- 1.5 Summary of Project Impacts and Mitigation Measures 1-12
- 1.6 Alternatives to the Proposed Project 1-13
  - 1.6.1 Comparison of Alternatives 1-13
- 1.7 Areas of Controversy 1-16
- 1.8 References 1-16

2. Introduction and Background **2-1**
- 2.1 Introduction 2-1
- 2.2 Background – Regional Water System and the Water System Improvement Program 2-1
  - 2.2.1 Regional Water System Overview 2-1
  - 2.2.2 SFPUC Water System Improvement Program 2-2
  - 2.2.3 Other Related Projects 2-7
- 2.3 Purpose of this EIR 2-9
- 2.4 Public Outreach 2-9
  - 2.4.1 Notice of Preparation 2-10
  - 2.4.2 Public and Agency Comments on the NOP 2-10
- 2.5 Organization of the Draft EIR 2-15
- 2.6 Public Participation 2-15
- 2.7 References 2-16

Page

Volume 1 (continued)

3. Project Description **3-1**
3.1 Introduction 3-1
3.2 Project Goals and Objectives 3-1
3.3 Proposed Project Components 3-3
● 3.3.1 Overview 3-3
3.3.2 Proposed Groundwater Well Facilities Locations 3-4
3.3.3 Pipeline Locations 3-7
● 3.3.4 Sunset Reservoir Facility Location 3-14
3.4 Project Construction 3-14
3.4.1 Groundwater Well Facilities 3-14
3.4.2 Pipeline Construction 3-41
● 3.4.3 Sunset Reservoir Construction 3-47
● 3.4.4 Construction Schedule 3-50
3.4.5 SFPUC Standard Construction and Greenhouse Gas Reduction Measures 3-53
3.5 Operations and Maintenance 3-53
3.5.1 Operations 3-53
3.5.2 Maintenance 3-59
3.6 Intended Uses of the EIR 3-60
3.6.1 Approvals Required 3-60
3.7 References 3-61

4. Plans and Policies **4-1**
4.1 City and County of San Francisco Plans and Policies 4-2
3.4.1 San Francisco General Plan 4-2
4.1.2 San Francisco Bicycle Plan 4-6
4.1.3 San Francisco Sustainability Plan 4-6
4.2 SFPUC Plans and Policies 4-7
4.2.1 SFPUC Strategic Sustainability Plan 4-7
4.3 San Francisco Recreation and Park Department Plans and Policies 4-7
4.3.1 Golden Gate Park Master Plan 4-7
4.3.2 Other Plans 4-9
4.4 Other Plans and Policies 4-10
4.4.1 Golden Gate National Recreation Area Management Policies 2006 4-10
4.5 References 4-11

5. Environmental Setting and Impacts **5.1-1**
5.1 Overview 5.1-1
5.1.1 Scope of Analysis 5.1-1
5.1.2 Significance Determinations 5.1-2
5.1.3 Relationship to the WSIP PEIR 5.1-3
● 5.1.4 Approach to Cumulative Impact Analysis and Cumulative Projects 5.1-26
5.1.5 Overview of Groundwater Modeling Approach 5.1-40
5.1.6 References 5.1-51

5.2 Land Use 5.2-1
5.2.1 Setting 5.2-1
5.2.2 Regulatory Framework 5.2-9
● 5.2.3 Impacts and Mitigation Measures 5.2-9
5.2.4 References 5.2-12

Page

Volume 1 (continued)

5. Environmental Setting and Impacts (continued)

5.3 Aesthetics 5.3-1
5.3.1 Setting 5.3-1
5.3.2 Regulatory Framework 5.3-19
5.3.3 Impacts and Mitigation Measures 5.3-20
5.3.4 References 5.3-47

5.4 Population and Housing 5.4-1
5.4.1 Setting 5.4-1
5.4.2 Regulatory Framework 5.4-1
5.4.3 Impacts and Mitigation Measures 5.4-1
5.4.4 References 5.4-3

5.5 Cultural and Paleontological Resources 5.5-1
5.5.1 Setting 5.5-1
5.5.2 Regulatory Framework 5.5-24
5.5.3 Impacts and Mitigation Measures 5.5-27
5.5.4 References 5.5-42

5.6 Transportation and Circulation 5.6-1
5.6.1 Setting 5.6-1
5.6.2 Regulatory Framework 5.6-5
5.6.3 Impacts and Mitigation Measures 5.6-7
5.6.4 References 5.6-28

5.7 Noise 5.7-1
5.7.1 Setting 5.7-1
5.7.2 Regulatory Framework 5.7-7
5.7.3 Impacts and Mitigation Measures 5.7-8
5.7.4 References 5.7-24

5.8 Air Quality 5.8-1
5.8.1 Setting 5.8-1
5.8.1 Regulatory Framework 5.8-17
5.8.3 Impacts and Mitigation Measures 5.8-23
5.8.4 References 5.8-41

5.9 Greenhouse Gas Emissions 5.9-1
5.9.1 Setting 5.9-1
5.9.1 Regulatory Framework 5.9-2
5.9.3 Impacts and Mitigation Measures 5.9-12
5.9.4 References 5.9-23

5.10 Wind and Shadow 5.10-1
5.10.1 Setting 5.10-1
5.10.2 Regulatory Framework 5.10-1
5.10.3 Impacts and Mitigation Measures 5.10-3
5.10.4 References 5.10-4

5.11 Recreation 5.11-1
5.11.1 Setting 5.11-1
5.11.2 Regulatory Framework 5.11-15
5.11.3 Impacts and Mitigation Measures 5.11-16
5.11.4 References 5.11-30

Page

Volume 2 (*bound separately*)

5. Environmental Setting and Impacts (continued)

5.12 Utilities and Service Systems 5.12-1
5.12.1 Setting 5.12-1
5.12.2 Regulatory Framework 5.12-4
● 5.12.3 Impacts and Mitigation Measures 5.12-6
5.12.4 References 5.12-16

5.13 Public Services 5.13-1
5.13.1 Setting 5.13-1
5.13.2 Regulatory Framework 5.13-2
5.13.3 Impacts and Mitigation Measures 5.13-3
5.13.4 References 5.13-4

5.14 Biological Resources 5.14-1
5.14.1 Setting 5.14-1
5.14.2 Regulatory Framework 5.14-29
● 5.14.3 Impacts and Mitigation Measures 5.14-38
5.14.4 References 5.14-75

5.15 Geology and Soils 5.15-1
5.15.1 Setting 5.15-1
5.15.2 Regulatory Framework 5.15-15
5.15.3 Impacts and Mitigation Measures 5.15-18
5.15.4 References 5.15-25

5.16 Hydrology and Water Quality 5.16-1
5.16.1 Setting 5.16-1
5.16.2 Regulatory Framework 5.16-54
● 5.16.3 Impacts and Mitigation Measures 5.16-66
5.16.4 References 5.16-146

5.17 Hazards and Hazardous Materials 5.17-1
5.17.1 Setting 5.17-1
5.17.2 Regulatory Framework 5.17-9
● 5.17.3 Impacts and Mitigation Measures 5.17-17
5.17.4 References 5.17-28

5.18 Mineral and Energy Resources 5.18-1
5.18.1 Setting 5.18-1
5.18.2 Regulatory Framework 5.18-3
5.18.3 Impacts and Mitigation Measures 5.18-5
5.18.4 References 5.18-9

5.19 Agricultural and Forest Resources 5.19-1
5.19.1 Setting 5.19-1
5.19.2 Regulatory Framework 5.19-1
5.19.3 Impacts and Mitigation Measures 5.19-2
5.19.4 References 5.19-3

Page

Volume 2 (continued)

6. Other CEQA Issues **6-1**
6.1 Growth-Inducing Impacts 6-1
6.1.1 Introduction and Overview 6-1
6.1.2 Summary of PEIR Growth-inducement Analysis 6-2
6.1.3 Summary of Conclusions 6-5
6.1.4 Indirect Effects of Growth 6-5
6.2 Summary of Cumulative Impacts 6-6
6.3 Significant and Unavoidable Impacts 6-7
6.3.1 Significant and Unavoidable, and Potentially Significant and Unavoidable Effects of the Proposed Project 6-7
6.3.2 Significant and Unavoidable Effects of the WSIP 6-7
6.4 Areas of Known Controversy and Issues to be Resolved 6-10
6.5 References 6-11

7. Alternatives **7-1**
7.1 Introduction 7-1
7.2 WSIP Alternatives 7-2
7.3 Groundwater Supply Project Alternatives Analysis 7-4
7.3.1 Project Objectives 7-4
7.3.2 Significant Environmental Impacts 7-5
7.3.3 Approach to Alternative Selection 7-8
7.3.4 Selected CEQA Alternatives 7-9
7.4 Comparison of Alternatives 7-39
7.5 Alternatives Considered but Rejected From Further Analysis 7-40
7.5.1 Option 1: Different Distribution Pipeline Routes 7-42
7.5.2 Option 2: Different Well Locations within the North Westside Groundwater Basin 7-44
7.5.3 Option 3: Develop Groundwater Resources in Different Basins in San Francisco 7-47
7.5.4 Option 4: Develop Other Water Resources 7-49
7.6 References 7-50

8. EIR Preparers **8-1**
8.1 EIR Authors 8-1
8.2 EIR Consultants 8-1
8.3 Project Sponsors 8-2
8.4 EIR Contributors 8-3

● **9. Responses to Comments** **9-1**
9.1 Introduction 9-1
9.1.1 Purpose of the Responses to Comments Document 9-1
9.1.2 Environmental Review Process 9-2
9.1.3 Document Organization 9-4
9.2 Project Description Revisions 9-5
9.2.1 Introduction to the Project Description Revisions 9-5
9.2.2 Description of the Project Description Revisions 9-5
9.2.3 Environmental Effects of the Project Description Revisions 9-7
9.3 List of Persons Commenting 9-8

Page

Volume 2 (continued)

9. Responses to Comments (continued)

9.4 Comments and Responses 9-9
- 9.4.1 General Comments 9-9
- 9.4.2 Project Description 9-18
- 9.4.3 Transportation and Circulation 9-25
- 9.4.4 Recreation 9-26
- 9.4.5 Biological Resources 9-28
- 9.4.6 Hydrology and Water Quality 9-35
- 9.4.7 Alternatives 9-56

9.5 DEIR Revisions 9-57
- 9.5.1 Acronyms, Abbreviations, and Glossary 9-57
- 9.5.2 Summary 9-57
- 9.5.3 Project Description 9-57
- 9.5.4 Environmental Setting and Impacts, Overview 9-63
- 9.5.5 Land Use 9-63
- 9.5.6 Aesthetics 9-64
- 9.5.7 Cultural and Paleontological Resources 9-66
- 9.5.8 Transportation and Circulation 9-67
- 9.5.9 Noise 9-69
- 9.5.10 Air Quality 9-69
- 9.5.11 Recreation 9-72
- 9.5.12 Utilities and Service Systems 9-72
- 9.5.13 Biological Resources 9-73
- 9.5.14 Hydrology and Water Quality 9-74
- 9.5.15 Hazards and Hazardous Materials 9-76

9.6 References 9-76

Attachment A 9-79

Attachment B 9-99

Appendices (*CD inside back cover of Volume 1*)

A. Scoping Reports A-1

B. WSIP PEIR Consistency Analysis and Mitigation Measures, Applicability to the Proposed Project B-1

C. Vegetation Change Analysis Methodology C-1

D. Hydrology and Water Quality Supporting Material D-1

Page

List of Figures

2-1	SFPUC Regional Water System	2-3
2-2	SFPUC Water Supply Watersheds	2-4
2-3	SFPUC Water Service Area – San Francisco and SFPUC Wholesale Customers	2-5
3-1	Project Location	3-2
3-2	Lake Merced Well Facility Construction Area	3-5
3-3	South Sunset Well Facility Construction Area	3-6
3-4	West Sunset Well Facility Construction Area	3-8
3-5	Central Pump Station Well Facility Construction Area	3-9
3-6	South Windmill Replacement Well Facility Construction Area	3-10
3-7	North Lake Well Facility Construction Area	3-11
● 3-8	Pipeline Segments	3-12
3-9a	Lake Merced Well Facility – Proposed Project Components and Construction Area	3-21
3-9b	Lake Merced Well Facility – Proposed Building Elevations	3-22
3-10a	South Sunset Well Facility – Proposed Project Components and Construction Area	3-25
3-10b	South Sunset Well Facility – Proposed Building Elevations	3-26
3-11a	West Sunset Well Facility – Proposed Project Components and Construction Area	3-28
3-11b	West Sunset Well Facility – Proposed Building Elevations	3-29
3-12a	Central Pump Station Well Facility – Proposed Project Components and Construction Area	3-31
3-12b	Central Pump Station Well Facility – Proposed Building Elevations	3-32
3-13a	South Windmill Replacement Well Facility – Proposed Project Components and Construction Area	3-34
3-13b	South Windmill Replacement Well Facility – Proposed Building Elevations	3-35
3-14a	North Lake Well Facility – Proposed Project Components and Construction Area	3-37
3-14b	North Lake Well Site – Proposed Building Elevations	3-38
● 3-15	Construction Phasing	3-51
5.1-1	Cumulative Projects	5.1-39
5.3-1	Photo Location Map	5.3-3
5.3-2	Public Views of the Lake Merced Well Facility Site	5.3-4
5.3-3	Public Views of the South Sunset Well Facility Site	5.3-5
5.3-4	Public Views of the West Sunset Well Facility Site	5-3-6
5.3-5	Public Views of the Central Pump Station Facility Site	5.3-7
5.3-6	Public Views of the South Windmill Replacement Well Facility Site	5.3-8
5.3-7	Public Views of the North Lake Well Facility Site	5.3-9
5.3-8	Public Views of the Pipeline Route in the Sunset Neighborhood	5.3-10
5.3-9	Public Views of the Pipeline Route in Golden Gate Park	5.3-11
5.3-10	Lake Merced Pump Well Facility and Overlook Draft Landscape Plan	5.3-28
5.3-11	Lake Merced Well Facility Simulation	5.3-29
5.3-12	South Sunset Well Facility Draft Landscape Plan	5.3-32
5.3-13	South Sunset Well Facility Simulations	5.3-33
5.3-14	West Sunset Well Facility Draft Landscape Plan	5.3-35
5.3-15	West Sunset Well Facility Simulation	5.3-36
5.3-16	Central Pump Facility Draft Landscape Plan	5.3-38
5.3-17	Central Pump Station Well Facility Simulation	5.3-39
5.3-18	South Windmill Replacement Well Facility Draft Landscape Plan	5.3-40

Page

List of Figures (continued)

5.3-19 South Windmill Replacement Well Facility Simulation 5.3-41
5.3-20 North Lake Well Facility Representative Landscape Plan 5.3-43
5.3-21 North Lake Well Facility Simulation 5.3-44
5.7-1 Effect of Noise on People 5.7-2
5.7-2 Noise Measurement Locations 5.7-5
5.8-1 Project Location Index Map 5.8-9
5.8-2 Project Location – South Windmill Replacement Well and North Lake Well Facilities 5.8-11
5.8-3 Project Location – Central Pump Station Well Facility 5.8-12
5.8-4 Project Location – West Sunset Well Facility 5.8-13
● 5.8-5 Project Location – Sunset Reservoir 5.8-14
5.8-6 Project Location – South Sunset Well Facility 5.8-15
5.8-7 Project Location – Lake Merced Well Facility 5.8-16
5.8-8 MEI Locations 5.8-32
5.11-1 Recreational Opportunities 5.11-5
5.11-2 Simulated Lake Merced Lake Levels 5.11-23
5.11-3 Simulated Lake Merced Lake Levels - Relative to Modeled Existing Conditions 5.11-24
5.14-1 Lake Merced 2012 Vegetation Types 5.14-7
5.14-2 Lake Merced Sensitive Habitats and Species 5.14-15
5.14-3 CNDDB Occurrences 5.14-17
5.14-4 Simulated Lake Merced Lake Levels 5.14-61
5.14-5 Simulated Lake Merced Lake Levels - Relative to Modeled Existing Conditions 5.14-63
5.15-1a Geologic Map - North Project Area 5.15-2
5.15-1b Geologic Map - South Project Area 5.15-3
5.15-2a Seismic Hazard Map - North Project Area 5.15-6
5.15-2b Seismic Hazard Map - South Project Area 5.15-7
5.15-3 Regional Faults 5.15-10
5.16-1 Westside Groundwater Basin Location Map 5.16-3
5.16-2 North-South Geologic Cross Section Westside Groundwater Basin 5.16-5
5.16-3 Well Location Map 5.16-12
5.16-4 Groundwater Elevation Contours 5.16-16
5.16-5 Historic Lake Merced Water Levels 5.16-37
5.16-6 Well Interface Schematic 5.16-81
5.16-7 Seawater Intrusion Schematics for Unconfirmed and Confined Aquifers 5.16-89
5.16-8a Flow Chart for Seawater Intrusion Mitigation 5.16-102
5.16-8b Flow Chart for Seawater Intrusion Mitigation 5.16-103
5.16-9 Interaction of Groundwater and Lakes 5.16-105
5.16-10 Simulated Lake Merced Lake Levels 5.16-108
5.16-11 Simulated Lake Merced Lake Levels Relative to Projected Existing Conditions 5.16-111
5.16-12 Flow Chart for Lake Merced Mitigation 5.16-116
5.16-13 Lake Merced Water Surface Elevation Range for Avoidance of Significant Surface Water Interaction Effects 5.16-119
5.17-1 Hazardous Material Sites Identified within 1/4-mile of Project Facilities 5.17-5
7-1 Option 2: Other Potential Well Locations within the North Westside Groundwater Basin 7-45

Page

List of Tables

1-1	Summary of Impacts and Mitigation Measures	1-17
1-2	Selected CEQA Alternatives	1-15
1-3	Comparison of the Environmental Impacts of the CEQA Alternatives	1-42
2-1	WSIP Goals and Objectives	2-6
2-2	Summary of Scoping Comments	2-11
3-1	Summary of Pipeline Segments	3-13
3-2	Summary Construction Requirements for Well Facilities	3-15
3-3	Well Facility Pump Description	3-20
3-4	Equipment Usage for Well Facility Construction	3-40
3-5	Summary of Proposed Pipeline Construction Requirements	3-42
3-6	Equipment Usage for Pipeline Construction	3-48
3-7	Equipment Usage for Sunset Reservoir Construction Activities	3-50
3-8	Construction Duration by Activity Type	3-52
3-9	Average Groundwater Well Pumping Rates	3-54
3-10	Operating Life Expectancies for Well Facility Equipment and Pipeline Components	3-59
5.1-1	Summary of WSIP Water Supply Impacts and Mitigation Measures – Tuolumne River System and Downstream Water Bodies	5.1-5
5.1-2	Summary of WSIP Water Supply Impacts and Mitigation Measures – Alameda Creek Watershed	5.1-12
5.1-3	Summary of WSIP Water Supply Impacts and Mitigation Measures – Peninsula Watershed	5.1-18
5.1-4	Summary of WSIP Water Supply Impacts and Mitigation Measures – Westside Groundwater Basin	5.1-23
5.1-5	Summary of WSIP Water Supply Impacts and Mitigation Measures – Cumulative Water Supply	5.1-25
5.1-6	Cumulative Projects and Impacts in or near the San Francisco Groundwater Supply Project	5.1-28
5.1.7	Summary of Pumping Assumptions for Model Input	5.1-43
5.2-1	Land Uses in the Vicinity of Proposed Project Sites	5.2-2
5.2-2	Summary of Impacts – Land Use	5.2-10
5.3-1	Summary of Visual Sensitivity Findings	5.3-13
5.3-2	Summary of Impacts – Aesthetics	5.3-22
5.5-1	Recorded Historical Architectural Resources Within or Immediately Adjacent to the C-APE	5.5-18
5.5-2	Cultural Resources Studies Performed Within or Adjacent to the C-APE	5.5-22
5.5-3	Summary of Impacts – Cultural and Paleontological Resources	5.5-28
5.6-1	Characteristics of Roadways in the Project Area	5.6-2
5.6-2	Summary of Impacts – Transportation and Circulation	5.6-11
5.6-3	Weekday Construction Vehicle Trip Generation	5.6-21
5.7-1	Existing Noise Environments at Proposed Project Location	5.7-6
5.7-2	Summary of Impacts – Noise	5.7-10
5.7-3	Typical Noise Levels from Construction Activities and Construction Equipment	5.7-11
5.7-4	Estimated Construction Noise Levels (dBA) at the Closest Sensitive Receptors	5.7-13
5.7-5	Vibration Velocities for Construction Equipment and Activities	5.7-20
5.7-6	Noise Measurements From Similar Pump Facility Operations	5.7-21
5.7-7	Ambient Noise Level Increase from Pump Operations	5.7-21
5.7-8	Ambient Noise Level Increase from Energy Generator Testing	5.7-22
5.8-1	San Francisco Ambient Air Quality Monitoring Summary (2004-2010)	5.8-3

Page

List of Tables (continued)

5.8-2	Criteria Air Pollutant Significance Thresholds	5.8-4
5.8-3	Permitted Stationary Sources and Major Roadway Sources in the Project Vicinity	5.8-8
5.8-4	State and Federal Ambient Air Quality Standards and SFBAAB Attainment Status	5.8-18
5.8-5	Summary of Impacts – Air Quality	5.8-27
● 5.8-6	Average Daily Construction-related Pollutant Emissions – Phase 1	5.8-28
● 5.8-7	Average Daily Construction-related Pollutant Emissions – Phases 1 and 2	5.8-28
5.8-8	Construction-Period Health Risk Assessment Results	5.8-31
5.8-9	Maximum Day and Annual Generator Testing-related Pollutant Emissions	5.8-34
5.8-10	Operational-Period Health Risk Assessment Results	5.8-35
5.8-11	Construction-Phase Cumulative Health Risks	5.8-38
5.8-12	Cumulative Health Risks – Operational	5.8-40
5.9-1	GHG Reductions From the AB 32 Scoping Plan Sectors	5.9-6
5.9-2	City Greenhouse Gas Regulations Applicable to the Proposed Project	5.9-16
5.11-1	Recreational Resources in the Project Area	5.11-2
5.11-2	Summary of Impacts – Recreation	5.11-17
5.11-3	Estimated Lake Merced Conditions	5.11-26
5.12-1	Existing Aboveground and Underground Utilities Located along and Across San Francisco Groundwater Supply Project Pipeline Alignments	5.12-2
5.12-2	Active Landfills Likely to Receive Project Construction Waste	5.12-4
5.12-3	Summary of Impacts – Utilities and Service Systems	5.12-8
5.13-1	Fire Stations in the Project Vicinity	5.13-2
5.14-1	Special-Status Plant Species Reported or With Potential to Occur Near the Groundwater Supply Project	5.14-18
● 5.14-2	Special-Status Animal Species Reported or With Potential to Occur Near the Groundwater Supply Project	5.14-22
5.14-3	Summary of Impacts – Biological Resources	5.14-41
5.14-4	Trees and Large Shrubs to be Removed and Retained Under the Proposed Project	5.14-48
5.14-5	Lake Merced Vegetation Acreage: 2002, 2010, and 2012	5.14-57
5.14-6	Predicted Vegetation Change and Percent Change Relative to a 6-Foot City Datum Water Surface Elevation without the Project: Receding Water Levels	5.14-66
5.14-7	Lake Merced Water Surface Elevation Decline with No-Net-Loss of Wetlands	5.14-68
5.15-1	Active Faults in the Project Site Vicinity	5.15-9
5.15-2	Summary of Impacts and Significance – Geology and Soils	5.15-20
5.16-1	Existing North Westside Groundwater Basin Monitoring Network	5.16-9
5.16-2	Rated Pump Capacity and Estimated Peak Daily Demand for Existing Wells that Could be Affected by the Project	5.16-18
5.16-3	Existing Average Annual Recycled Water and Groundwater Use and Peak Demand at Golf Clubs in the Lake Merced Area	5.16-19
5.16-4	Summary of Groundwater Quality Data for Parameters that have Exceeded Drinking Water Standards in the Groundwater Monitoring Network	5.16-21
5.16-5	Summary of Groundwater Analytical Data for Proposed Production Wells	5.16-24
5.16-6	Summary of Groundwater Analytical Data for Groundwater Ambient Monitoring and Assessment Program	5.16-28
5.16-7	Lake Merced Water Quality Data and Basin Plan Water Quality Objectives	5.16-39
5.16-8	Summary of Impacts – Hydrology and Water Quality	5.16-68
5.16-9	Estimated Reduction in Production Capacity at Existing Wells	5.16-83

List of Tables (continued)

		Page
5.16-10	Comparison of Estimated Reduced Production Capacity to Peak Daily Demand at Existing Wells	5.16-83
5.16-11	Estimated Subsidence Due to Project Operation	5.16-88
5.16-12	Lake Merced Water Surface Elevation Range for Avoidance of Significant Surface Water Interaction Effects	5.16-118
5.17-1	Hazardous Materials Sites Identified Within 1/4 Mile of the Project Site	5.17-3
5.17-2	Summary of Impacts and Significance – Hazards and Hazardous Materials	5.17-18
5.18-1	Summary of Impacts – Mineral and Energy Resources	5.18-6
6.1-1	Summary of Impacts and Significance – Cumulative Impacts	6-8
7-1	Selected CEQA Alternatives	7-10
7-2	Comparison of the Environmental Impacts of the CEQA Alternatives	7-11
7-3	Alternatives Considered but Rejected from Further Consideration	7-41

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ACRONYMS, ABBREVIATIONS, AND GLOSSARY

Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
µmhos/cm	micromhos per centimeter;
µg/L	micrograms per liter;
AADT	annual average daily traffic
AB	California Assembly Bill
AB 32	Assembly Bill 32
ABAG	Association of Bay Area Governments
ACM	asbestos-containing materials or Alternative Calculation Method
ADRR	Archeological Data Recovery Report
ADT	average daily traffic
afy	acre-feet per year
APE	area of potential effect
ASCE	American Society of Civil Engineers
ATCM	Airborne Toxic Control Measure
B20	biodiesel
BA	biological assessment
B.P.	before present
BAAQMD	Bay Area Air Quality Management District
BAWSCA	Bay Area Water Supply and Conservation Agency
bgs	below ground surface
Bicycle Plan	San Francisco Bicycle Plan
BMPs	best management practices
BO	biological opinion
CAA	Clean Air Act

CAFE	Corporate Average Fuel Economy
CAL FIRE	California Department of Forestry and Fire Protection
Cal-EPA	California Environmental Protection Agency
Cal-IPC	California Invasive Plant Council
Cal-OSHA	California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CAP	Clean Air Plan
C-APE	CEQA-Area of Potential Effect
CARB	California Air Resources Board
CCAA	California Clean Air Act
CCR	California Code of Regulations
CCSF	City and County of San Francisco
CDFFP	California Board of Forestry and Fire Protection
CDFW	California Department of Fish and Wildlife
CDMG	California Division of Mines and Geology
CEC	California Energy Commission
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CGS	California Geological Survey
CH4	methane
CHRIS	California Historical Resources Information System
CIWMB	California Integrated Waste Management Board
CMA	Congestion Management Agency
CMP	congestion management program
CNDDB	California Natural Diversity Database
CNEL	Community Noise Equivalent Level
CNPS	California Native Plant Society
CO	carbon monoxide
CO_2	carbon dioxide
CO_2E	carbon dioxide equivalent
Corps	U.S. Army Corps of Engineers
CPUC	California Public Utilities Commission

CUPA	Certified Unified Program Agencies
dB	decibel
dBA	A-weighted decibel
DO	dissolved oxygen
DEC	Division of Emergency Services
DPH	Department of Public Health
DPM	diesel engine particulate matter
DPR	California Department of Parks and Recreation
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
DWSAP	Drinking Water Source Assessment and Protection
EIR	environment impact report
EISA	Energy and Independence Security Act of 2007
EP	Environmental Planning section of the San Francisco Planning Department
EPCA	Energy Policy and Conservation Act
ERO	Environmental Review Officer
ERP	Electricity Resource Plan
ESA	Environmental Science Associates
FEMA	Federal Emergency Management Agency
FESA	Federal Endangered Species Act
FIRM	flood insurance rate map
FOWSP	Friends of the West Sunset Playground
FTA	Federal Transit Administration
g	gravity
GGNRA	Golden Gate National Recreation Area
GHG	Greenhouse Gas
GIS	geographic information system
gpm	gallons per minute
GVW	gross vehicle weight
HFCs	hydrofluorocarbons
HMBP	hazardous materials business plan
HP	horsepower
HRE	historic resources evaluation
Hz	hertz

I-680	Interstate 680
IBC	International Building Code
ICF	ICF International
ISCST3	Industrial Source Complex Short Term
kWh	kilowatt-hours
L_{dn}	day-night noise level
LEED®	Leadership in Energy and Environmental Design
L.E.D	light-emitting diode
L_{eq}	steady-state energy level
LBP	lead-based paint
LOS	level of service
MA	management areas
MCL	Maximum Contaminant Level
MCLG	maximum contaminant level goal
MEI	maximally exposed individual
mg/L	milligram per liter
mgd	million gallons per day
mL	milliliters
mV	millivolt
MLD	Most Likely Descendant
MMT	million metric tons
MMTCO2E	million metric tons of carbon dioxide equivalent
MPN	Most Probably Number
MPOs	Metropolitan Planning Organizations
mpg	miles per gallon
MRZ	Mineral Resource Zones
MT	metric ton
MUNI	San Francisco Municipal Railway
MY	Model Year
N_2O	nitrous oxide
NAHC	Native American Heritage Commission
NAP	Natural Areas Program
NDBC	National Data Buoy Center
NEPA	National Environmental Policy Act

NHPA	National Historic Preservation Act
NHTSA	National Highway Traffic Safety Administration
NMFS	National Marine Fisheries Service
NO_2	nitrogen dioxide
NOAA	National Oceanographic and Atmospheric Administration
NOP	Notice of Preparation
NO_X	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NPPA	California Native Plant Protection Act
NPS	National Park Service
NTU	Nephelometric Turbidity Units
NU/mL	natural units per milliliter per milliliter
NWIC	Northwest Information Center
O_3	ozone
OEHHA	Office of Environmental Health Hazard Assessment
OPR	Office of Planning and Research
Park Master Plan	Golden Gate Park Master Plan
PCB	polychlorinated biphenyls
PEIR	Program Environmental Impact Report
PG&E	Pacific Gas and Electric Company
PM	particulate matter
PM_{10}	particulate matter, 10 microns or less in diameter
$PM_{2.5}$	particulate matter, 2.5 microns or less in diameter
PPV	peak particle velocity
PRC	California Public Resources Code
RCRA	Resource Conservation and Recovery Act
RHNA	Regional Housing Needs Allocation
ROG	reactive organic gases
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
SARA	Superfund Amendments and Reauthorization Act
SB	Senate Bill
SB 97	Senate Bill 97
SCADA	standard supervisory control and data acquisition
SCAQMD	South Coast Air Quality Management District

SCS	sustainable community strategy
SDC	seismic design category
SF Bay	San Francisco Bay
SFBAAB	San Francisco Bay Area Air Basin
SFDE	San Francisco Department of the Environment
SFDPW	San Francisco Department of Public Works
SFMTA	San Francisco Municipal Transportation Agency
SFPUC	San Francisco Public Utilities Commission
SFRPD	San Francisco Recreation and Parks Department
SFSUCMP	The Francisco State University Campus Master Plan
SFUSD	San Francisco Unified School District
SMARA	Surface Mining and Reclamation Act
SO_2	sulfur dioxide
SPEAK	Sunset-Parkside Action Committee
SR	State Route
SVP	Society of Vertebrate Paleontology
SWPPP	stormwater pollution prevention plan
SWRCB	State Water Resources Control Board
TEP	Transit Effectiveness Project
TMDL	total maximum daily load
TPC Harding Park	Tournament Players Cup Harding Park
TPH	total petroleum hydrocarbons
TTLC	Total Threshold Limit Concentration
UCS	Uniform Building Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	Underground storage tanks
VFD	variable-frequency drive
WHR	wildlife habitat relationship
WPCP	Water Pollution Control Plant
WRCC	Western Regional Climate Center
WSA	Wilbur Smith Associates
WSIP	Water System Improvement Program

Glossary of Terms

Acre-foot. An acre-foot is the quantity of water required to cover 1 acre to a depth of 1 foot. Equal to 1,233.5 cubic meters (43,560 cubic feet).

● **Adaptive management.** The iterative process of learning from experience and adjusting management practices based on the feedback received through monitoring.

A-weighted decibel (dBA). Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, human response is factored into sound descriptions in a process called "A-weighting," expressed as "dBA." The dBA, or A-weighted decibel, refers to a scale of noise measurement that approximates the range of sensitivity of the human ear to sounds of different frequencies.

Alquist-Priolo Earthquake Fault Zone Act. The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. In accordance with this act, the state geologist established regulatory zones called "earthquake fault zones" around the surface traces of active faults and published maps showing these zones. Within these zones, buildings for human occupancy cannot be constructed across the surface trace of active faults. Each earthquake fault zone extends approximately 200 to 500 feet on either side of the mapped fault trace.

Alluvium. Consists of unconsolidated mixtures of gravel, sand, clay, and silt typically deposited by streams.

Anadromous. Anadromous fish hatch (rear) in freshwater, migrate to the ocean (saltwater) to grow and mature, and migrate back to freshwater to spawn and reproduce.

Aquifer. An aquifer is a geologic unit that transmits and stores water and can yield a substantial quantity of water to wells and/or springs.

Aquitard. A semi-impermeable layer that confines an aquifer.

Beneficial use. Those uses of water as defined in the State of California Water Code (Chapter 10 of Part 2 of Division 2), including but not limited to agricultural, domestic, municipal, industrial, power generation, fish and wildlife habitat, recreation, and mining.

Biological monitoring. The periodic examination of biological specimens for the purposes of monitoring their exposure to or the effects of potentially toxic chemicals in the environment. Biological monitoring is typically performed by analyzing the amount of a toxic substance or its metabolites in body tissues and fluids. Also refers to assessing the biological status of populations and communities of organisms at risk in order to protect them and to gain an early warning of possible hazards to human health.

Biological Opinion. Document issued under the authority of the Federal Endangered Species Act stating the U.S. Fish and Wildlife Service and/or the National Marine Fisheries Service findings as to whether a federal action is likely to jeopardize the continued existence of a threatened or endangered species or result in the destruction or adverse modification of critical habitat.

CEQA (California Environmental Quality Act). State law that requires state, local, and other non-federal agencies in California to evaluate the environmental implications of their actions.

Community Noise Equivalent Level (CNEL). Because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dBA increment be added to "quiet time" noise levels to form a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). CNEL adds a 5-dBA "penalty" during the evening hours (7:00 p.m. to 10:00 p.m.) and a 10-dBA penalty during the night hours (10:00 p.m. to 7:00 a.m.).

Cultural resource. A fragile and nonrenewable remnant of human activity that is valued by or significantly representative of a culture or that contains significant information about a culture. Cultural resources encompass archeological, traditional, and built environment resources, including landscapes or districts, sites, buildings, structures, objects, or cultural practices that are usually greater than 50 years of age and possess architectural, historic, scientific, or other technical value.

Cumulatively considerable. A CEQA term used to indicate whether or not a cumulative impact is significant.

Day-night noise level (L_{dn}). Another 24-hour noise descriptor, called the day-night noise level (L_{dn}), is similar to CNEL. While both add a 10-dBA penalty to all nighttime noise events between 10:00 p.m. and 7:00 a.m., Ldn does not add the evening 5-dBA penalty. In practice, Ldn and CNEL usually differ by less than 1 dBA at any given location for transportation noise sources.

Dewater. To remove water from a trench or other excavation.

Discharge. The flow of surface water in a stream or canal or the outflow of groundwater from a flowing artesian well, ditch, or spring. Also refers to the discharge of liquid effluent from a facility, or to chemical emissions into the air through designated venting mechanisms.

Dissolved oxygen (DO). The oxygen freely available in water, which is vital to fish and other aquatic life and for the prevention of odors. DO levels are considered an important indicator of a water body's ability to support desirable aquatic life. Secondary and advanced waste treatment are generally designed to ensure adequate DO in waste-receiving waters.

Disturbance. Any event or series of events that disrupt ecosystem, community, or population structure and alter the physical environment.

Diversion. The use of part of a stream flow as water supply; a channel for diverting water to sites where it can be used and disposed of.

Drawdown. The lowering of the level of water body, such as a reservoir or a groundwater basin

Earthquake faults.

> *Reverse faults* involve predominantly vertical movement in which the upper block moves upward in relation to the lower block.
>
> *Thrust faults* are low-angle reverse faults.
>
> *Blind-thrust* faults are low-angled subterranean faults that have no surface expression.

Range-front faults are faults along the front of mountain ranges responsible for the uplift of the mountains.

Strike-slip faults are vertical (or nearly vertical) fractures where the blocks have mostly moved horizontally.

EIR (environmental impact report). A report required by the California Environmental Quality Act to describe the environmental impact of a proposed project.

EIR certification. EIR adoption by a governing agency that involves acceptance of the document as being complete and adequate according to the California Environmental Quality Act.

Endangered species. Any species or subspecies of bird, mammal, fish, amphibian, reptile, or plant that is in serious danger of becoming extinct throughout all or a significant portion of its range. Federally listed endangered species are officially designated by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service and published in the Federal Register. Species may also be listed under the California Endangered Species Act by the Department of Fish and Game.

Fill. Excavated soil that is placed back into or near an excavated area or that is imported to one location from another location.

Groundwater. Water that is located beneath the ground surface in soil pore spaces and in the fractures of rock formations.

Groundwater Discharge. The volumetric flow rate of groundwater through an aquifer.

Groundwater production well. A well used to extract water from an aquifer that can be used as potable water or for other purposes.

Groundwater Recharge. The action of increasing groundwater storage by natural processes (e.g., rainfall, streamflow) or by human activity.

Environmental cases. Sites suspected of releasing hazardous substances or that have had cause for hazardous materials investigations and are identified on regulatory agency lists. These are sites where soil and/or groundwater contamination is known or suspected to have occurred.

Evapotranspiration. The sum of evaporation and plant transpiration from the earth's land surface to the atmosphere.

Expansive soils. These types of soils are characterized by their ability to undergo significant volume change (shrink and swell) due to variations in soil moisture content.

Flux. The amount of groundwater flowing out to the bay or ocean, or surface water body, or entering the aquifer from the bay or ocean, or surface water body.

Fugitive dust. "Fugitive" dust generally refers to the emission of fine soil particles that are released to the atmosphere from a construction site or agricultural field.

Habitat. The specific area or environment in which a particular type of animal or plant lives.

Hazardous materials. Defined in Section 25501(h) of the California Health and Safety Code, are materials that, because of their quantity, concentration, or physical or chemical characteristics, pose a substantial present or potential hazard to human health and safety or to the environment if released to the workplace or environment. Hazardous materials have been and are commonly used in commercial, agricultural, and industrial applications as well as in residential areas to a limited extent.

Hazardous materials business plans. Businesses that handle specified quantities of chemicals are required to submit a hazardous materials business plan (HMBP) in accordance with community right-to-know laws. This plan allows local agencies to plan appropriately for a chemical release, fire, or other incident.

Hazardous waste. Any material that is relinquished, recycled, or inherently waste-like. Title 22 of the California Code of Regulations, Division 4.5, Chapter 11, contains regulations for the classification of hazardous wastes. A waste is considered a hazardous waste if it is toxic (causes human health effects), ignitable (has the ability to burn), corrosive (causes severe burns or damage to materials), or reactive (causes explosions or generates toxic gases) in accordance with the criteria established in Article 3. Article 4 lists specific hazardous wastes, and Article 5 identifies specific waste categories, including Resource Conservation and Recovery Act (RCRA) hazardous wastes, non-RCRA hazardous wastes, extremely hazardous wastes, and special wastes.

Hydrology. The science that deals with the waters above and below land surfaces; their occurrence, circulation, and distribution, both in time and space; their biological, chemical, and physical properties; and their reaction with their environment, including their relation to living beings.

Hydrophytic vegetation. Plant life growing in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content.

Important farmlands.

> *Prime Farmland* is land that has the best combination of physical and chemical characteristics for crop production. It has the soil quality, growing season, and moisture supply needed to produce sustained high yields of crops when treated and managed.
>
> *Farmland of Statewide Importance* is land other than Prime Farmland that has a good combination of physical and chemical characteristics for crop production.
>
> *Unique Farmland* does not meet the criteria for Prime Farmland or Farmland of Statewide Importance but has been used for the production of specific high-economic-value crops.
>
> *Farmland of Local Importance* is either currently producing crops or has the capability of production, but does not meet the criteria of the categories above.
>
> *Grazing Land* is land on which the vegetation is suited to the grazing of livestock.

Infrastructure. Physical structures that form the foundation for development. Infrastructure includes: groundwater wells, water pipelines, electric power, communications, transit and transportation facilities, and oil and gas pipelines and associated facilities.

Irrigation water. Water of sufficiently quality that can be used for landscape irrigation.

L_{eq}. Time variations in noise exposure are typically expressed in terms of a steady-state energy level (called L_{eq}) that represents the acoustical energy of a given measurement. L_{eq} (24) is the steady-state energy level measured over a 24-hour period.

Liquefaction. A phenomenon in which saturated granular sediments temporarily lose their shear strength during periods of earthquake-induced, strong groundshaking. The susceptibility of a site to liquefaction is a function of the depth, density, and water content of the granular sediments and the magnitude of earthquakes likely to affect the site.

Level of service (LOS). A qualitative description of a highway/road's performance based on average delay per vehicle, vehicle density, or volume-to-capacity ratios. Levels of service range from LOS A, which indicates free-flow or excellent conditions with short delays, to LOS F, which indicates congested or overloaded conditions with extremely long delays.

Mass Balance. An application of the "conservation of mass" principle (i.e., that matter cannot disappear or be created spontaneously). For the purpose of this EIR, mass balance is an accounting of the inflows to and outflows from a water body. An increase in water levels indicates greater inflows than outflows and a decrease in water levels indicates greater outflows than inflows

Maximum contaminant level (MCL). The MCL is the highest level of a contaminant that is allowed in drinking water. The MCL is set as close to the maximum contaminant level goal (MCLG – see below) as is economically or technically feasible. While the MCL is higher than the MCLG, it is considered protective of human health.

Maximum contaminant level goal. The MCLG is the level below which there is no known or expected health risk to human health.

Mitigation. One or all of the following: (1) Avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating an impact over time by preservation and maintenance operations during the life of an action; and (5) compensating for an impact by replacing or providing substitute resources or environments.

MODFLOW 2000. A finite-difference numerical modeling software developed by the USGS.

Overboard. Water pumped from wells that is discharged rather than directed into the water supply.

Perimeters. Littoral habitat (defined as areas with 3 feet or less of water around the lake).

Permitted hazardous materials uses. Facilities that use hazardous materials or handle hazardous wastes but comply with current hazardous materials and hazardous waste regulations.

Pocket water. A water hole in the bed of an intermittent stream, especially the bowl at the foot of a cliff over which the stream passes when in the flood stage.

PPV. To assess the potential for structural damage associated with vibration, the vibratory ground motion in the vicinity of the affected structure is measured in terms of peak particle velocity (PPV) in the vertical and horizontal directions (vector sum), typically in units of inches per second (in/sec).

Potable water. Water of sufficiently high quality that can be consumed by humans; drinking water

Program Environmental Impact Report. One type of environmental review document identified under the California Environmental Quality Act that may be used to evaluate a plan or program that has multiple components (projects and actions) or to address a series of actions that are related.

Regional water system. The entire SFPUC water system starting at Hetch Hetchy Reservoir and ending in San Francisco; the regional system includes all facilities serving the SFPUC wholesale and retail customers, except for the retail customers in San Francisco and a few limited areas outside of San Francisco (e.g., Castlewood). The SFPUC regional water system consists of a complex network of facilities covering a geographic range of about 160 miles, from the Sierra Nevada on the east to San Francisco on the west. The regional water system crosses seven counties—Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco. The regional water system includes over 280 miles of pipelines, over 60 miles of tunnels, 11 reservoirs, 5 pump stations, and 2 water treatment plants.

Riparian. The land adjacent to a natural watercourse such as a river or stream. Riparian areas support vegetation that provides important wildlife habitat, as well as important fish habitat when sufficient to overhang the bank.

Sensitive receptors. Persons that are sensitive or more vulnerable to effects of (i.e., that "receive") excessive noise and/or poor air quality than the general population, usually analyzed in terms of land use types where such persons are typically located.

Serpentine. A naturally occurring group of minerals that can be formed when ultramafic rocks are metamorphosed during uplift to the earth's surface. Serpentinite is a rock consisting of one or more serpentine minerals. This rock type is commonly associated with ultramatic rock along earthquake faults. Small amounts of chrysotile asbestos, a fibrous form of serpentine minerals, are common in serpentinite.

Special-status species. Several species known to occur within the general region of the program area are accorded "special status" because of their recognized rarity or vulnerability to habitat loss or population decline. Some of these species receive specific protection in federal and/or state endangered species legislation. Others have been designated as "sensitive species" or "species of special concern" on the basis of adopted policies of federal, state, or local resource agencies. These species are referred to collectively as "special-status species."

Spoils. Excess soil remaining from an excavation after backfilling is completed.

Structural fill. Typically a screened earthen material used to create a strong, stable base for structural purposes.

Test well. A well used to gather data on local groundwater characteristics and determine whether the site can produce sufficient volume and quality of water to operate a groundwater production well

Threatened species. Legal status afforded to plant or animal species that are likely to become endangered within the foreseeable future throughout all or a significant portion of their range, as determined by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service.

Water Blending. The mixing of water supply originating from multiple sources and done in a manner to meet water quality objectives.

Water distribution system. System of water pipelines and connection points that transmit water between wells and reservoirs

Well facility. Facility that consists of a groundwater well, and a pump station, and associated piping.

Westside Basin. The Westside Basin is a groundwater aquifer system that extends from Golden Gate Park in San Francisco southward to San Bruno. The Basin provides important municipal and irrigation water supply for the communities and businesses that overly the Basin.

Wetland. A zone periodically or continuously submerged or having high soil moisture, which has aquatic and/or riparian vegetation components, and is maintained by water supplies significantly in excess of those otherwise available through local precipitation.

Williamson Act. Under a Williamson Act (Land Conservation Act of 1965) contract, the landowner agrees to limit the use of the land to agriculture and compatible uses for a period of at least 10 years. In return, the land is taxed at a rate based on the agricultural production of the land, rather than its real estate market value.

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CHAPTER 1
Summary

1.1 Introduction and Purpose of the Project

The San Francisco Public Utilities Commission (SFPUC) is proposing the San Francisco Groundwater Supply Project (Groundwater Supply Project). The proposed project would provide an average of up to 4 million gallons per day (mgd) of groundwater to augment San Francisco's municipal water supply. All of the proposed groundwater well facilities would supply groundwater to existing reservoirs, where it would be blended with San Francisco's existing municipal water supply before distribution within the city. All project components would be located on the west side of San Francisco on land owned by the City and County of San Francisco (CCSF). The well facilities would be managed by the SFPUC, including those located on land currently managed by the San Francisco Recreation and Park Department (SFRPD).

Under the San Francisco Administrative Code, Chapter 31, the San Francisco Planning Department's Environmental Planning section (EP) is responsible for conducting the environmental review of all CCSF projects pursuant to the requirements of the California Environmental Quality Act (CEQA). The Planning Department is the lead agency responsible for preparing this Environmental Impact Report (EIR) in compliance with CEQA, and the SFPUC is the project sponsor proposing to implement the Groundwater Supply Project. This EIR is being prepared for the public and decision-makers to disclose the potential physical impacts of the Groundwater Supply Project so that an informed judgment can be made about the project's environmental consequences.

1.2 Overview of SFPUC Regional Water System

This overview of the SFPUC regional water system provides background information and context for the proposed Groundwater Supply Project. The discussion includes a description of the existing water system and the SFPUC's Water System Improvement Program (WSIP).

1.2.1 Existing Regional Water System

The CCSF, through the SFPUC, owns and operates a regional water system that extends from the Sierra Nevada to San Francisco and serves retail and wholesale customers in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties. The regional water system consists of water conveyance, treatment, and distribution facilities, and delivers water to retail and wholesale customers. The regional system includes over 280 miles of pipelines, over 60 miles of tunnels, 11 reservoirs, 5 pump stations, and 2 water treatment plants. The SFPUC currently delivers an annual average of about 265 mgd of water to its customers. The source of the water supply is a combination of local supplies from streamflow and runoff in the Alameda Creek watershed and in the San Mateo Creek and Pilarcitos Creek watersheds (referred to together as the Peninsula watersheds), augmented with imported supplies from the Tuolumne River watershed. Local watersheds provide about 15 percent of total supplies, and the Tuolumne River provides the remaining 85 percent.

The SFPUC serves about one-third of its water supplies directly to retail customers, primarily in San Francisco, and about two-thirds of its water supplies to wholesale customers by contractual agreement. The wholesale customers are largely represented by the Bay Area Water Supply and Conservation Agency (BAWSCA), which consists of 26 member agencies in Alameda, San Mateo, and Santa Clara Counties.[1] Some of these wholesale customers have other sources of water in addition to what they receive from the SFPUC, while others rely completely on the SFPUC for supply.

1.2.2 SFPUC Water System Improvement Program

In October 2008, the SFPUC adopted a systemwide program, the WSIP (also known as the "Phased WSIP Variant") (SFPUC Resolution 08-200). The WSIP is a comprehensive program designed to improve the regional system with respect to water quality, seismic response, and water delivery based on a planning horizon through the year 2030, and to improve the regional system with respect to water supply to meet water delivery needs in the SFPUC service area through the year 2018. The WSIP consists of a water supply strategy and modifications to system operations as well as construction of a series of facility improvement projects in seven counties—Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco. The Groundwater Supply Project is one of the WSIP facility improvement projects.

The overall goals of the WSIP are to maintain high-quality water; reduce vulnerability to earthquakes; increase delivery reliability and improve the ability to maintain the system; meet customer water supply needs; enhance sustainability in all system activities; and achieve a cost-effective, fully operational system (see Table 2-1 in Chapter 2, Introduction and Background). To further these program goals, the WSIP also includes objectives that address system performance in the areas of water quality, seismic reliability, delivery reliability, and water supply (see SFPUC Resolution 08-0200).

To address the potential environmental impacts of the WSIP in compliance with CEQA, the San Francisco Planning Department prepared a Program EIR (PEIR) on the proposed WSIP, which the San Francisco Planning Commission certified in October 2008 (San Francisco Planning Department, 2008; San Francisco Planning Commission Motion No. 17734). The PEIR evaluated the environmental impacts of the WSIP water supply strategy and system operations at a project

[1] The Cordilleras Mutual Water Association is an additional wholesale customer that receives water from the SFPUC but is not a BAWSCA member. It is a small water association serving 18 single-family homes in San Mateo County.

level of detail, and evaluated the environmental impacts of the WSIP facility improvement projects at a program level of detail. When the SFPUC approved the WSIP in 2008, it made CEQA Findings on the program, including a statement of overriding considerations and adoption of a mitigation monitoring and reporting program (SFPUC Resolution 08-0200).

This project-level EIR on the Groundwater Supply Project tiers from the WSIP PEIR and also incorporates by reference the relevant analyses presented in the PEIR with respect to the WSIP's impacts and mitigation measures that apply to the Groundwater Supply Project. The PEIR (State Clearinghouse No. 2005092026) is available for public review at the San Francisco Planning Department, 1650 Mission Street, San Francisco, CA 94103, and is on the Planning Department's website at http://www.sfplanning.org. CEQA permits tiering from a program-level EIR in order to allow agencies to broadly consider the environmental effects of a series of actions and/or policies, and then to provide a more detailed examination of a project's impacts in a subsequent project-level EIR. The Groundwater Supply Project was defined as part of the WSIP and was analyzed in the PEIR as a WSIP facility improvement project. This project-level EIR provides more detailed information about the Groundwater Supply Project, its impacts and project-specific mitigation measures, and alternatives to the project. This EIR summarizes and incorporates by reference the PEIR evaluation of the impacts associated with the WSIP water supply strategy and system operations, including the PEIR analysis and conclusions regarding impacts on the SFPUC's watersheds and the WSIP's growth-inducement impacts. The PEIR analysis of WSIP water supply and growth-inducement impacts accounted for the proposed project in sufficient detail, and no further evaluation of these aspects of the proposed project is required.

Description of the WSIP

The WSIP involves improvements to the regional system with respect to water quality, seismic response, and water delivery based on a planning horizon through the year 2030. The WSIP also includes phased implementation of a water supply strategy to meet projected water demand through the year 2018. The WSIP also includes full implementation of the proposed WSIP facility improvement projects to insure that the public health, seismic safety, and delivery reliability goals are achieved as soon as possible.[2] Under the WSIP, the SFPUC established the year 2018 as an interim mid-term planning horizon for its water supply strategy. Thus, the SFPUC made a decision about a water supply strategy to serve its customers through 2018, and is deferring a decision regarding long-term water supply after 2018 and through 2030 until it undertakes further water supply planning and demand analysis.

The WSIP includes the following key program elements:

- Full implementation of all of the 17 proposed WSIP facility improvement projects described in the PEIR.

[2] The size and design of the WSIP facility improvement projects are driven by the SFPUC's system performance objectives and would not change as a result of the water supply decision included as part of the WSIP (see SFPUC Resolution No. 08-0200).

- Water supply delivery of 265 mgd (average annual target delivery) to regional water system customers through 2018, with water supplies originating from the Tuolumne, Alameda, and Peninsula watersheds. This includes 184 mgd for the wholesale customers (including 9 mgd for the cities of San Jose and Santa Clara), and 81 mgd for the retail customers.
- Development of 20 mgd of conservation, recycled water and groundwater within the SFPUC service area (10 mgd in the retail service area and 10 mgd in the wholesale service area).
- Dry-year transfer from the Modesto and/or Turlock Irrigation Districts of about 2 mgd coupled with the Westside Groundwater Basin conjunctive-use project to meet the drought year goal of limiting rationing to no more than 20 percent on a systemwide basis.
- Reevaluation of 2030 demand projections, potential regional water system purchase requests, and water supply options by 2018, and a separate SFPUC decision in 2018 regarding regional water system water deliveries after 2018.
- Financial incentives to limit water sales to an annual average of 265 mgd from the watersheds.

Under the WSIP, the SFPUC will deliver to customers up to 265 mgd from the SFPUC watersheds on an average annual basis. While average annual deliveries from the SFPUC watersheds would be limited to 265 mgd, such that there would be no increase in diversions from the Tuolumne River to serve additional demand, there would be a small increase in average annual Tuolumne River diversions of about 2 mgd in order to meet delivery and drought reliability goals through 2018.

The SFPUC must maintain water deliveries to all its customers for the protection of public health and safety. Therefore, under the WSIP, the SFPUC will work with its customers to develop financial incentives to limit water sales to an average annual amount of 265 mgd from the watersheds through 2018. With the projected 20 mgd of conservation, recycled water and groundwater projects, the WSIP water supply strategy would meet average daily demand of 285 mgd in 2018.

As part of adoption of the WSIP, the SFPUC has committed to implementing the mitigation measures identified for the WSIP in the PEIR, including measures addressing impacts that may result from increases in deliveries from the SFPUC watersheds over the total average annual of 265 mgd in the event that conservation, recycled water, and groundwater projects are not completed prior to the increase in customer demand (SFPUC Resolution No. 08-0200).

WSIP Systemwide Operation Strategy

The WSIP also provides an operating strategy for the regional water system, which addresses the condition of the physical facilities and infrastructure while accounting for factors that affect the system including fluctuating customer demand, meteorological and hydrological conditions, facility and infrastructure capacity and maintenance requirements, and institutional parameters. The operating strategy addresses four components of system operation: water supply and storage, water quality, water delivery, and asset management.

Day-to-day operation of the regional water system under the WSIP is similar to prior operations, but provides for additional facility maintenance activities and improved emergency preparedness. This will allow the SFPUC to meet its WSIP objectives and provide for increased system reliability and additional flexibility for scheduling repairs and maintenance. The WSIP operations strategy also includes a multistage drought response program. Under the WSIP, regional water system operations continue to comply with all applicable institutional and planning requirements including complying with all water quality, environmental, and public safety regulations; maximizing the use of water from local watersheds; assigning a higher priority to water delivery over hydropower generation; and meeting all downstream flow requirements.

Summary of Impacts and Mitigation Measures Associated with the WSIP Water Supply and System Operations Strategy

The WSIP would result in changes in reservoir levels and associated changes in downstream flows in rivers and creeks in the three affected watersheds, potentially affecting groundwater, water quality, fisheries, and terrestrial biological resources. In the event that deliveries to customers exceed 265 mgd (average annual), streamflow changes in the Tuolumne River watershed could affect fisheries and terrestrial biological resources. In the Alameda Creek and Peninsula watersheds, the WSIP, which includes restoring the historical storage capacities of Calaveras and Lower Crystal Springs Reservoirs, could affect reservoir levels, downstream flows, fisheries, and terrestrial biological resources. In addition, the WSIP proposes to develop groundwater supplies in the North Westside Groundwater Basin as well as a conjunctive-use program in the South Westside Groundwater Basin.

The WSIP impacts identified in the PEIR that are potentially significant but mitigable, potentially significant and unavoidable, and significant and unavoidable are listed below. As set forth in the PEIR, the San Francisco Planning Department determined the environmental impacts on all resources not listed below would be less than significant and no mitigation measures for those impacts would be required (see WSIP PEIR Chapter 5, Environmental Setting and Impacts, for further discussion of the impact analysis on the WSIP's water supply strategy; see PEIR Chapter 6, Mitigation Measures, for a list of the mitigation measures associated with these impacts).

Potentially Significant but Mitigable WSIP Water Supply and System Operations Impacts

- **Fisheries Resources:** Tuolumne River (only when average annual deliveries from the watersheds exceed 265 mgd); Alameda Creek.

- **Terrestrial Biological Resources:** Tuolumne River (below La Grange Dam - only when average annual deliveries exceed 265 mgd; and impacts on alluvial features that support meadow and riparian habitat from O'Shaughnessy Dam to Don Pedro Reservoir); Calaveras Reservoir; Alameda Creek; Calaveras Creek; Upper and Lower Crystal Springs Reservoir.

- **Groundwater:** Pumping overdraft; change in water levels in Lake Merced and other surface water features; seawater intrusion due to decreased groundwater levels; contamination of drinking water.

Potentially Significant and Unavoidable WSIP Water Supply and System Operations Impacts

- **Fisheries:** Upper and Lower Crystal Springs Reservoir. Based on the best available information at that time, the PEIR made the conservative determination that the WSIP would result in potentially significant and unavoidable impact on fishery resources in Crystal Springs Reservoir related to inundation of spawning habitat upstream of the reservoir (see PEIR Chapter 5, Section 5.5.5, Impact 5.5.5-1). The project-level fisheries analysis in the EIR on the Lower Crystal Springs Dam Improvements project modified certain PEIR impact determinations based upon more detailed site-specific data and analysis (San Francisco Planning Department, 2010). Project-level conclusions supersede any contrary impact conclusions in the PEIR, and the project-level analysis determined that impacts on fishery resources due to inundation effects would be less than significant.

- **Growth inducement:** SFPUC service area.

Significant and Unavoidable WSIP Water Supply and System Operations Impacts

- **Streamflow:** Alameda Creek below Alameda Creek Diversion Dam. Based on the best available information at that time, the PEIR made the conservative determination that the WSIP would result in a significant and unavoidable impact related to flow along Alameda Creek below the Alameda Creek Diversion Dam ("Alameda Creek Hydrologic Impact") (see PEIR Chapter 5, Section 5.4.1, Impact 5.4.1-2). The project-level analysis in the Calaveras Dam Replacement Project EIR modifies this PEIR impact determination to be less than significant based upon more detailed site-specific data and analysis (San Francisco Planning Department, 2011). Project-level conclusions supersede any contrary impact conclusions in the PEIR.

Alternatives to the WSIP

The PEIR evaluated seven alternatives to the WSIP because of their apparent ability to meet most of the WSIP's goals, their ability to reduce one or more of the significant impacts associated with program implementation, their potential feasibility, and their collective ability to provide a reasonable range of alternatives to foster informed decision-making and public participation. Analysis of the No Program Alternative was included as required by CEQA. The seven WSIP alternatives are summarized in Chapter 7, Alternatives, of this EIR; PEIR Chapters 9, CEQA Alternatives, and 14, Master Responses, respectively, present a more detailed summary of these alternatives and are incorporated into this EIR by reference.

1.3 Project Objectives

The objectives of the San Francisco Groundwater Supply Project are to:

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

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

1.4 Project Description

1.4.1 Project Components

The Groundwater Supply Project includes the following components:

- Construction of six groundwater production well facilities, including the construction of four new groundwater well facilities as part of Phase 1, and as part of Phase 2, the conversion of two existing irrigation well facilities in Golden Gate Park to potable groundwater well facilities, if the SFPUC's Westside Recycled Water Project is also approved and constructed. Each of these facilities would include a groundwater well and a pump station. Disinfection equipment would be included at two of the groundwater well facilities and pH adjustment equipment would be installed at one well facility

- Construction of a distribution system (including pipelines and connection points) to connect five of the groundwater well facilities to Sunset Reservoir. The sixth well would connect to the Lake Merced Pump Station (which pumps water to both Sutro and Sunset Reservoirs) and would require a short length of new distribution piping.

- Construction of a pH adjustment facility at Sunset Reservoir as an addition to an existing reservoir building and a chlorine analyzer/sample station at the reservoir.

As mentioned above, the project is proposed to 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) conversion of the two existing irrigation 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. As part of Phase 1 of the proposed project, the SFPUC would convert test wells that were previously installed at the proposed well sites south of Golden Gate Park and one at the proposed Central Pump Station well site in Golden Gate Park. The SFPUC would also construct the pipelines necessary to deliver groundwater from the Phase 1 well facilities to the existing municipal water supply system.

Phase 2 of the project would only be implemented after the SFPUC's San Francisco Westside Recycled Water Project[3] is also approved and constructed. The SFPUC is proposing the Westside Recycled Water Project, a WSIP facility improvement project, to develop a new recycled water supply for nonpotable irrigation uses at Golden Gate Park and nearby golf courses. The availability of recycled water in Golden Gate Park would enable the SFPUC to convert two existing well facilities in the park from irrigation and ornamental lake fill use to municipal supply. Pipelines would be extended to the two existing irrigation well facilities in Golden Gate Park. For all wells in Golden Gate Park, piping features that would ensure positive separation between potable systems and irrigation systems, such as a "swivel-ell" pipe coupling or air gap, would be installed because these wells would also serve as a backup irrigation supply and ornamental lake fill for Golden Gate

[3] The San Francisco Westside Recycled Water Project (San Francisco Planning Department Case No. 2008.0091E), one of the facility improvement projects under the approved WSIP, is currently undergoing environmental review. On September 8, 2010, the San Francisco Planning Department published a Notice of Preparation that an environmental impact report would be prepared for this project (http://www.sf-planning.org/ftp/files/MEA/2008.0091E_Westside_Water_NOP.pdf).

Park to accommodate any emergency repairs or unplanned outages of the park's irrigation water facilities. If construction of the Westside Recycled Water Project is delayed, the two existing irrigation wells would not be converted to potable water supply, and the project's operation would be limited to the four groundwater wells developed in Phase 1 and total annual production from these wells would be approximately 2.5 to 3.0 mgd.

1.4.2 Project Location

The proposed project is located on the west side of San Francisco on land owned by the City and County of San Francisco (CCSF). Phase 1 of the project includes construction and operation of three new production groundwater well facilities south of Golden Gate Park, and one in Golden Gate Park, as well as pipeline segments that would connect the well facilities with existing municipal water storage facilities. Phase 2 of the proposed project, which would be implemented if the Westside Recycled Water Project is approved and constructed, would consist of converting two existing irrigation well facilities in Golden Gate Park to potable water supply and installation of pipeline segments that would connect the well facilities to the Phase 1 pipelines. The locations of proposed well facilities and pipelines are briefly described below.

Phase 1 Well Facility Sites. The three groundwater well facilities proposed south of Golden Gate Park include the Lake Merced site, South Sunset site, and West Sunset site. The Lake Merced well facility would be sited just west of Lake Merced Boulevard, next to Lake Merced. The South Sunset well facility site is on the corner of the South Sunset Playground, at 40th Avenue and Wawona Street, next to an SFRPD-managed public recreational field used for softball, baseball, and soccer. The West Sunset well facility site is at the West Sunset Playground, at the intersection of 40th Avenue and Quintara Street, adjacent to SFRPD-managed public recreational fields. The well facility site proposed in Golden Gate Park is to the west of the existing Central Pump Station, which is south of Overlook Drive and east of the Middle Drive West/Overlook Drive intersection.

Phase 2 Well Facility Sites. The two well sites proposed for conversion in Golden Gate Park include the existing South Windmill Replacement well site and the North Lake well site. The existing South Windmill Replacement well is located in the western part of Golden Gate Park, north of Martin Luther King Jr. Drive and east of the Murphy Windmill and Millwright's Cottage. The existing North Lake well is located in the western part of Golden Gate Park, south of Fulton Street and adjacent to Chain of Lakes Drive.

Groundwater Transmission Pipelines. The proposed groundwater transmission pipelines would connect five groundwater wells to the Sunset Reservoir. Pipeline segments 1 through 4 would be constructed during Phase 1; under Phase 2, pipeline segments 5 and 6 would be installed in Golden Gate Park. The location of the pipeline alignments are summarized below.

- **Segment 1 – West Sunset Well Facility to Sunset Reservoir.** This pipeline would extend west along Quintara Street, north along 41st Avenue to Ortega Street, and east along Ortega Street for approximately one mile to 24th Avenue, and continue south along 24th Avenue before entering the Sunset Reservoir.

- **Segment 2 – Golden Gate Park Pipeline Junction to West Sunset Playground**. This pipeline would extend from a junction at the intersection of Chain of Lakes Drive East and Martin Luther King Jr. Drive and continue south for approximately one mile along 41st Avenue to Quintara Street, and then east for one block to the West Sunset well facility.

- **Segment 3 – Central Pump Station Well Facility to Golden Gate Park Pipeline Junction**. This segment would extend from Chain of Lakes Drive East along Martin Luther King Jr. Drive and then along Middle Drive West, to Overlook Drive, ending at the Central Pump Station site.

- **Segment 4 – South Sunset Well Facility to West Sunset Well Facility.** This pipeline would extend from the South Sunset site along 40th Avenue between Wawona and Vicente Streets, west along Vicente Street to 41st Avenue, north along 41st Avenue between Vicente and Quintara Streets, and east one block along Quintara Street to the West Sunset well facility.

- **Segment 5 – North Lake Well Facility to Golden Gate Park Pipeline Junction.** This pipeline would extend north along Chain of Lakes Drive East for approximately 0.5 mile to connect to the North Lake well facility.

- **Segment 6 – South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction.** This pipeline would extend west along Martin Luther King, Jr. Drive for approximately 0.4 mile to connect to the South Windmill Replacement well facility.

- **Sunset Reservoir Facilities.** A chlorine analyzer and sample station would be constructed at the northwest corner of Sunset Reservoir and a pH adjustment facility would be constructed as an addition to an existing Sunset Reservoir building, along with piping between the pH adjustment facility and the North and South basins of the Sunset Reservoir.

1.4.3 Project Construction

Phase 1 of the Groundwater Supply Project is expected to begin in fall 2014 and conclude in spring 2016, resulting in an overall construction period of approximately 19.5 months. Depending on the timing and approval of the Westside Recycled Water Project, Phase 2 of construction could begin as early as summer 2015 and conclude in fall 2016. Project construction would generally take place on weekdays (Monday through Friday) during the daytime hours, 7:00 a.m. to 5:00 p.m.[4] No weekend construction work would occur.

Staging areas for construction materials and equipment would be located on developed or previously disturbed areas, rights-of-way, or roadsides. Contractors would utilize staging areas for equipment and materials storage as well as for stockpiling purposes of excavated soil. Project activities would include vegetation removal (including some tree removal); site clearing; grading and excavation; demolition of existing irrigation well facilities (South Windmill Replacement and North Lake); construction of well facilities, pumps, fencing and associated facilities; pipeline

[4] Truck and worker trips at project facility sites would end at 4:30 p.m. However, trucks leaving the sites at 4:30 p.m. would not reach their destinations until about 5:00 p.m.

installation; backfilling; paving; site clean-up; and landscaping. Pipeline installation would primarily be open-trench and generally progress at a rate of 60 to 120 feet per day, or 300 to 600 feet per week. However, pipeline construction activities might not be continuous. In addition, at two locations where auger boring (trenchless) construction is proposed (i.e., beneath both the N-Judah and L-Taraval MUNI light rail lines), pits (a driving pit and a receiving pit) would be constructed on either side of the rail lines. The total expected duration of each auger boring operation would be approximately four weeks. An estimated 1,900 cubic yards of excess spoils would be generated during pipeline construction and approximately 260 cubic yards of excess spoils would be generated from well facility construction. These spoils would be stockpiled at a staging area for reuse or disposed of at an appropriate landfill.

1.4.4 Project Operations

Groundwater Supply System Operation

Once construction of the Groundwater Supply Project is complete, the groundwater would be blended with San Francisco's municipal water supply and distributed to local customers through the Sunset and Sutro Reservoirs. Normal daily extraction rates from each of the six wells would be approximately 0.4 to 1.5 mgd, for a total annual average of 3 mgd during Phase 1, and 4 mgd when Phase 2 is implemented. However, due to water quality requirements as well as seasonal variations in water demand, production from the proposed wells could vary on a daily basis. The pumps would operate during the day and night, the timing and duration of which would vary on a day-to-day basis. Trucks would deliver treatment chemicals to the Lake Merced and West Sunset well facilities, and to the Sunset Reservoir treatment facility, approximately every three weeks.

In addition to normal operations, the proposed project would provide a source of drinking water in the event that other imported water sources are interrupted due to earthquake damage or other emergency situation. The six wells would be capable of producing up to 6 mgd (total) during a emergency and could operate at this rate for up to 30 days, consistent with the WSIP level of service goals (SFPUC, 2009). Portable diesel generators would provide backup power to enable operation of the West Sunset well facility and the North Lake well facility during an emergency. Furthermore, the three well facilities in Golden Gate Park would provide a backup supply for irrigation and for filling the ornamental lakes in Golden Gate Park.

Groundwater Monitoring and Lake Merced Monitoring

During project operation, the SFPUC would continue to monitor groundwater levels, groundwater quality, and surface water levels in the Westside Groundwater Basin monitoring network (described in Section 5.16, Hydrology and Water Quality). The monitoring results would be used to detect seawater intrusion, changes in water levels in surface water bodies (such as Lake Merced and Pine Lake), and interference with other wells. The existing groundwater monitoring well network in the North Westside Groundwater Basin consists of 17 locations and

31 individual wells for groundwater elevation monitoring.[5] In addition, the SFPUC would continue to conduct ongoing monitoring of water levels and quality in Lake Merced.

Overboard Pumping

During operation of the well facilities, the initial volume of water pumped from each well upon startup would be discharged rather than directed into the water supply system – a process referred to as "overboard pumping." Overboard pumping would occur automatically for one to five minutes each time a well has been shut down and needs to be restarted. Although the volume of these discharges would vary from site to site, where feasible, overboard water would be used in water features, percolated into the ground onsite, or used to augment a natural water body.

Groundwater Sampling and Treatment

In accordance with California Department of Public Health regulations, the SFPUC would be required to obtain a domestic water supply permit for the Groundwater Supply Project municipal wells. As part of obtaining this permit, the SFPUC would prepare a plan describing the proposed methods for compliance with the domestic water quality and monitoring regulations specified in Title 22, Division 4, Chapter 15, of the California Code of Regulations. The constituents to be addressed in the water quality monitoring plan include bacterial levels, inorganic chemicals, organic chemicals, trihalomethanes, radioactivity, general minerals, and general physical parameters. For additional information regarding the required elements of the plan, refer to Chapter 3, Project Description, Section 3.5, Operations and Maintenance.

The SFPUC has determined that the groundwater quality at proposed production well sites meets all federal and State drinking water standards except for the nitrate standards at one well and manganese standards at another. The groundwater quality also does not meet the SFPUC water quality operational targets at all six well sites for pH, fluoride, total hardness, nitrate, and total dissolved solids.[6] Therefore, to achieve these goals and to meet the public health requirements set by the California Department of Public Health and the U.S. Environmental Protection Agency, groundwater would be blended with the SFPUC surface water supply at a target percentage of up to 15 percent. In addition, to address potential microbial contamination, all groundwater would be disinfected at the Lake Merced and West Sunset well facilities prior to being conveyed into the municipal water system. Disinfection would consist of adding a 12.5 percent solution of sodium hypochlorite to maintain a free chlorine concentration of 1.5 mg/L in the groundwater. Water entering the municipal water system would be monitored at the Lake Merced Pump Station and Sunset Reservoir. In addition, pH adjustment facilities would be included at the Lake Merced well facility and at Sunset Reservoir, so that the pH of the blended water would be similar to San Francisco's municipal water supply before blending.

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5 The State Water Resources Control Board identifies the basin as the Westside Groundwater Basin; however, for the purpose of this project, the portion of the groundwater basin within San Francisco is called the North Westside Groundwater Basin, and the portion within San Mateo County is called the South Westside Groundwater Basin.

6 The SFPUC maintains water quality goals that are guidelines for internal operations and exceed State and federal regulatory standards.

Maintenance

SFPUC would manage all six well facilities, including those located within SFRPD-managed parkland. Longer-term maintenance of the facilities would include removal and repair (or replacement) of pumps, valves, and other equipment. The SFPUC's standard supervisory control and data acquisition (SCADA) system would also allow for remote monitoring of all well facilities and pipeline equipment. On a daily basis, a facility operator would check the equipment at each groundwater facility and pump site.

1.5 Summary of Project Impacts and Mitigation Measures

Chapter 5, Environmental Setting, Impacts, and Mitigation Measures, of this EIR presents the environmental impact analyses for all CEQA topic areas and provides mitigation measures that would reduce significant impacts to a less-than-significant level, where feasible. A summary of all impacts and mitigation measures is provided below in **Table 1-1**. The categories used to designate impact significance in Table 1-1 are:

- **No Impact (NI).** An impact is considered not applicable (no impact) if there is no potential for impacts or the environmental resource does not occur within the project area or the area of potential effect. For example, there would be no impact related to grading if there is no grading proposed at a particular project site.

- **Less than Significant (LS).** This determination applies if there is a potential for some limited impact but not a substantial, adverse effect that qualifies under the significance criteria as a significant impact. No mitigation is required for impacts determined to be LS.

- **Less than Significant with Mitigation (LSM).** This determination applies if there is a potential for the project to result in an adverse effect that meets the significance criteria, or if there is certainty that the project would result in an adverse effect that meets the significance criteria, but feasible mitigation is available that would reduce the impact to a less-than-significant level. An impact described as "potentially" significant indicates there is a potential for this impact to occur, but there is either not enough project information or site-specific information to determine definitively whether or not it qualifies under the significance criteria as significant. Impacts identified as "potentially significant" are treated the same as significant impacts in this EIR.

Additional categories used to designate impact significance include "significant and unavoidable" (SU) and "significant and unavoidable with mitigation" (SUM). These designations apply if the project would result in an adverse effect that meets the significance criteria, but for which there appears to be no feasible mitigation available to reduce the impact to a less-than-significant level or there is some mitigation available to lessen the impact, but the residual effect after implementation of the measure would remain significant. However, as presented in this EIR, the proposed project would not result in impacts that would be significant and unavoidable or significant and unavoidable with mitigation, with the exception of the project's growth inducement potential.

As discussed in Chapter 6, Section 6.1, Growth Inducement, the proposed project is one of several capital improvement projects that make up the SFPUC's WSIP. Implementation of the WSIP would support growth in the SFPUC service area, thereby contributing indirectly to environmental impacts caused by that growth. Because the proposed project is part of the WSIP and would contribute to the WSIP's growth-inducement impact, the Groundwater Supply Project would therefore contribute to the significant and unavoidable program-level impacts associated with growth inducement.

1.6 Alternatives to the Proposed Project

This section describes the project alternatives that were selected and analyzed in accordance with CEQA Guidelines Section 15126.6(a). The four alternatives to the proposed project selected for detailed analysis in this EIR are:

- Alternative 1: No Project Alternative
- Alternative 2: Reduced Yield Alternative
- Alternative 3: Local Desalination Plant Alternative
- Alternative 4: Pipeline Location Alternative

Table 1-2 provides a brief description of these alternatives and highlights how they differ from the proposed project. This section also evaluates the impacts of the selected alternatives relative to those of the proposed project. Since the alternatives are conceptual, the evaluation is based on the available information and reasonable assumptions about how each alternative would be implemented.

Table 1-3 (found at the end of this chapter) summarizes the environmental impacts of the selected alternatives compared to those of the proposed project. This table presents the significant impacts of the proposed project as well as less-than-significant impacts whose severity would be different under the project alternatives than under the proposed project. Table 1-3 does not include less-than-significant impacts of the proposed project that would have the same significance determination and/or impact severity as those of the project alternatives.

1.6.1 Comparison of Alternatives

The CEQA Guidelines require the identification of an environmentally superior alternative to the proposed project (Section 15126.6[e]). If it is determined that the "no project" alternative would be the environmentally superior alternative, then the EIR shall also identify an environmentally superior alternative among the other project alternatives (Section 15126.6[3]).

The No Project Alternative and Reduced Yield Alternative would both reduce operational effects relative to the proposed project because: (1) there would be no new groundwater pumping under the No Project Alternative, and (2) under the Reduced Yield Alternative, groundwater pumping would be conducted primarily in Golden Gate Park, and pumping would be reduced by half at the West Sunset well and would be eliminated at the South Sunset and Lake Merced wells. The total average groundwater production under the Reduced Yield Alternative would be 2.9 mgd compared to 4 mgd under the proposed project. Construction impacts would be eliminated under the No Project Alternative. In addition, the Reduced Yield Alternative would decrease the intensity of all but one construction-related impact of the proposed project because well facilities would not be constructed at the South Sunset Playground and Lake Merced sites; the disinfection facilities would not be constructed at Lake Merced; and the 4,460-foot distribution pipeline connecting the South Sunset well facility to the West Sunset well facility would not be constructed. While the significant impacts of the proposed project would remain significant under the Reduced Yield Alternative, they would be reduced to a less-than-significant level with the implementation of mitigation measures specified in this EIR for the proposed project.

While the Reduced Yield Alternative would meet the project objectives, the No Project Alternative would not. Neither alternative would fully meet the WSIP goals and objectives that rely directly on the contribution of the Groundwater Supply Project to fulfill systemwide level of service objectives. Therefore, both alternatives could jeopardize the SFPUC's ability to meet the adopted WSIP goals and objectives adopted as part of the WSIP under SFPUC Resolution 08-0200. Further, in the event of a catastrophic emergency, the SFPUC could be limited in its ability to meet the adopted WSIP seismic, delivery, and water supply reliability goals, particularly in the San Francisco region, because less (or no) groundwater would be available. This could affect the SFPUC's ability to restore service after a major earthquake or an unplanned facility outage (such as a power failure or other unforeseen event).

While the Local Desalination Plant Alternative would reduce all of the operational impacts related to groundwater pumping under the proposed project, it would introduce different operational impacts related to scenic resources, recreational resources, entrainment and/or impingement of marine organisms in the intake pipeline, fault rupture and unstable slopes, degradation of water quality as a result of saline water, increased use of hazardous materials during operation, and increased energy use during operation. Many of the construction impacts would be reduced relative to the proposed project, but because this alternative would be located in a more sensitive area with respect to cultural resources compared to the proposed project, there would be a greater potential to encounter previously unrecorded and buried (or otherwise obscured) archeological deposits, archeological resources, and/or human remains (Impacts CP-2a and CP-4). In addition, animals at the zoo could be subjected to construction-related noise and dust (Impact BI-1); historic resources could be disturbed if the desalination plant were constructed at the National Guard Armory and the existing buildings were eligible for inclusion on the National Register of Historic Places (Impact CP-1); and demolition or alteration of the existing buildings at the National Guard Armory could encounter hazardous building materials (Impact HZ-2).

Because this alternative would provide a sustained capacity of 4 mgd treated water and an emergency capacity of 6 mgd, it would be identical to the proposed project with respect to helping the SFPUC meet its adopted WSIP seismic, delivery, and water supply reliability goals. However, as discussed above, there are challenges associated with this alternative, including, among others, uncertainties regarding regulatory and permitting conditions for brine disposal and for minimizing impacts on aquatic resources.

The Pipeline Location Alternative would have the same operational impacts as the proposed project because the same amount of groundwater would be pumped from the same wells. Construction-related noise impacts would be less than those of the proposed project, but this alternative could result in construction impacts related to traffic disruption on Sunset Boulevard (Impact TR-1); a greater potential to accidentally rupture or require relocation of utilities (Impacts UT-3 and UT-4); and removal of a larger number of trees (Impact BI-3). Because this alternative would produce the same amount of groundwater as the proposed project, it would be identical with regard to helping the SFPUC meet its adopted WSIP seismic, delivery, and water supply reliability goals.

Based on the evaluation above, the Reduced Yield Alternative is considered to be the environmentally superior alternative among the project alternatives (other than the No Project Alternative). The Reduced Yield Alternative would decrease the intensity of both the operational and construction-related impacts relative to those of the project. However, this alternative would not meet WSIP level of service goals to the same extent as the proposed project.

TABLE 1-2
SELECTED CEQA ALTERNATIVES

Alternative	How Does the Alternative Differ from the Proposed Project?
Alternative 1: No Project – The SFPUC would not construct the proposed well facilities or distribution pipelines, and San Francisco's municipal water supply would continue to operate as it does under existing conditions with implementation of other projects under the WSIP.	• The SFPUC would not construct new well facilities and associated disinfection facilities, distribution pipelines, or pH-adjustment facilities. • The SFPUC would not convert two existing irrigation wells in Golden Gate Park to potable groundwater well facilities. • The SFPUC would not produce 3 to 4 mgd of groundwater proposed under the project to meet the project objectives.
Alternative 2: Reduced Yield Alternative – The SFPUC would construct four new well facilities and operate four municipal supply wells instead of six, and would produce up to 2.9 mgd of local groundwater instead of the 4 mgd that would be produced under the Groundwater Supply Project.	• The SFPUC would construct four new well facilities and associated disinfection and pH-adjustment facilities and operate four municipal supply wells instead of six; well facilities would not be constructed at the Lake Merced site or the South Sunset site. • The 4,460-foot distribution pipeline connecting the South Sunset well facility to the West Sunset well facility would not be constructed. • The SFPUC would produce 1.75 to 2.9 mgd of groundwater instead of the 3 to 4 mgd planned under the proposed project.
Alternative 3: Local Desalination Plant Alternative – The SFPUC would construct a small desalination plant to supplement or replace the water supply that would be provided by the Groundwater Supply Project.	• For local water supply purposes, the SFPUC would construct a small desalination plant at or near the Oceanside Water Pollution Control Plant along with the associated seawater intake structure, intake pipeline, pump stations, treatment facilities, and distribution pipelines. • The SFPUC would not construct new well facilities and associated disinfection facilities, distribution pipelines for the groundwater well facilities, or pH-adjustment facilities. • The SFPUC would not convert two existing irrigation wells in Golden Gate Park to potable groundwater well facilities. • The SFPUC would produce a sustained capacity of 4 mgd, with an emergency capacity of up to 6 mgd, of desalinated seawater instead of groundwater to achieve the project objectives (same capacity as the proposed project).
Alternative 4: Pipeline Location Alternative – The SFPUC would construct most of the pipeline reaches extending to the north and south of Ortega Street along Sunset Boulevard.	• The SFPUC would construct pipeline segments 2 and 4 along Sunset Boulevard, within the street or adjacent unpaved footpath. • The SFPUC would not construct pipeline segments 2 and 4 along 40th and 41st Avenues.

1.7 Areas of Controversy

During the first scoping meeting, held on January 20, 2010, attendees commented on the scope of the Draft EIR. Written comments were also received during the scoping period (between December 30, 2009 and January 30, 2010). A second scoping period began on March 2, 2011 and, throughout the scoping period, comments were accepted through April 1, 2011. Two scoping reports were prepared that summarize the comments received on the project (see **Appendix A**). Based on the number of comments received on each of the topics listed in the scoping reports, the most controversial issues for the proposed project, as expressed by community members, are: surface and groundwater impacts (discussed in Section 5.16, Hydrology and Water Quality); land subsidence (discussed in Sections 5.15, Geology and Soils, and 5.16, Hydrology and Water Quality); potential conflicts with existing plans and policies, particularly the Golden Gate Park Master Plan (discussed in Chapter 4, Plans and Policies); and cumulative impacts (discussed in each resource topic discussed in Chapter 5, Environmental Setting and Impacts). Refer to Table 2-2 in Chapter 2, Introduction and Background, for an overview of environmental concerns raised during the scoping period.

1.8 References

San Francisco Planning Department, *Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program*, San Francisco Planning Department File No. 2005.0159E, October 2008.

San Francisco Planning Department, *Final Environmental Impact Report for the San Francisco Public Utilities Commission's Lower Crystal Springs Dam Improvements Project*, File No. 2005.0161E, State Clearinghouse No. 2007012002. Certified October 7, 2010.

San Francisco Planning Department, *Draft Environmental Impact Report for the San Francisco Public Utilities Commission's Calaveras Dam Replacement Project*, File No. 2005.0161E, State Clearinghouse No. 2005102102. Certified January 27, 2011.

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, 2009.

TABLE 1-1
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.2: Land Use			
Impact LU-1: Project operations would not result in substantial long-term or permanent impacts on the existing character of the vicinity.	LS	None required.	LS
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.	LS	None required.	LS
Section 5.3: Aesthetics			
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.	LS	None required.	LS
Impact AE-2: Temporary construction would not result in substantial sources light or glare and would not adversely affect day or nighttime views in the area.	LS	None required.	LS
Impact AE-3: The proposed project would not have an adverse effect on a scenic vista.	LS	None required.	LS
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.	S	**M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS
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.	LS	None required.	LS
Impact C-AE: The proposed project would have a cumulatively considerable contribution to a significant cumulative aesthetic impact.	S	**M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.4: Population and Housing			
No impacts related to population and housing.	NI	None required.	NI
Section 5.5: Cultural and Paleontological Resources			
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.	LS	None required.	LS
Impact CP-2a: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5.	S	**M-CP-2a: Accidental Discovery of Archeological Resources.** The following measures shall be implemented should construction activities result in the accidental discovery of a cultural resource: Construction activities will immediately be suspended within 50 feet of the find if there is any indication of a potential archeological resource. To avoid the potential for adverse effects on accidentally discovered buried or submerged historical resources, as defined in CEQA Guidelines Section 15064.5(a), the SFPUC shall distribute the Planning Department's archeological resource "ALERT" sheet to the project prime contractor; to any project subcontractor firms (including demolition, excavation, grading, foundation, pile driving, etc.); and/or to utilities firms involved in soil-disturbing activities within the project site. Prior to undertaking any soil-disturbing activities, each contractor shall be responsible for ensuring that the ALERT sheet is circulated to all field personnel, including machine operators, field crew, pile drivers, supervisory personnel, etc. The SFPUC shall provide the Environmental Review Officer (ERO) with a signed affidavit from the responsible parties (prime contractor, subcontractor(s), and utilities firm) confirming that all field personnel have received copies of the ALERT sheet. If the ERO determines that an archeological resource may be present within the project site, the SFPUC shall retain the services of a qualified archeological consultant, based on standards developed by the Planning Department archeologist. The archeological consultant shall advise the ERO as to whether the discovery is an archeological resource that retains sufficient integrity and is of potential scientific/historical/cultural significance. If an archeological resource is present, the archeological consultant shall identify and evaluate the archeological resource and make a recommendation as to what action, if any, is warranted. Based on this information, the ERO may require specific additional measures to be implemented by the SFPUC. Measures could include: in-situ preservation of the archeological resource; an archeological monitoring program; or an archeological evaluation program. The ERO might also require that the SFPUC immediately implement a site security program if an archeological resource is at risk from vandalism, looting, or other damaging actions.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.5: Cultural and Paleontological Resources (cont.)			
Impact CP-2a (cont.)		If an archeological resource is discovered, the archeological consultant shall submit an Archeological Data Recovery Report (ADRR) to the ERO which, in addition to the usual ADRR contents, will evaluate the historical significance of any discovered archeological resource, as well as describe the archeological and historical research methods employed in the archeological monitoring/data recovery program(s) undertaken, and present, analyze, and interpret the recovered data. Information that may put at risk any archeological resource shall be provided in a separate removable insert within the final report. Once approved by the ERO, copies of the ADRR shall be distributed as follows: the relevant California Historical Resources Information System Information Center shall receive one copy, and the ERO shall receive a copy of the transmittal letter of the ADRR to the Information Center. The San Francisco Planning Department, Environmental Planning section shall receive three copies of the ADRR along with copies of any formal site recordation forms (DPR 523 series) and/or documentation for nomination to the National Register /California Register. The SFPUC shall receive copies of the ADRR in the number requested. In instances of high public interest in or high interpretive value of the resource, the ERO may require a different final report content, format, and distribution than that presented above.	
● **Impact CP-2b:** Construction of the proposed Lake Merced well facility would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5.	S	**M-CP-2b:** Based on a reasonable presumption that archeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried historical resources. The project sponsor shall retain the services of a qualified archeological consultant, based on standards developed by the Planning Department archeologist. The archeological consultant shall undertake an archeological testing program as specified herein. In addition, the consultant shall be available to conduct an archeological monitoring and/or data recovery program if required pursuant to this measure. The archeological consultant's work shall be conducted in accordance with this measure at the direction of the Environmental Review Officer (ERO). All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to the ERO for review and comment, and shall be considered draft reports subject to revision until final approval by the ERO. Archeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for up to a maximum of four weeks. At the direction of the ERO, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less than significant level potential effects on a significant archeological resource as defined in CEQA Guidelines Sect. 15064.5 (a)(c). ***Consultation with Descendant Communities.*** On discovery of an archeological site associated with descendant Native Americans or the Overseas Chinese an appropriate representative of the descendant group and the ERO shall be contacted. The representative of the descendant group shall be given the opportunity to monitor archeological field investigations of the site and to consult with ERO regarding appropriate archeological treatment of the site, of recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archeological Resources Report shall be provided to the representative of the descendant group.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.5: Cultural and Paleontological Resources (cont.)			
Impact CP-2b (cont.)		***Archeological Testing Program.*** The archeological consultant shall prepare and submit to the ERO for review and approval an archeological testing plan (ATP). The archeological testing program shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the archeological testing program will be to determine to the extent possible the presence or absence of archeological resources and to identify and to evaluate whether any archeological resource encountered on the site constitutes an historical resource under CEQA. At the completion of the archeological testing program, the archeological consultant shall submit a written report of the findings to the ERO. If based on the archeological testing program the archeological consultant finds that significant archeological resources may be present, the ERO in consultation with the archeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional archeological testing, archeological monitoring, and/or an archeological data recovery program. If the ERO determines that a significant archeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either: A) The proposed project shall be re-designed so as to avoid any adverse effect on the significant archeological resource; or B) A data recovery program shall be implemented, unless the ERO determines that the archeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible. ***Archeological Monitoring Program.*** If the ERO in consultation with the archeological consultant determines that an archeological monitoring program (AMP) shall be implemented the archeological monitoring program shall minimally include the following provisions: • The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. The ERO in consultation with the archeological consultant shall determine what project activities shall be archeologically monitored. In most cases, any soils-disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, driving of piles (foundation, shoring, etc.), site remediation, etc., shall require archeological monitoring because of the risk these activities pose to potential archeological resources and to their depositional context; • The archeological consultant shall advise all project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archeological resource; • The archeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archeological consultant and the ERO until the ERO has, in consultation with project archeological consultant, determined that project construction activities could have no effects on significant archeological deposits;	

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.5: Cultural and Paleontological Resources (cont.)			
Impact CP-2b (cont.)		• The archeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis; • If an intact archeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The archeological monitor shall be empowered to temporarily redirect demolition/excavation/pile driving/construction activities and equipment until the deposit is evaluated. If in the case of pile driving activity (foundation, shoring, etc.), the archeological monitor has cause to believe that the pile driving activity may affect an archeological resource, the pile driving activity shall be terminated until an appropriate evaluation of the resource has been made in consultation with the ERO. The archeological consultant shall immediately notify the ERO of the encountered archeological deposit. The archeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archeological deposit, and present the findings of this assessment to the ERO. Whether or not significant archeological resources are encountered, the archeological consultant shall submit a written report of the findings of the monitoring program to the ERO. ***Archeological Data Recovery Program.*** The archeological data recovery program shall be conducted in accord with an archeological data recovery plan (ADRP). The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archeological consultant shall submit a draft ADRP to the ERO. The ADRP shall identify how the proposed data recovery program will preserve the significant information the archeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archeological resources if nondestructive methods are practical. The scope of the ADRP shall include the following elements: • *Field Methods and Procedures.* Descriptions of proposed field strategies, procedures, and operations. • *Cataloguing and Laboratory Analysis.* Description of selected cataloguing system and artifact analysis procedures. • *Discard and Deaccession Policy.* Description of and rationale for field and post-field discard and deaccession policies. • *Interpretive Program.* Consideration of an on-site/off-site public interpretive program during the course of the archeological data recovery program. • *Security Measures.* Recommended security measures to protect the archeological resource from vandalism, looting, and non-intentionally damaging activities.	

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.5: Cultural and Paleontological Resources (cont.)			
Impact CP-2b (cont.)		• *Final Report.* Description of proposed report format and distribution of results. • *Curation.* Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities. ***Final Archeological Resources Report.*** The archeological consultant shall submit a Draft Final Archeological Resources Report (FARR) to the ERO that evaluates the historical significance of any discovered archeological resource and describes the archeological and historical research methods employed in the archeological testing/monitoring/data recovery program(s) undertaken. Information that may put at risk any archeological resource shall be provided in a separate removable insert within the final report. Once approved by the ERO, copies of the FARR shall be distributed as follows: California Archeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and the ERO shall receive a copy of the transmittal of the FARR to the NWIC. The Environmental Planning division of the Planning Department shall receive one bound, one unbound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest in or the high interpretive value of the resource, the ERO may require a different final report content, format, and distribution than that presented above.	
Impact CP-3: The proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature.	LS	None required.	LS
Impact CP-4: The proposed project would potentially disturb human remains, including those interred outside of formal cemeteries.	S	**M-CP-4: Accidental Discovery of Human Remains.** The following measures shall be implemented should construction activities result in the accidental discovery of human remains and associated cultural materials: The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activities shall comply with applicable state laws. This shall include immediate notification of the coroner of the county within which the project is located and, in the event of the coroner's determination that the human remains are Native American, notification of the California Native American Heritage Commission, which shall appoint a Most Likely Descendant (MLD) (PRC Section 5097.98). The archeological consultant, SFPUC, and MLD shall make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5[d]). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. The PRC allows 24 hours	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.5: Cultural and Paleontological Resources (cont.)			
Impact CP-4 (cont.)		to reach agreement on these matters. If the MLD and the other parties do not agree on the reburial method, the SFPUC shall follow Section 5097.98(b) of the PRC, which states that "the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance."	
Impact CP-5: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5.	S	**M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS
Impact C-CP: The proposed project would possibly result in cumulatively considerable impacts related to historical, archeological, or paleontological resources or human remains.	S	**M-CP-2a: Accidental Discovery of Archeological Resources, M-CP-2b: Archeological Testing Program, M-CP-4: Accidental Discovery of Human Remains and M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS
Section 5.6: Transportation and Circulation			
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.	LS	None required.	LS
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.	LS	None required.	LS
Impact TR-3: Project construction would not substantially limit access to adjacent roadways and land uses due to construction within roadways.	LS	None required.	LS
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.	LS	None required.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.6: Transportation and Circulation (cont.)			
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.	LS	None required.	LS
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.	LS	None required.	LS
Section 5.7: Noise and Vibration			
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.	S	**M-NO-1: Administrative and Source Controls.** The SFPUC shall ensure that a noise control plan is prepared, reviewed, and approved by SFPUC, and is prepared and implemented by a qualified noise consultant, defined as a board-certified Institute of Noise Control Engineering member or other qualified consultant or engineer approved by the project engineer. The SFPUC shall verify that the noise control plan contains at least the following elements: • *Daytime:* Construction noise levels shall not exceed the 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. at all residential receptors (except where construction activities occur for two weeks or less at one location). The noise control plan shall identify sensitive receptor locations and include measures that could be employed to maintain noise levels at or below these performance standards, which could include, but not be limited, the following: • Implement best available noise control techniques such as mufflers, intake silencers, ducts, engine enclosures, acoustically attenuating shields or shrouds. • Limit continuous operation of heavy equipment near sensitive receptors. • Locate stationary noise sources (e.g., generators, fans, pumps) as far from sensitive receptors as possible and use noise controls (e.g., enclosures, barriers) as necessary. • The name and phone number of a SFPUC designated project liaison shall be posted at project facility construction sites so that the public can contact the liaison if noise disturbance occurs. This liaison shall immediately take steps to resolve any complaints received, including modifying construction practices as necessary to address the noise complaint.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.7: Noise and Vibration (cont.)			
Impact NO-2: Construction activities would not result in substantial groundborne vibration or groundborne noise levels.	LS	None required.	LS
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.	LS	None required.	LS
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.	LS	None required.	LS
Section 5.8: Air Quality			
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.	LS	None required.	LS
Impact AQ-2: Project construction would not result in substantial exposure of sensitive receptors to pollutant concentrations.	LS	None required.	LS
Impact AQ-3: Project construction activities would not result in the creation of objectionable odors that affect a substantial number of people.	LS	None required.	LS
Impact AQ-4: Project operations would generate emissions of criteria pollutants and precursors, but would not violate air quality standards or contribute substantially to an existing air quality violation.	LS	None required.	LS
Impact AQ-5: Project operations would expose sensitive receptors to pollutant concentrations, but concentrations would not be considered substantial.	LS	None required.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.8: Air Quality (cont.)			
Impact AQ-6: Project operations could create objectionable odors, but the odors would not affect a substantial number of people.	LS	None required.	LS
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.	LS	None required.	LS
Section 5.9: Greenhouse Gas Emissions			
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.	LS	None required.	LS
Section 5.10: Wind and Shadow			
No impacts related to wind and shadow.	NI	None required.	NI
Section 5.11: Recreation			
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.	LS	None required.	LS
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.	LS	None required.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.11: Recreation (cont.)			
Impact RE-3: The proposed project would physically degrade existing recreational resources.	S	**M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS
Impact C-RE: The project's contribution to cumulative impacts on recreational resources and uses would be cumulatively considerable.	S	**M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS
Section 5.12: Utilities and Service Systems			
Impact UT-1: Project construction would not result in a substantial adverse effect related to landfill capacity.	LS	None required.	LS
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.	LS	None required.	LS
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.	S	**M-UT-3a: Preconstruction Utility Identification and Coordination.** Prior to construction activities, the SFPUC or its contractor(s) shall determine the locations of overhead and underground utility lines, such as natural gas, electricity, sewer, telephone, cable, fuel, water, and Muni lines, that may be encountered during construction work. Pursuant to State law, the SFPUC or its contractor(s) shall notify USA North so that utility companies may be advised of the work and may field-mark or otherwise protect and warn the contractor of their existing utility lines. Information regarding the location of existing utilities shall be reviewed before construction activities begin. Utilities may be located by customary techniques such as geophysical methods and hand excavation. The SFPUC or its contractor(s) shall notify all affected utility service providers in advance of the project construction plans and schedule. The SFPUC or its contractor(s) shall make arrangements with these entities regarding the protection, relocation, or temporary disconnection of services prior to the start of construction, and prompt reconnection of services, as required. **M-UT-3b: Protection of Other Utilities during Construction.** Specifications shall be prepared as part of the design plans. These specifications shall include procedures for the excavation, support, and fill of areas around subsurface utilities, cables, and pipes. If the project encounters overhead electric and/or telephone lines during pipeline construction, the SFPUC or its contractor(s) shall coordinate with SFMTA and appropriate telecommunication service providers to de-energize overhead electric lines as required by the federal and State Occupational Safety and Health Administration (OSHA) regulations.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.12: Utilities and Service Systems (cont.)			
Impact UT-3 (cont.)		**M-UT-3c: Safeguard Employees from Potential Accidents Related to Underground Utilities.** While any excavation is open, the SFPUC or its contractors shall protect, support, or remove underground utilities as necessary to safeguard employees. As part of contractor specifications, the contractor(s) shall be required to provide updates on excavations planned for the upcoming week and to specify when construction will occur near a high-priority utility. At the beginning of each week when this work will take place, per California OSHA, the contractor is required to hold safety tailgate meetings and to document contents of meeting. The SFPUC is not required to attend these contractor tailgate meetings, but may attend. **M-UT-3d: Notify San Francisco Fire Department.** If construction activities result in damage to high-priority utility lines the SFPUC or its contractor(s) shall immediately notify the San Francisco Fire Department to protect worker and public safety. **M-UT-3e: Emergency Response Plan and Notification.** The SFPUC or its contractor(s) shall develop an emergency response plan prior to commencing construction activities. The emergency response plan shall identify measures to be taken in response to a leak or explosion resulting from a utility rupture. In addition, the SFPUC or its contractor(s) shall notify the appropriate emergency response department whenever damage to any utility results in a threat to public safety. **M-UT-3f: Ensure Prompt Reconnection of Utilities.** The SFPUC or its contractor(s) shall promptly notify utility providers to reconnect any disconnected utility lines as soon as it is safe to do so. **M-UT-3g: Coordinate Final Construction Plans with Affected Utilities.** The SFPUC or its contractor(s) shall coordinate final construction plans and specifications with affected utilities.	
Impact UT-4: Project construction would potentially result in a substantial adverse effect related to the relocation of local utilities.	S	**M-UT-3a, Preconstruction Utility Identification and Coordination,** and **M-UT-3g, Coordinate Final Construction Plans with Affected Utilities,** would apply to this impact.	LS
Impact UT-5: Project operations would not result in the construction or expansion of wastewater treatment facilities, exceed wastewater treatment requirements, or result in a determination by the wastewater treatment provider that there is insufficient capacity to serve the project.	LS	None required.	LS
Impact UT-6: Project operations would not require more water supply than would be available through existing entitlements and resources, nor would it require new or expanded water supply resources or entitlements.	LS	None required.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.12: Utilities and Service Systems (cont.)			
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.	S	**M-UT-3a: Preconstruction Utility Identification and Coordination, M-UT-3b: Protection of Other Utilities during Construction; M-UT-3c: Safeguard Employees 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 apply to this impact.	LS
Section 5.13: Public Services			
No impacts related to public services.	NI	None required.	NI
Section 5.14: Biological Resources			
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.	S	**M-BI-1a: Avoidance and Minimization Measures for California Red-Legged Frog and Western Pond Turtle.** During construction at the Lake Merced, North Lake well, and Central Pump Station sites, the SFPUC shall ensure a biological monitor is present during installation of exclusion fencing and initial vegetation clearing and/or grading, and shall implement the following measures: • Within one week before work at these sites begins (including demolition and vegetation removal), a qualified biologist shall supervise the installation of exclusion fencing along the boundaries of the work area, as deemed necessary by the biologist, to prevent California red-legged frogs, western pond turtles, and, incidentally common wildlife from entering the work area. The construction contractor shall install suitable fencing with a minimum height of 3 feet above ground surface with an additional 4-6 inches of fence material buried such that species cannot crawl under the fence. • A qualified biologist shall conduct environmental awareness training for all construction workers prior to construction workers beginning their work efforts on the project. The training shall include information on species identification, avoidance measures to be implemented by the project, and the regulatory requirements and penalties for noncompliance. If necessary, the content shall vary according to specific construction areas (e.g., workers on city streets will receive training on nesting birds but not on California red-legged frog identification). • A qualified biologist shall survey the excluded area within 48 hours before the onset of initial ground-disturbing activities and shall be present during initial vegetation clearing and ground-disturbing activities. The biological monitor shall monitor the exclusion fencing weekly to confirm proper maintenance and inspect for frogs and turtles. If frogs or turtles are found, the SFPUC shall halt construction and contact the USFWS and/or CDFW for instructions on how to proceed. Construction shall resume after approval from the USFWS and/or CDFW. • During project activities, excavations deeper than 6 inches shall be covered overnight or an escape ramp of earth or a wooden plank at a 3:1 rise shall be installed; openings such as pipes where California red legged frogs or western pond turtles might seek refuge shall be covered when not in use; and all trash that may attract predators or hide California red-legged frogs or western pond turtles shall be properly contained on a daily basis, removed from the worksite, and disposed of regularly. Following construction, the construction contractor shall remove all trash and construction debris from work areas.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.14: Biological Resources (cont.)			
Impact BI-1 (cont.)		**M-BI-1b: Avoidance and Minimization Measures for Special-Status Bats.** A qualified wildlife biologist shall conduct preconstruction special-status bat surveys when large trees are to be removed, or when occasionally used or vacant buildings are to be demolished. If active day or night roosts are found, the wildlife biologist shall take actions to make such roosts unsuitable habitat prior to tree removal or building demolition. A no-disturbance buffer of 100 feet shall be created around active bat roosts being used for maternity or hibernation purposes. Bat roosts initiated during construction are presumed to be unaffected, and no buffer would necessary. **M-BI-1c: Avoidance and Minimization Measures for Monarch Butterfly.** Construction activities in and around potential butterfly overwintering sites shall occur outside of the overwintering season (October to March), to the greatest extent feasible, to avoid potential impacts on monarch butterfly at the Golden Gate Park sites. However, when it is not feasible to avoid the overwintering season and construction activities take place during this time, the following measures shall apply: • Preconstruction surveys shall be conducted for overwintering monarch butterfly sites within 100 feet of the construction areas. • If an active overwintering site is located, work activities shall be delayed within 100 feet of the site location until avoidance measures have been implemented. Appropriate avoidance measures shall include the following measures (which may be modified as a result of consultation with the CDFW to provide equally effective measures): - If the qualified wildlife biologist determines that construction activities shall not affect an active overwintering site, activities may proceed without restriction. - A no-disturbance buffer may be established around the overwintering site to avoid disturbance or destruction until after the overwintering. - The extent of the no-disturbance buffers shall be determined by a qualified wildlife biologist in consultation with the CDFW.	
Impact BI-2: Construction of the proposed project would not adversely affect federally protected wetlands.	LS	None required.	LS
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.	S	**M-BI-3: Plant Replacement Trees.** The SFPUC shall replace the trees removed within SFRPD-managed lands with trees of equivalent ecological value (i.e., similar species) at a 1:1 ratio. If planting trees of equivalent ecological value at a 1:1 ratio is not feasible or such trees are not available, removed trees shall be replaced at a ratio of 1 inch for every 1 inch of the removed tree's diameter at breast height. If the project site does not have adequate room for replanting trees, the SFPUC shall coordinate with SFRPD to identify acceptable replanting locations in the vicinity of the project site. The SFPUC shall monitor tree replacement plantings annually for a minimum of three years after completion of construction to ensure the plantings have become established and, if necessary, shall replant to ensure the success of the replacement plantings.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.14: Biological Resources (cont.)			
Impact BI-4: The proposed project's facility siting and maintenance would not result in substantial biological resources impacts.	LS	None required.	LS
Impact BI-5: Operation of the proposed project would not adversely affect species identified as candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.	LS	None required.	LS
Impact BI-6: Operation of the proposed project would potentially adversely affect sensitive habitat types associated with Lake Merced.	S	**M-HY-9, Lake Level Management for Lake Merced** would apply to this impact.	LS
Impact BI-7: Operation of the proposed project would adversely affect wetland habitats and other waters of the United States associated with Lake Merced.	S	**M-HY-9: Lake Level Management for Lake Merced** would apply to this impact.	LS
Impact C-BI: The proposed project would result in a considerable contribution to 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.	S	**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; and M-BI-1c, Avoidance and Minimization Measures for Monarch Butterfly; M-BI-3, Plant Replacement Trees M-HY-9, Lake Level Management for Lake Merced** would apply to this impact.	LS
Section 5.15: Geology and Soils			
Impact GE-1: The proposed project is not located on a geologic unit that could become unstable as a result of project construction.	LS	None required.	LS
Impact GE-2: The proposed project would not result in substantial soil erosion or the loss of topsoil during construction.	LS	None required.	LS
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.	LS	None required.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.15: Geology and Soils (cont.)			
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.	LS	None required.	LS
Impact GE-5: The proposed project would not create substantial risks to life or property due to expansive or corrosive soils.	LS	None required.	LS
Impact C-GE: Project implementation would not result in cumulatively considerable impacts related to geology, soils, and seismicity.	LS	None required.	LS
Section 5.16: Hydrology and Water Quality			
Impact HY-1: Project construction would possibly violate water quality standards and waste discharge requirements or otherwise substantially degrade water quality.	S	**M-HY-1: Implement Groundwater Dewatering BMPs at Lake Merced Well Facility.** If groundwater produced during construction of the Lake Merced facility is not discharged to the sewer system, the SFPUC shall include a requirement in construction contracts that its construction contractor(s) develop and implement standard BMPs for the treatment of sediment-laden water produced during groundwater dewatering. BMPs could include discharging water through filtration media, such as filter bags or a similar filtration device, or allowing the filtered water to infiltrate into the soil. If infiltration is used, application of the groundwater shall be conducted at a rate and location that does not allow runoff into Lake Merced or drainage conveyances such as storm drains and does not cause flooding or runoff to adjacent properties. The discharge of groundwater shall also be conducted at a rate that does not allow ponding, unless the ponding is a result of implementing BMPs to reduce the velocity of the flow and occurs within constructed containment, such as an excavation or berm with no outlet. The discharge must also be applied at a sufficient distance from building foundations or other areas that could be damaged from ground settling or swelling. No chemicals shall be added to the discharged groundwater. Alternatively, rather than discharging groundwater, filtered groundwater could be used to spray disturbed areas and the soil stockpile to reduce fugitive dust emissions, if there is sufficient water and it is determined feasible by the construction contractor.	LS
Impact HY-2: Project operation would not violate any water quality standards or waste discharge requirements or otherwise degrade water quality.	LS	None required.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.16: Hydrology and Water Quality (cont.)			
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.	LS	None required.	LS
Impact HY-4: Project operation would not create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide an additional source of polluted runoff.	LS	None required.	LS
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.	LS	None required.	LS
Impact HY-6: Project operations would not decrease the production rate of existing nearby wells as a result of localized groundwater drawdown within the Westside Groundwater Basin such that existing or planned land use(s) would not be supported.	LS	None required.	LS
Impact HY-7: Project operations would not result in substantial land subsidence due to decreased groundwater levels in the Westside Groundwater Basin.	LS	None required.	LS
Impact HY-8: Project operations would possibly result in seawater intrusion due to decreased groundwater levels in the Westside Groundwater Basin.	S	**M-HY-8a: Expand Coastal Monitoring Network.** A minimum of one year prior to operating the South Windmill Replacement well, North Lake well, or Central Pump Station well facilities in Golden Gate Park, the SFPUC shall rehabilitate existing groundwater wells in the western portion of the park or install new groundwater monitoring wells between the Pacific Coast and the South Windmill Replacement well and North Lake well facilities. The SFPUC expects that existing wells NL-1 and SF-1, which are screened similarly to the North Lake irrigation well, can be rehabilitated, and wells SWM-3 and NWM-3 may also be able to be rehabilitated, if found. If the wells cannot be rehabilitated, the SFPUC shall coordinate with the SFRPD and install new wells in the same approximate location in areas of Golden Gate Park that are not highly used by the public and are currently developed/disturbed or are substantially devoid of vegetation in order to minimize the effects of installation. These monitoring wells shall be located a maximum of 100 feet inland to provide a coastal monitoring location in both the Shallow Aquifer and	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.16: Hydrology and Water Quality (cont.)			
Impact HY-8 (cont.)		Primary Production Aquifer for the detection of seawater intrusion. These wells shall be included in the coastal groundwater monitoring network and monitored as part of the SFPUC's ongoing monitoring program for the detection of seawater intrusion. To establish a baseline of groundwater quality, these wells (which have not been previously monitored as part of the SFPUC's groundwater monitoring program) shall be monitored on a quarterly basis for a minimum of one year prior to operation of the South Windmill Replacement well, North Lake well, and Central Pump Station well facilities. For each monitoring event, a groundwater sample from each well shall be analyzed for the same parameters as are measured under the existing groundwater monitoring program (chloride, TDS, and specific conductance). **M-HY-8b: Continuous Groundwater Monitoring in the Primary Production Aquifer.** The SFPUC shall install pressure transducers in coastal monitoring wells Kirkham MW-255, Kirkham MW-385, Ortega MW-265, Ortega MW-400, Taraval MW-240, Taraval MW-400, and San Francisco Zoo MW-450, which are completed in the Primary Production Aquifer, and shall conduct continuous groundwater-level monitoring in these monitoring wells. These groundwater levels shall be monitored as part of the ongoing monitoring program for the detection of seawater intrusion. **Mitigation Measure M-HY-8c: Adaptive Management Program for Seawater Intrusion.** The SFPUC shall implement the Groundwater Supply Project in a stepwise manner, conduct monitoring to detect seawater intrusion, and alter pumping to prevent seawater intrusion from advancing to the coastal monitoring network in accordance with the process described below and shown in Figure 5.16-9 ((included in Section 5.16, Hydrology and Water Quality). Prior to beginning full operation of the proposed project, the SFPUC shall begin pumping at a reduced rate and continue monitoring the expanded coastal monitoring network (including the new wells added under Mitigation Measure M-HY-8a) for evidence of seawater intrusion according to the following procedure: • At initial startup, the project wells shall be operated at a maximum combined capacity of 1 mgd. • The SFPUC shall continue semiannual groundwater quality monitoring of the coastal network (including the new wells added under Mitigation Measure M-HY-8a) in accordance with the ongoing monitoring program as revised by Mitigation Measure M-HY-8b. • After one year of monitoring, the SFPUC may increase annual pumping by 1 mgd each year, up to a total of 3 mgd during Phase 1 of the project and 4 mgd during Phase 2 if none of the chloride concentrations detected in the coastal monitoring network equals or exceeds 142 mg/L. If this limit is not met, semiannual groundwater quality monitoring of the coastal network shall continue. • In the event that the chloride concentration in any of the coastal monitoring wells equals or exceeds 142 mg/L, the SFPUC shall increase the coastal groundwater quality monitoring frequency to quarterly.	

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.16: Hydrology and Water Quality (cont.)			
Impact HY-8 (cont.)		• If there is an upward trend in chloride levels after three quarterly monitoring periods such that projected chloride levels could reach the secondary MCL of 250 mg/L in three years (based on a trend analysis using the most recent three quarters of groundwater sampling), the SFPUC shall either temporarily redistribute pumping to decrease pumping rates closest to the affected monitoring well, or decrease the overall pumping rate. • However, if the SFPUC can demonstrate to the satisfaction of the San Francisco Planning Department Environmental Review Officer, with independent 3rd party concurrence, that the upward trend is not due to the project, the SFPUC may continue pumping subject to the requirements of this mitigation measure. • Pumping may continue at the adjusted production rate and pattern as long as none the coastal monitoring wells exhibit chloride concentrations that are projected to reach 250 mg/L within three years (based on a trend analysis using the most recent three quarters of groundwater sampling). • The total annual pumping rate may be increased by 1 mgd (up to a maximum of 3 mgd during Phase 1 of the project and 4 mgd during Phase 2) after 21 months of quarterly monitoring indicate that none of the chloride concentrations at the coastal monitoring locations are projected to reach 250 mg/L within the next three years. • If the chloride concentration reaches 250 mg/L at any of the coastal monitoring points, the SFPUC shall stop pumping at the nearest project well, and stop all groundwater pumping if necessary to prevent seawater intrusion from progressing further. Pumping shall not be resumed until chloride concentrations at the affected well have been below 142 mg/L for one year based on quarterly monitoring. • The monitoring frequency may be reduced to semiannual once the chloride concentration in an affected well decreases to 142 mg/L or lower for one year based on quarterly monitoring.	
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.	S	**Mitigation Measure M-HY-9: Lake-Level Management for Lake Merced.** The SFPUC shall implement a lake level management program in accordance with the process described below and shown in Figure 5.16-12 (included in Section 5.16, Hydrology and Water Quality). The program requires SFPUC to implement the Groundwater Supply Project in a stepwise manner; conduct monitoring to detect changes in lake level and water quality as well as groundwater-level elevations, and shall respond to project-related changes. Lake levels may be augmented by adding supplemental water (SFPUC system water, treated stormwater, or recycled water), if available. The SFPUC may also alter or redistribute pumping as necessary to avoid adverse effects on Lake Merced in the event a supplemental water source is not available or is insufficient to restore lake levels. Implementation of this measure shall be coordinated with the SFPUC's ongoing Lake Merced lake-level, lake water quality, and groundwater monitoring programs to document and maintain the database of these parameters throughout project operations. Prior to beginning full operation of the Groundwater Supply Project, the SFPUC shall begin pumping at a reduced rate and continue lake-level and groundwater monitoring for the purpose of detecting adverse effects on Lake Merced according to the following procedure:	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

<table>
<tr><th>IMPACT</th><th>Level of Significance Prior to Mitigation</th><th>Mitigation Measure(s)</th><th>Level of Significance After Mitigation</th></tr>
<tr><td colspan="4">Section 5.16: Hydrology and Water Quality (cont.)</td></tr>
<tr><td>Impact HY-9 (cont.)</td><td></td><td>• At initial startup, the wells shall be operated at a maximum combined capacity of 1 mgd.

• The SFPUC shall continue to maintain Lake Level Model so as to be able to evaluate what lake levels would be without implementation of the project based on the actual hydrologic conditions that occurs during project implementation. The SFPUC shall use the model to determine the amount of lake-level decreases that are attributable to the project rather than to hydrologic or other factors, and:

- If lake levels are projected to be within the range that would occur without the project, based on maintenance of the Lake-Level Model, then no project impact is indicated and no corrective action shall be required.

- If project-related lake levels are projected to be below the range that would occur without the project, the allowable deviation from naturally occurring lake levels is dependent on what the naturally occurring lake levels would be without the project. Corrective action shall be implemented if the trigger levels identified in Table 5.16-12 (included in Section 5.16, Hydrology and Water Quality) are projected to be exceeded.

• If after one year of monitoring, lake-level are above the trigger levels specified in Table 5.16-12, the SFPUC may increase pumping by 1 mgd per year, up to a total of 3 mgd during Phase 1, and up to a total of 4 mgd after Phase 2 is implemented.

• If project-related lake levels are projected to be below the range that would occur without the project, the allowable deviation from naturally occurring lake levels that would prevent significant wetlands and water quality impacts from occurring is dependent on what the naturally occurring lake levels would be without the project. Corrective action shall be implemented if the trigger levels identified in the final column of Table 5.16-12 and shown on Figure 5.16-13 are projected to be exceeded, compared to water levels that would occur without the project.

• If, after one year of monitoring, lake-level drop below the trigger levels specified in Table 5.16-12 and groundwater monitoring, in combination with the Lake-Level Model results indicates that the decline is due to project-related pumping, the SFPUC shall augment lake levels by adding supplemental water of suitable quality (such as surplus potable water that is dechloraminated at the Lake Merced Pump Station, stormwater from the Vista Grande Canal, recycled water, or stormwater diverted from other development in the Lake Merced watershed) if available, to maintain lake levels at the specified trigger level based on Lake- Level modeling. At the end of the subsequent year of monitoring, the SFPUC may increase pumping by 1 mgd (up to a total of 3 mgd during Phase 1 and up to 4 mgd after Phase 2 is implemented) if water levels can be maintained at the above-specified trigger levels. The SFPUC shall continue lake-level and groundwater monitoring, lake water-quality monitoring, and maintenance of the Lake- Level Model, and if warranted based on monitoring data and model results, continue supplemental water additions.

The rate of surplus water additions shall be controlled such that water surface elevation increases are no greater than 0.5 feet over a 2.5 week period in any single nesting season (conservatively March 1 through August 15) and no greater than 3 feet in any given year to avoid impacts to nesting birds and western pond turtle.</td><td></td></tr>
</table>

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.16: Hydrology and Water Quality (cont.)			
Impact HY-9 (cont.)		• If a supplemental water source is not available or is insufficient to maintain lake levels above the trigger levels specified in Table 5.16-12, implement other corrective actions such as redistributing pumping to reduce or eliminate groundwater withdrawals near Lake Merced or decreasing the overall pumping rate to maintain lake levels at or above the specified trigger levels. The SFPUC shall continue lake-level and groundwater-level monitoring, Lake Merced water quality monitoring, and maintenance of the Lake- Level Model to determine the effectiveness of the corrective measures such that lake levels shall be maintained at the above-specified trigger levels. As shown in Figure 5.16-12, the SFPUC shall continue to monitor lake levels and shall continue supplemental water additions or redistribution/reduction of groundwater pumping to maintain Lake Merced water levels at the above-specified trigger levels.	
Impact HY-10: The proposed project would not have a substantial adverse effect on water quality in Pine Lake.	LS	None required.	LS
Impact HY-11: Project operation would possibly cause a violation of water quality standards.	S	**M-HY-11: Prepare a Source Water Protection Program and Update Drinking Water Source Assessment.** Because the DWSAP reports for each proposed well facility identified potentially contaminating activities with a vulnerability score of 8 or higher, the SFPUC shall develop and implement a source water protection program including the following components to be implemented to prevent contamination of the well facility: • Integration with the Westside Basin Groundwater Monitoring Program to identify changes in water quality that would warrant further study and response. • Continued cooperation with the San Francisco Department of Public Health in that department's implementation of the existing well construction and well destruction permit program. The goal of protecting and preserving groundwater quality requires that all wells be properly constructed and maintained during their operational lives, and properly destroyed after their useful lives. • Continued cooperation with the San Francisco Department of Public Health in that department's management of cases in the North Westside Basin where spills or leaks of chemicals (e.g., leaking underground fuel tanks) could threaten groundwater quality to ensure that the responsible party adequately investigates and cleans up any contamination that could threaten drinking water quality. • Continued cooperation with the SFPUC Wastewater Enterprise's Urban Watershed Management Program in the implementation of guidelines to maintain appropriate buffers between low impact development stormwater facilities and drinking water well facilities. • Continued coordination with the San Francisco Planning Department to ensure SFPUC review of and comment on CEQA planning documents for proposed projects in the North Westside Groundwater Basin to ensure that groundwater quality would not be degraded as a result of project implementation.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.16: Hydrology and Water Quality (cont.)			
Impact HY-11 (cont.)		The source water protection program shall specify that in the event that potential contamination is identified, the SFPUC shall increase the monitoring frequency at the potentially affected well, investigate the potential source of contamination, coordinate with the San Francisco Department of Public Health or RWQCB to require responsible parties to address identified sources of contamination, and shut down the affected well or provide additional treatment for the groundwater if contamination of the drinking water supply cannot otherwise be avoided. In addition, the SFPUC shall update the drinking water source assessment for each well facility every five years to review existing and planned land uses as well as to identify potentially contaminating activities, as required by the California Department of Public Health, and revise monitoring requirements, if necessary to address additional potentially contaminating activities. The SFPUC shall encourage public participation in the development of the source water protection program and shall update the program every five years along with the drinking water source assessments for each project well, to prevent contamination that could cause an exceedance of drinking water MCLs at the project wells.	
Impact HY-12: Project operation would not have a substantial adverse effect on groundwater depletion in the Westside Groundwater Basin.	LS	None required.	LS
Impact C-HY-1: Facility construction, siting, operations, and maintenance, in combination with past, present, and reasonably foreseeable future projects in the site vicinity, would not adversely affect hydrology and water quality.	LS	None required.	LS
Impact C-HY-2: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would not have a substantial adverse effect related to well interference.	LS	None required.	LS
Impact C-HY-3: Operation of the proposed project would not result in a cumulatively considerable contribution to cumulative impacts related to subsidence.	LS	None required.	LS
Impact C-HY-4: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would possibly have a substantial adverse effect related to seawater intrusion.	S	**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 Sea Water Intrusion** would apply to this impact**.**	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.16: Hydrology and Water Quality (cont.)			
Impact C-HY-5: The proposed project, in combination with past, present, and reasonably foreseeable future projects, would possibly have a substantial adverse effect on water quality that could affect the beneficial uses of Lake Merced or water quality in Pine Lake.	S	**M-HY-9: Lake Level Management for Lake Merced**	LS
Impact C-HY-6: Operation of the proposed project would not result in a cumulatively considerable contribution to cumulative impacts related to water quality standards.	LS	None required.	LS
Impact C-HY-7: Operation of the proposed project would not result in a cumulatively considerable contribution to cumulative impacts related to groundwater depletion.	LS	None required.	LS
Section 5.17: Hazards and Hazardous Materials			
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.	LS	None required.	LS
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.	S	**M-HZ-2a: Preconstruction Hazardous Materials Assessment.** Within three months prior to construction, the SFPUC shall retain a qualified environmental professional to conduct a regulatory agency database review to update and identify hazardous materials sites within ¼ mile of the project sites and to review appropriate standard information sources to determine the potential for soil or groundwater contamination at the project sites. Should this review indicate a high likelihood of encountering contamination at the project sites, follow-up sampling shall be conducted to characterize soil and groundwater quality prior to construction to provide necessary data for the site health and safety plan (Mitigation Measure M-HZ-2b) and hazardous materials management plan (Mitigation Measure M-HZ-2c). If needed, site investigations or remedial activities shall be performed at the project site in accordance with applicable laws. **M-HZ-2b: Health and Safety Plan.** The construction contractor shall, prior to construction, prepare a site-specific health and safety plan in accordance with federal OSHA regulations (29 CFR 1910.120) and Cal-OSHA regulations (8 CCR Title 8, Section 5192) to address worker health and safety issues during construction. The health and safety	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.17: Hazards and Hazardous Materials (cont.)			
Impact HZ-2 (cont.)		plan shall identify the potentially present chemicals, health and safety hazards associated with those chemicals, all required measures to protect construction workers and the general public from exposure to harmful levels of any chemicals identified at the site (including engineering controls, monitoring, and security measures to prevent unauthorized entry to the work area), appropriate personal protective equipment, and emergency response procedures. The health and safety plan shall designate qualified individuals responsible for implementing the plan and for directing subsequent procedures in the event that unanticipated contamination is encountered. The plan shall include requirements for management of soil on the east side of the North Lake Pump Station (near boring SB-4), from the ground surface to a depth of about 0.5 feet, that contains elevated levels of lead: shallow soil in this area shall be excavated and temporarily stockpiled for additional testing to determine offsite disposal requirements. Alternatively, affected soil shall be isolated beneath building foundations or pavement areas during construction, pending approval from the San Francisco Department of Public Health. **M-HZ-2c: Hazardous Materials Management Plan.** The contractor shall, prior to construction, 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. Contract specifications shall mandate full compliance with all applicable local, State, and federal regulations related to identifying, transporting, and disposing of hazardous materials, including those encountered in excavated soil, and demolition debris. The contractor shall provide the SFPUC with copies of hazardous waste manifests documenting that disposal of all hazardous materials has been performed in accordance with the law.	
Impact HZ-3: Project construction would not cause hazardous emissions or handle acutely hazardous materials within ¼ mile of a school.	LS	None required.	LS
Impact HZ-4: Project construction would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	LS	None required.	LS
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.	LS	None required.	LS
Impact HZ-6: Project operations would not cause hazardous emissions or handle acutely hazardous materials within ¼ mile of a school.	LS	None required.	LS

TABLE 1-1 (Continued)
SUMMARY OF IMPACTS AND MITIGATION MEASURES

IMPACT	Level of Significance Prior to Mitigation	Mitigation Measure(s)	Level of Significance After Mitigation
Section 5.17: Hazards and Hazardous Materials (cont.)			
Impact HZ-7: Project operations would possibly impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.	S	**M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS
Impact C-HZ: Implementation of the proposed project would possibly result in cumulatively considerable impacts related to hazards and hazardous materials.	S	**M-HY-9, Lake Level Management for Lake Merced,** would apply to this impact.	LS
Section 5.18: Minerals and Energy Resources			
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.	LS	None required.	LS
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.	LS	None required.	LS
Impact C-ME: Project implementation would not result in cumulatively considerable impacts related to mineral and energy resources.	LS	None required.	LS
Section 5.19: Agriculture and Forest Resources			
No impacts related to agriculture and forest resources.	NI	None required.	NI

TABLE 1-3
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS					
Aesthetics					
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. (Less than Significant with Mitigation) **Impact C-AE:** The proposed project would have a cumulatively considerable contribution to a significant cumulative aesthetic impact. (Less than Significant with Mitigation)	Pumping of 3 to 4 mgd of groundwater could reduce Lake Merced water levels to approximately 10 feet lower than under the modeled existing conditions. Under cumulative conditions, Lake Merced water levels would likely be higher than under the modeled existing conditions for much of the simulation period. However, the estimated lake levels would be lower than levels under either the Groundwater Storage and Recovery Project and the Vista Grande Drainage Basin Improvement Project. Lower water levels in Lake Merced would detract from the scenic quality of the lake as viewed from the trail/pedestrian sidewalk around the perimeter of the lake, adjacent roadways, trails, docks, and golf courses, and picnic areas on John Muir Drive and Lake Merced Boulevard.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could affect the scenic quality of Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease groundwater-level declines in the vicinity of Lake Merced and associated declines in lake levels that could affect the scenic quality of Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could affect the scenic quality of Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts. **Increased** Scenic resources would degrade under this alternative if the desalination plant were visible in the foreground of views from the Great Highway.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, changes in Lake Merced water levels that could affect the scenic quality of the lake would be the same as under the proposed project. Further, there would be no construction of additional buildings that would change the aesthetics impacts. As with the proposed project, the pipeline would be below ground and would not introduce any new aesthetics impacts.
Cultural Resources					
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. (Less than Significant)	The proposed project would not adversely affect any identified historic resources.	**No Change** No historic resources would be adversely affected.	**No Change** No historic resources would be adversely affected.	**Increased** Construction of the desalination plant at the National Guard Armory could potentially affect a historic resource if the existing buildings are found to be eligible for inclusion on the National Register of Historic Places.	**No Change** No historic resources would be adversely affected under this alternative.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS (cont.)					
Cultural Resources					
Impact CP-5: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5. (Less than Significant with Mitigation) **Impact C-CP:** The proposed project would possibly result in cumulatively considerable impacts related to historical, archeological, or paleontological resources or human remains. (Less than Significant with Mitigation)	Pumping of 3 to 4 mgd of groundwater could reduce Lake Merced water levels to approximately 10 feet lower than under the modeled existing conditions. Under cumulative conditions, Lake Merced water levels would likely be higher than under the modeled existing conditions for much of the simulation period. However, the estimated lake levels would be lower than levels under the Groundwater Storage and Recovery Project and the Vista Grande Drainage Basin Improvement Project. Lower water levels in Lake Merced could expose and damage known and currently unknown archeological resources.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels attributable to groundwater pumping under the proposed project that could expose archeological resources at Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease groundwater-level declines in the vicinity of Lake Merced and associated declines in lake levels that could expose archeological resources at Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels attributable to groundwater pumping under the proposed project that could expose archeological resources at Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts. **Increased** Historic or archeological resources could be affected if the desalination plant were constructed at the Fleishhacker Bath House site or National Guard Armory Site.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, impacts related to changes in Lake Merced water levels that could expose archeological resources at Lake Merced would be the same as under the proposed project. **Similar** Although a portion of the pipeline would be constructed in Sunset Boulevard instead of residential streets, this alternative would install approximately the same overall length of pipeline as the proposed project. Therefore, there would be a similar potential to encounter known and previously unidentified archeological resources.
Recreation					
Impact RE-3: The proposed project would physically degrade existing recreation resources. (Less than Significant with Mitigation) **Impact C-RE:** The project's contribution to cumulative impacts on recreational resources and uses would be cumulatively considerable. (Less than Significant with Mitigation)	Pumping of 3 to 4 mgd of groundwater could reduce Lake Merced water levels to approximately 10 feet lower than under the modeled existing conditions. Under cumulative conditions, Lake Merced water levels would likely be higher than under the modeled existing conditions for much of the simulation period.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could degrade recreational resources at Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease groundwater-level declines in the vicinity of Lake Merced and	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could degrade recreational resources at Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, there would be no change in impacts related to degradation of recreational resources at Lake Merced compared to the proposed project.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS (cont.)					
Recreation (cont.)					
Impact RE-3 and Impact C-RE (cont.)	However, the estimated lake levels would be lower than levels under the Groundwater Storage and Recovery Project and the Vista Grande Drainage Basin Improvement Project. Lower water levels in Lake Merced would reduce the capacity available to support the approximately 250 daily on-water recreationists. Further, the water's edge would be substantially farther from the existing shoreline, and stationary docks would not be in contact with the water's edge or surface. Floating docks would have to be moved to provide water access.	basin. There would be no contribution to any cumulative impacts.	associated declines in lake levels that could degrade recreational resources at Lake Merced.	basin. There would be no contribution to any cumulative impacts.	**Increased** If the pipeline were located within the unpaved footpath adjacent to Sunset Boulevard, recreational resources could be adversely affected. However, the pipeline would be below ground and the path would be restored following the installation of each one-block pipeline segment.
Biological Resources					
Impact BI-5: Operation of the proposed project would not adversely affect species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. (Less than Significant)	Operation of the proposed project would have no adverse effects on species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.	**No Change** There would be no additional groundwater pumping and none of the proposed facilities would be constructed or operated; therefore, there would be no impact on species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.	**No Change** Two less well facilities would be constructed and operated under this alternative, and the total amount of groundwater pumping would be reduced from 4 mgd to 2.9 mgd. Similar to the proposed project, operation under this alternative would have no adverse effects on species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.	**Increased** Operation of the desalination plant could result in the entrainment and/or impingement of marine organisms in the intake pipeline. While this impact could be addressed by installing fine screens at the intake structure, there would be a greater potential under this alternative for effects on a species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, as with the proposed project, operation under this alternative would have no adverse effects on species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS (cont.)					
Biological Resources					
Impact BI-6: Operation of the proposed project would potentially adversely affect sensitive habitat types associated with Lake Merced. (Less than Significant with Mitigation) **Impact C-BI:** The proposed project would 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. (Less than Significant with Mitigation)	Pumping of 3 to 4 mgd of groundwater could reduce Lake Merced water levels to approximately 10 feet lower than under the modeled existing conditions. Under cumulative conditions, Lake Merced water levels would likely be higher than under the modeled existing conditions for much of the simulation period. However, the estimated lake levels would be lower than levels under the Groundwater Storage and Recovery Project and the Vista Grande Drainage Basin Improvement Project. Decreased water levels during operation of the proposed project could reduce aquatic habitat and degrade water quality. This could result in adverse effects on fish habitat-related beneficial uses of Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could affect the scenic quality of Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease groundwater-level declines in the vicinity of Lake Merced and associated declines in lake levels that could affect fish habitat-related beneficial uses of Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could affect fish habitat-related beneficial uses of Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, changes in Lake Merced water levels that could affect fish habitat-related beneficial uses of the lake would be the same as under the proposed project.
Impact BI-7: Operation of the proposed project would adversely affect wetland habitats and other waters of the United States associated with Lake Merced. (Less than Significant with Mitigation)	Pumping of 3 to 4 mgd of groundwater could reduce Lake Merced water levels to approximately 10 feet lower than under the modeled existing conditions. Lowered water levels in Lake Merced would adversely affect freshwater marsh wetlands at Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could affect freshwater marsh wetlands at Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin.	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease groundwater-level declines in the vicinity of Lake Merced and associated declines in lake levels that could affect freshwater marsh wetlands at Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could affect freshwater marsh wetlands at Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, changes in Lake Merced water levels that could affect freshwater marsh wetlands at the lake would be the same as under the proposed project.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS (cont.)					
Geology and Soils					
Impact GE-1: The proposed project is not located on a geologic unit that could become unstable as a result of project construction. (Less than Significant)	Engineered fill has been incorporated into the project design and thus, the well facility locations would not experience differential settlement. None of the well facilities or distribution pipelines are located in areas of landslide susceptibility or faulting.	**No Impact** There would be no facilities or structures constructed that could be subject to impacts associated with fault rupture or unstable slopes.	**No Change** Although only four well facilities would be constructed under this alternative instead of six, none would be located in an area of landslide susceptibility or faulting.	**Increased** Under Alternative 3, the intake structure and pipeline would terminate in or near the surface rupture zone of the active San Andreas Fault, which is located on the ocean floor about two miles west of the Oceanside Water Pollution Control Plant (WPCP). In addition, areas along the coast (such as ocean bluffs) can be unstable and are subject to erosion. If the desalination plant were sited to the west of the Oceanside WPCP, the plant location could be subject to instability and erosion.	**No Change** Impacts would not change compared to those of the proposed project because the same facilities would be constructed in the same locations. The new pipeline would not be located in an area of landslide susceptibility or faulting.
Hydrology and Water Quality					
Impact HY-8: Project operations would possibly result in seawater intrusion due to decreased groundwater levels in the Westside Groundwater Basin. (Less than Significant with Mitigation) **Impact C-HY-4:** The proposed project, in combination with past, present, and reasonably foreseeable future projects, could have a substantial adverse effect related to seawater intrusion. (Less than Significant with Mitigation)	Under the proposed project and cumulative conditions, pumping of 3 to 4 mgd of groundwater could cause Shallow Aquifer levels near the Pacific Ocean coastline to be below the "exclusion head" (the theoretical groundwater level necessary to prevent seawater intrusion) for a greater amount of time than would occur under the modeled existing conditions, with some coastal groundwater elevations below sea level. Because operation of the proposed project would reduce some groundwater levels to below the exclusion head (with some coastal groundwater elevations below sea level), and a	**Decreased** There would be no additional groundwater pumping or associated decline in groundwater levels that could increase the potential for seawater intrusion. However, groundwater levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. As for the modeled existing conditions, the potential for seawater intrusion would be low. There would be no contribution to any cumulative impacts.	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease the decline in groundwater levels and associated potential for seawater intrusion in the portion of the North Westside Groundwater Basin that is south of the West Sunset well.	**Decreased** There would be no additional groundwater pumping or associated decline in groundwater levels that could increase the potential for seawater intrusion. However, groundwater levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. As for modeled existing conditions, the potential for seawater intrusion would be low. There would be no contribution to any cumulative impacts.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, there would be no change in the potential for seawater intrusion.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS (cont.)					
Hydrology and Water Quality (cont.)					
Impact HY-8 and Impact C-HY-4 (cont.)	portion of the Shallow Aquifer is open to the Pacific Ocean, the potential exists for seawater intrusion to occur.				
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. (Less than Significant with Mitigation) **Impact C-HY-5:** The proposed project, in combination with past, present, and reasonably foreseeable future projects, would possibly have a substantial adverse effect on water quality that could affect the beneficial uses of Lake Merced. (Less than Significant with Mitigation)	Pumping of 3 to 4 mgd of groundwater could reduce Lake Merced water levels to approximately 10 feet lower than under the modeled existing conditions. Under cumulative conditions, Lake Merced water levels would likely be higher than under the modeled existing conditions for much of the simulation period. However, the estimated lake levels would be lower than levels under the Groundwater Storage and Recovery Project and the Vista Grande Drainage Basin Improvement Project. The decline in water levels could cause degradation of lake water quality that could affect beneficial uses of Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could degrade lake water quality or result in associated effects on the beneficial uses of Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease groundwater-level declines in the vicinity of Lake Merced and associated declines in lake levels that could affect water quality. Therefore, there would be less potential for degradation of lake water quality and the associated effects on the beneficial uses of Lake Merced.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could cause degradation of lake water quality, or result in associated effects on the beneficial uses of Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, the decline in lake levels would not change the identified impacts related to lake water quality or associated effects on the beneficial uses of Lake Merced.
Impact HY-11: Project operation would possibly cause a violation of water quality standards. (Less than Significant with Mitigation)	Each well is considered vulnerable to contamination based on potentially contaminating activities with a vulnerability score of 8 or higher, as identified by the Drinking Water Source Assessment and Protection Program reports.	**No Impact** There would be no groundwater pumping or associated vulnerability to groundwater contamination.	**Decreased** The South Sunset and Lake Merced wells would not be operated. Therefore, the total number of wells would be four instead of six, resulting in a reduction of the potential for the project wells to produce contaminated groundwater.	**No Impact** There would be no groundwater pumping under this alternative or associated vulnerability to groundwater contamination. **Increased** Operation of a desalination plant could result in the degradation of water quality as a result of high-salinity discharges into the Pacific Ocean from the existing outfall structure.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, there would be no change in impacts related to violations of water quality standards.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS (cont.)					
Hazards and Hazardous Materials					
Impact HZ-5: Project operations wound not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. (Less than Significant)	The proposed project would use a minor amount of hazardous materials for the disinfection and pH adjustment of groundwater introduced into the distribution system, in accordance with applicable regulations.	**Decreased** There would be no groundwater pumping or associated treatment of groundwater that would require the use of hazardous materials.	**Decreased** Production of 2.9 mgd of groundwater under this alternative instead of 4 mgd under the proposed project would require less disinfection and pH adjustment and the associated use of hazardous materials.	**Increased** Although impacts related to hazardous materials use would be less than significant based on compliance with applicable regulations, operation of the desalination plant under this alternative would require the use of chemicals for pH adjustment, disinfection, particulate removal, control of scale, prevention of biological fouling, cleaning, and reverse-osmosis to remove salts.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be treated using the same disinfection and pH-adjustment facilities as the proposed project. Therefore, there would be no change in impacts related to the use of hazardous materials.
Impact HZ-7: Project operations would possibly impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (Less than Significant with Mitigation) **Impact C-HZ:** Implementation of the proposed project would possibly result in cumulatively considerable impacts related to hazards and hazardous materials. (Less than Significant with Mitigation)	Pumping of 3 to 4 mgd of groundwater could reduce Lake Merced water levels to approximately 10 feet lower than under the modeled existing conditions. Under cumulative conditions, Lake Merced water levels would likely be higher than under the modeled existing conditions for much of the simulation period. However, the estimated lake levels would be lower than levels under the Groundwater Storage and Recovery Project and the Vista Grande Drainage Basin Improvement Project. Decreased water levels could result in less Lake Merced water available for firefighting and sanitation purposes.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could reduce the amount of water in Lake Merced. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**Decreased** Under Alternative 2, redistribution of the groundwater pumping to all three Golden Gate Park wells and the West Sunset well, combined with a lower production rate (a total of 2.9 mgd compared to 4 mgd under the proposed project), would decrease groundwater-level declines in the vicinity of Lake Merced and associated declines in lake levels that would decrease the amount of water in the lake. Therefore, there would be less potential to decrease the amount of Lake Merced water available for firefighting and sanitation purposes.	**Decreased** There would be no additional groundwater pumping or associated decline in Lake Merced water levels that could decrease the amount of water in the lake. However, lake levels could decline in response to naturally occurring hydrologic conditions or ongoing existing groundwater pumping in the basin. There would be no contribution to any cumulative impacts.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be pumped using the same well stations as the proposed project. Therefore, the decline in lake levels would not change the identified impacts related to the amount of Lake Merced water available for emergency purposes.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
LONG-TERM IMPACTS (cont.)					
Energy and Mineral Resources					
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. (Less than Significant)	The proposed project would not use large amounts of energy or use the energy in a wasteful manner. The total amount of energy used by the project would constitute both a small portion of San Francisco's existing energy use and of the total energy produced by the Hetch Hetchy System; in addition, the design of the proposed facilities would comply with applicable energy efficiency measures specified by the SFPUC Power Enterprise's Energy Efficiency Group.	**No Impact** There would be no groundwater pumping or associated energy use for pumping, distribution, and treatment of the groundwater.	**Decreased** Production of 2.9 mgd of groundwater under this alternative instead of 4 mgd under the proposed project would require less energy for pumping, distribution, and treatment of the groundwater.	**Increased** Although the design of the small desalination plant would comply with applicable energy-efficiency measures specified by the SFPUC Power Enterprise's Energy Efficiency Group, operation of the desalination plant under this alternative would require substantial increases in energy consumption to desalinate the feed water.	**No Change** Under this alternative, 3 to 4 mgd of groundwater would be produced using the same well stations and treatment facilities as the proposed project. Therefore, there would be no change in energy use during operation.
SHORT-TERM IMPACTS					
Cultural Resources and Paleontological Resources					
Impact CP-2a: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5. (Less than Significant with Mitigation) **Impact CP-4:** The proposed project would potentially disturb human remains, including those interred outside of formal cemeteries. (Less than Significant with Mitigation)	Previously unrecorded and buried (or otherwise obscured) archeological deposits, archeological resources, and/or human remains could be encountered during construction of six well facilities and 28,860 feet of distribution pipelines.	**No Impact** Because there would be no construction under Alternative 1, there would be no potential to encounter previously unrecorded and buried (or otherwise obscured) archeological deposits, archeological resources, or human remains.	**Decreased** Only four well facilities would be constructed as compared to six under the proposed project. The length of distribution pipelines would be reduced from 28,860 feet to 24,400 feet. With less excavation and soil disturbance, there would be a decreased potential to encounter previously unrecorded and buried (or otherwise obscured) archeological deposits, archeological resources, or human remains.	**Increased** No well facilities would be constructed under this alternative. Rather, a desalination plant would be constructed at or near the Oceanside WPCP. The total length of distribution pipeline would be approximately 16,160 feet less than under the proposed project. However, the desalination plant and portions of the distribution pipeline would be constructed in a more sensitive area with respect to cultural resources compared to the proposed project, resulting in a greater potential to encounter previously unrecorded and buried (or otherwise obscured)	**Similar** Under Alternative 4, there would be no change in the total length of distribution pipelines, and the same number of well facilities would be constructed. Further, the alternate pipeline alignment would be located within a road and disturbed areas, similar to the proposed project, and would not be constructed in a more sensitive area. Therefore, the potential to encounter previously unrecorded and buried (or otherwise obscured) archeological deposits, archeological resources, or human remains would be similar to the proposed project.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
SHORT-TERM IMPACTS (cont.)					
Cultural Resources and Paleontological Resources (cont.)					
Impact CP-2a and Impact CP-4 (cont.)				archeological deposits, archeological resources, and human remains.	
Impact CP-2b: Construction of the proposed Lake Merced well facility would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5. (Less than Significant with Mitigation)	Ground-disturbing activities associated with the proposed Lake Merced well facility may adversely impact legally-significant prehistoric deposits.	**No Impact** Because there would be no construction under Alternative 1, there would be no potential to encounter legally-significant prehistoric deposits at the Lake Merced well facility location.	**No Impact** The Lake Merced well facility would not be constructed under this alternative; therefore, there would be no potential to encounter legally-significant prehistoric deposits at the Lake Merced well facility location.	**No Impact** The Lake Merced well facility would not be constructed under this alternative; therefore, there would be no potential to encounter legally-significant prehistoric deposits at the Lake Merced well facility location.	**No Change** Under Alternative 4, there would be no change related to construction of the Lake Merced well facility, therefore there would be the same potential to encounter legally-significant prehistoric deposits at the Lake Merced well facility location.
Traffic					
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. (Less than Significant)	The proposed project would not require the closure of any traffic lanes, with the exception of a staging area that would occupy part of a roadway right-of-way.	**No Impact** Because there would be no construction under Alternative 1, there would be no construction-related transportation and circulation effects.	**Decreased** Only four well facilities would be constructed as compared to six under the proposed project, and the length of distribution pipelines would be reduced from 26,860 feet to 22,400 feet. Therefore, the traffic delays and transportation effects would be even less intense than the already less-than-significant effects of the proposed project.	**Decreased** Only 12,700 feet of distribution pipeline would be constructed compared to 26,860 feet under the proposed project. Therefore, fewer traffic delays and transportation effects would occur compared to the less-than-significant effects that would occur under the project.	**Increased** Construction of Segments 2 and 4 of the distribution pipelines (8,800 feet of pipeline) along Sunset Boulevard could require closure of up to one lane of traffic for one block at a time, resulting in increased travel delays that would not occur under the proposed project.
Noise and Vibration					
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	Use of some construction equipment could result in noise levels greater than allowed under the San Francisco Noise Ordinance, which limits noise from any individual piece of construction equipment to 80 A-weighted decibels at 100 feet.	**No Impact** Because there would be no construction under Alternative 1, there would be no construction-related noise.	**Decreased** The same construction equipment would be used for this alternative as for the proposed project. However, only four well facilities would be constructed as compared to six under the	**Decreased** No well facilities would be constructed under this alternative. Rather, a desalination plant would be constructed at or near the Oceanside WPCP. The total length of distribution	**No Change** The same number of well facilities would be constructed under this alternative, resulting in the same noise impacts.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
SHORT-TERM IMPACTS (cont.)					
Noise and Vibration (cont.)					
periodic increase in ambient noise levels in the project vicinity above noise levels existing without the project. (Less than Significant with Mitigation)			proposed project. The length of distribution pipelines would also be reduced from 26,860 feet to 22,400 feet. With less construction, there would be a decrease in the use of equipment that could exceed the noise limits of the San Francisco Noise Ordinance.	pipeline would be approximately 14,160 feet less than under the proposed project. With less construction, there would be a decrease in the use of equipment that could exceed the noise limits of the San Francisco Noise Ordinance.	**Decreased** Although the same types of equipment would be used for similar construction durations, residential receptors along the relocated pipeline alignment would be farther from the construction activities and would not be subjected to noise levels in excess of the speech interference threshold.
Utilities and Service Systems					
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. (Less than Significant with Mitigation)	Accidental rupture of or damage to utility lines could occur during construction of six well facilities and 28,860 feet of distribution pipelines.	**No Impact** Because there would be no construction under Alternative 1, there would be no potential to accidentally rupture a utility line.	**Decreased** Only four well facilities would be constructed as compared to six under the proposed project. The length of distribution pipelines would be reduced from 26,860 feet to 22,400 feet. With less construction involving excavation, there would be less potential to accidentally rupture a utility line.	**Decreased** No well facilities would be constructed under this alternative. Rather, a desalination plant would be constructed at or near the Oceanside WPCP. The length of distribution pipelines constructed through developed neighborhoods would be approximately 4,950 feet less than under the proposed project. With less construction involving excavation in developed areas, there would be less potential to accidentally rupture a utility line.	**Increased** Under Alternative 4, there would be no change in the total length of distribution pipelines, and the same number of well facilities would be constructed. However, 8,800 feet of pipeline would be installed along Sunset Boulevard instead of 41st Avenue. Because Sunset Boulevard is a major thoroughfare, there are likely more underground utilities beneath the street, and the potential for rupture of a utility line during construction would be greater.
Impact UT-4: Project construction would potentially result in a substantial adverse effect related to the relocation of local utilities. (Less than Significant with Mitigation)	Utility relocation could potentially be required for installation of 28,860 feet of distribution pipelines.	**No Impact** Because there would be no construction under Alternative 1, it would not be necessary to relocate any utilities.	**Decreased** The length of distribution pipelines under this alternative would be reduced from 26,860 feet to 22,400 feet. With less excavation, there would be a decreased potential to encounter utilities that would require relocation.	**Decreased** No well facilities would be constructed under this alternative. Rather, a desalination plant would be constructed at or near the Oceanside WPCP. The length of distribution pipelines constructed through developed	**Increased** Under Alternative 4, there would be no change in the total length of distribution pipelines, and the same number of well facilities would be constructed. However, 8,800 feet of pipeline would be installed along Sunset Boulevard

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
SHORT-TERM IMPACTS (cont.)					
Utilities and Service Systems					
Impact UT-4 (cont.)				neighborhoods would be approximately 4,950 feet less than under the proposed project. With less excavation in developed areas, there would be a decreased potential to encounter utilities that would require relocation.	instead of 41st Avenue. Because Sunset Boulevard is a major thoroughfare, there are likely more underground utilities beneath the street, and potential need to relocate utilities during construction would be greater.
Biological Resources					
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. (Less than Significant with Mitigation)	Project construction could adversely affect western pond turtle at Lake Merced, and western pond turtle and California red-legged frog at the North Lake and Central Pump Station well facility sites. Direct mortality of special-status bats could occur through vegetation removal or building demolition at the well facilities and Sunset Reservoir. Vegetation clearing during construction, including tree removal, could destroy or affect overwintering sites for monarch butterflies at the Golden Gate Park project sites. These species would not be affected by construction of the distribution pipelines.	**No Impact** Because there would be no construction under Alternative 1, no special-status species would be adversely affected.	**Decreased** The Lake Merced well facility would not be constructed under this alternative. Therefore, the adverse effect on the western pond turtle and special-status bats would be reduced. The South Sunset well facility would not be constructed, reducing the adverse effect on special-status bats.	**Similar** The areas available for the desalination plant are located in potential habitat for western pond turtle, California-red legged frog, and special-status bats. Impacts on these resources would be similar to those of the proposed project. **Increased** The desalination plant and part of the distribution pipeline would be constructed near the zoo, and zoo animals could be subjected to construction noise and dust, which would not occur under the proposed project.	**No Change** The same number of well facilities would be constructed in the same locations as the proposed project. Therefore, there would be no change in effects on species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS. **Similar** Similar to the proposed project, the distribution pipelines would be installed within the street or grass median strip, and no special-status species would be adversely affected.
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. (Less than Significant with Mitigation)	Six trees would be removed, none of which are native to the San Francisco area.	**No Impact** Because there would be no construction under Alternative 1, no tree removal would be required.	**Decreased** The Lake Merced well facility would not be constructed under this alternative, resulting in removal of one less tree (a Monterey pine).	**Similar** The areas available for the desalination plant contain mature trees. Impacts on these resources would be similar to those of the proposed project.	**No Change** The same number of well facilities would be constructed in the same locations as the proposed project. Therefore, there would be no change in the need to remove trees.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
SHORT-TERM IMPACTS (cont.)					
Biological Resources (cont.)					
Impact BI-3 (cont.)					**Increased** If the distribution pipelines were installed within the footpath adjacent to Sunset Boulevard, removal of additional trees could be required.
Impact C-BI: The proposed project would 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. (Less than Significant with Mitigation)	Project construction has the potential to adversely affect special-status species, including California red-legged frog, western pond turtle, special-status bats, and monarch butterfly. In addition, the project could conflict with local policies or ordinances protecting biological resources by removing six trees that provide potential foraging opportunities, cover, and nesting and roosting habitat for birds and bats.	**No Impact** Because there would be no construction under Alternative 1, there would be no impact on special-status species and no tree removal would be required. There would be no contribution to any cumulative impacts.	**Decreased** The Lake Merced well facility would not be constructed under this alternative. Therefore, the adverse effect on the western pond turtle and special-status bats would be reduced. The South Sunset well facility would not be constructed, reducing the adverse effect on special-status bats.	**Similar** Construction under this alternative could adversely affect special-status species, including California red-legged frog, western pond turtle, special-status bats, monarch butterfly, and zoo animals. In addition, Alternative 3 could result in the removal of trees, thus conflicting with local policies or ordinances protecting biological resources.	**No Change** The same number of well facilities would be constructed in the same locations as the proposed project. Therefore, there would be no change in effects on species identified as a candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the CDFW or USFWS. In addition, there would be no change in the need to remove trees. **Similar** Similar to the proposed project, the distribution pipelines would be installed within the street or grass median strip, and no special-status species would be adversely affected. **Increased** If the distribution pipelines were installed within the footpath adjacent to Sunset Boulevard, removal of additional trees could be required.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
SHORT-TERM IMPACTS (cont.)					
Hydrology and Water Quality					
Impact HY-1: Project construction would possibly violate water quality standards and waste discharge requirements or otherwise substantially degrade water quality. (Less than Significant with Mitigation)	Groundwater produced during construction dewatering at the Lake Merced well facility could contain sediments. If the water were discharged to Lake Merced, these sediments could degrade water quality.	**No Impact** Because there would be no construction under Alternative 1, no groundwater dewatering would be required.	**Decreased** The Lake Merced well facility would not be constructed under this alternative; therefore, all groundwater produced during dewatering could be discharged to the combined sewer system instead of Lake Merced.	**Similar** Under Alternative 3, construction of the distribution pipeline could occur partially within the area served by the separate storm sewer system at Lake Merced. As with the proposed project, the groundwater produced during construction dewatering could contain sediments that could degrade water quality in Lake Merced if the water were discharged to the lake.	**No Change** Groundwater dewatering would be required at the Lake Merced well facility, the same as under the proposed project.
Hazards and Hazardous Materials					
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 in soil and groundwater. (Less than Significant with Mitigation)	Construction activities at the North Lake and Central Pump Station well facility sites could expose construction workers and/or the environment to known elevated lead levels in shallow soil.	**No Impact** Because there would be no construction under Alternative 1, there would be no potential to encounter lead or other hazardous materials in the soil.	**No Change** Both the North Lake and Central Pump Station well facilities would be constructed under this alternative; therefore, the potential to encounter elevated lead levels at these locations would be the same as under the proposed project.	**Decreased** Neither the North Lake nor Central Pump Station well facilities would be constructed under this alternative, and there is no documented contamination at the Oceanside WPCP. Therefore, there would be a decreased potential to encounter elevated lead levels at these locations. **Increased** If the desalination plant were constructed at the Fleishhacker Bath House site, there would be the potential to encounter hazardous materials in the soil. If the desalination plant were constructed at the National Guard Armory site, there would be the potential to encounter hazardous building materials if the existing	**No Change** Both the North Lake and Central Pump Station well facilities would be constructed under this alternative; therefore, the potential to encounter elevated lead levels at these locations would be the same as under the proposed project. **Similar** Land uses along Sunset Boulevard are similar to those along 41st Avenue; therefore, there would be a similar potential to encounter hazardous materials in the soil during construction of Segments 2 and 4.

TABLE 1-3 (Continued)
COMPARISON OF THE ENVIRONMENTAL IMPACTS OF THE CEQA ALTERNATIVES

Impact	Proposed Project	Alternative 1: No Project	Alternative 2: Reduced Yield	Alternative 3: Local Desalination Plant[a]	Alternative 4: Pipeline Location
SHORT-TERM IMPACTS (cont.)					
Hazards and Hazardous Materials					
Impact HZ-2 (cont.)				buildings required demolition or alteration. **Similar** The distribution pipeline would traverse neighborhoods similar to those that would be crossed under the proposed project. Therefore, the potential to encounter hazardous materials in the soil during pipeline construction would be similar.	

[a] Alternative 3, Desalination Plant, is described below under the heading Alternative 2: Local Desalination Plant. Under this alternative, the desalination plant could be sited at one of several undeveloped areas near the Oceanside WPCP site, such as near the former Fleishhacker Bath House, the San Francisco Zoo overflow parking lot, or in the vicinity of the National Guard Armory.

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CHAPTER 2
Introduction and Background

2.1 Introduction

The San Francisco Public Utilities Commission (SFPUC) is proposing the San Francisco Groundwater Supply Project (Groundwater Supply Project), which would provide an average of up to 4 million gallons per day (mgd) of groundwater to San Francisco's municipal water supply. The Groundwater Supply Project involves construction of up to six groundwater well facilities (each consisting of a well and pump station), 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. Five of the proposed groundwater well facilities would supply groundwater to the Sunset Reservoir where it would be blended with San Francisco's existing municipal water supply before distribution within the City. The sixth well would connect to the Lake Merced Pump Station supply. The project would be implemented in two phases: (1) the 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) following approval and construction of the SFPUC's proposed Westside Recycled Water Project, the conversion of the two existing irrigation well facilities to municipal water supply wells and operation of all project six wells to provide an annual average of up to 4 mgd of groundwater.

2.2 Background – Regional Water System and the Water System Improvement Program

2.2.1 Regional Water System Overview

The City and County of San Francisco (CCSF), through the SFPUC, owns and operates a regional water system that extends from the Sierra Nevada to San Francisco and provides drinking water to 2.4 million people in San Francisco, San Mateo, Santa Clara, Alameda, and Tuolumne Counties. The regional water system consists of water conveyance, storage, treatment, and distribution facilities, and delivers water to retail and wholesale customers. The existing system includes more than 280 miles of pipelines, more than 60 miles of tunnels, 11 reservoirs, five pump stations, and two water treatment plants. The SFPUC currently delivers an annual average of about 265 mgd of water to its customers. The water source is a combination of local supplies from streamflow and runoff in the Alameda Creek watershed and in the San Mateo Creek and Pilarcitos Creek watersheds (referred to together as the Peninsula watershed), and imported supplies from the Tuolumne River watershed. Local watersheds provide about 15 percent of total supplies, and the Tuolumne River watershed provides the remaining 85 percent. **Figure 2-1** illustrates the general location of the SFPUC regional water system, and **Figure 2-2** shows the location of the water supply watersheds.

Water from the upper Tuolumne River watershed that is captured in the Hetch Hetchy Reservoir can be delivered to SFPUC customers without filtration, provided it meets all federal[1] and State[2] “filtration avoidance” requirements. These requirements specify that the water provider must meet source water quality standards and disinfection criteria and conduct extensive routine water quality monitoring and watershed protection activities. The SFPUC maintains the filtration avoidance status for Hetch Hetchy water by proactively operating and maintaining facilities to prevent contamination of water supplies, and, when unfavorable changes in water quality do occur, by diverting the quality-impaired Hetch Hetchy water out of the regional water system to prevent the water from being delivered to customers (SFPUC, 2008). SFPUC water supplies from the Alameda Creek and Peninsula watersheds do not meet the filtration avoidance criteria and require filtration before delivery to customers.

The SFPUC serves about one-third of its water supplies directly to retail customers, primarily in San Francisco, and about two-thirds of its water supplies to wholesale customers by contractual agreement. The wholesale customers are represented by the Bay Area Water Supply and Conservation Agency (BAWSCA), which consists of 26 member agencies, as shown on **Figure 2-3**.[3] Some of these wholesale customers have access to other sources of water in addition to the supplies they receive from the SFPUC regional water system, and others rely completely on the SFPUC for water.

2.2.2 SFPUC Water System Improvement Program

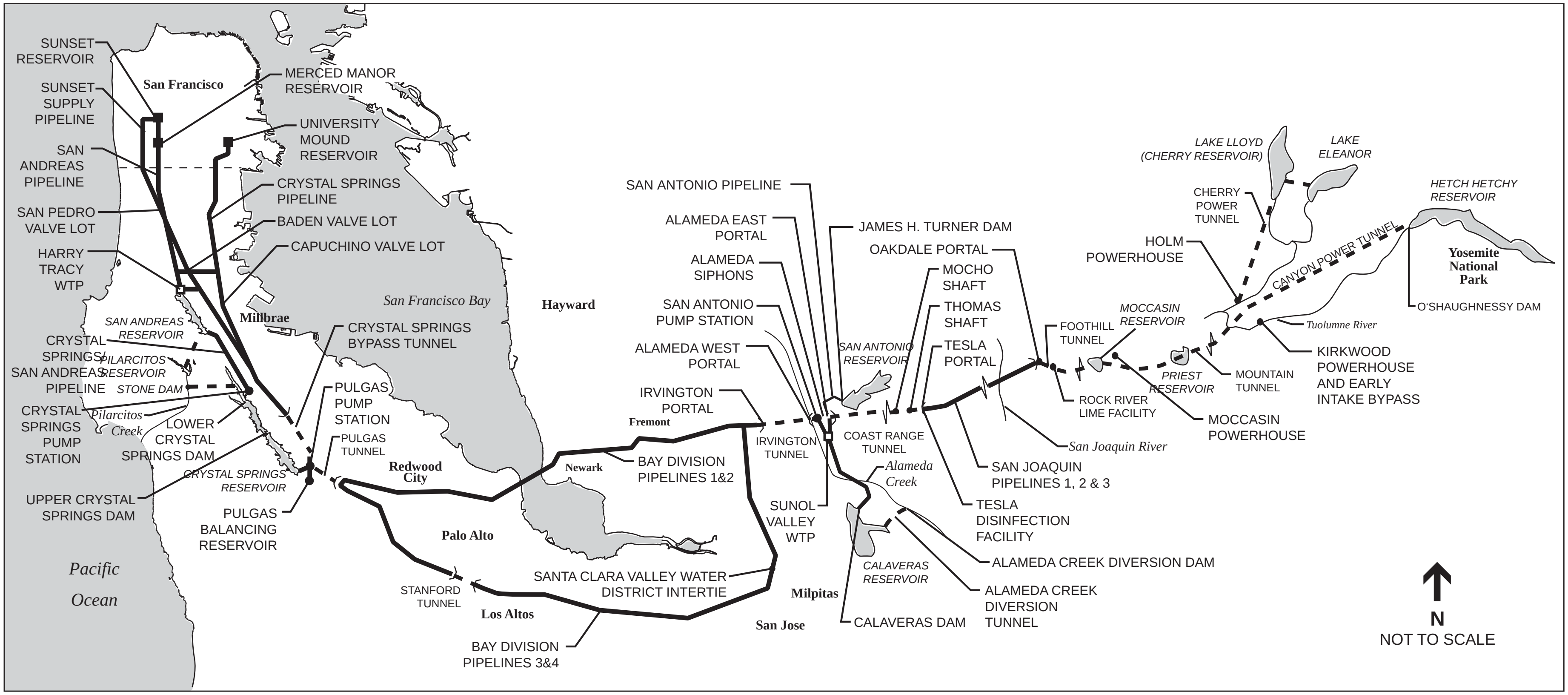
On October 30, 2008, the SFPUC adopted the Water System Improvement Program (WSIP) (also known as the “Phased WSIP Variant”) and the WSIP goals and objectives (SFPUC Resolution 08-200 [SFPUC, 2008]). The adopted WSIP will improve the regional water system reliability with respect to water quality, seismic response, and water delivery, based on a planning horizon through the year 2030. The WSIP will also improve the regional system with respect to water supply, to meet water delivery needs in the service area through the year 2018. The program area spans seven counties: Tuolumne, Stanislaus, San Joaquin, Alameda, Santa Clara, San Mateo, and San Francisco.

The WSIP includes a water supply strategy, modifications to system operations, and construction of a series of facility infrastructure improvement projects. The overall goals of the WSIP are 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

1 In 1991, the U.S. Environmental Protection Agency (USEPA) adopted the Surface Water Treatment Rule, which includes water quality provisions for unfiltered water systems. In 1993, the USEPA approved Hetch Hetchy water supplies as an unfiltered source that meets all filtration avoidance criteria contained in the federal statute.

2 In 1998, the state added filtration avoidance provisions to Title 22 of the California Code of Regulations, under which the California Department of Public Health currently regulates the Hetch Hetchy system.

3 The Cordilleras Mutual Water Association is also a wholesale customer receiving water from the SFPUC, but it is not a BAWSCA member and is not shown in Figure 2-3. It is a small water association serving 18 single-family homes in San Mateo County.



Pipeline

Tunnel

Water Treatment Plant (WTP)

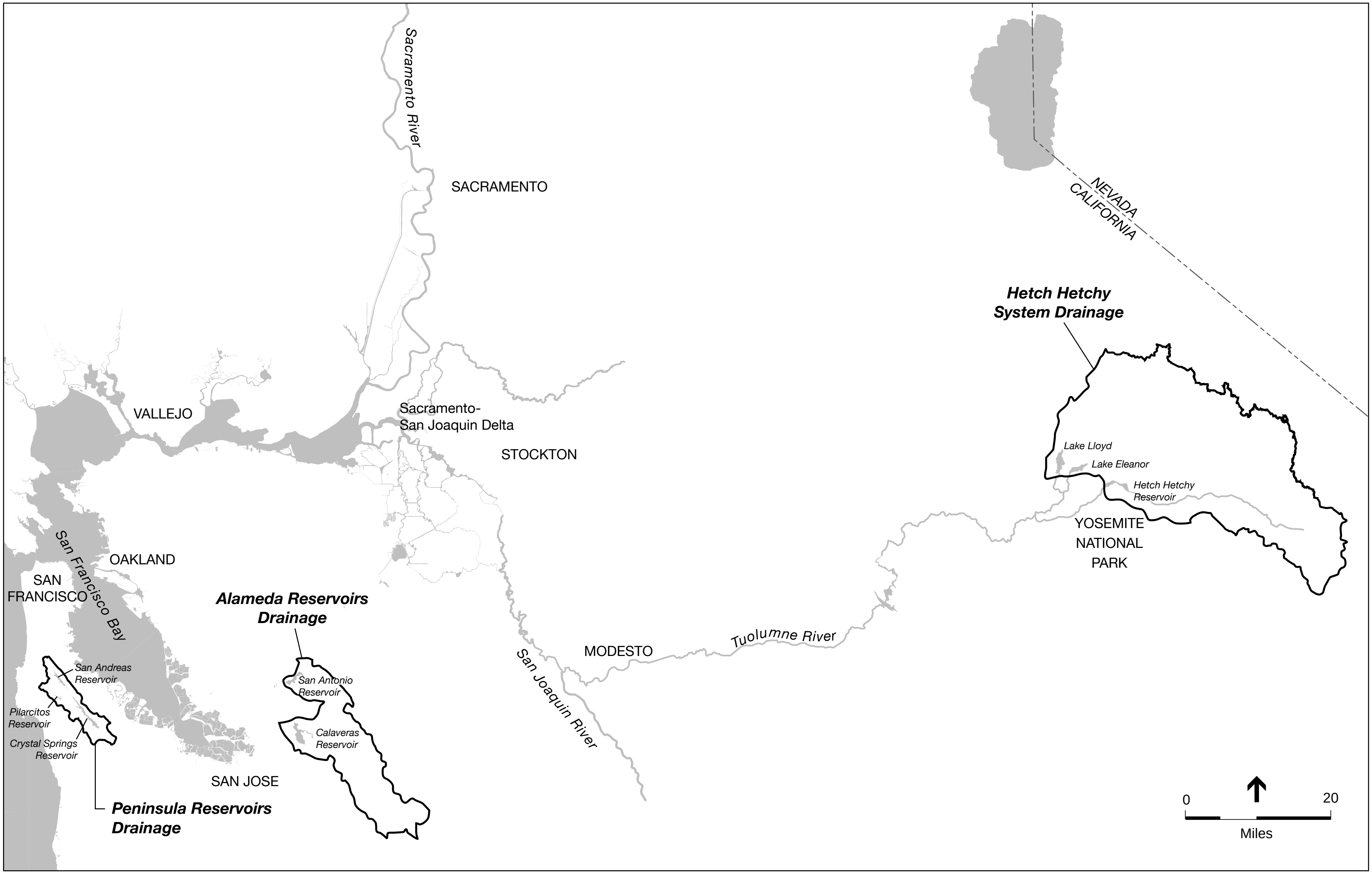
Other Facilities

Segments of the system not shown

SOURCE: ESA+Orion, 2009

San Francisco Groundwater Supply Project EIR

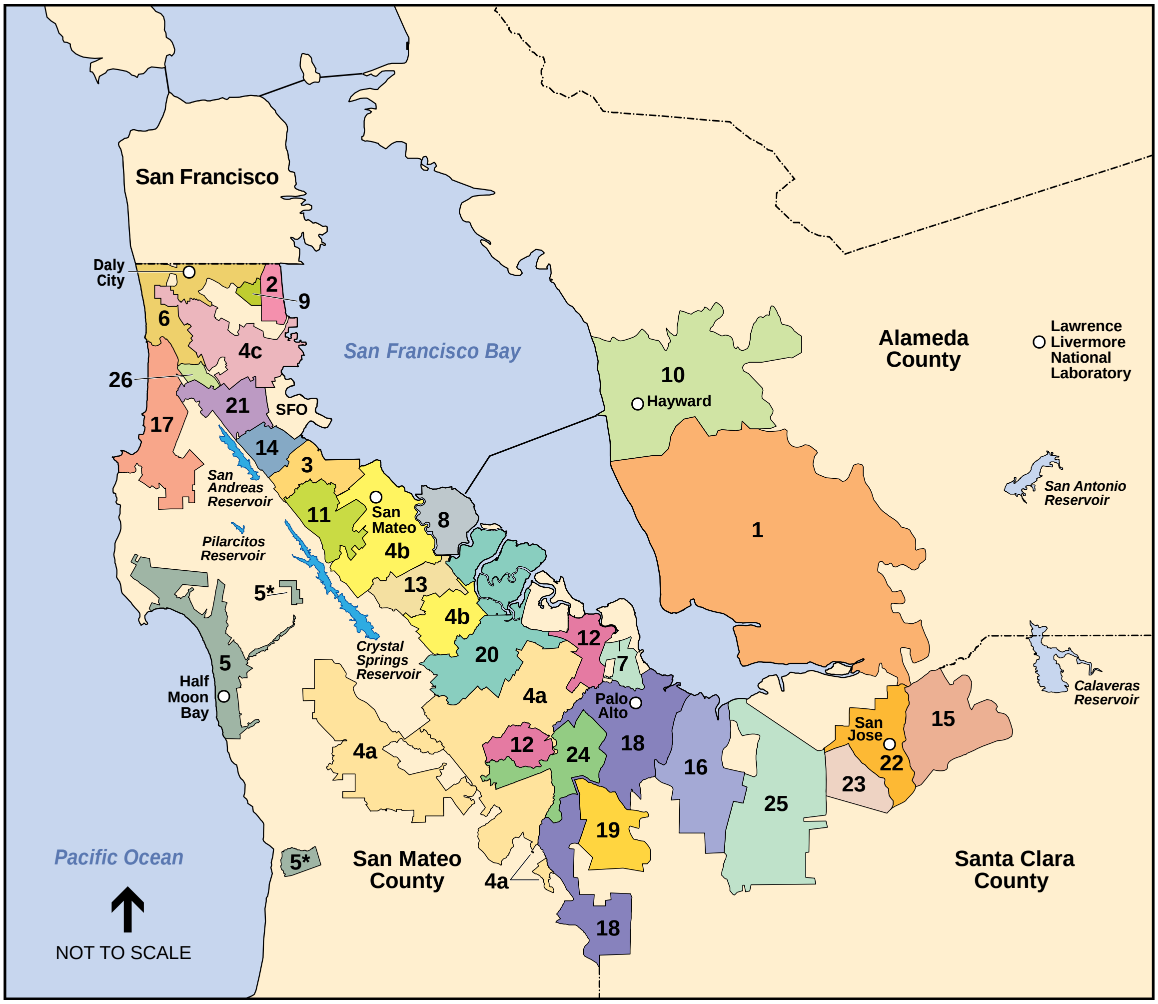
Figure 2-1
SFPUC Regional Water System



SOURCE: San Francisco Planning Department, 2008

San Francisco Groundwater Supply Project EIR

Figure 2-2
SFPUC Water Supply Watersheds



Legend

(Wholesale customers and members of Bay Area Water Supply and Conservation Agency)

1 Alameda County Water District
2 City of Brisbane
3 City of Burlingame
4a CWS – Bear Gulch
4b CWS – Mid-Peninsula
4c CWS – South San Francisco
5 Coastside County Water District
6 City of Daly City
7 City of East Palo Alto
8 Estero Municipal Improvement District
9 Guadalupe Valley Municipal Improvement District
10 City of Hayward
11 Town of Hillsborough
12 City of Menlo Park
13 Mid-Peninsula Water District
14 City of Millbrae
15 City of Milpitas
16 City of Mountain View
17 North Coast County Water District
18 City of Palo Alto
19 Purissima Hills Water District
20 City of Redwood City
21 City of San Bruno
22 City of San Jose (North)
23 City of Santa Clara
24 Stanford University
25 City of Sunnyvale
26 Westborough Water District

***** Portions of Coastside County Water District not served by the SFPUC regional water system.

NOTE: For the purposes of this EIR, the California Water Service (CWS) Company is a single wholesale customer with three different water service districts.

SOURCE: BAWSCA, 2010

Figure 2-3
SFPUC Water Service Area –
San Francisco and SFPUC Wholesale Customers

(see **Table 2-1**). To further these program goals, the WSIP includes objectives that address system performance in the areas of water quality, seismic reliability, delivery reliability, and water supply.

TABLE 2-1
WSIP GOALS AND OBJECTIVES

Program Goal	System Performance Objective
Water Quality – *maintain high-quality water*	• Design improvements to meet current and foreseeable future federal and State water quality requirements. • Provide clean, unfiltered water originating from Hetch Hetchy Reservoir and filtered water from local watersheds. • Continue to implement watershed protection measures.
Seismic Reliability – *reduce vulnerability to earthquakes*	• Design improvements to meet current seismic standards. • Deliver basic service to the three regions in the service area (East/South Bay, Peninsula, and San Francisco) within 24 hours after a major earthquake. Basic service is defined as average winter-month usage, and the performance objective for the regional system is 229 million gallon per day (mgd). The performance objective is to provide delivery to at least 70 percent of the turnouts (i.e., water diversion connecting points from the regional system to customers) in each region, with 104, 44, and 81 mgd delivered to the East/South Bay, Peninsula, and San Francisco regions, respectively. • Restore facilities to meet average-day demand of up to 300 mgd within 30 days after a major earthquake.
Delivery Reliability – *increase delivery reliability and improve the ability to maintain the system*	• Provide operational flexibility to allow for planned maintenance shutdown of individual facilities without interrupting customer service. • Provide operational flexibility to minimize the risk of service interruption from unplanned facility upsets or outages. • Provide operational flexibility and system capacity to replenish local reservoirs as needed. • Meet estimated average annual demand of up to 300 mgd under the conditions of one planned shutdown of a major facility for maintenance concurrent with one unplanned facility outage resulting from a natural disaster, emergency, or facility failure/upset.
Water Supply – *meet customer water needs in nondrought and drought periods*	• Meet average annual water demand of 265 mgd from the SFPUC watersheds for retail and wholesale customers during nondrought years for system demands through 2018. • Meet dry-year delivery needs through 2018 while limiting rationing to a maximum 20 percent systemwide reduction in water service during extended droughts. • Diversify water supply options during nondrought and drought periods. • Improve use of new water sources and drought management, including groundwater, recycled water, conservation, and transfers.
Sustainability – *enhance sustainability in all system activities*	• Manage natural resources and physical systems to protect watershed ecosystems. • Meet, at a minimum, all current and anticipated legal requirements for the protection of fish and wildlife habitat. • Manage natural resources and physical systems to protect public health and safety.
Cost effectiveness – *achieve a cost-effective, fully operational system*	• Ensure the cost-effective use of funds. • Maintain a gravity-driven system. • Implement a regular inspection and maintenance program for all facilities.

SOURCE: SFPUC Resolution No. 08-0200

The San Francisco Planning Department prepared a Program Environmental Impact Report (PEIR) to address the potential environmental impacts of the WSIP. The San Francisco Planning Commission certified the WSIP PEIR on October 30, 2008 (San Francisco Planning Department, 2008; San Francisco Planning Commission Motion No. 17734; State Clearinghouse Number 2005092026). The SFPUC approved the WSIP and made findings pursuant to the California Environmental Quality Act (CEQA), including preparation of a statement of overriding considerations and adoption of a mitigation monitoring and reporting program, for the WSIP. The WSIP PEIR is described in Section 5.1.3, Relationship to the WSIP PEIR.

Under the adopted WSIP, the SFPUC committed to implementing conservation, water recycling, and groundwater supply programs in the SFPUC retail service area to achieve the equivalent of 10 mgd of supply every year, including nondrought and drought periods. The proposed San Francisco Groundwater Supply Project is one of several water supply projects that would help the SFPUC meet this water supply goal. The following sections describe other SFPUC WSIP and Daly City projects that would directly or indirectly address this water supply goal.

2.2.3 Other Related Projects

Westside Recycled Water Project

The Westside Recycled Water Project is a WSIP facility improvement project proposed by the SFPUC. This project would reduce the CCSF’s reliance on potable water for nonpotable uses such as irrigation through the production and distribution of highly treated recycled water.[4] The Westside Recycled Water Project would meet the current demands of several SFPUC customers with substantial irrigation demands, including Golden Gate Park, Lincoln Park/Lincoln Park Golf Course (Lincoln Park), and the Presidio Golf Course.

While the Westside Recycled Water Project would replace potable groundwater currently pumped for irrigation and other non-potable water uses in Golden Gate Park, the San Francisco Groundwater Supply Project would serve as a backup irrigation supply for the park. The Westside Recycled Water Project, along with the San Francisco Groundwater Supply Project and the regional Groundwater Storage and Recovery Project (discussed below), were developed as part of the overall program to achieve the SFPUC's goal to provide reliable and high quality drinking water to 800,000 retail customers in San Francisco and 27 wholesale customers during nondrought and drought periods. The groundwater projects and recycled water project support the goal of the SFPUC to diversify water supply and also are responsive to the provisions of Section 3.19 of the City's Park Code directing the San Francisco Recreation and Park Department to work with the SFPUC “to maximize water use efficiency and non-potable water use on all property under the jurisdiction of the Recreation and Park Commission.”

4 The San Francisco Westside Recycled Water Project (San Francisco Planning Department Case No. 2008.0091E) is currently undergoing environmental review. On September 8, 2010, the San Francisco Planning Department published a Notice of Preparation that an environmental impact report would be prepared for this project (http://www.sf-planning.org/ftp/files/MEA/2008.0091E_Westside_Water_NOP.pdf).

Groundwater Storage and Recovery Project

The Groundwater Storage and Recovery (GSR) Project is a WSIP facility improvement project proposed by the SFPUC.[5] The project would increase water supply reliability during dry years or in emergencies, by increasing water storage in the southern portion of the Westside Groundwater Basin (referred to as the "South Westside Groundwater Basin")[6] during wet and normal years for subsequent recapture during dry years. The proposed GSR Project is located in San Mateo County and is sponsored by the SFPUC in coordination with its partner agencies, which include the cities of Daly City and San Bruno, and the California Water Service Company (Cal Water) in its South San Francisco service area (collectively referred to as Partner Agencies).

The SFPUC currently supplies surface water to the Partner Agencies from its regional water system. The Partner Agencies supply potable water to their retail customers through a combination of groundwater from the South Westside Groundwater Basin and purchase of SFPUC surface water. The proposed GSR Project would provide supplemental SFPUC surface water to the Partner Agencies during normal and wet years. During these years, the Partner Agencies would reduce their groundwater pumping by a comparable amount to increase the amount of groundwater in storage through natural (in-lieu) recharge. During normal and wet years, the volume of groundwater in the South Westside Groundwater Basin would increase due to natural recharge and reduced groundwater pumping by the Partner Agencies. During dry years, the Partner Agencies and the SFPUC would pump the stored groundwater using 16 new well facilities, as needed to supplement other supplies. This new dry-year water supply would be blended with water from the SFPUC regional water system, and made available to the Partner Agencies, certain SFPUC retail customers and other wholesale water customers, overlying the South Westside Groundwater Basin, thereby increasing the available water supply to all regional water system customers.

Vista Grande Drainage Basin Improvement Project

The WSIP includes the Lake Merced project, which is aimed at raising the level of Lake Merced in San Francisco using a supplemental source of water, such as treated stormwater, recycled water, groundwater, or SFPUC system water. However, that project is not proceeding at this time, in light of Daly City's proposed Vista Grande Drainage Basin Improvement Project. Daly City is in the initial stages of engineering design and environmental compliance for the Vista Grande Drainage Basin Improvement Project.[7] The South Lake Merced Alternative, which is currently identified as the

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5 The Groundwater Storage and Recovery Project (San Francisco Planning Department Case No. 2008.1396E) is currently undergoing environmental review. On June 24, 2009, the San Francisco Planning Department published a Notice of Preparation that an environmental impact report would be prepared for this project (http://www.sf-planning.org/Modules/ShowDocument.aspx?documentid=398).

6 The State Water Resources Control Board identifies the basin as the Westside Groundwater Basin; however, for the purpose of this EIR, the portion of the groundwater basin within San Francisco is called the North Westside Groundwater Basin, and the portion within San Mateo County is called the South Westside Groundwater Basin.

7 The Vista Grande Project is currently environmental review. On February 28, 2013 the City of Daly City and the National Park Service published a Notice of Preparation/Notice of Intent that an environmental impact report/environmental impact statement would be prepared for this project (http://www.dalycity.org/City_Hall/Departments/public_works/Reports_1119/vistagrande_alts.htm).

proposed Vista Grande Drainage Basin Improvement Project, would divert some stormwater (and authorized non-storm water) flows from the Vista Grande Canal to South Lake Merced, which would also help to fulfill the goals of the WSIP Lake Merced project.

2.3 Purpose of this EIR

Under the San Francisco Administrative Code, Chapter 31, the San Francisco Planning Department, through its Environmental Planning section (EP), is the lead agency responsible for implementing CEQA requirements for all projects sponsored by or within the CCSF, including those sponsored by the SFPUC. EP determined that preparation of this EIR for the Groundwater Supply Project, for which the SFPUC is the project sponsor, is required for the project to comply with CEQA. CEQA requires the preparation of an EIR when a proposed project could significantly affect the physical environment.

EP has prepared this EIR to provide the public and responsible and trustee agencies reviewing the Groundwater Supply Project with information about the project's potential effects on the environment. This EIR describes the potential environmental impacts resulting from implementation of the Groundwater Supply Project, identifies mitigation measures for reducing impacts to a less-than-significant level where feasible, and evaluates alternatives to the proposed project.

2.4 Public Outreach

In accordance with Sections 15063 and 15082 of the CEQA Guidelines, the San Francisco Planning Department, as lead agency, sent a Notice of Preparation (NOP) to interested entities and individuals to begin the formal CEQA scoping process for the Groundwater Supply Project on December 30, 2009 date. The NOP mailing list included approximately 3,700 contacts for local, State, and federal agencies, as well as regional and local interest groups, and property owners and tenants within 300 feet of the proposed project areas (see **Appendix A-1**). The initial scoping period began on December 30, 2009 and ended on January 30, 2010. Pursuant to CEQA Guidelines Section 15083, the San Francisco Planning Department held a public scoping meeting on January 20, 2010 at Golden Gate Senior Center in San Francisco, California. The notices was placed in the legal classified section of the *San Francisco Chronicle* (San Francisco, CA) informing the general public of the scoping meeting, the purpose of which was to present the project to the public and to receive public input regarding the appropriate scope of the EIR analysis. Attendees were provided with an opportunity to make comments or express concerns about potential effects of the project that they felt should be analyzed in the EIR. Approximately 30 people attended the meeting, six of whom provided verbal comments on the scope of the EIR. Additionally, 13 organizations and individuals submitted written comments in response to the NOP (see Appendix A-1).

Subsequent to issuance of the NOP in 2009, the SFPUC made the following changes to the proposed project:

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

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

Consequently, a revised NOP was published on March 2, 2011 to identify those changes for interested parties, and to describe the proposed facilities and potential environmental effects of the revised project (see **Appendix A-2**). The second scoping period began on March 2, 2011 and ended on April 1, 2011. The revised NOP was distributed to the recipients of the initial NOP, as well as additional to recipients in the vicinity of the revised pipeline alignment; was posted on the San Francisco Planning Department website; and was placed in the legal classified section of the *San Francisco Chronicle* (San Francisco, CA). No public scoping meeting was held for the revised NOP. Seven organizations and individuals submitted written comments in response to the revised NOP (see Appendix A-2).

All comments received during both scoping periods have been considered in the preparation of this EIR to the extent they remain relevant to the project, as revised.

2.4.1 Notice of Preparation

Both the initial and revised NOPs included descriptions of proposed project construction and operation activities, maps of the project area and facilities, a discussion of required permits and approvals, as well as preliminary discussions of the potential environmental impacts of the project. Resource areas initially identified as potentially being impacted by the proposed project included land use, aesthetics, transportation and circulation, air quality, recreation, biological resources, and hydrology and water quality. The revised NOP (2011) also included a description of project changes following the 2009 NOP release.

2.4.2 Public and Agency Comments on the NOP

The scoping process provided an opportunity for governmental agencies and the public to comment on the issues covered in, and by the scope of, the EIR. The Planning Department prepared draft scoping reports to summarize the public scoping process and the comments received in response to both the initial NOP and the revised NOP. The primary environmental concerns raised during the scoping periods are summarized in **Table 2-2**, which also references the EIR sections where the comments are considered.

TABLE 2-2
SUMMARY OF SCOPING COMMENTS

Commenter	Summary of Comment	Considered in the EIR
San Francisco Recreation and Park Department (April 1, 2011)	Impacts on Golden Gate Park and other parks should be addressed and mitigated as necessary; pipeline routes should avoid impacts on Golden Gate Park resources	Chapter 5, Environmental Setting and Impacts
Golden Gate Park Preservation Alliance (March 31, 2011)	Describe impacts on parklands and residential/ commercial neighborhoods, including traffic, biological resources, aesthetics, and energy for all project phases, including future expansion	Chapter 5, Environmental Setting and Impacts
	Describe impacts associated with groundwater withdrawal	Section 5.16, Hydrology and Water Quality
	Address cumulative impacts	Chapter 5, Environmental Setting and Impacts (Cumulative Impacts throughout chapter)
	Address alternative design for Golden Gate Park and West Sunset Playground sites	Chapter 3, Project Description
	Address applicable San Francisco plans and policies	Chapter 4, Plans and Policies
	Consider alternative water sources	Chapter 7, Alternatives
	Consider alternatives to Golden Gate Park sites	Chapter 7, Alternatives
	Describe the expected pumping for each well facility during all project phases	Chapter 3, Project Description
Golden Gate Audubon Society (January 10, 2010)	Discuss surface water impacts	Section 5.16, Hydrology and Water Quality
	Discuss ongoing need for groundwater recharge	Section 5.16, Hydrology and Water Quality
	Consider environmental impacts of San Francisco Recreation and Park Department projects	Chapter 5, Environmental Setting and Impacts (Cumulative Impacts throughout chapter)
Sierra Club San Francisco Group (January 8, 2010)	Clarify the purpose of the project	Chapter 3, Project Description
	Address saltwater intrusion and impacts on Lake Merced	Section 5.16, Hydrology and Water Quality
	Discuss ongoing need for groundwater recharge	Section 5.16, Hydrology and Water Quality
	Discuss greenhouse gas emissions associated with project operations	Section 5.9, Greenhouse Gas Emissions
Sierra Club (December 29, 2009)	Discuss impacts of groundwater pumping on Lake Merced	Section 5.11, Recreation, Section 5.14, Biological Resources; Section 5.16, Hydrology and Water Quality
Andrew Chan (Public Scoping Meeting, January 20, 2010)	Identify project schedule information	Chapter 3, Project Description
	Identify impacts on residential areas from pipeline construction/siting	Chapter 5, Environmental Setting and Impacts
	Consider a pipeline route within Great Highway	Chapter 7, Alternatives

TABLE 2-2 (Continued)
SUMMARY OF SCOPING COMMENTS

Commenter	Summary of Comment	Considered in the EIR
Joan Giradot (Public Scoping Meeting, January 20, 2010)	Identify alternatives to the project	Chapter 7, Alternatives
	Describe existing pumping and whether there is sufficient groundwater available to include the project pumping	Section 5.16, Hydrology and Water Quality
	Describe noise impacts and mitigation measures	Section 5.7, Noise
Dale Gutierrez (March 9, 2011)	Address water quality concerns related to adding groundwater to the drinking water supply	Chapter 3, Project Description; Section 5.16, Hydrology and Water Quality
	Describe cumulative groundwater quality impacts associated with projects in the South Windmilll Replacement well facility site location	Section 5.16, Hydrology and Water Quality
Dale Gutierrez (March 31, 2011)	Address water quality concerns related to adding groundwater to the drinking water supply	Chapter 3, Project Description; Section 5.16, Hydrology and Water Quality
	Describe cumulative groundwater quality impacts associated with projects in the South Windmilll Replacement well facility site location	Section 5.16, Hydrology and Water Quality
Dennis Huey (January 29, 2010)	Discuss soil stability along pipeline routes and associated impacts on adjacent structures	Section 5.15, Geology and Soils; Chapter 7, Alternatives
	Discuss potential for pipe rupture or failure in the event of an earthquake	Section 5.15, Geology and Soils
Nicole Iroz-Elardo (Public Scoping Meeting, January 20, 2010)	Describe overall management of the Westside Groundwater Basin	Section 5.16, Hydrology and Water Quality
	Consider including pervious surfaces over pipeline routes to increase recharge	Comment referred to SFPUC for consideration, but the SFPUC chose not to include this suggestion in its project proposal. See Chapter 3, Project Description.
Eileen Kho (January 12, 2010)	Discuss soil stability along pipeline routes and associated impacts on adjacent structures	Section 5.15, Geology and Soils
	Discuss potential for pipe rupture or failure in the event of an earthquake	Section 5.15, Geology and Soils
	Expresses a preference that the pipeline route be removed from 40th Avenue	Chapter 3, Project Description; Chapter 7, Alternatives
Michael Laughlin (January 6, 2010)	Requests information about the availability of the EIR and related studies	Notice of Availability; Chapter 2, Introduction and Background
	Discuss subsidence and seawater intrusion impacts	Section 5.16, Hydrology and Water Quality
	Discuss ongoing need for groundwater recharge	Section 5.16, Hydrology and Water Quality
	Discuss construction impacts of pipeline construction, including settlement impacts	Chapter 5, Environmental Setting and Impacts; Section 5.15, Geology and Soils
	Identify project schedule and project location	Chapter 3, Project Description
Joyce Law (Public Scoping Meeting, January 20, 2010)	Describe whether project pipelines could leak and affect adjacent properties	Section 5.15, Geology and Soils

TABLE 2-2 (Continued)
SUMMARY OF SCOPING COMMENTS

Commenter	Summary of Comment	Considered in the EIR
Steve Lawrence (December 30, 2009)	Describe Lake Merced functions	Section 5.16, Hydrology and Water Quality
	Describe project well relationship to Lake Merced and Lake Merced Pump Station, proposed water service areas, timing of pumping, portion of groundwater to be blended to regional water supply, and disinfection/ treatment needs	Chapter 3, Project Description
	Discuss potential land subsidence impacts	Section 5.16, Hydrology and Water Quality
Steve Lawrence (January 11, 2010)	Describe timing of pumping, portion of groundwater to be blended with regional water supply, disinfection/treatment needs, and land-management agreement with San Francisco Recreation and Park Department	Chapter 3, Project Description
	Requests information regarding public scoping meeting transcripts	Chapter 2, Introduction and Background
Steve Lawrence (Public Scoping Meeting, January 20, 2010)	Indicate the amount of groundwater that would be blended with surface water supplies	Chapter 3, Project Description
	Discuss water quality, seawater intrusion, and other impacts associated with groundwater withdrawal (including cumulative impacts)	Section 5.16, Hydrology and Water Quality
	Describe land-management agreement with San Francisco Recreation and Park Department	Chapter 3, Project Description
Steve Lawrence (January 21, 2010)	Describe portion of groundwater to be blended with regional water supply, disinfection/treatment needs, and potential for contamination of drinking water from recycled water use in groundwater basin	Chapter 3, Project Description; Section 5.16, Hydrology and Water Quality
Steve Lawrence (January 25, 2010)	Discuss groundwater impacts of recycled water use and of cumulative recycled water and artificial turf projects	Section 5.16, Hydrology and Water Quality
Steve Lawrence (January 29, 2010)	Discuss impacts of groundwater pumping on Lake Merced water levels	Section 5.16, Hydrology and Water Quality
Steve Lawrence (March 3, 2011)	Discuss groundwater depletion, water quality, seawater intrusion, and other impacts associated with groundwater withdrawal	Section 5.16, Hydrology and Water Quality
Maureen Maggiolo (January 20, 2010)	Discuss traffic and soil stability impacts related to pipeline locations	Section 5.6, Transportation and Circulation; Section 5.15, Geology and Soils
	Discuss construction-related vibration impacts	Section 5.7, Noise
Dick Morten (January 18, 2010)	Discuss use of the hydrological model developed by Daly City	Section 5.16, Hydrology and Water Quality
	Discuss seawater intrusion impacts	Section 5.16, Hydrology and Water Quality
	Discuss use of the project for emergency use and potable drinking water, including coordination with the auxiliary water supply system	Chapter 3, Project Description

TABLE 2-2 (Continued)
SUMMARY OF SCOPING COMMENTS

Commenter	Summary of Comment	Considered in the EIR
Dan Murphy (Golden Gate Audubon Society) (Public Scoping Meeting, January 20, 2010)	Ensure any impact to surface water bodies is mitigated	Section 5.14, Biological Resources; Section 5.16, Hydrology and Water Quality
	Address ongoing need for aquifer recharge	Section 5.16, Hydrology and Water Quality
Jim Spahr (January 20, 2010)	Describe impacts on adjacent land uses	Chapter 5, Environmental Setting and Impacts
William Wanner (January 27, 2010)	Discuss potential subsidence impacts associated with pipeline locations	Section 5.15, Geology and Soils; Chapter 7, Alternatives
	Describe impacts on adjacent land uses	Chapter 5, Environmental Setting and Impacts
Nancy Wuerfel (April 1, 2011)	Address Section 4.113 of the city charter	Section 3.6, Required Permits and Approvals
	Indicate whether park irrigation can be converted back to groundwater use following implementation of project Phase 2	Chapter 2.0, Project Description
	Describe operational noise impacts	Section 5.7, Noise
	Address potential to connect well facilities to existing pipelines rather than constructing new pipelines	Chapter 7.0, Alternatives
	Describe water quality impacts associated with addition of groundwater to municipal water supply	Chapter 3, Project Description; Section 5.16, Hydrology and Water Quality
	Describe alternative well facility locations	Chapter 7.0, Alternatives
	Describe alternative water supplies	Chapter 2.0, Introduction and Background; Chapter 7.0, Alternatives
	Describe population and growth impacts	Section 5.4, Population and Housing; Section 6.1, Growth-inducing Impacts
Chunyao Xia (January 15, 2010)	Discuss construction-related effects on adjacent structures	Section 5.7, Noise; Section 5.15, Geology and Soils
LC Yim (January 25, 2010)	Discuss potential impacts of pipeline rupture or failure	Section 5.15, Geology and Soils
	Discuss construction impacts on adjacent land uses	Chapter 5, Environmental Setting and Impacts
	Expresses preference for an alternative to the West Sunset well facility and the pipeline alignment on 40th Avenue	Chapter 3, Project Description; Chapter 7, Alternatives

2.5 Organization of the EIR

This EIR is organized into eight chapters, as discussed below:

- **Chapter 1, Executive Summary.** This chapter summarizes the proposed project, identifies potentially significant environmental impacts and mitigation measures, and describes the alternatives considered in this EIR. It also identifies areas of controversy and issues to be resolved.
- **Chapter 2, Introduction and Background.** This chapter provides project background information and describes the purpose and organization of the EIR, as well as the environmental review process.
- **Chapter 3, Project Description.** This chapter describes the proposed project (including project objectives), summarizes project components, and provides information about project construction. The chapter also lists required permits and approvals.
- **Chapter 4, Plans and Policies.** This chapter describes applicable land use plans and policies and their relevance to the project and then discusses the project's consistency with those plans.
- **Chapter 5, Environmental Setting and Impacts.** This chapter is subdivided into sections for each environmental resource topic. Each section describes the environmental and regulatory setting, the criteria used to determine impact significance, and the approach to the analysis for that resource topic. It then analyzes potential environmental impacts and the project-specific mitigation measures that have been developed to address significant and potentially significant impacts. Each section also includes an evaluation of cumulative impacts with respect to that resource topic.
- **Chapter 6, Other CEQA Issues.** This chapter discusses growth-inducing effects, summarizes the cumulative impacts, identifies the significant environmental effects that cannot be avoided if the proposed project is implemented, and describes the significant irreversible impacts, as well as known areas of controversy.
- **Chapter 7, Alternatives.** This chapter describes the alternatives to the proposed project and compares their impacts to those of the proposed project. This chapter also summarizes the alternatives that were considered but eliminated from further analysis.
- **Chapter 8, EIR Authors and Consultants.** This chapter lists the authors of this EIR.
- **Chapter 9, Response to Comments.** This chapter includes responses to comments received on the Draft EIR and a summary of project description changes since the Draft EIR.

2.6 Public Participation

The CEQA Guidelines and Chapter 31 of the San Francisco Administrative Code encourage public participation in the planning and environmental review processes. CCSF provided opportunities for the public to present comments and concerns regarding the CEQA processes. These opportunities occurred during a public review and comment period and a public hearing before the San Francisco Planning Commission. The Draft EIR was available for public review and comment on the Planning Department's SFPUC Negative Declarations and EIRs web page (http://tinyurl.com/puccases). CDs and paper copies were also available at the Planning Information Center (PIC) counter on the first floor of 1660 Mission Street, San Francisco.[8] Referenced materials are available for review by appointment at the Planning Department's office on the fourth floor of 1650 Mission Street (call 415-575-9035 or e-mail timothy.johnston@sfgov.org).

Written public comments were submitted to the Planning Department to the attention of Sarah Jones, Acting Environmental Review Officer, at 1650 Mission Street, Suite 400, San Francisco, CA 94103, during the specified public review and comment period (indicated on the cover of this EIR), and written and oral comments were presented at a public hearing concerning the project (also indicated on the cover of this EIR).

2.7 References

San Francisco Planning Department, *Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program*, San Francisco Planning Department File No. 2005.0159E, State Clearinghouse Number 2005092026, October 2008.

San Francisco Planning Department, *Groundwater Storage and Recovery Project Notice of Preparation*, San Francisco Planning Department File No. 2008.1396E, State Clearinghouse Number 2005092026, June 2009.

San Francisco Public Utilities Commission (SFPUC), SFPUC Resolution 08-200, 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.

[8] Paper copies were also available for review at the San Francisco Main Library and Ortega, Anza, Richmond, Park, and Sunset branches; Stanford University Jonsson Library of Government Documents; the Government Publications Department of the San Francisco State University Library; the Hastings College of Law Library; and University of California Institute of Government Studies.

CHAPTER 3
Project Description

3.1 Introduction

The San Francisco Public Utilities Commission (SFPUC) is proposing the San Francisco Groundwater Supply Project (Groundwater Supply Project) to provide an average of up to 4 million gallons per day (mgd) of groundwater to augment San Francisco's municipal water supply. All of the proposed groundwater well facilities would supply groundwater to existing reservoirs, where it would be blended with San Francisco's existing municipal water supply before distribution within the city. The Groundwater Supply Project well facilities would be located on the west side of San Francisco (see **Figure 3-1**) on land owned by the City and County of San Francisco (CCSF). The well facilities would be managed by the SFPUC, including those located on land currently managed by the San Francisco Recreation and Park Department (SFRPD).

3.2 Project Goals and Objectives

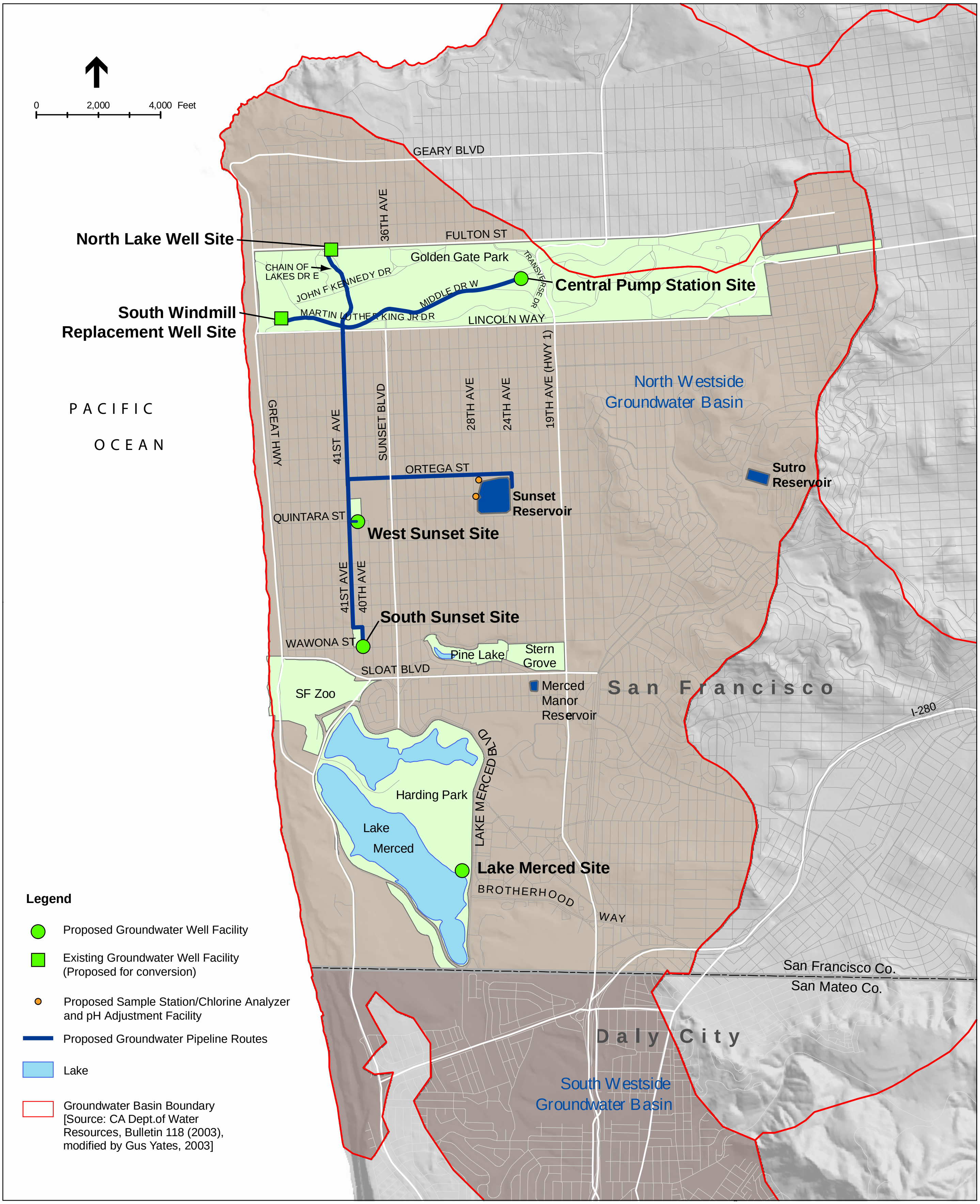
As described in Chapter 2, Introduction and Background, the Groundwater Supply Project is a component of the SFPUC's adopted Water System Improvement Program (WSIP). With the exception of the water supply goal, the overall WSIP goals and objectives (listed in Table 2-1) are based on a planning horizon through 2030. The water supply goal is based on a planning horizon through 2018. The overall WSIP goals for the regional water system are to:

- Maintain high-quality water
- Reduce vulnerability to earthquakes
- Increase water 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
- Achieve a cost-effective, fully operational system

The objectives of the San Francisco Groundwater Supply Project are to:

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

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



SOURCE: SFPUC, 2009; 2010

San Francisco Groundwater Supply Project EIR

Figure 3-1
Project Location

3.3 Proposed Project Components

3.3.1 Overview

The Groundwater Supply Project includes the following components:

- Construction of up to six groundwater production well facilities, including the construction of four new groundwater well facilities as part of Phase 1, and as part of Phase 2, the conversion of two existing irrigation well facilities in Golden Gate Park to potable groundwater well facilities, following approval and construction of the SFPUC's Westside Recycled Water Project. Each of these facilities would include a groundwater well and a pump station. Disinfection equipment would be included at two of the groundwater well facilities and pH adjustment equipment would be installed at one well facility.

- Construction of a distribution system (including pipelines and connection points) to connect five of the groundwater well facilities to Sunset Reservoir. The sixth well would connect to the Lake Merced Pump Station (which pumps water to both Sutro and Sunset Reservoirs) and would require a short length of new distribution piping.

- Construction of a pH adjustment facility at Sunset Reservoir as an addition to an existing reservoir building and a chlorine analyzer/sample station at the reservoir.

As mentioned above, the project is proposed to 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) conversion of the two existing irrigation 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, for a total of approximately 4 mgd with all six wells in operation under Phase 2. As described above, the SFPUC would construct and operate four new well facilities with dedicated groundwater distribution pipelines under Phase 1. The SFPUC, in consultation and coordination with the SFRPD, previously installed four test wells, including three at the proposed well facility sites south of Golden Gate Park and one at the proposed Central Pump Station well facility site in Golden Gate Park. These test wells were installed to gather data on local groundwater characteristics and determine whether the proposed well facility sites could produce a sufficient volume and quality of water to operate a groundwater production well. Following installation and testing, the test wells were capped and have not been used for any purpose since that time. As part of Phase 1 of the proposed project, the SFPUC would convert the test wells into production wells by installing pumps and constructing other required infrastructure. Piping features such as an air gap would be installed at the Central Pump Station well facility to enable this well to provide backup irrigation and ornamental lake fill supply for Golden Gate Park to accommodate any emergency repairs or unplanned outages of the park irrigation system. The SFPUC would also construct the pipelines necessary to deliver groundwater from the Phase 1 well facilities to the existing municipal water supply system (Figure 3-1). The two existing irrigation wells in Golden Gate Park would not be used to supply the municipal system as part of Phase 1.

Phase 2 of the project would only be implemented after the SFPUC's San Francisco Westside Recycled Water Project[1] is also approved and constructed. The SFPUC is proposing the Westside Recycled Water Project, a WSIP facility improvement project, to develop a new recycled water supply for nonpotable irrigation uses at Golden Gate Park, Lincoln Park Golf Course, and the Presidio Golf Course. The availability of recycled water in Golden Gate Park would enable the SFPUC to convert two existing well facilities in the park from irrigation use to municipal supply. Pipelines would be extended to the two existing irrigation well facilities in Golden Gate Park. Piping features such as a "swivel-ell" pipe coupling or air gap would be installed so that these wells would also serve as a backup irrigation and ornamental lake fill supply for Golden Gate Park to accommodate any emergency repairs or unplanned outages of the recycled water facilities. However, if construction of the Westside Recycled Water Project is delayed, the two existing irrigation wells would not be converted to potable water supply use until a later date, and the project's operation would be limited to the four groundwater wells developed in Phase 1. In this case, total average annual production from the four well facilities would be approximately 2.5 to 3.0 mgd. When the Westside Recycled Water Project is implemented, the existing irrigation wells would be converted to municipal use under Phase 2. With Phase 2 in operation, annual average production from all six well facilities would be approximately 4 mgd.

3.3.2 Proposed Groundwater Well Facility Locations

Phase 1 of the proposed project includes construction and operation of three new production groundwater well facilities south of Golden Gate Park, and one in Golden Gate Park. Phase 2 of the proposed project would consist of converting two existing irrigation well facilities in Golden Gate Park to potable water supply and operation of all six wells. These facilities are described below and shown in Figure 3-1.

Phase 1 Well Facility Locations

Lake Merced Well Facility Site. As shown in **Figure 3-2**, the existing Lake Merced Pump Station is west of Lake Merced Boulevard, next to Lake Merced. Figure 3-2 defines the well facility footprint and areas that could be disturbed during project construction. The Tournament Players Cup Harding Park is to the north of the Lake Merced Pump Station. The Lake Merced well facility would be located approximately 100 feet southeast of the existing pump station in an undeveloped area of SFPUC-managed land. This area is restricted from public use and access.

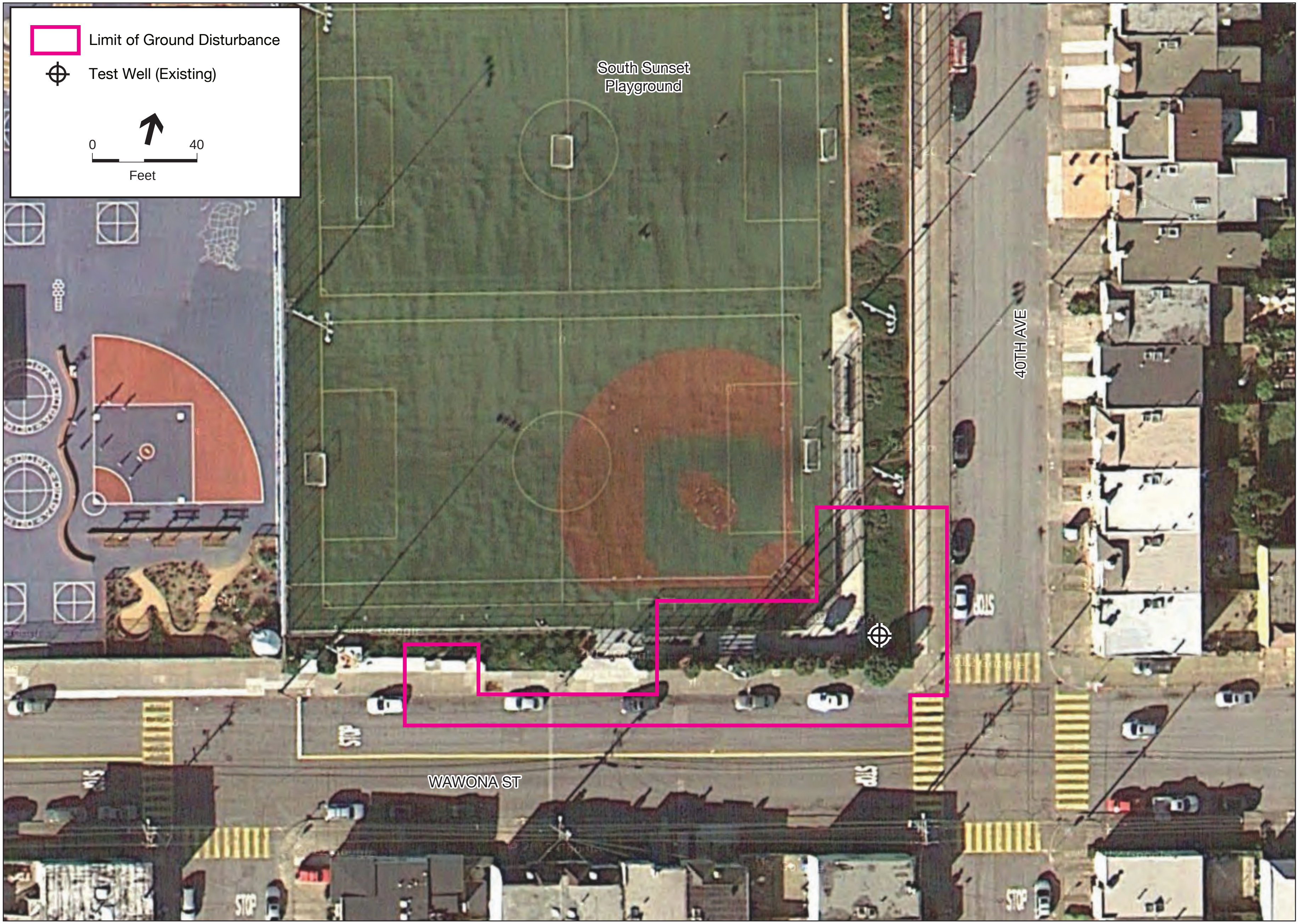
South Sunset Well Facility Site. As shown in **Figure 3-3**, the proposed South Sunset well facility site is on the corner of the South Sunset Playground, at 40th Avenue and Wawona Street, next to an SFRPD-managed public recreational field used for softball, baseball, and soccer. There are residences across the street along 40th Avenue and Wawona Street. The proposed well facility would be located within a landscaped berm adjacent to the sports field. The proposed well facility building includes a storage facility for playground and field maintenance equipment.

[1] The San Francisco Westside Recycled Water Project (San Francisco Planning Department Case No. 2008.0091E) is currently undergoing environmental review. On September 8, 2010, the San Francisco Planning Department published a Notice of Preparation that an environmental impact report would be prepared for this project (http://www.sf-planning.org/ftp/files/MEA/2008.0091E_Westside_Water_NOP.pdf).

SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-2
Lake Merced Well Facility Construction Area



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-3
South Sunset Well Facility Construction Area

West Sunset Well Facility Site. As shown in **Figure 3-4**, the proposed West Sunset well facility site is at the West Sunset Playground, at the intersection of 40th Avenue and Quintara Street, adjacent to SFRPD-managed public recreational fields. There are residences across from the well facility site along Quintara Street. The proposed well facility would occupy a small portion of the northeast corner of the parking lot, south of the existing recreational field used for baseball, soccer, basketball, lacrosse, rugby, and other uses.

Central Pump Station Well Facility Site. The Central Pump Station well facility site is south of Overlook Drive (see **Figure 3-5**), east of the Middle Drive West/Overlook Drive intersection. The proposed well facility site is to the west of the existing fenced Central Pump Station. The SFRPD currently uses the fenced yard area at the Central Pump Station for wood waste storage and composting operations.

Phase 2 Well Facility Locations

South Windmill Replacement Well Facility Site. The existing South Windmill Replacement well is located in the western part of Golden Gate Park, north of Martin Luther King Jr. Drive (see **Figure 3-6**) and east of the Murphy Windmill and Millwright's Cottage. The well facility site is within the former Richmond-Sunset Water Pollution Control Plant site, which was largely removed in 1995. A garage/storage structure to the south of the well facility still remains. The SFRPD currently uses this area to store logs and other materials. The existing irrigation well facility distributes groundwater for irrigation and ornamental lake fill within Golden Gate Park.

North Lake Well Facility Site. The existing North Lake well facility is located in the western part of Golden Gate Park, south of Fulton Street and adjacent to Chain of Lakes Drive (a publicly accessible roadway) (see **Figure 3-7**). The existing irrigation well facility distributes groundwater for irrigation and ornamental lake fill within Golden Gate Park.

3.3.3 Pipeline Locations

As shown in Figure 3-1 and **Figure 3-8**, the proposed groundwater transmission pipelines would connect five groundwater wells to Sunset Reservoir (see **Table 3-1**). Figure 3-8 identifies the pipeline locations by the sequence in which construction would occur. Pipeline segments 1 through 4 would be constructed during Phase 1, and segments 5 and 6 would be constructed as part of Phase 2. The pipeline segments are described below.

Segment 1 would connect the West Sunset well facility to Sunset Reservoir. This segment would extend west along Quintara Street, north along 41st Avenue to Ortega Street, and east along Ortega Street for approximately one mile to 24th Avenue. At this location, the pipeline would continue southward along 24th Avenue for approximately one block before entering the Sunset Reservoir facility, as described below.

SOURCE: SFPUC, 2010; ESA

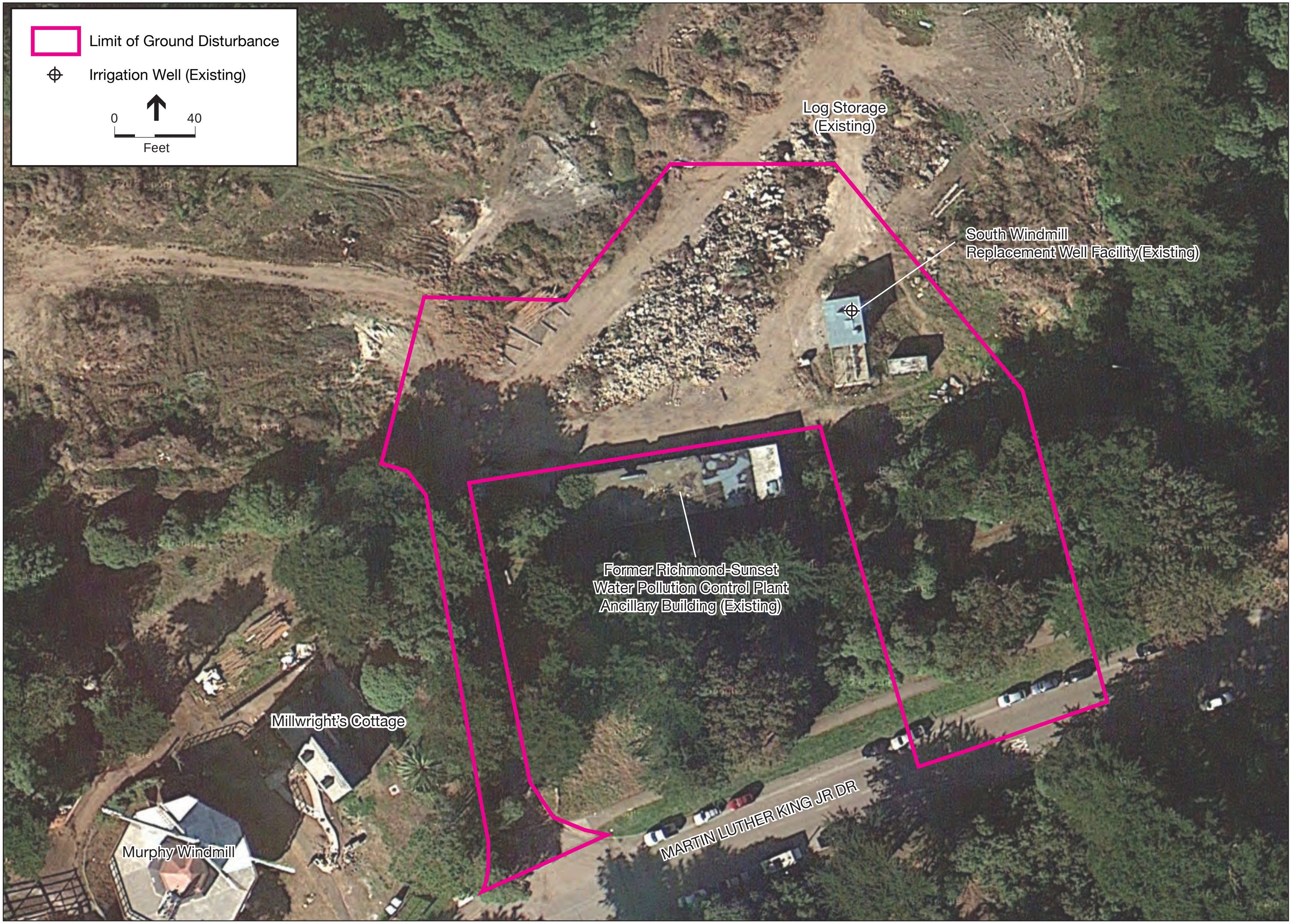
San Francisco Groundwater Supply Project EIR

Figure 3-4
West Sunset Well Facility Construction Area

SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-5
Central Pump Station Well Facility Construction Area



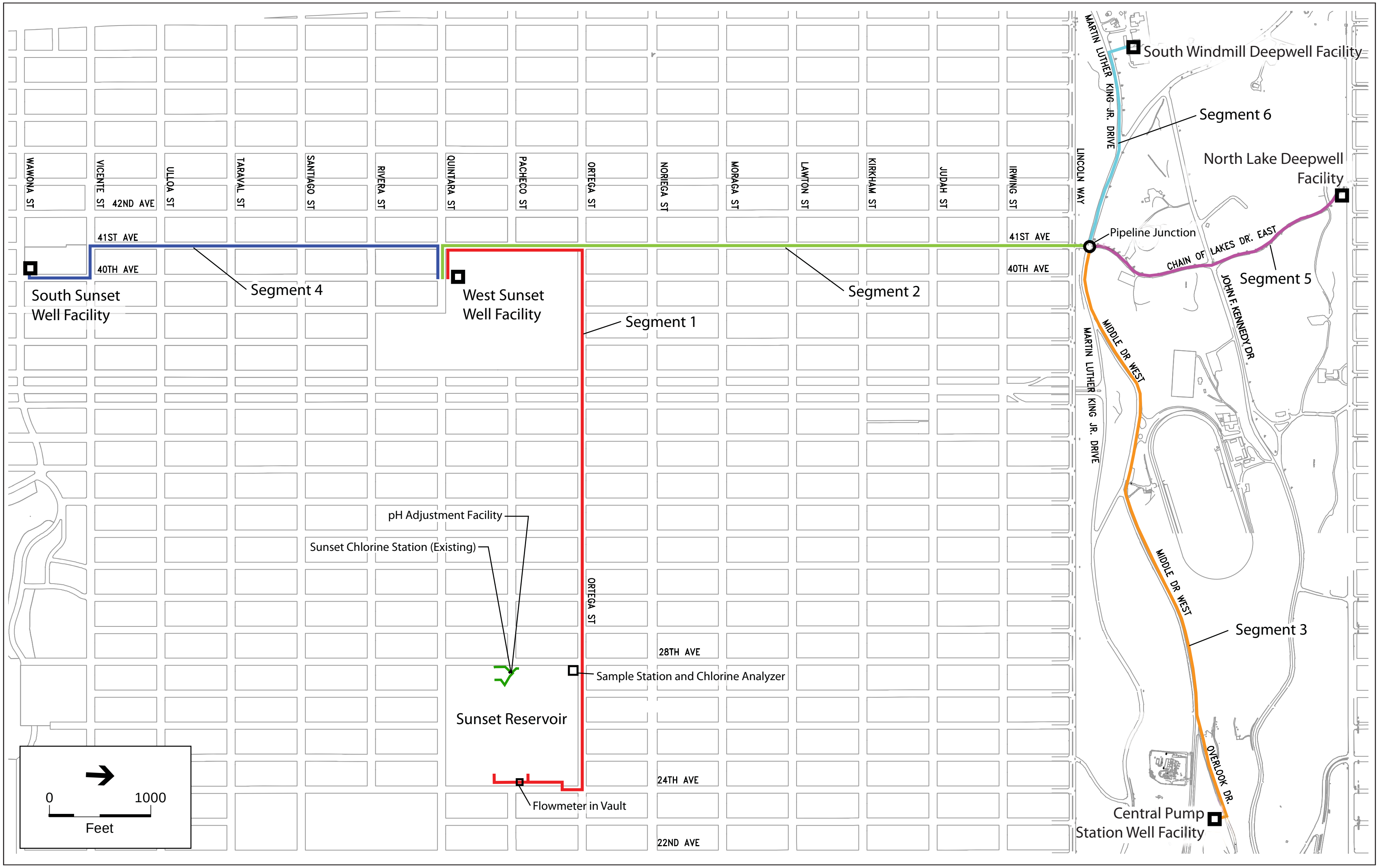
SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-6
South Windmill Replacement Well Facility Construction Area

SOURCE: SFPUC, 2010; ESA

Figure 3-7
North Lake Well Facility Construction Area



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-8 (Revised)
Pipeline Segments

TABLE 3-1
SUMMARY OF PIPELINE SEGMENTS

Segment[a]	Location	Approximate Length
Phase 1		
1. West Sunset Well Facility to Sunset Reservoir	• Quintara Street (west) to 41st Avenue • 41st Avenue (north) to Ortega Street • Ortega Street (east) to 24th Avenue • 24th Avenue (south) to Sunset Reservoir	6,860 feet
2. Golden Gate Park Pipeline Junction[b] to West Sunset Playground	• Chain of Lakes Drive East/41st Avenue (south) to Quintara Street • Quintara Street (east) to 40th Avenue	4,920 feet[c]
3. Central Pump Station Well Facility to Golden Gate Park Pipeline Junction	• Overlook Drive/Middle Drive West (west) to Martin Luther King Jr. Drive • Martin Luther King Jr. Drive (west) to Chain of Lakes Drive	5,800 feet
4. South Sunset Well Facility to West Sunset Well Facility	• 40th Avenue (north) to Vicente Street • Vicente Street (west) to 41st Avenue • 41st Avenue (north) to Quintara Street • Quintara Street (east) to 40th Avenue	4,460 feet[c]
Phase 2		
5. North Lake Well Facility to Golden Gate Park Pipeline Junction	• Chain of Lakes Drive East (south) to Martin Luther King Jr. Drive	2,740 feet
6. South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction	• Martin Luther King Jr. Drive (east) to Chain of Lakes Drive	2,080 feet

[a] The pipeline required to connect the Lake Merced well facility to the adjacent Lake Merced Pump Station is described as part of the Lake Merced well facility description.
[b] Golden Gate Park "Pipeline Junction" is located at the intersection of Chain of Lakes Drive East and Martin Luther King Jr. Drive (see Figure 3-8).
[c] Excludes lengths accounted for in common excavation in Segment 1.

Within Golden Gate Park, potable water wells would be connected to Segment 2, a single pipeline that would extend from the park to the West Sunset well facility (see Figures 3-1 and 3-8). The pipeline segment would begin at a junction at the intersection of Chain of Lakes Drive East and Martin Luther King Jr. Drive. The pipeline would continue south for approximately one mile along 41st Avenue to Quintara Street, and then east for one block to the West Sunset well facility.

Segment 3 would connect the Central Pump Station well facility to pipeline Segment 2. Segment 3 would extend eastward from Chain of Lakes Drive East along Martin Luther King Jr. Drive for 750 feet, and then for approximately one mile along Middle Drive West. The pipeline would then continue for approximately 700 feet along Middle Drive West and Overlook Drive to the Central Pump Station well facility.

Segment 4 would connect the South Sunset and West Sunset well facilities. The pipeline would extend from the South Sunset well facility site along 40th Avenue between Wawona and Vicente Streets, west along Vicente Street to 41st Avenue, north along 41st Avenue between Vicente and Quintara Streets, and east one block along Quintara Street to the West Sunset well facility.

Phase 2 of the project would include connecting the North Lake and South Windmill Replacement well facilities to the pipeline junction at the intersection of Chain of Lakes Drive East and Martin Luther King Jr. Drive. Segment 5 would extend north, from the pipeline junction, along Chain of Lakes Drive East for approximately 0.5 mile to connect to the North Lake well facility. Segment 6 would extend approximately 0.4 mile west, from the pipeline junction, along Martin Luther King Jr. Drive to the South Windmill Replacement well facility.

3.3.4 Sunset Reservoir Facility Location

● As described in Section 3.3.3, Pipeline Locations, the groundwater distribution pipeline would extend along 24th Avenue before entering the Sunset Reservoir facility (see Figure 3-1). The pipeline would terminate in both the north and south basins of Sunset Reservoir, where the groundwater would be blended with the water in storage and then distributed to customers throughout much of San Francisco. A chlorine analyzer and sample station would be constructed at the northwest corner of Sunset Reservoir, where the incoming groundwater would be tested for chlorine levels. In addition, a pH adjustment facility would be constructed as an addition to an existing Sunset Reservoir building, along with chemical injection piping between the pH adjustment facility and the north and south basins of the Sunset Reservoir. In addition, a concrete vault would be constructed west of the south basin to provide installation and maintenance access for a proposed reservoir surface water inlet flow meter.

3.4 Project Construction

This section details the construction locations, activities, and methods for the proposed Groundwater Supply Project. Section 3.4.1 discusses the groundwater well facilities; Section 3.4.2 addresses the pipelines; Section 3.4.3 addresses the Sunset Reservoir facilities; Section 3.4.4 outlines project construction schedule requirements; and Section 3.4.5 describes the SFPUC's standard construction and greenhouse gas reduction measures.

3.4.1 Groundwater Well Facilities

The following subsections describe the proposed activities for each well facility site, including demolition and tree removal; well facility construction, excavation, spoils[2] storage/disposal, and dewatering activities; and installation of work/staging areas. **Table 3-2** summarizes the proposed construction activities.

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[2] "Spoils" refers to soil remaining from an excavation after backfilling is completed.

TABLE 3-2
SUMMARY OF CONSTRUCTION REQUIREMENTS FOR WELL FACILITIES

Well Facility / Staging Area	Construction Task	Construction Area[a]	Depth of Excavation / Quantity of Excavation and Fill
Phase 1			
Lake Merced Well Facility Staging Area: onsite	• Remove asphalt paving from Lake Merced Pump Station access road • Construct groundwater well facility • Install groundwater and overboard[b] pipeline • Install water treatment tank • Install new electrical and gas utilities • Install connection to city water supply and drainage piping • Remove 1 tree	Well Facility: 6,190 square feet Water Tank: 3,500 square feet Groundwater and Overboard Pipeline: 180-foot-long x 10-foot-wide trench Staging Area: 4,250 square feet Access Road Restoration: 5,500 square feet Utility trench to Lake Merced Boulevard: 900 square feet Total: Up to 22,140 square feet	Depth: Mostly 5 to 8 feet deep with recompaction; some areas of densification using vibrocompaction[c] / stone columns up to 24 feet deep Excavation: 300 cubic yards Fill:[d] 300 cubic yards Spoils:[e] 0 cubic yards Structural fill:[f] 70 cubic yards
South Sunset Well Facility Staging Areas: Wawona St. (north), 40th Avenue (west)	• Construct groundwater well facility • Install groundwater and overboard pipeline • Install connection to city water supply • Upgrade electrical utilities	Well Facility: 1,000 square feet Staging Area: 2,400 square feet Total: 3,400 square feet	Depth: 8.5 to 13 feet Excavation: 220 cubic yards Fill: 100 cubic yards Spoils: 120 cubic yards Structural fill: 0 cubic yards
West Sunset Well Facility Staging Area: Quintara St. (north)	• Construct groundwater well facility • Install groundwater and overboard pipeline • Install subsurface percolation basin • Install connection to city water supply • Install new electrical and gas utilities • Repair portions of chain-link fencing • Remove 3 trees	Well Facility: 9,000 square feet Staging Area: 2,300 square feet Total: 11,300 square feet	Depth: 8.5 to 14 feet Excavation: 250 cubic yards Fill: 150 cubic yards Spoils: 100 cubic yards Structural fill: 0 cubic yards
Central Pump Station Well Facility Staging Area: onsite	• Construct groundwater well facility • Install groundwater and overboard piping • Install new electrical utilities • Install pipeline with air gap for back up irrigation supply	Well Facility: 12,800 square feet Staging Area: 2,400 square feet Total: Up to 15,200 square feet	Depth: approximately 0 feet (slab-on-grade with drilled piers) Excavation: 150 cubic yards Fill: 150 cubic yards Spoils: 0 cubic yards Structural fill: 0 cubic yards
			Phase 1 Subtotals Excavation: 920 cubic yards Fill: 700 cubic yards Spoils: 220 cubic yards

TABLE 3-2 (Continued)
SUMMARY OF CONSTRUCTION REQUIREMENTS FOR WELL FACILITIES

Well Facility / Staging Area	Construction Task	Construction Area[a]	Depth of Excavation / Quantity of Excavation and Fill
Phase 2			
South Windmill Replacement Well Facility Staging Area: onsite	• Demolish existing well facility • Construct new groundwater well facility • Install groundwater, water, and overboard piping • Upgrade electrical utilities • Install swivel-ell pipe coupling or air gap for back up irrigation supply	Well Facility: 9,600 square feet Staging Area: 2,400 square feet Total: Up to 12,000 square feet	Depth: 2 feet (slab on grade with drilled piers) Excavation: 130 cubic yards Fill: 30 cubic yards Spoils: 100 cubic yards Structural fill: 0 cubic yards
North Lake Well Facility Staging Area: onsite	• Demolish existing well facility • Construct new groundwater well facility • Install groundwater and water piping • Upgrade electrical utilities • Install swivel-ell pipe coupling or air gap for back up irrigation supply • Remove 2 trees	Well Facility: 7,500 square feet Staging Area: 2,400 square feet Total: Up to 9,900 square feet	Depth: 0 feet (slab-on-grade with drilled piers) Excavation: 100 cubic yards Fill: 100 cubic yards Spoils: 0 cubic yards Structural fill: 0 cubic yards
`			**Phase 2 Subtotals** Excavation: 230 cubic yards Fill: 130 cubic yards Spoils: 100 cubic yards
			Phase 1 and 2 Totals Excavation: 1,150 cubic yards Fill: 830 cubic yards Spoils: 320 cubic yards

[a] "Construction Area" refers to the areas of construction disturbance and staging, not the finished footprint of the proposed facilities.
[b] "Overboard" refers to water pumped from wells that is discharged rather than directed into the water supply. See Section 3.5.1, Operations for details.
[c] Vibrocompaction is a deep compaction technique for densifying sandy soils in place by means of an electric vibrating unit. Under the influence of simultaneous vibration and saturation, loose sand particles are repacked into a more compact state, and lateral confining pressure within the sand mass is increased.
[d] "Fill" refers to soil placed back into the excavation.
[e] "Spoils" refers to soil remaining from an excavation after backfilling is completed. Spoils could expand by up to approximately 20 percent as soils are less compact once excavated.
[f] "Structural fill" refers to new material added to an excavation for structural purposes.

SOURCE: SFPUC, 2009a

Site Preparation and Construction

Construction of the proposed groundwater well facilities would require excavation and grading as well as demolition of existing facilities. Some trees would be removed within the construction and staging areas at several of the proposed new well facility sites. Trees adjacent to construction areas that are not proposed for removal would be protected by:

- Establishing a Tree Protection Zone (TPZ) around any tree or group of trees to be retained. The formula typically used is defined as 1.5 times the radius of the dripline or 5 feet from the edge of any grading, whichever is greater. The TPZ could be adjusted on a case-by-case basis after consultation with a certified arborist.

- Marking the TPZ of any trees to be retained with permanent fencing (e.g., post and wire or equivalent), which would remain in place for the duration of construction activities in the area. "Keep out" signs would be posted on all sides of fencing.

- Prohibiting construction-related activities, including grading, trenching, construction, demolition, or other work shall within the TPZ. No heavy equipment or machinery would be operated within the TPZ. No construction materials, equipment, machinery, or other supplies would be stored within a TPZ. No wires or signs would be attached to any tree. Any modifications would be approved and monitored by a certified arborist.

- Pruning selected trees to provide necessary clearance during construction and to remove any defective limbs or other parts that may pose a failure risk. All pruning would be completed by a certified arborist or tree worker and adhere to the *Tree Pruning Guidelines* of the International Society of Arboriculture.

In addition, nesting birds and their nests would be protected during construction by:

- Conducting tree removal and pruning activities, as well as other construction activities, outside the bird nesting season (January 15 to August 15) to the extent feasible.

- If construction during bird nesting season cannot be fully avoided, conducting preconstruction nesting surveys by a qualified wildlife biologist within seven days of the start of construction (i.e., active ground disturbance, vegetation removal, building demolition).

- If active nests are located during the preconstruction bird nesting survey, setting up and maintaining a line-of-sight buffer area around the active nest and prohibiting construction activities within the buffer; modifying construction activities; and/or removing or relocating active nests.[3]

All material removed from the sites, including concrete, metal, and green waste, would be recycled to the extent feasible or disposed of at an appropriate landfill in compliance with applicable federal, State, and local regulations. It is estimated that demolition of the two existing well facilities would require disposal of approximately 240 cubic yards of materials (concrete and rebar, wood, roofing materials, piping, metal cabinets, etc.). Specific site requirements are described below.

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[3] SFPUC will confirm with the California Department of Fish and Wildlife that the protections are appropriate given the nests that are found on the site.

Phase 1 Well Facilities

Lake Merced Well Facility. Construction of the Lake Merced well facility would require clearing and grubbing of the project site, including removal of the asphalt paving of the Lake Merced Pump Station access road and removal of one tree. Other trees would be protected in place, as discussed above. The majority of excavation associated with construction of this facility would occur at depths of approximately 5 to 8 feet; however, installation of the stone columns to strengthen the soil to prevent unacceptable settlement in the event of strong seismic shaking would require excavations up to approximately 24 feet deep. An estimated 300 cubic yards of soil would be excavated, and all material would be reused onsite as fill. In addition, construction at the site would require the placement of approximately 70 cubic yards of structural fill.

South Sunset Well Facility. Construction of the South Sunset well facility would require the removal of a retaining wall, chain-link fencing, and concrete paving. This site would be excavated about 6 feet into an existing slope at depths of 8.5 to 13 feet. An estimated 220 cubic yards of soil would be excavated, and 100 cubic yards would be reused onsite as fill material. Excavation for the proposed building construction would generate a total of approximately 120 cubic yards of spoils. Most of the trees and shrubs located within the park in a planting strip along Wawona Street would be protected in place; however, three shrubs would be salvaged for reuse. No trees would be removed. Street trees along the sidewalk would be retained. The portable playground bleachers and players' benches along Wawona Street would be temporarily removed during construction and replaced when construction is complete. The building construction activities at the South Sunset well facility would require closure of the southern playing field to install the overboard[4] pipeline and connect it to the existing perforated drain pipe located beneath the playing fields.

West Sunset Well Facility. Construction of the West Sunset well facility would require the removal of portions of asphalt paving, a retaining wall, and a concrete curb. In addition, the currently damaged chain-link fencing area adjacent to the site would be replaced. This building site would be excavated up to 7 feet into an existing hillside slope on the northern side of the site, at depths from approximately 8.5 to 14 feet. An estimated 250 cubic yards of soil would be excavated, and 150 cubic yards would be reused as fill material. Excavation for the proposed building construction would generate a total of approximately 100 cubic yards of spoils. Three trees between the existing parking area and playing fields would be removed, and other trees would be protected in place, as discussed above. Construction activities at the West Sunset Well Facility would not require field closures.

Central Pump Station Well Facility. Construction of the Central Pump Station well facility would require clearing and grubbing of the project site. Trees in the vicinity of the project site would be protected in place, as discussed above. An estimated 150 cubic yards of soil would be excavated at the site, and all material would be reused onsite as fill. The building would be constructed on the existing grade, with excavation of up to 35 feet only required for installation of piers.

[4] "Overboard" refers to water pumped from wells that is discharged rather than directed into the water supply.

Phase 2 Well Facilities

South Windmill Replacement Well Facility. Construction of the South Windmill Replacement well facility would require the demolition of a 900-square-foot irrigation well building and removal of fencing and concrete paving. Trees in the vicinity of the project site would be protected in place, as discussed above, and no trees would be removed. Construction of the facility would require general excavation to a depth of approximately 2 feet. An estimated 130 cubic yards of soil would be excavated at the site, and 30 cubic yards would be reused as fill. Excavation for the building construction would generate a total of approximately 100 yards of spoils. Excavation of up to 35 feet would be required only for installation of piers.

North Lake Well Facility. Development of the North Lake well facility site would require the demolition of the 900-square-foot irrigation well facility and removal of fencing, asphalt pavement, and a masonry unit wall located along the north and west boundaries of the site. Two trees directly east of the existing well facility would be removed, and other trees surrounding the project site would be protected, as discussed above. An estimated 100 cubic yards of soil would be excavated at the site, and 100 cubic yards would be reused as fill. The building would be constructed on the existing grade, with excavation of up to 35 feet only required for installation of piers.

Well Facility Construction

Well facility construction would involve upgrading existing test wells to production wells and converting landscape irrigation wells to meet municipal well construction standards, as well as installing pumps, valves, and electrical utility connections. To convert the existing test wells to production wells, the contractor would also build a concrete pump pedestal above the finished floor elevation of the well facility, and then modify the top of the well. Standard supervisory control and data acquisition (SCADA) equipment would be installed at each site for remote operation and monitoring of the well facility and pipeline equipment. SCADA would also provide water supply protection, as would other security features, such as permanent fencing around the some of the facilities.

The facility plans include vertical turbine and centrifugal (horizontal split-case) well pumps and pump motors (see **Table 3-3**). Well facility buildings would include noise-limiting 8- to 10-inch-thick concrete walls, 8-inch-thick concrete roofs, and acoustical louvers shielding vented openings. Access to the wellheads and pumps for major maintenance would be provided through the well facilities' roofs. The facilities would be constructed in compliance with California's Energy Efficiency Standards as specified in the California Code of Regulations, Title 24, Part 6. The project would include Leadership in Energy and Environmental Design-compliant adhesives, sealants, paints, etc. The well facilities would include reinforced concrete flooring and chemical rooms would have a low-volatile organic compound, corrosion resistant coating applied to their concrete floors. All fluorescent lighting fixtures will have high efficiency advanced electronic ballasts. All facilities would also have a removable 'Kalwall' skylight, made of translucent fiberglass. The facility plans include conceptual landscaping, as described below for each facility. Some modification of conceptual landscaping plans may be made as they are finalized, such as changes to the specific types of native plants to be installed. Nevertheless, the site footprint and general landscaping plan would remain as presented in the EIR. The design of the proposed facilities reflects input from the San Francisco Arts Commission's Civic Design Review Committee.

TABLE 3-3
WELL FACILITY PUMP DESCRIPTION

Well Facility	Pump Type	Proposed Pumping Rate[a] (gallons per minute)		Motor Description	
		Normal	Maximum	Horsepower	Volts
Phase 1					
Lake Merced Well Facility Well Pump	Vertical Turbine Pump	600	600	75	460
Lake Merced Well Facility Booster Pump	Centrifugal – Horizontal Split-case Pump	600	600	100	460
South Sunset Well Facility	Vertical Turbine Pump	500	600	150	460
West Sunset Well Facility	Vertical Turbine Pump	650	720	150	460
Central Pump Station Well Facility	Vertical Turbine Pump	1,500	1,600	350	460
Phase 2					
South Windmill Replacement Well Facility	Vertical Turbine Pump	1,000	1,100	200	460
North Lake Well Facility	Vertical Turbine Pump	500	600	150	460

[a] Each well's proposed pumping rate is the design rate of the pump, shown here as a range; daily pumping rates would be subject to demand, which is represented by the average pumping rates discussed in Section 3.5.1, Operations.

SOURCE: SFPUC, 2011a

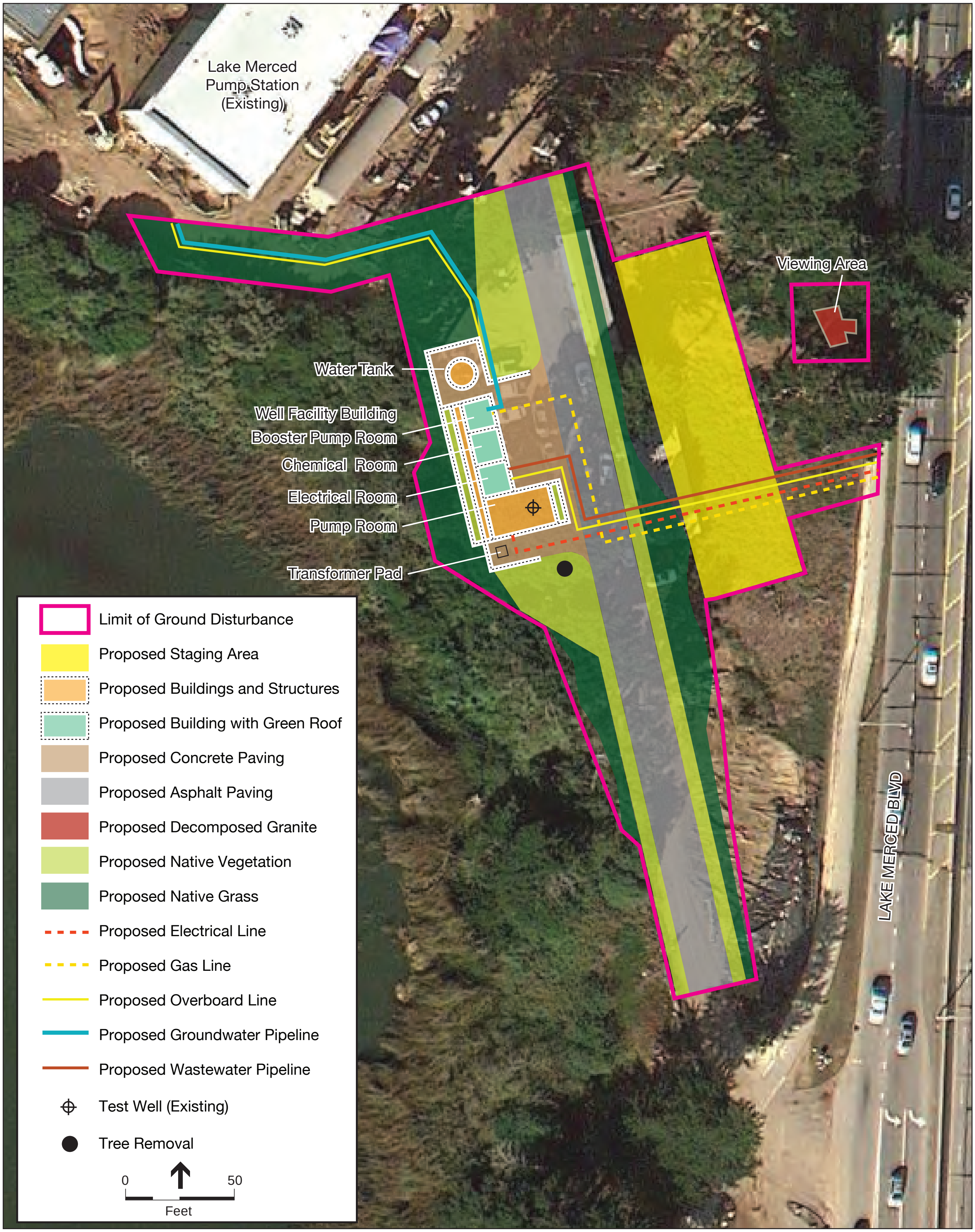
Phase 1 Well Facilities

Lake Merced Well Facility

The Lake Merced well facility would be housed in an L-shaped, four-room building. The pump room would be 30 feet long by 19 feet wide; the smaller (15-foot by 15-foot) rooms would house the chemical treatment facilities, electrical facilities, and a booster pump (see **Figures 3-9a** and **3-9b**).

The chemical treatment room would contain one sodium hypochlorite[5] tank and two associated metering pumps. The groundwater would be disinfected by injecting sodium hypochlorite into the pipeline exiting the pump room. A ½-inch sodium hypochlorite feeder line (made of chlorinated polyvinyl chloride pipe) would extend from the chemical room to the pump room. The feeder line would be placed within a larger-diameter polyvinyl chloride pipe that would provide secondary containment of the solution. Treated groundwater would be pumped to an approximately 11,400-gallon water tank (covering an area of 3,500 square feet) located on the north side of the building. The tank, described in more detail below, would detain groundwater, providing the necessary contact time for the sodium hypochlorite to disinfect the groundwater. A booster pump located in the proposed well facility building would pump treated groundwater from the tank to the Lake Merced Pump Station's supply manifold. One sodium hydroxide tank and two associated metering pumps would

[5] Sodium hypochlorite is similar to household bleach but is more concentrated.



SOURCE: SFPUC, 2010; ESA

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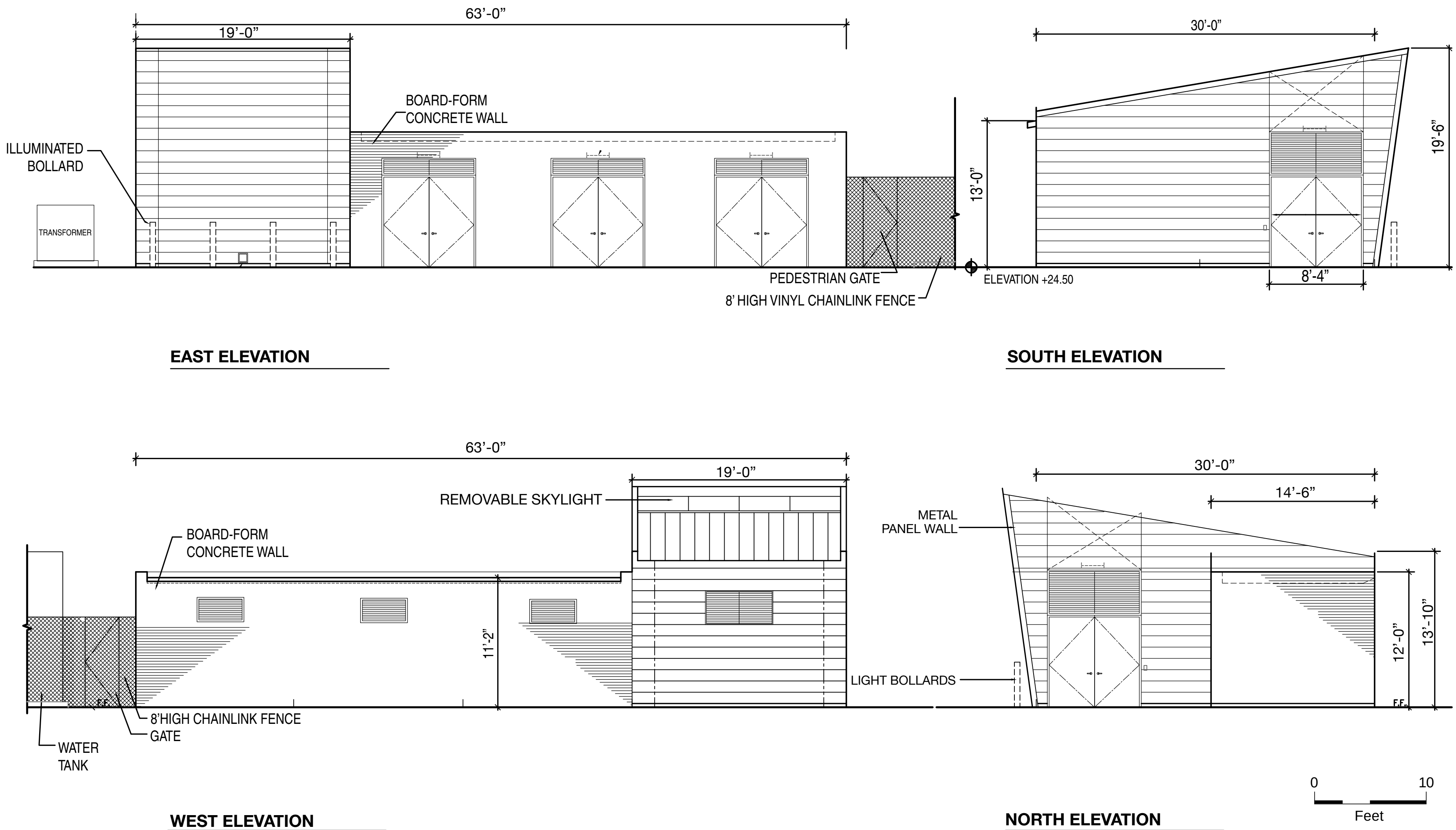
Figure 3-9a
Lake Merced Well Facility - Proposed Project Components and Construction Area



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-9b
Lake Merced Well Facility - Proposed Building Elevations

also be installed in the chemical treatment room. Sodium hydroxide would be added to the treated groundwater for pH adjustment, via double-contained chemical piping. The chemical treatment room would also include an eye-wash/shower and sink for worker safety.

The building would have board-form concrete and metal panel walls, hollow metal doors, and louvered vents. The concrete walls would be a dark stone-gray color; the metal panels would have a lighter gray finish; and the doors would be a charcoal (darker) gray color. The southern (pump room) portion of the building would have a roof sloping toward the lake with metal-clad roofing panels and a removable skylight. This portion of the building would have a roofline height of approximately 20 feet above grade facing Lake Merced Boulevard and a roofline height of approximately 14 feet above grade facing Lake Merced. The roof of the remaining portion of the building would have a height of approximately 12 feet above grade. This portion of the roof would be flat and covered by a green roof. A 12-foot-diameter water tank would be located on the northern side of the building. The approximately 14-foot-tall tank would be surrounded by an 8-foot-high black chain-link fence. Exterior lighting would include lighted bollards east of the pump room and recessed LED soffit lights (lights installed beneath an overhanging structure) above the doors of the building.

In order to ensure adequate soil strength and resistance to prevent settlement and liquefaction, the project calls for excavation with recompaction to a depth of 5 to 8 feet throughout most of the site. Some areas could require vibrocompaction/stone columns (up to a depth of 24 feet) to stabilize potentially liquefiable soil. A subsurface buttress wall would be installed on the northwest side of the Lake Merced well facility site. The buttress wall would extend 5 feet above the ground surface so it could also serve as a small retaining wall. Additionally, other small retaining walls could be needed to provide a level site for the building and tank pads. One tree would be removed from the site.

Two 8-inch-diameter pipelines would be constructed from the well facility to the existing Lake Merced Pump Station. One pipeline would connect to the municipal supply system at the pump station. The second pipeline installed for overboard water would connect to the existing pump station's wet well. The well facility would be connected to existing water, sewer, and electrical lines along Lake Merced Boulevard. Water and sewer service would be provided to operate a sink and emergency eye wash in the chemical room; water would also be used for pump system operation and maintenance.

Following construction activities, the excavated area would be restored by planting groundcover, shrubs, and grasses (see Figure 3-9a). The groundcover and shrubs would consist of plants that are native to California. Vegetated swales would be constructed along the access road and would also be planted with California natives. The access road would be repaved, and a concrete parking area and paving would be provided on the east and south sides of the building.

A proposed overlook east of the well facility along Lake Merced Boulevard would extend from the existing pedestrian path near the roadway. This overlook would consist of an approximately 20-foot by 20-foot level pad finished with decomposed granite and furnished with two benches and an interpretive sign.

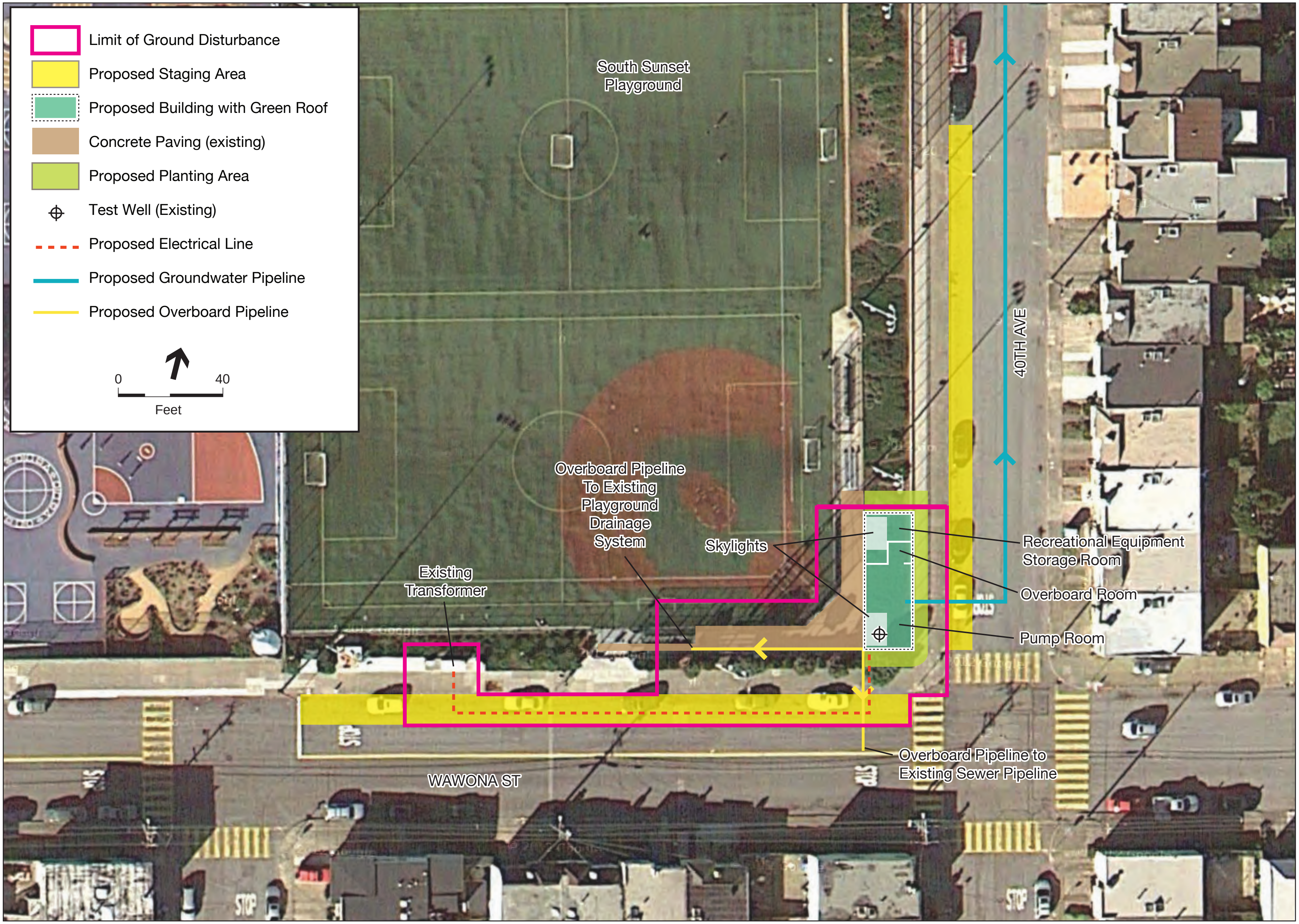
South Sunset Well Facility

The South Sunset well facility would be housed in an approximately 55-foot-long by 19-foot-wide building on the southeast corner of the South Sunset Playground. The facility would be behind the back-stop of the adjacent baseball diamond. In addition to a pump room (35 feet by 19 feet) and overboard room (8 feet by 9 feet) constructed for operation of the project, an approximately 17-foot by 19-foot, L-shaped storage room would be provided for use exclusively by the SFRPD to store recreational and maintenance equipment (see **Figures 3-10a** and **3-10b**).

The well facility site would be excavated into a slope situated between the lower-lying playing field and the higher street level, and would partially replace an existing retaining wall in the area. The building would have board-form concrete walls and a roof that slopes toward 40th Avenue. The wall along 40th Avenue would be approximately 5 feet above the sidewalk grade. The southern wall facing Wawona Street and the northern wall would slope up to the roofline, which would be approximately 14 feet above the playground field. On the west façade, doors facing the playground would provide building access; in the central portion of the façade, a metal-clad cornice extending from above an overhead door would incorporate a water feature. This feature would trickle overboard water from the cornice (approximately 25 gallons per minute) down the wall, and the water would collect in a metal-clad steel planter. The planter would drain to San Francisco's combined storm drain/sewer system. The sloped roof would be visible from 40th Avenue. With the exception of two skylights, the building would have a green roof. A stainless-steel tensile wire fence would be installed above the building walls along 40th Avenue and Wawona Street and along the northern wall facing the bleachers. The fence would have "South Sunset Playground" stenciled in black paint along the 40th Avenue side. The concrete walls would be a dark stone-gray color; the metal panels would have a lighter gray finish; and the doors would be a charcoal (darker) gray color. The building walls along the north, east, and south faces would also serve as retaining walls. Exterior lighting would consist of recessed LED soffit lights above the doors of the building.

One 8-inch-diameter pipeline would extend from the well facility to the groundwater pipeline to be installed in 40th Avenue (see Section 3.3.3, Pipeline Locations). Overboard water would be conveyed via a separate new pipeline segment to an existing perforated drainage pipeline that provides subsurface drainage for the playground. As a passive safety measure, overboard water would also be connected to an existing sewer pipeline in Wawona Street. A one-way check valve would be installed before the sewer connection to separate the overboard and subsurface drainage pipelines from the combined sewer system. An existing transformer adjacent to the playground would provide electrical service via an underground line. The contractor would install a pipeline connection to a potable water pipeline to provide a water supply for pump system operation and maintenance.

Following construction activities, the contractor would restore the excavated area by replacing removed fencing, repaving the concrete sidewalk, and returning the playing field to its general pre-project condition; and plant areas around the well facility (including planter strips along the sidewalks) with California native species, such as blue oat grass. The steel planter associated with the water feature on the western façade would be planted with variegated rush.

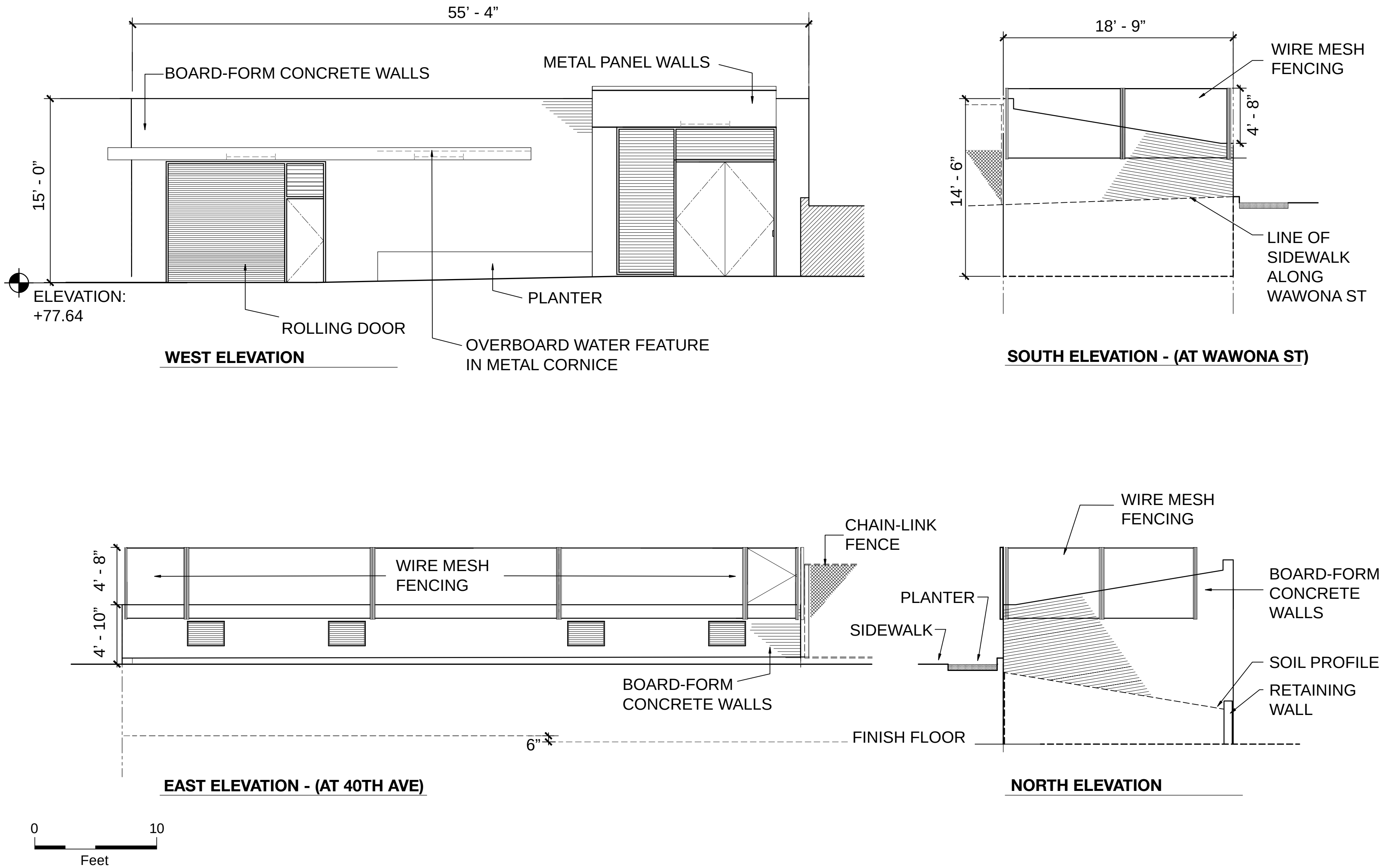


SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-10a

South Sunset Well Facility - Proposed Project Components and Construction Area



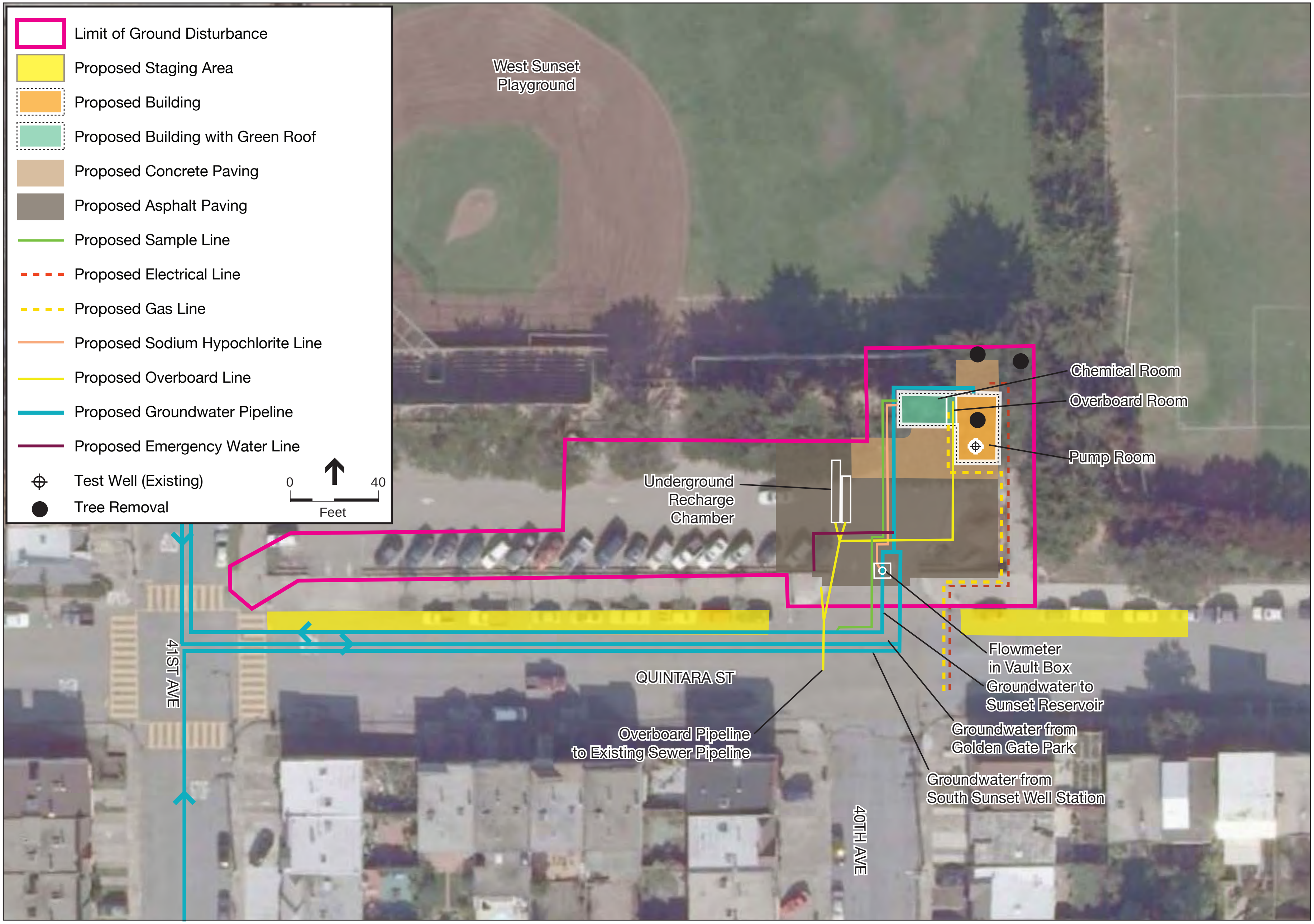
SOURCE: SFPUC, 2010; ESA

Figure 3-10b
South Sunset Well Facility - Proposed Building Elevations

West Sunset Well Facility

The West Sunset well facility would be housed in an L-shaped building, approximately 45 feet long by 34 feet wide, at the West Sunset Playground (see **Figures 3-11a** and **3-11b**). The proposed well facility would be constructed in an area to the south of the recreational field and would occupy a small portion (approximately 12 feet by 20 feet) of the northeast corner of the parking lot. The building would consist of a 19-foot by 31-foot pump room, a 6-foot by 14-foot overboard room, and a 14-foot by 20-foot chemical room. The chemical treatment facilities would consist of two sodium hypochlorite tanks and metering pumps located in the chemical room. The chemical room would also include an eye-wash/shower and sink for worker safety, and have fire protection sprinklers. The building site would be excavated into a slope situated between the playing field and the lower-lying street level. The building would have board-form concrete and metal panel walls, hollow metal doors, and louvered vents. The concrete walls would be a dark stone-gray color; the metal panels would have a lighter gray finish; and the doors would be a charcoal (darker) gray color. The eastern (pump room) portion of the building would have a concrete built-up roof sloping north toward the playing field, as well as a removable skylight. The roofline height of this portion of the building would be approximately 17 feet above grade facing Quintara Street, and approximately 7 feet above grade facing the playground. The roof of the remaining portion of the building would be flat and planted as a green roof. The roofline height of this portion of the building would be approximately 5 feet above grade facing the playing field and approximately 12 feet above grade facing Quintara Street. A fenced enclosure would be located along the northern side of the building facing the playing field. An 8-foot-high, gray, chain-link fence would enclose an electrical transformer to be installed on a 15-foot by 20-foot concrete slab, and a satellite antenna would be mounted on a concrete footing. Exterior lighting would consist of recessed LED soffit lights above the doors of the building. A separate area of the parking lot currently used by the SFRPD to stockpile soil products, which are used to maintain the ball fields, would continue to be used by the SFRPD for storage of these materials; the SFPUC would provide modular concrete barriers for use by the SFRPD to segregate the various soils products and to separate these products from the parking area.

The well facility would be connected to three water supply pipelines to be installed in Quintara Street. These pipelines, described in Section 3.3.3, Pipeline Locations, would connect this well facility with the South Sunset well facility, the well facilities located in Golden Gate Park, and Sunset Reservoir. The groundwater would be disinfected by injecting a sodium hypochlorite solution into the belowground water line that extends from the well facility to Sunset Reservoir. A belowground vault located in the entrance driveway to the West Sunset Playground parking area would provide access to the solution injection port. A ½-inch sodium hypochlorite feeder line (made of chlorinated polyvinyl chloride pipe) would extend from the chemical room of the well facility to the belowground vault. The feeder line would be placed within a larger-diameter polyvinyl chloride pipe, which would provide secondary containment in the event of a leak. The water would be disinfected at a location downstream of the connection with the pipelines from the South Sunset and Golden Gate Park well facilities; groundwater from these sources as well as from the West Sunset well facility would be treated at this location. A sample line would be connected from the pipeline (downstream of the injection point) to the chemical room, where the disinfected groundwater pumped to Sunset Reservoir could be tested.

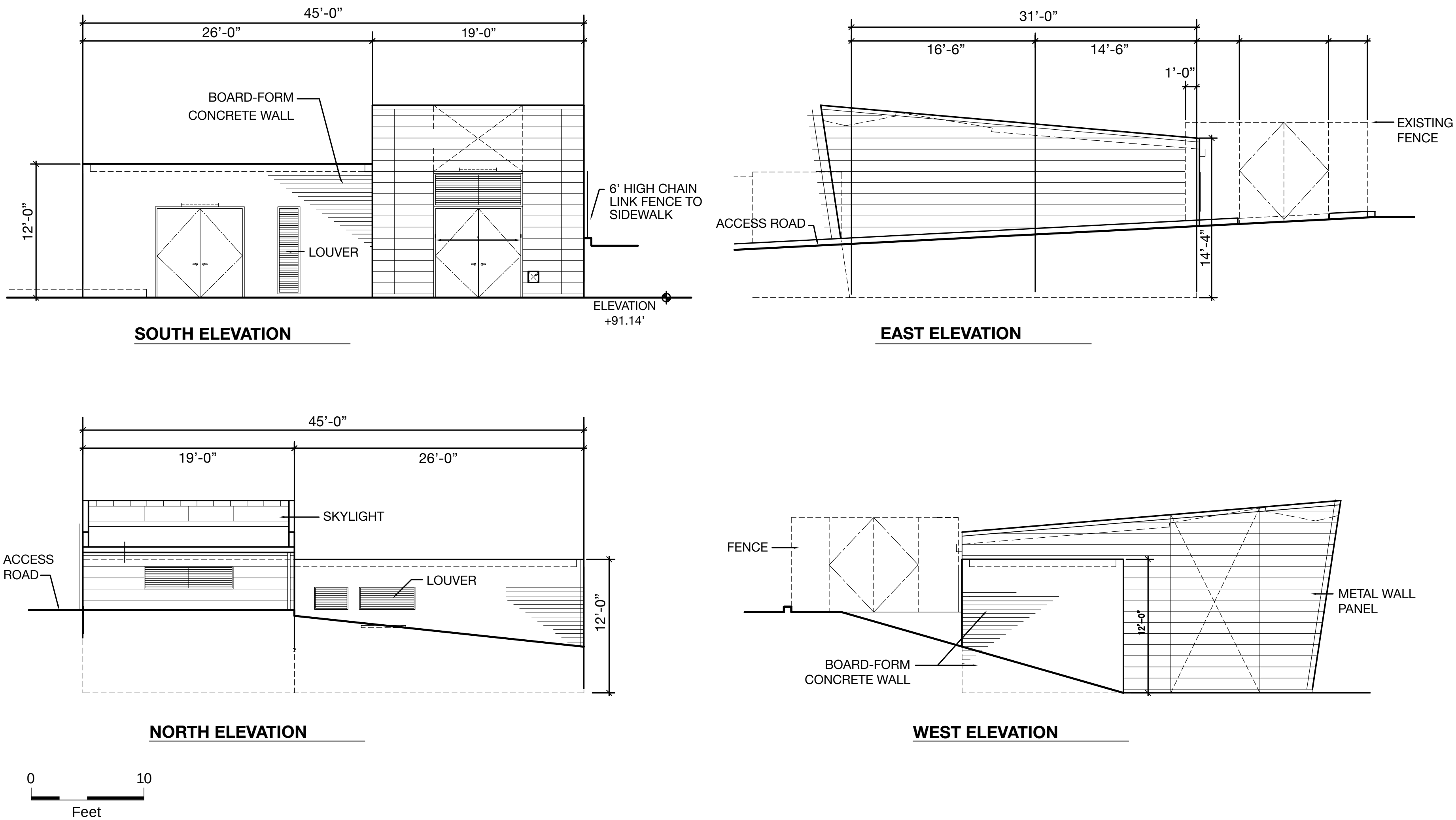


SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-11a

West Sunset Well Facility - Proposed Project Components and Construction Area



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-11b
West Sunset Well Facility -
Proposed Building Elevations

Overboard water would be conveyed to an underground vault that would drain to two below-grade recharge chambers; the groundwater would percolate through these recharge chambers and back into the ground. The vault would have an overflow pipe to convey overboard water flows to an existing sewer line in Quintara Street when flows exceed the recharge chamber capacity. A one-way check valve would be installed before the sewer connection to separate the overboard pipeline and recharge chambers from the combined sewer system. Electrical and gas service would be provided via a connection to existing utilities in Quintara Street at 40th Avenue.

The well facility building would occupy a small portion of the northeast corner of the parking lot. Following construction activities, the remaining parking lot would be returned to its general pre-project condition. Pavement and curbs would be replaced and parking space lines redrawn. The excavated area west of the well facility building would be restored by planting groundcover and other vegetation. Ornamental vines would be planted in vine pockets along the retaining wall on the east side of the parking lot. Ornamental and native plant varieties could include variegated Aptenia, blue oat grass, Engelman Virginia creeper, and coast silk tassel.

Central Pump Station Well Facility

The Central Pump Station well facility would be located south of Overlook Drive within Golden Gate Park, approximately 120 feet west of the existing Central Pump Station. The proposed facility would be a rectangular 42-foot by 19-foot building and would have concrete walls, hollow metal doors, and louvered vents. The concrete walls would be a dark stone-gray color; the metal panels would have a lighter gray finish; and the doors would be a charcoal (darker) gray color. The roof of the building would be flat (built-up concrete), and the parapet walls would have an off-center architectural gap. Exterior lighting, consisting of recessed LED soffit lights above the doors of the building, would be manually operated as needed by operations staff (see **Figures 3-12a** and **3-12b**).

The well facility would be connected to a groundwater pipeline to be installed in Overlook Drive. This pipeline, described in Section 3.3.3, Pipeline Locations, would connect this well facility, along with the other wells in Golden Gate Park, to the West Sunset well facility, where the groundwater would be disinfected and then conveyed to Sunset Reservoir. Overboard water would be conveyed to a French drain that would allow the groundwater to percolate back into the ground. Runoff from the facility roof and grounds would travel by gravity to a sump drain and that would allow stormwater to percolate into the ground. A pipeline serving as an irrigation backup supply would connect the well facility to the underground reservoir at the Central Pump Station. Electrical service would be provided via a connection to the Central Pump Station east of the well facility site.

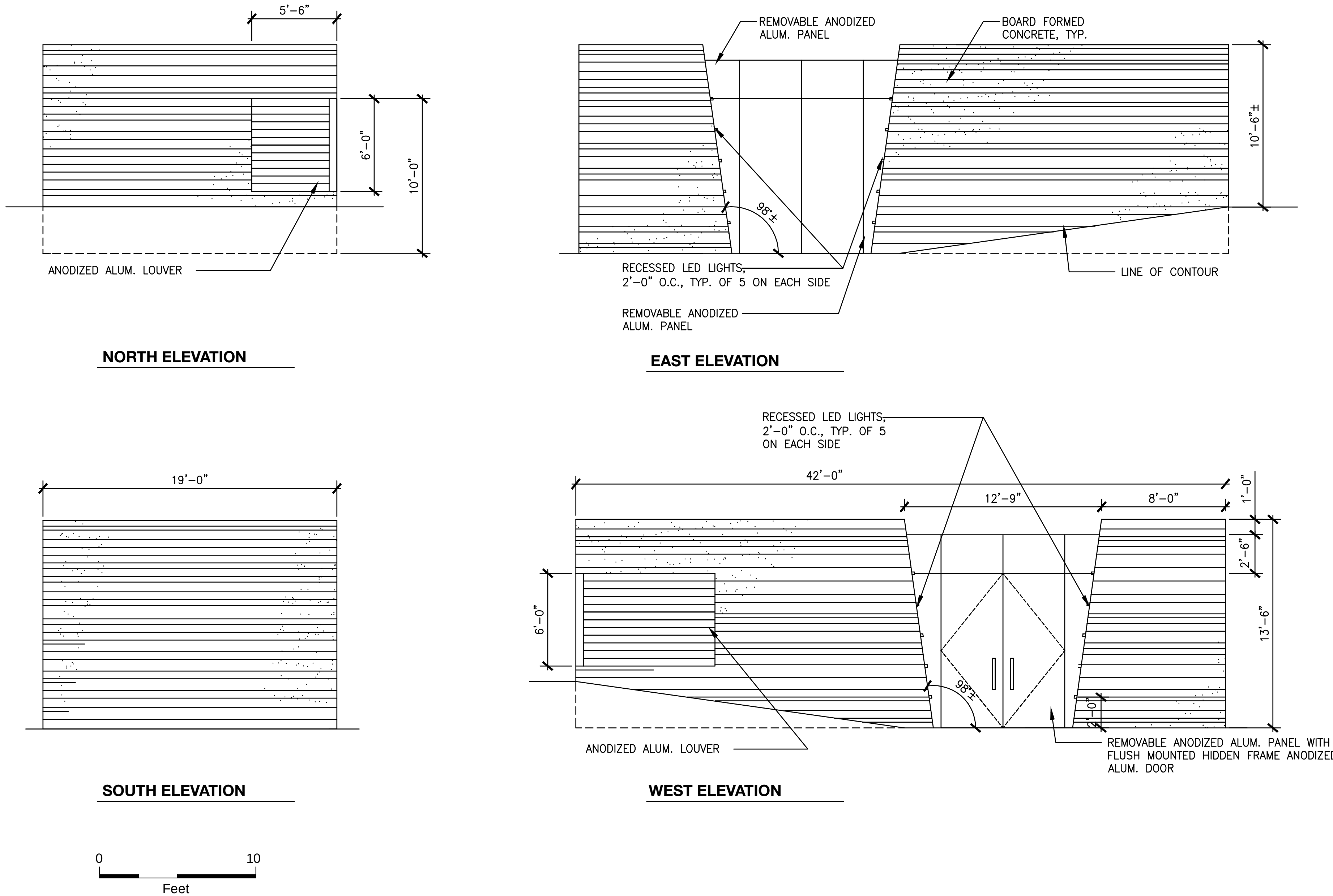
Following construction activities, the site would be landscaped. A grass-pavement system (permeable pavers) would be installed on the west and south sides of the building to support occasional vehicular use. This system incorporates a network of rigid plastic cells below the soil surface to bear the weight of vehicles and avoid soil compaction. This area would be surrounded by a 1-foot retaining wall. A gravel driveway and a small concrete parking area would be provided. The remainder of the surrounding area would be seeded with California native grasses.

SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-12a

Central Pump Station Well Facility - Proposed Project Components and Construction Area



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-12b
Central Pump Station Well Facility - Proposed Building Elevations

Phase 2 Well Facilities

South Windmill Replacement Well Facility

The existing 20-foot by 45-foot irrigation well facility building would be demolished and replaced with a new well facility building (see **Figures 3-13a** and **3-13b**). The proposed facility would be a rectangular 42-foot by 19-foot building. The concrete walls would covered with painted plaster; and the doors would be a green color. The roof of the building would be angular clad in slate shingles. The roof would include a removable translucent panel.

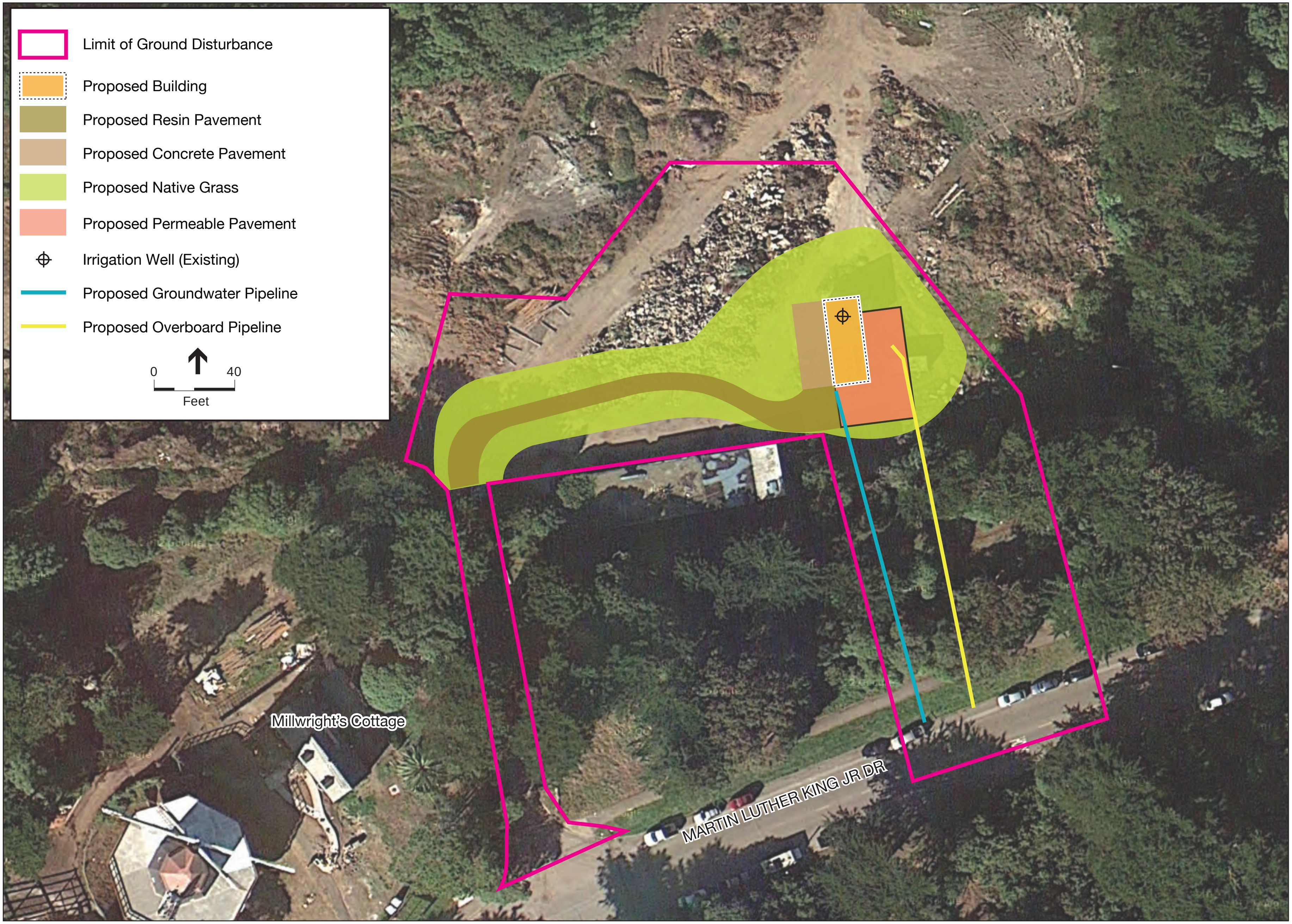
The well facility would be connected to a groundwater pipeline to be installed in Martin Luther King Jr. Drive. This pipeline, described in Section 3.3.3, Pipeline Locations, would connect this well facility, along with the other wells located in Golden Gate Park, to the West Sunset well facility, where the groundwater would be disinfected and then conveyed to Sunset Reservoir. An overboard drain line would be constructed from the well facility to the existing overboard line and French drain on Martin Luther King Jr. Drive. The drain would also collect stormwater runoff from the site. A swivel-ell or air gap would branch off of the main groundwater pipeline using a pipe tee; following implementation of the Westside Recycled Water Project, this design feature would be manually connected by a pipeline to the proposed recycled water system as needed, so that the well could serve as a backup irrigation source. Electricity would be provided by an existing line that is already connected to electrical service. The transformer for this electrical service is located in the vicinity of the Murphy Windmill.

Following construction activities, the site would be graded and planted with California native grasses. A grass-pavement system would be installed on the eastern and southern sides of the building to support occasional vehicular use. A driveway would be repaved with permeable paving, and a small permeable concrete pad would be provided for parking maintenance vehicles. The remainder of the surrounding area would be seeded with California native grasses.

North Lake Well Facility

The North Lake well facility would be at the site of an existing irrigation well facility south of Fulton Street and east of Chain of Lakes Drive East in Golden Gate Park. The existing 46-foot by 16-foot building would be demolished and replaced with a new well facility building (see **Figures 3-14a** and **3-14b**). The new building would be a rectangular 46-foot by 19-foot building. It would be approximately 14 feet high and would have concrete walls, hollow metal doors, and louvered vents. The concrete walls would be a dark stone-gray color; the metal panels would have a lighter gray finish; and the doors would be a charcoal (darker) gray color. The roof of the building would be flat (built-up concrete), and the parapet walls would have an off-center architectural gap. The building would include space for installation of two rotary blowers (air compressors) currently housed in the existing structure for use in aerating North Lake. Exterior lighting, consisting of recessed LED soffit lights above the doors of the building, would be manually operated as needed by operations staff.

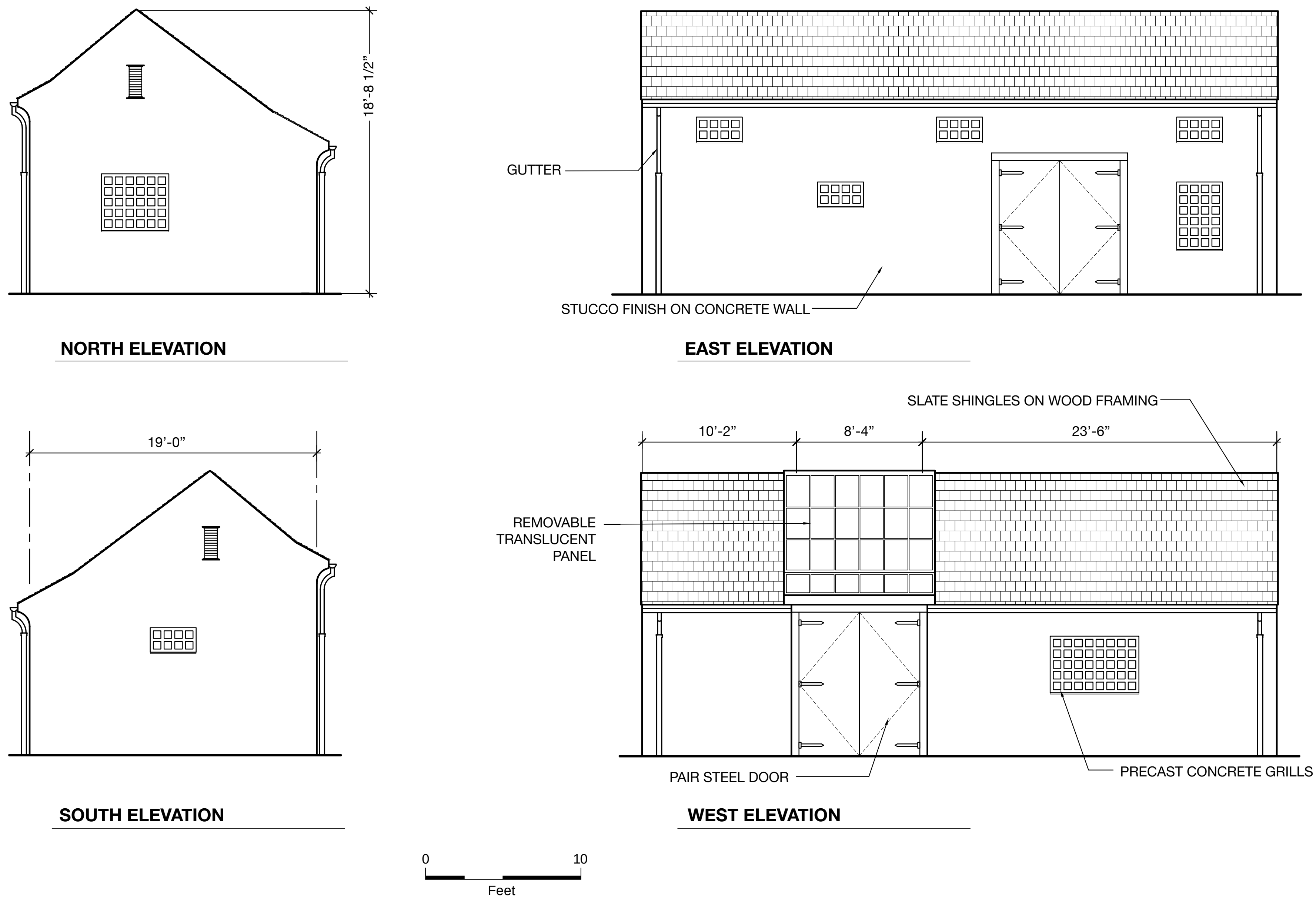
The well facility would be connected to a groundwater pipeline to be installed in Chain of Lakes Drive. This pipeline, described in Section 3.3.3, Pipeline Locations, would connect this well facility, along with the other wells located in Golden Gate Park, to the West Sunset well facility, where the groundwater would be disinfected and then conveyed to Sunset Reservoir. Overboard water would



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-13a
South Windmill Replacement Well Facility -
Proposed Project Components and Construction Area



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-13b
South Windmill Replacement Well Facility - Proposed Building Elevations

be pumped through an existing overboard pipeline to fill North Lake. A swivel-ell or air gap would branch off of the main pipeline using a pipe tee; following implementation of the SFPUC's proposed Westside Recycled Water Project, this design feature would be manually connected by a pipeline to the proposed recycled water distribution system as needed, so that the well could serve as a backup irrigation source. This site includes a pipeline that extends north to Fulton Street, which is the connection point for emergency water supply trucks to receive groundwater from this well facility. Electrical service would be provided via an existing connection to a utility transformer located north of the proposed well facility at Fulton Street.

A grass-pavement system would be installed on the southwest and southeast sides of the building to support occasional vehicular use. The existing driveway would be paved with gravel, and a concrete pad would be provided for maintenance vehicle parking. A retaining wall that is 12 inches high and 40 feet long would be installed on the northwest side of the concrete paving area to contain slope erosion. Finally, a 5-foot-wide concrete pad would be installed around the entire building perimeter. Runoff from the facility roof and grounds would travel by gravity to a sump drain and that would allow stormwater to percolate into the ground. Following construction activities, the remainder of the site would be seeded with California native grasses.

Spoils Disposal

The proposed construction activities at the well facility sites would generate approximately 320 cubic yards of spoils.[6] Excavated soil that is not reused would be stockpiled daily at a staging area for future reuse as part of the project or would be disposed of at an appropriate landfill. Most of the spoils are expected to be Class III nonhazardous waste.[7] If any soil contaminated with hazardous materials were encountered during project activities, it would be characterized and disposed of at an appropriate landfill in compliance with applicable federal, State, and local regulations.

Dewatering

If water were to accumulate in an open excavation as a result of groundwater seepage or precipitation, dewatering could be required to maintain a somewhat dry working environment so that construction activities may proceed. Dewatering typically involves pumping water out of the excavated area and, following appropriate onsite treatment, discharging the water over land or into a nearby sewer drain or open channel. Discharge to the San Francisco combined sewer system would require a permit from the SFPUC Wastewater Enterprise. Discharge to an open channel or over land must be performed in accordance with municipal stormwater permits and the requirements of the Statewide General Construction Permit for Stormwater Discharges Associated with Construction

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6 The maximum amount of project-related spoils that could require disposal was conservatively estimated and likely underestimates the amount of fill that can be reused on site.

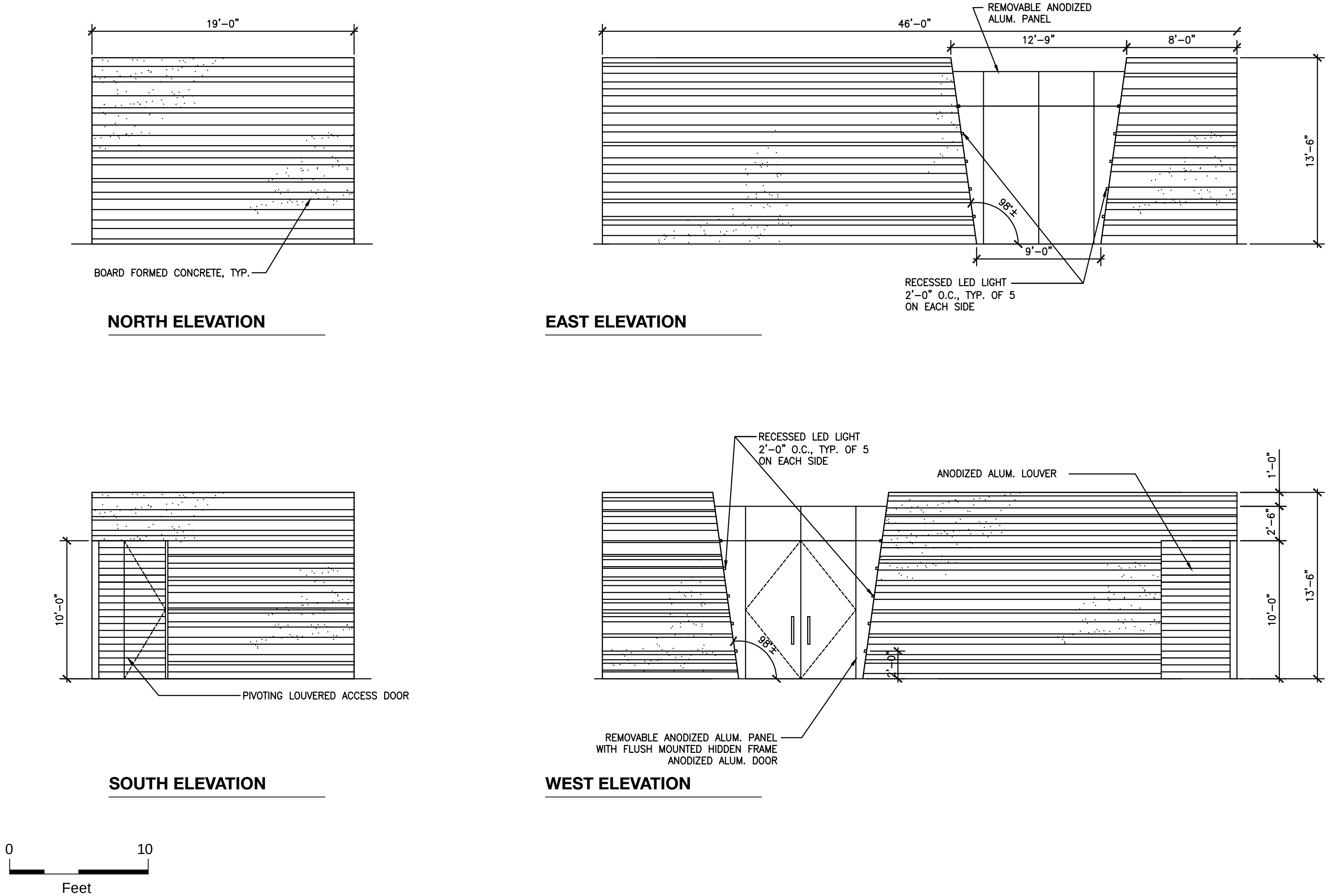
7 The nearest disposal sites or transfer stations for Class III wastes are in San Bruno and South San Francisco, both within about eight miles of the project area. The nearest hazardous waste disposal site is near Kettleman City, approximately 260 miles from the project area. Other disposal options may be available for restricted but nonhazardous waste, and for hazardous waste not subject to the requirements of the Resource Conservation and Recovery Act.

SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-14a

North Lake Well Facility - Proposed Project Components and Construction Area



SOURCE: SFPUC, 2010; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-14b
North Lake Well Facility -
Proposed Building Elevations

Activity issued by the State Water Resources Control Board. Section 5.16, Hydrology and Water Quality, describes permit requirements and required best management practices.

Staging Areas

Each construction area would require a staging area for contractors' construction-related equipment and materials storage (e.g., construction vehicles, building materials, pipes, fuels, lubricants). Contractors could also use staging areas to stockpile excavated soil for reuse. The project staging areas would be located on developed or previously disturbed areas, rights-of-way, or roadsides. Contractors would use staging areas for up to 16 months during well facility construction. Once a staging area is no longer needed, the contractor would restore (i.e., regrade, revegetate, and repave) the area to its general preconstruction condition.

Lake Merced Well Facility. As shown in Figure 3-9a, project staging would occur in an approximately 40-foot by 160-foot undeveloped area. The proposed staging area lies 60 feet east of the well facility site.

South Sunset Well Facility. As shown in Figure 3-10a, construction staging would occur in two areas: an approximately 30-foot by 210-foot area located approximately 25 feet south of the well facility site, on the north side of Wawona Street between 40th and 41st Avenues; and an approximately 10-foot by 210-foot area located approximately 25 feet east of the well facility site on 40th Avenue, in the parking lane on the west side of the street. Road construction signage, traffic cones, K-rail (temporary concrete traffic barriers), portable electric flashing signs, and/or flaggers would be used to direct traffic around the staging area.

West Sunset Well Facility. As shown in Figure 3-11a, project, construction staging would occur in two areas located within the parking lane on the north side of Quintara Street, approximately 60 feet south of the proposed well facility: an approximately 10-foot by 230-foot area between the entrance to the playground parking area and 41st Avenue, and an approximately 10-foot by 100-foot area east of the entrance to the playground parking lot.

Central Pump Station Well Facility. Construction staging would occur adjacent to the south side of Overlook Drive, in an area currently used by SFRPD for temporary storage of mulch and other materials.

South Windmill Replacement Well Facility. Construction staging would occur in the approximately 0.75-acre construction area surrounding the existing well facility. The staging area would be west of the well facility site in an approximately 120-foot by 80-foot area.

North Lake Well Facility. Project construction staging would be located along the existing access road to the facility.

Site Access

Most of the project sites are directly accessible from existing public roadways and SFPUC or SFRPD service roads. The proposed Central Pump Station well facility site would require site clearance, and grading to develop a permanent access driveway (see Figure 3-12a). Local and regional roadways would be used to haul construction materials; these roads would be designated based on the San Francisco Metropolitan Transportation Agency Truck Traffic Route Map (SFMTA, 2010). The project does not propose lane closures of public streets, with the exception of the South Sunset well facility, which includes construction staging areas on Wawona Street and 40th Avenue, and the West Sunset Well Facility, which includes construction staging areas within the parking lane along Quintara Street.

Project Workforce

Development of each new groundwater well facility would require an average of four construction workers, with up to eight workers during peak construction periods. According to the proposed project schedule, construction activities could overlap at all six well facilities at certain times. In this event, there could be an average of 24 construction workers, with up to 48 workers during peak construction periods.[8]

Construction Equipment

Site preparation and foundation work for each well facility is expected to require a front-end loader, excavator, and roller compactor. Aboveground project components, such as well facilities and pumps, would be constructed using a forklift, telescopic crane, and pump-setting rig. An arc welder would also be necessary for facility construction. Two hauling trucks and six pickup trucks would be used to transport equipment and other materials. A diesel generator (with self-contained fuel tanks) might also be needed during construction. **Table 3-4** presents the estimated equipment usage at each construction area.

TABLE 3-4
EQUIPMENT USAGE FOR WELL FACILITY CONSTRUCTION

	Construction Usage per Well Facility		
Equipment	**Number of Each Equipment Type**	**Duration of Use (weeks[a])**	**Daily Usage (hours/day)**
Front-End Loader	1	7	6
Excavator	1	7	6
Forklift	1	14	2
Telescopic Crane	1	8	8
Roller Compactor	1	7	8
Hauling Trucks	2	60	2
Pump-Setting Rig	1	1	8
Arc Welder	1	4	8
Pickup	6	60	1
Generator	1	9	8
Vibrocompactor[b]	1	8	8

[a] Weeks are composed of five-day work weeks.
[b] Required at the Lake Merced well facility only.

SOURCE: SFPUC, 2012b

[8] This number does not include truck drivers associated with material deliveries or spoils disposal.

3.4.2 Pipeline Construction

Figures 3-1 and 3-8 show the locations of the proposed pipeline infrastructure and connection points with the Lake Merced Pump Station and Sunset Reservoir. The proposed groundwater transmission pipelines would be 8 inches to 16 inches in diameter and would consist of cement-lined ductile iron. **Table 3-5** provides specific information about each pipeline segment, including the construction footprints for the pipeline, trench, and driving/receiving pits and the estimated excavation volumes. The pipeline alignment would primarily be located within existing roadways; after pipeline construction activities are completed, the roadways would be restored to their general preconstruction conditions. Tree removal would only be required adjacent to the well facilities, because all other pipeline construction would occur within roadways. Section 3.4.1, Groundwater Well Facilities, identifies the number of trees that would removed at each well facility site. The following subsections describe the activities associated with pipeline construction.

Construction Activities

In general, the pipeline alignments would be excavated to a depth of 6 feet. The trench construction corridor for all project activities would generally be 10 feet wide for single pipeline alignments. The trench construction corridor would be 16 feet wide for the few segments where two or three groundwater pipelines, electrical, and/or overboard utility lines would extend along the same route (e.g., sections of Quintara Street and 41st Avenue near the West Sunset well facility). The open-cut trench method would generally be used for most of the pipeline construction. This method involves the following steps: initial delineation and ground-clearing of the work area; grading or pavement cutting; excavation of the trench; placement of the pipe; backfilling of the trench; and restoration of the work surface. Typically, an approximately 4-foot-wide by 6-foot-deep trench would be excavated to install 8-inch-diameter pipeline sections. Occupational Safety and Health Administration standards require shoring for trenches that are 5 feet or greater in depth to prevent the surrounding soil and adjacent structures from collapsing. Shoring would be performed using methods such as speed shoring (plywood siding with a cross-brace system), prefabricated trench boxes along the inside of the trench, or drilled soldier piles with lagging. It would be necessary to dewater trenches in areas where groundwater is encountered (see the section below entitled "Dewatering" for further information).

The pipeline route would cross the L-Taraval San Francisco Municipal Railway (MUNI) light rail line at its intersection with 41st Avenue, and the N-Judah MUNI light rail line at its intersection with 41st Avenue. Trenchless construction (auger boring) would be used to tunnel under the light rail lines without disturbing the lines or other underground utilities in these areas. A driving pit and receiving pit would be required to be excavated for each MUNI light-rail crossing, the dimensions of which are shown on Table 3-5. Shoring of these pits would be performed as discussed above. Dewatering of pits would be performed if groundwater is encountered.

Once the open-cut trench is excavated and shored, structural fill bedding material (sand) would be placed along the bottom of the trench, and the new pipe section would then be lowered by crane or backhoe and fitted into place using self-locking push-on pipe joints. Prior to installation, the joints

TABLE 3-5
SUMMARY OF PROPOSED PIPELINE CONSTRUCTION REQUIREMENTS

Pipeline Segment	Construction Task	Construction Area[a]	Depth of Excavation / Quantity of Excavation and Fill
PHASE 1			
1. West Sunset Well Facility to Sunset Reservoir			
• Quintara Street (west) to 41st Avenue • 41st Avenue (north) to Ortega Street • Ortega Street (east) to 24th Avenue • 24th Avenue (south) to Sunset Reservoir	• Install pipeline using open-cut excavation	Pipeline: 6,860 feet long: 4-foot-wide trench along Ortega Street and 24th Avenue 6-foot wide trench along 41st Avenue between Ortega Street and Quintara Street 8-foot wide trench along Quintara Street	Depth: 6 feet Excavation: 6,900 cubic yards Fill:[b] 6,500 cubic yards Spoils:[c] 400 cubic yards Structural fill:[d] 300 cubic yards
2. Golden Gate Park Pipeline Junction to West Sunset Playground			
Golden Gate Park pipeline junction located at intersection of Chain of Lakes Drive East and Martin Luther King Jr. Drive • Chain of Lakes Drive East/41st Avenue (south) to Quintara Street • Quintara Street (east) to 40th Avenue	• Install pipeline using open-cut excavation	Pipeline: 4,920- x 4-foot-wide trench[e]	Depth: 6 feet Excavation: 4,400 cubic yards Fill: 4,000 cubic yards Spoils: 400 cubic yards Structural fill: 300 cubic yards
Auger Boring under Judah Street			
	• Auger bore under N-Judah San Francisco Municipal Railway light rail line	Pipeline length: 100 feet Driving pit: 10-foot-wide x 25-foot long x 12-foot deep Receiving pit: 6-foot wide x 8-foot long x 10-foot deep	Depth: 12 feet (maximum) Excavation: 150 cubic yards Fill: 120 cubic yards Spoils: 30 cubic yards Structural fill: 10 cubic yards
3. Central Pump Station Well Facility to Golden Gate Park Pipeline Junction			
• Overlook Drive/Middle Drive West/ Martin Luther King Jr. Drive (west) to Chain of Lakes Drive	• Install pipeline using open-cut excavation	Pipeline: 5,800- x 4-foot-wide trench	Depth: 6 feet Excavation: 5,200 cubic yards Fill: 4,700 cubic yards Spoils: 500 cubic yards Structural fill: 400 cubic yards
4. South Sunset Well Facility to West Sunset Well Facility			
• 40th Avenue (north) to Vicente Street • Vicente Street (west) to 41st Avenue • 41st Avenue (north) to Quintara Street • Quintara Street (east) to 40th Avenue	• Install pipeline using open-cut excavation	Pipeline: 4,460- x 4-foot-wide trench[f]	Depth: 6 feet Excavation: 4,000 cubic yards Fill: 3,700 cubic yards Spoils: 300 cubic yards Structural fill: 240 cubic yards

TABLE 3-5 (Continued)
SUMMARY OF PROPOSED PIPELINE CONSTRUCTION REQUIREMENTS

Pipeline Segment	Construction Task	Construction Area[a]	Depth of Excavation / Quantity of Excavation and Fill
PHASE 1 (cont.)			
4. South Sunset Well Facility to West Sunset Well Facility (cont.)			
Auger Boring under Taraval Street			
	• Auger bore under L-Taraval MUNI light rail line	Pipeline length: 100 feet Driving pit: 10-foot wide x 25-foot long x 10-foot deep Receiving pit: 6-foot wide x 8-foot long x 8-foot deep	Depth: 10 feet (maximum) Excavation: 110 cubic yards Fill: 100 cubic yards Spoils: 10 cubic yards Structural fill: 10 cubic yards
TOTALS			
			Phase 1 subtotals: Excavation: 20,760 cubic yards Fill: 19,120 cubic yards Spoils: 1,640 cubic yards
PHASE 2			
5. North Lake Well Facility to Golden Gate Park Pipeline Junction			
• Chain of Lakes Dr. East (south) to Martin Luther King Jr. Drive	• Install pipeline using open-cut excavation	Pipeline: 2,740- x 4-foot-wide trench	Depth: 6 feet Excavation: 2,440 cubic yards Fill: 2,240 cubic yards Spoils: 200 cubic yards Structural fill: 150 cubic yards
6. South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction			
• Martin Luther King Jr. Drive (east) to Chain of Lakes Drive	• Install pipeline using open-cut excavation	Pipeline: 2,080- x 4-foot-wide trench	Depth: 6 feet Excavation: 1,850 cubic yards Fill: 1,700 cubic yards Spoils: 150 cubic yards Structural fill: 120 cubic yards
TOTALS			
			Phase 2 subtotals: Excavation: 4,290 cubic yards Fill: 3,940 cubic yards Spoils: 350 cubic yards
			Phases 1 and 2 totals: Excavation: 25,050 cubic yards Fill: 23,060 cubic yards Spoils: 1,990 cubic yards

[a] "Construction Area" refers to the areas of construction disturbance associated with pipeline construction.
[b] "Fill" refers to soil placed back in the excavation.
[c] "Spoils" refers to soil remaining from an excavation after backfilling is completed. Spoils could expand by up to approximately 20% as soils are less compact once excavated.
[d] "Structural fill" refers to new material added to an excavation for structural purposes.
[e] Excludes lengths accounted for in common excavation in Segment 1 (above); namely, 41st Avenue between Ortega Street and Quintara Street, and along Quintara Street
[f] Excludes length along Quintara Street; accounted for in common excavation of Segment 1

SOURCE: SFPUC, 2009a

would be inspected. To prevent corrosion, polyethylene sheets would be wrapped around the pipelines prior to installation. In addition, the pipeline segments and protective steel pipe casing proposed to extend beneath the MUNI crossings would also be provided with cathodic protection.[9] The excavated fill material would be reused to backfill the trenches and driving/receiving pits. Following compaction of the backfill, the work surface area would be restored to its general preconstruction condition in accordance with San Francisco Department of Public Works (SFDPW) design standards. Excavated material that was not reused for backfill, such as broken pavement and any excess soil, would be disposed of offsite at an approved location.

Pipeline construction using the open-cut trench method would progress at an estimated rate of 60 to 120 feet per day, or 300 to 600 feet per week. This rate is equivalent to approximately one to two weeks per city block, depending on the block length. Subsequent final paving would progress at approximately 300 feet per day, or about two days per city block, and would occur after a substantial length of pipeline had been constructed. The range of daily and weekly progress takes into account the potential for non-continuous construction activities.

Trenchless pipeline construction would require approximately four weeks per MUNI crossing. Final paving of these areas would be performed in conjunction with the final paving for that pipeline segment.

Excavation and Stockpiling of Soil

As described above, trench excavations for the proposed pipeline alignments would be approximately 6 feet deep and 4 feet wide. The excavated soil would be used as the primary source of backfill material, supplemented as necessary with structural fill materials (e.g., imported subbase aggregate and sand). Phase 1 pipeline construction would require excavation of approximately 20,760 cubic yards of soil, of which approximately 19,120 cubic yards would be reused for backfilling. Approximately 25,050 cubic yards of soil excavation would be required for Phases 1 and 2 combined. Approximately 23,060 cubic yards of excavated soil would be used for backfilling for Phases 1 and 2.

Spoils Disposal

Pipeline construction is expected to generate a total of approximately 1,990 cubic yards of excess spoils. At the end of each day, any excavated soil that is not reused in a trench would be stockpiled at a staging area for reuse as part of the project or disposed of at an appropriate landfill. Most of the spoils material is expected to be Class III nonhazardous waste. If any soil contaminated with hazardous materials were encountered, it would be characterized, transported, and disposed of at an appropriate landfill in compliance with applicable federal, State, and local regulations.

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[9] Cathodic protection is used to prevent the corrosion of metal in underground pipelines. "Sacrificial" metallic anodes, consisting of small cables connected to the pipeline, are designed to corrode in place to prevent the pipeline from corroding.

Dewatering

It is not expected that substantial near-surface groundwater would be encountered at any of the pipeline alignments. However, if water were to accumulate in an open construction trench or driving/receiving pit as a result of groundwater seepage or precipitation, dewatering of the construction work area would be required. Dewatering typically involves pumping water out of the trench/pit and, following appropriate onsite treatment, discharging the water over land or into a nearby sewer or open channel. Discharge to the San Francisco combined sewer system would require a permit from the SFPUC Wastewater Enterprise, and most of the proposed project sites would be subject to these requirements. Discharge to an open channel or over land must be performed in accordance with municipal stormwater permits and the requirements of the Statewide General Construction Permit for Stormwater Discharges Associated with Construction Activity issued by the State Water Resources Control Board. Permit requirements and mandatory best management practices are discussed in Section 5.16, Hydrology and Water Quality.

Temporary In-road Work Areas, Permits, and Approvals

Most of the pipeline alignments would be located within existing public roadways. Prior to pipeline construction, the SFPUC's contractor would coordinate with the San Francisco Department of Public Works and Department of Parking and Traffic to obtain any necessary construction permits. Construction activities would also be coordinated with MUNI's Street Operations office to reduce any impacts on transit operations. All temporary construction easements and permits, where applicable, would be obtained prior to starting construction.

During project construction, single-lane closures would be necessary along the pipeline routes located in the Sunset District, which would require implementation of two-way, alternating traffic in the remaining available lane. As noted above, pipeline construction would proceed at an estimated rate of approximately one to two weeks per city block, depending on the block length. Single-lane closures on any given block along the construction corridor would last for one to two weeks, coinciding with pipeline construction as it proceeds block-by-block. Any temporary sidewalk or traffic lane closures would be coordinated with the appropriate city departments in an effort to minimize traffic impacts. In general, lane and sidewalk closures would be subject to review and approval by San Francisco's Transportation Advisory Staff Committee, which consists of representatives of the San Francisco Metropolitan Transportation Agency, Department of Public Works, San Francisco Fire Department, San Francisco Police Department, San Francisco Department of Public Health, and the Port of San Francisco. Transportation advisory staff would determine whether it is preferable to temporarily remove parking on both sides of some streets to allow for two-way traffic.

For the proposed pipeline routes along 24th and 40th Avenues, the pipeline would be constructed in the center of the western lane of these two-lane roads. For the proposed pipeline route along 41st Avenue, the pipeline would be constructed in the center of the western lane of this two-lane road. Public parking in the opposite lane would be prohibited during pipeline construction. Along Ortega Street, the pipeline would be located in the center of the southern lane, and public parking would be prohibited in this lane during pipeline construction. The pipeline segment along Quintara Street would be located in the center of the northern lane, and public parking would be prohibited in this lane during pipeline construction. Pipeline construction across Sunset Boulevard (intersection with Ortega Street) would be phased to minimize lane closures.

As with pipeline construction in the Sunset District, single-lane closures would be necessary during pipeline construction in Golden Gate Park; these closures would coincide with pipeline construction as it proceeds block-by-block at an estimated rate of 60 feet per day. Lane closures would extend for approximately one city block at any given time along Martin Luther King Jr. Drive, Middle Drive West, Overlook Drive, and the John F. Kennedy Drive crossing, which would require the implementation of two-way, alternating traffic in the remaining available lane. The pipeline would be installed in the center of a single lane within each roadway. During pipeline construction, public parking would be prohibited along the lane under construction. Because Chain of Lakes Drive is narrower than these other roadways, full closure of Chain of Lakes Drive East would be required for approximately 0.5 mile (between the Chain of Lakes Drive entrance to the North Lake well facility) during pipeline construction along this roadway; with closure only within the section of roadway under construction (i.e., the entrance to the well facility to John F. Kennedy Drive; John F. Kennedy Drive to Martin Luther King Jr. Drive). Pipeline installation activities along Chain of Lakes Drive East would be phased so that during times of active work between the Equitation Field to John F. Kennedy Drive, vehicle access to the Equitation Field would be maintained from Martin Luther King Jr. Drive, and vice versa. The pipeline route would be located near the center of the roadway, and the construction corridor would occupy the entire roadway. Access would be restored during non-construction hours by covering trenches with steel plates or the equivalent.

Staging Areas

Staging areas would be established adjacent to pipeline alignments throughout the project area, and potentially along the eastern curb lane of 37th Avenue, for the storage of contractors' construction equipment and materials (e.g., vehicles, pipes, fuels, lubricants). The staging areas might also be used to stockpile excavated soil for eventual reuse by the project during construction. For pipeline construction, all project staging is expected to occur within the identified 10- to 16-foot-wide construction corridor. The staging areas would be occupied for the duration of the construction period for the associated pipeline segment. Staging areas would be relocated as necessary to follow the pipeline construction as it progresses, block-by-block, along the pipeline route. Once pipeline construction at each location is completed (typically over a seven-week period) and the staging area is no longer needed, the area and roadway would be restored to their general pre-project conditions and in accordance with SFDPW design standards.

Within Golden Gate Park, construction contractors would use the in-street pipeline construction corridor and staging areas located at the well facilities to stage equipment and materials. Staging areas would operate for the duration of the construction period for each pipeline segment and would be relocated as necessary to follow pipeline construction as it progresses along the pipeline route. All paved roadways and unpaved areas would be restored to their general preconstruction conditions.

Site Access

Existing public roadways or unpaved service roads would provide the primary access routes to all pipeline construction areas and staging areas. The SFPUC would require the contractor develop a Construction Management Plan in accordance with Public Works Code Article 2.4 and per SFMTA requirements for construction work occurring within these public roadways. The SFPUC's contractor would coordinate implementation of the Construction Management Plan to manage traffic traveling to and from Golden Gate Park in accordance with a permit obtained from the Department of Public Works, Bureau of Streets and Mapping. The street alignment plans of the San Francisco Department of Parking and Traffic would be included in the contract documents for use by the contractor. The SFPUC's contractor would also coordinate with the SFRPD to manage traffic within Golden Gate Park, as access to some park facilities would be altered due to the temporary closure of the Chain of Lakes Drive entrance during construction.

For pipeline construction within residential areas, the SFPUC would require construction contractors to ensure adequate access to residential and commercial driveways/garage entrances.

Project Workforce

Construction for sequential installation of pipeline segments would require a construction crew consisting of approximately 10 to 15 workers. One major segment (e.g., West Sunset well facility to Sunset Reservoir) would be under construction at any given time.[10]

Construction Equipment

Pipeline installation would typically require a pavement breaker, two backhoe loaders, and a bobcat/skip loader. Two hauling trucks and seven pickup trucks would be used to transport pipelines, equipment, soil, and other materials. A compactor would also be needed for infill compaction. In addition, an excavator, arc welder, and additional auger boring equipment would be required for MUNI light rail line crossings. A diesel generator (with self-contained fuel tanks) might also be needed during construction. **Table 3-6** shows the estimated equipment usage for each segment, based on estimates for the longest segment (7,280 feet).

3.4.3 Sunset Reservoir Construction

● The project facilities to be located at Sunset Reservoir would be within or attached to existing buildings, with the exception of the chlorine analyzer and sample station, and-chemical injection piping, a vault, and an electrical conduit, which would be below grade. After piping installation, surface conditions along the alignment would be restored to their general preconstruction conditions. Tree removal would not be required. Construction of the Sunset Reservoir facilities are described below.

[10] This number does not include truck drivers associated with material deliveries or spoils disposal.

TABLE 3-6
EQUIPMENT USAGE FOR PIPELINE CONSTRUCTION

	Construction Usage Per Segment[a]		
	Number of Each Equipment Type	Duration of Use (weeks)[b]	Daily Use (hours/day)
Backhoe Loader	2	16	8
Hauling Trucks	2	16	2
Compactor	1	16	2
Pickup[c]	7	16	1
Generator	1	16	1
Excavator[d]	1	2	8
Arc Welder[e]	1	1	2
Trenchless Pipeline Construction (at MUNI crossings)[e]	1	1	8
Bobcat/Skip Loader	1	16	2

[a] Estimates are based on the construction duration for the longest pipeline segment (16 weeks).
[b] Weeks are composed of five-day work weeks.
[c] Pickup use for short-haul trips at construction areas. Does not include use for worker commuting.
[d] An excavator would be used for excavating and backfilling the pits needed for the trenchless pipeline construction
[e] Trenchless pipeline construction would be performed for the two MUNI light rail crossing segments only. Equipment usage represents the auger/boring machinery and arc welder only. The other equipment needed is accounted for in the table.

SOURCE: SFPUC, 2012b

Construction Activities

Construction activities at Sunset Reservoir would include:

- Installation of two 12-inch flow meters within vaults located on the east side of Sunset Reservoir.
- Installation of a concrete pad and a chlorine analyzer and sample station at the northwest corner of Sunset Reservoir.
- Modification of the existing Sunset Chlorine Station located west of the west side of the reservoir's north and south basins. Modifications would include the addition of a pH adjustment facility on the northeast side of the existing chlorine station. The facility would be approximately 15 feet long by 11 feet wide and approximately 11 feet high. The existing Sunset Chlorine Station is approximately 32 feet long by 17 feet wide and is approximately 13 feet high. The proposed facility would include two sodium hydroxide storage tanks and two chemical metering pumps, including secondary chemical containment features, and an emergency shower/eyewash.
- Installation of approximately 350 feet of chemical injection piping below grade between the building and the north and south basins of the reservoir. Some of the piping would be installed along the side of an existing culvert; however, approximately 95 feet of the piping would be installed via an excavated trench.
- Installation of a concrete vault west of the south basin, near the existing fence along 28th Avenue, which would provide installation and maintenance access for a proposed reservoir surface water inlet flow meter. The vault would be approximately 5 feet wide, 5 feet long, and 25 feet deep.

- Installation of approximately 165 linear feet of electrical conduit that would connect the proposed flow meter to the existing Sunset Chlorine Station.

Excavation and Stockpiling of Soils

Trench excavations for the proposed chemical injection piping would be 1.25 to 2.25 feet deep by 1.25 feet wide, and trench excavations for the proposed electrical conduit would be 2 feet deep by 1.25 feet wide. Approximately 355 cubic yards of soil would be excavated for construction of the Sunset Reservoir facilities, and this soil would be used as the primary source of backfill material. The excavated materials would be~~,~~ supplemented as necessary with approximately 20 cubic yards of structural fill material (e.g., imported sand and aggregate subbase).

- [text deleted]

Spoils Disposal

- Construction of the Sunset Reservoir facilities could generate approximately 100 cubic yards of excess spoils. At the end of each day, excavated soil that is not reused for grading or trench backfill would be stockpiled for reuse as part of the project or disposed of at an appropriate landfill. Most of the spoils material is expected to be Class III non-hazardous waste. If any soil contaminated with hazardous materials were encountered, it would be characterized, transported, and disposed of at an appropriate landfill in compliance with applicable federal, State, and local regulations.

Dewatering

- The chemical injection piping would be within and in the vicinity of existing underground chemical and sample piping and culverts, and the pH adjustment facility would be immediately adjacent to the existing Sunset Chlorine Station. Given the presence of existing piping, culverts, and structures, it is not expected that near-surface groundwater would be encountered during construction of the Sunset Reservoir facilities. However, construction of the flow meter access vault would require excavation that is slightly over 25 feet deep, and near-surface groundwater could be encountered. If water were to accumulate in an open construction pit or trench as a result of groundwater seepage or precipitation, dewatering of the construction work area would be required. Dewatering typically involves pumping water out of the trench/pit and, following appropriate onsite treatment, discharging the water over land or into a nearby sewer or open channel. Discharge to the San Francisco combined sewer system would require a permit from the SFPUC Wastewater Enterprise, and most of the proposed project sites would be subject to these requirements. Discharge to an open channel or over land must be performed in accordance with municipal stormwater permits and the requirements of the Statewide General Construction Permit for Stormwater Discharges Associated with Construction Activity issued by the State Water Resources Control Board. Permit requirements and mandatory best management practices are discussed in Section 5.16, Hydrology and Water Quality.

Staging Areas

Construction staging would be located within the Sunset Reservoir access roads and parking areas, adjacent to work areas. In addition, up to 6 street parking spaces along the east side of 28th Avenue would be required for workers and construction inspectors.

Site Access

Access to the Sunset Reservoir construction areas would be from existing public roadways, including 24th Avenue, 28th Avenue, and Ortega Street. Local and regional roadways would be used to haul construction materials; these roads would be designated based on the San Francisco Metropolitan Transportation Agency Truck Traffic Route Map (SFMTA, 2010). The project does not propose lane closures of public streets.

Project Workforce

Construction activities at Sunset Reservoir would require 3 to 5 workers.

Construction Equipment

Table 3-7 shows the estimated equipment usage for construction activities at Sunset Reservoir.

●

TABLE 3-7
EQUIPMENT USAGE FOR SUNSET RESERVOIR CONSTRUCTION ACTIVITIES

	Construction Usage		Daily Use (hours/day)
	Number of Each Equipment Type	**Duration of Use (weeks)[a]**	
Backhoe Loader	1	3	6
Forklift	1	8	2
Telescopic Crane	1	1	4
Hauling Trucks	2	8	2
Manual Compactor	1	4	6
Pickup[b]	3	32	1
Bobcat Compact Excavator	1	3	6
Excavator	1	1	6

[a] Weeks are composed of five-day work weeks.
[b] Pickup use for short-haul trips at construction areas. Does not include use for worker commuting.

SOURCE: SFPUC, 2012b

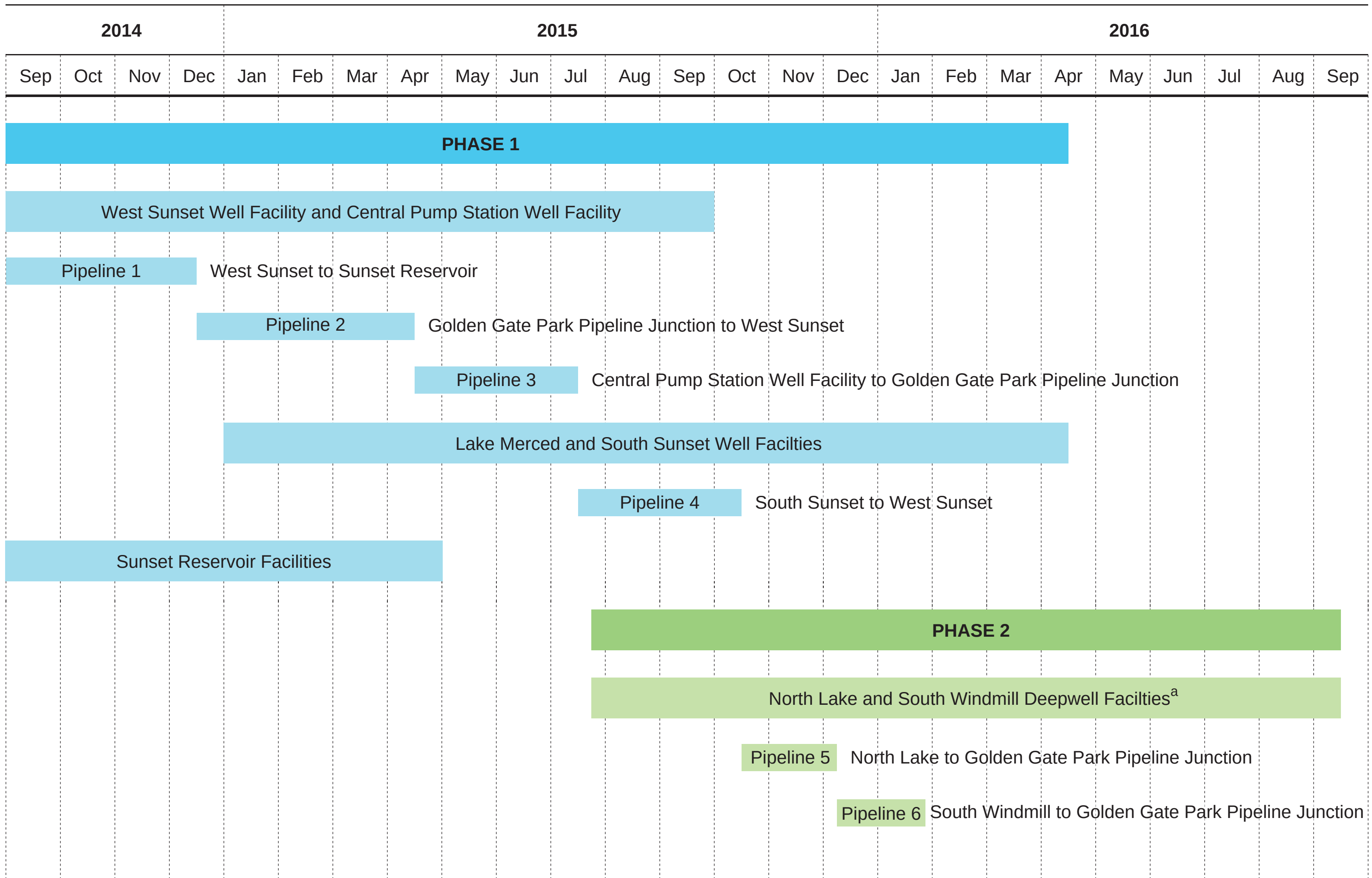
3.4.4 Construction Schedule

Project construction would occur in two phases, as shown in **Figure 3-15**. Implementation of Phase 2 of the Groundwater Supply Project would only occur following approval and implementation of the SFPUC's proposed Westside Recycled Water Project (see Section 3.3.1, Overview).

- Phase 1 is expected to begin in fall 2014 and conclude in spring 2016, approximately 19.5 months. This phase includes construction of the West Sunset well facility, the well facility in Golden Gate Park (at the Central Pump Station well facility site), the Lake Merced well facility, and the South Sunset well facility. The pipeline sections extending to these well facilities and to the Sunset Reservoir inlet piping (Pipeline Segments 1, 2, 3, and 4), and the Sunset Reservoir facilities would also be constructed during this stage.

- Depending on the timing of the Westside Recycled Water Project, Phase 2 of construction could begin as early as summer 2015 and conclude in fall 2016, approximately 14 months. Phase 2 would consist of converting two existing irrigation wells in Golden Gate Park (North Lake and South Windmill Replacement well facilities) to supply municipal water. The existing well facility buildings would be demolished and replaced with similarly sized new well facility buildings. The pipelines to these sites (Pipeline Segments 5 and 6) would also be constructed during this stage. These existing irrigation wells would only be converted to supply municipal water after construction of the Westside Recycled Water Project.

● **Table 3-8** provides the approximate duration of construction work necessary at each well facility site and for the Sunset Reservoir facilities, as well as the installation rate for the pipeline system. Well facilities construction would require approximately 15 to 18 months at each site. Construction activities are proposed to occur primarily



NOTE:
a Construction of the North Lake and South Windmill Deepwell facilities would only occur after approval of the San Francisco Westside Recycled Water Project.

SOURCE: SFPUC; ESA

San Francisco Groundwater Supply Project EIR

Figure 3-15 (Revised)
Construction Phasing

TABLE 3-8
CONSTRUCTION DURATION BY ACTIVITY TYPE

Construction Activity	Expected Duration per Facility
Well Facility	
Site Clearing, Grubbing, and Preparation	2 – 9 weeks
Foundation and Utility Connections	5 – 8 weeks
Building Construction and Equipment Installation	10 months
Startup, Testing, and Demobilization	4 months
Total Construction	**15 – 18 months**
Pipeline Installation	
Normal Construction Rate – Open-Cut Trench	300 – 600 feet per week
Trenchless Pipeline Construction (concurrent with open-cut trench)	4 weeks per site
Total Construction	**7 – 16 weeks per segment**
Sunset Reservoir Facilities – Total Construction	**8 months**

during the daytime hours (7:00 a.m. to 5:00 p.m.[11]), five days a week on non-holiday weekdays (Monday through Friday). No nighttime construction would occur and therefore a night noise permit (i.e., between 8 p.m. and 7 a.m.) would not be required. No weekend construction work would occur. In advance of project construction, SFPUC would provide a 10-day public notice describing project construction activities, schedule information, anticipated effects such as temporary closure of parking spaces or detours, and contact information. The notice would be distributed to adjacent properties and included on the SFPUC website along with project information.

As stated in Section 3.4.2, Pipeline Construction, the location of active pipeline excavation would continue to advance along the pipeline alignment. In general, pipeline installation would progress at a rate of 60 to 120 feet per day, or 300 to 600 feet per week. However, construction activities might not be continuous. For example, there could be up to several days between the completion of excavation and the beginning of pipe installation. The range of daily and weekly progress takes into account the potential for non-continuous construction activities.

At the two locations where auger boring (trenchless) construction is proposed (i.e., beneath both the N-Judah and L-Taraval MUNI light rail lines), two pits (a driving pit and a receiving pit) would be constructed on either side of the rail lines. Construction of the driving pit would take approximately one week. The horizontal boring, installation of a pipe sleeve, and then the installation of pipeline itself would take one week, during which time the receiving pit would be simultaneously excavated. Backfill and temporary pavement restoration would take about one week. The total expected duration of each trenchless operation would be approximately four weeks. Final paving of these areas would be performed in conjunction with the final paving for that pipeline segment.

[11] Truck and worker trips at project facility sites would end at 4:30 p.m. However, trucks leaving the sites at 4:30 p.m. would not reach their destinations until about 5:00 p.m.

3.4.5 SFPUC Standard Construction and Greenhouse Gas Reduction Measures

The SFPUC has established Standard Construction Measures (SFPUC, 2007) that would be implemented as part of all WSIP projects, including the proposed Groundwater Supply Project. The main objective of these measures is to reduce impacts on existing resources to the extent feasible. The Standard Construction Measures include activities such as early identification of sensitive environmental resources in the project area and notification of businesses, owners, and residents in areas adjacent to the WSIP projects regarding the nature, extent, and duration of construction activities. The SFPUC would ensure that the proposed project's contract specifications contain uniform minimum provisions to address these issues. The SFPUC would also implement the following greenhouse gas measure in all contractor specifications, and implement the third measure during project planning and design, which, in addition to having other environmental benefits, would also help reduce greenhouse gas emissions:

- The SFPUC will require that all contractors maintain tire inflation to the manufacturers' inflation specifications.
- The SFPUC will implement a construction worker education program for the proposed project.
- Since this is a WSIP project that includes the construction of new buildings, the SFPUC has consulted with the SFPUC Power Enterprise's Energy Efficiency Group to incorporate all feasible energy efficiency best practice measures for unoccupied pump stations into the project design. The practices to be incorporated would include:
    - Use of recommended lighting equipment and controls to achieve recommended illumination levels;
    - Incorporation of natural lighting through skylights;
    - Controlled, minimal exterior lighting;
    - Use of variable frequency drives for pumps;
    - Use of controls on ventilation equipment;
    - Direct drive ventilation fans; and
    - Use of weather-resistant materials to extend facility and equipment life.

3.5 Operations and Maintenance

3.5.1 Operations

Groundwater Supply System Operation

As described in Section 3.3, Overview, operation of the Groundwater Supply Project wells would be constructed in two phases. Phase 1 would include operation of four new groundwater well facilities (Lake Merced, South Sunset, West Sunset, and Central Pump Station). During operation of Phase 1, the Central Pump Station well would serve as a source of backup irrigation supply for the park if needed. Phase 2, which would proceed only after the SFPUC's proposed Westside Recycled Water Project is approved and implemented, would include conversion of two irrigation wells (South Windmill Replacement and North Lake well facilities) and operation of all six wells. With implementation of Phase 2, the converted irrigation wells and the new well in Golden Gate Park would continue to serve as backup sources of irrigation supplies for the park when recycled water is not available due to maintenance, emergencies, or other unforeseen situations.

Normal Operation

Table 3-9 indicates the average pumping rates for each well facility under Phases 1 and 2. Normal daily extraction rates from each of the six wells would be approximately 0.4 to 1.5 mgd, for a total annual average of 3 mgd during Phase 1, and 4 mgd after Phase 2 is implemented. The groundwater would be blended with San Francisco's municipal water supply and distributed to local customers served through the Sunset and Sutro Reservoirs. However, because of water quality requirements and goals (discussed below under Groundwater Sampling and Treatment), 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 rainfall supplies are more abundant and water use is lower—groundwater extraction would generally be less than 3 mgd during Phase 1, and less than 4 mgd when Phase 2 is implemented. During high-demand periods, the production rate could be greater than these amounts, but the total annual average production rate would be equal to 3 mgd during Phase 1, and 4 mgd after Phase 2 is implemented. For Phase 1, the monthly groundwater pumping would range between 2.6 and 3.4 mgd; for Phase 2, the monthly groundwater pumping would range between 3.4 and 4.5 mgd. The pumps would operate during the day and night, the timing and duration of which would vary on a day-to-day basis. Hydroelectric power from the Hetch Hetchy Regional Water System would be used for project operations under normal conditions.

TABLE 3-9
AVERAGE GROUNDWATER WELL PUMPING RATES

	Phase 1		Phase 2	
Well Facility	**mgd**	**afy**	**mgd**	**afy**
Lake Merced	0.43	482	0.43	482
South Sunset	0.48	544	0.46	515
West Sunset	0.63	707	0.59	661
Central Pump Station	1.45	1,631	1.37	1,534
South Windmill Replacement	–	–	0.65	728
North Lake	–	–	0.50	560
Total	**3.00**	**3,360**	**4.00**	**4,480**

NOTES:
Totals are rounded.
mgd = million gallons per day; afy = acre-feet per year.

SOURCE: Kennedy Jenks, 2012

Chemical Deliveries

At the Lake Merced and West Sunset well facilities, chemical trucks would deliver sodium hypochlorite (12.5 percent solution), to be used for water supply disinfection, approximately every three weeks. Sodium hydroxide would be delivered to the Lake Merced well facility and Sunset Reservoir facility for pH adjustment. These deliveries would be supervised by SFPUC staff.

Emergency Drinking Water Supply

In addition to normal operations, the proposed project would provide a source of drinking water in the event that other imported water sources are interrupted due to earthquake damage or other emergency situation. The six wells would be capable of producing up to 6 mgd (total) during an emergency and could operate at this rate for up to 30 days, consistent with the WSIP level of service goals (SFPUC, 2009b). Portable diesel generators would provide backup power to enable operation of the West Sunset well facility and the North Lake well facility during an emergency. The emergency water supply would not be included as part of the San Francisco Auxiliary Water Supply System, which is a system of mains and high-pressure fire hydrants, independent of the domestic water supply, built solely for the purpose of firefighting.

With all of the WSIP improvements in place, including the proposed Groundwater Supply Project, the SFPUC anticipates that it will be able to deliver basic service to the three regions in the service area (East/South Bay, Peninsula, and San Francisco) both during and immediately following an emergency such as a major earthquake. The supplemental drinking water supplies provided by the proposed Groundwater Supply Project, in combination with the other WSIP improvements, seek to ensure that the regional system can operate at a basic service level following an emergency. After all of the WSIP facility projects have been implemented, the SFPUC anticipates that it will be capable of completing necessary repairs to the system within 30 days of an emergency and of restoring regular water service to all customers. As part of the WSIP, the proposed Groundwater Supply Project has been designed to operate at up to 6 mgd for up to (but not more than) 30 days (San Francisco Planning Department, 2008).

Backup Supply for Golden Gate Park Irrigation

In addition to normal operations, the three well facilities in Golden Gate Park (the Central Pump Station well facility under Phase 1 and all three Golden Gate Park well facilities under Phase 2) would provide a backup supply for irrigation and for filling the ornamental lakes in Golden Gate Park. Connections to the proposed recycled water irrigation system would be made with either a swivel-ell pipe coupling or an air gap; therefore, because of the need to separate the drinking water and recycled water systems and to prevent backflow, a well could not be connected to both the irrigation supply and drinking water supply systems at the same time, nor could a pipeline connected to a recycled water reservoir using an air gap be simultaneously used for potable supply. Under Phase 1, project well use for backup would be limited to planned and unplanned outages of Golden Gate Park's other irrigation well facilities. In Phase 2, use of these well facilities for backup irrigation supply would be limited to planned and unplanned outages of the proposed recycled water supply.

Groundwater Monitoring

During project operation, the SFPUC would continue to monitor groundwater levels, groundwater quality, and surface water levels in the Westside Groundwater Basin monitoring network (described in Section 5.16, Hydrology and Water Quality). The monitoring results would be used to detect seawater intrusion, changes in water levels in surface water bodies (such as Lake Merced and Pine Lake), and interference with other wells. Groundwater pumping would be balanced among the four groundwater production wells (Phase 1 only) or six wells (including Phase 2), and the balance adjusted as necessary to minimize the potential for such effects.

Currently, the SFPUC conducts periodic groundwater elevation and water quality monitoring to identify any seawater intrusion and surface water/groundwater interactions, as well as to assess the general groundwater conditions in the basin resulting from ongoing pumping (SFPUC, 2012a). The existing groundwater monitoring well network in the North Westside Groundwater Basin consists of 17 locations and 31 individual wells for groundwater elevation monitoring.[12] Seven coastal monitoring locations and 20 individual wells are used to monitor for potential seawater intrusion along the Pacific Ocean coast, and seven monitoring locations are used to assess the interaction between the Shallow Aquifer layer and Lake Merced. In about half of the wells, groundwater elevation measurements are collected on a quarterly basis. In the remaining half of the wells, daily measurements are made using an electronic pressure transducer (SFPUC, 2012a).

Nine of the 17 groundwater elevation monitoring locations and 24 of the 31 individual wells are sampled to determine groundwater quality. Samples from the coastal monitoring wells are analyzed for chloride, total dissolved solids, and specific conductance. The parameters measured in the remaining wells include general minerals (total alkalinity, pH, specific conductance, total dissolved solids, hardness, turbidity, calcium, magnesium, sodium, potassium, bicarbonate, chloride, and sulfate) and nitrate. The SFPUC currently conducts sampling in the North Westside Groundwater Basin wells in accordance with its *Sampling and Testing Protocol for the Westside Groundwater Basin* (SFPUC, 2012a).

Lake Merced Monitoring

The SFPUC conducts ongoing monitoring of water levels and quality in Lake Merced. Lake levels have been recorded since the 1920s, and the SFPUC currently uses a pressure transducer to record daily lake levels at the Lake Merced Pump Station along the shoreline of South Lake. The Natural Resources and Lands Management Division of the SFPUC Water Enterprise conducts quarterly sampling for key water quality parameters, including dissolved oxygen, secchi depth (a measure of water clarity), algae, total phosphorous, total nitrogen, nitrogen-to-phosphorous ratio, total coliform, and *Esherichia coli* (SFPUC, 2011b).

[12] The State Water Resources Control Board identifies the basin as the Westside Groundwater Basin; however, for the purpose of this EIR, the portion of the groundwater basin within San Francisco is called the North Westside Groundwater Basin, and the portion within San Mateo County is called the South Westside Groundwater Basin.

Overboard Pumping

During operation of the well facilities, the initial volume of water pumped from each well upon startup would be discharged rather than directed into the water supply system—a process referred to as "overboard pumping." Through the use of a preset flow control valve, overboard pumping would occur automatically for one to five minutes each time a well has been shut down and needs to be restarted. The purpose of overboard pumping is to prevent groundwater that might contain minor amounts of sand and/or suspended sediment from entering the water supply. Overboard pumping would also occur after the initial conversion of the wells to drinking water supply production and after maintenance within the well. The volume of these discharges would vary from site to site. Where feasible, overboard water would be used in water features, percolated into the ground onsite, or used to augment a nearby natural water body. For the Lake Merced well facility, overboard pumping discharges would be directed into Lake Merced via the existing Lake Merced Pump Station's wet well. At the West Sunset well facility, overboard discharges would be directed to an onsite, underground recharge chamber that would allow the groundwater to percolate back into the aquifer. At the South Sunset well facility, overboard discharges would be directed to a large-diameter perforated drain pipe located beneath the adjacent playing fields, which would allow the groundwater to percolate back to the aquifer. In addition to these primary overboard features, backup discharge capabilities to the combined sewer system would be installed at the South Sunset and West Sunset well facilities. At the Golden Gate Park well facilities, water from overboard pumping would be used to fill North Lake, as currently occurs from the existing North Lake well facility, and would be used for groundwater recharge via the existing French drain at the South Windmill Replacement well facility and via a new French drain to be installed at the Central Pump Station well facility.

Groundwater Sampling and Treatment

In accordance with California Department of Public Health (DPH) regulations, the SFPUC would be required to obtain a domestic water supply permit for the Groundwater Supply Project municipal wells. As part of obtaining this permit, the SFPUC would prepare a plan describing the proposed methods for compliance with the domestic water quality and monitoring regulations specified in Title 22, Division 4, Chapter 15, of the California Code of Regulations. The constituents to be addressed in the water quality monitoring plan include bacterial levels, inorganic chemicals, organic chemicals, trihalomethanes, radioactivity, general minerals, and general physical parameters. The plan must show the locations of sampling points, the frequency of sampling at each point, and the types of analyses to be run on the samples. The plan would also indicate the sample collectors (e.g., water system personnel, certified laboratory) and the training these individuals have or will receive. Once the DPH approves the monitoring plan, it would be incorporated into the permit; the DPH is also responsible for enforcing the permit conditions. In addition, drinking water source assessments would be prepared for each of the wells in accordance with the DPH Drinking Water Source Assessment and Protection Program, as described in Section 5.16, Hydrology and Water Quality. These assessments would be updated every five years to evaluate the vulnerability of each well to contamination, and would identify source water protection measures if any of the wells were deemed vulnerable to potentially contaminating activities.

The SFPUC's water quality goals for adding groundwater to the municipal water system are to: maintain existing SFPUC water quality targets; meet State and federal regulatory standards; and ensure that drinking water produced by the project remains indistinguishable from the current municipal water supply in terms of its aesthetic quality (e.g., hardness, color, and taste). The SFPUC's water quality goals are guidelines for internal operations and exceed State and federal regulatory standards.

Based on a screening of existing groundwater quality data against Title 22 drinking water parameters,[13] the SFPUC has determined that the groundwater quality at the proposed production wells meets all federal and State drinking water standards, except for the following: (1) nitrate in one well was detected at 58 milligrams per liter (mg/L) compared to the primary Maximum Contaminant Level (MCL) of 45 mg/L; and (2) manganese in one well was detected at 0.079 mg/L compared to the secondary MCL of 0.050 mg/L. Low-levels of two volatile organic compounds were detected at two of the existing test and irrigation wells. The chlorinated solvent tetrachloroethylene was detected at one of the proposed production wells at a concentration that was above the laboratory reporting limit but approximately 10 times lower than the primary MCL of 0.005 mg/L. At another well, a low concentration of total xylenes was detected (approximately 1,000 times lower than the primary MCL of 1.75 mg/L). No other volatile organic compounds (e.g., MTBE) were detected at the proposed production wells, nor were pesticides, perchlorate, or radioactive compounds (SFPUC, 2009b).

To achieve the above-noted water quality goals, groundwater would be blended (mixed) with the SFPUC surface water supply at a target percentage of up to 15 percent. The SFPUC intends for blended water quality to meet or surpass its water quality targets and/or the public health requirements set by the DPH and the U.S. Environmental Protection Agency (USEPA). The blended water would require disinfection to control potential microbial contamination, and as a contingency for ensuring compliance with the USEPA "Ground Water Rule." To address potential microbial contamination, all groundwater would be disinfected at the Lake Merced and West Sunset well facilities prior to being conveyed into the municipal water system. Disinfection would consist of adding a 12.5 percent solution of sodium hypochlorite to maintain a free chlorine concentration of 1.5 mg/L in the groundwater. Water entering the municipal water system would be monitored at the Lake Merced Pump Station and Sunset Reservoir. As part of the project, a sample station and chlorine analyzer would be installed on a concrete pad in the northwest part of the Sunset Reservoir property to monitor the residual levels before water enters the reservoir and to provide control feedback to the metering pumps at the West Sunset well facility. The chlorine levels in groundwater entering Sunset Reservoir would be adjusted at the West Sunset well facility, where water from the West Sunset, South Sunset, and Golden Gate Park wells would be treated. In an analogous fashion, a sample station and chlorine analyzer would monitor the chlorine residual at the Lake Merced well

[13] MCLs are health-protective drinking water standards that public water systems must achieve. California's MCLs are specified in the California Code of Regulations, Title 22, Chapter 15, and include primary and secondary MCLs. The primary MCL is the highest level of a contaminant that is allowed in drinking water. The MCL is set as close to the maximum contaminant level goal (MCLG)—the level below which there is no known or expected risk to human health—as is economically and technically feasible. While the MCL is higher than the MCLG, it is considered protective of human health. Secondary MCLs are established to protect the aesthetic quality of drinking water and are based on effects such as taste and odor.

facility after the groundwater had been retained in the proposed onsite detention tank. These monitoring data would be used to adjust the dosage rate of sodium hypochlorite. In addition, pH adjustment facilities would be included at the Lake Merced well facility and at Sunset Reservoir, so that the pH of the blended water would be similar to San Francisco's municipal water supply before blending.

3.5.2 Maintenance

SFPUC would manage all six well facilities, including those located within SFRPD-managed areas. Longer-term maintenance of the facilities would include removal and repair (or replacement) of pumps, valves, and other equipment. **Table 3-10** details the typical equipment operating life expectancies and, by implication, the replacement intervals of the well facility equipment and pipeline components (SFPUC, 2009a).

TABLE 3-10
OPERATING LIFE EXPECTANCIES
FOR WELL FACILITY EQUIPMENT AND PIPELINE COMPONENTS

Facility Equipment or Component	Estimated Operational Life (years)
Well Pumps	17.5
Booster Pumps	17.5
Facility Piping	50
Facility Piping Valves	50
Underground Piping	45
Underground Valves	45
Electrical Switchgear	22.5
Solid-State Starters and Variable-Frequency Drive Equipment	9
Instrumentation and Controls	12.5
Communications Equipment (SCADA)	10
Chemical Treatment Equipment	12.5
Laboratory/Monitoring Equipment	6
Structures – Concrete	50
Tanks	45
Filter Vessels (if required)	45
Filter Media (if required)	7.5

SOURCE: SFPUC, 2009a

As noted above in Section 3.5.1, Operations, portable diesel generators would provide backup power to enable use of the West Sunset well facility and the North Lake well facility during a catastrophic emergency. For reliability-based testing purposes only, these generators would be tested for up to 50 hours per year.

SFPUC's SCADA system is a remote monitoring and control system that tracks flow, pressure, and the opening and closing of isolation valves throughout the municipal water supply system. It transmits field signals by radio to the SFPUC City Distribution Division's SCADA terminals. SCADA equipment installed as part of the proposed project would allow for remote monitoring of the well facility and pipeline equipment during project operations. In addition, a facility operator would make daily visits, by truck, to check the equipment at each of the groundwater well facility. Each visit would last for approximately 30 minutes.

Groundwater wells might need to be redeveloped and/or rehabilitated on an infrequent basis. The estimated operational life of the proposed groundwater wells is at least 50 years.

3.6 Intended Uses of the EIR

This is a project-specific EIR, intended to provide review under CEQA for the proposed San Francisco Groundwater Supply Project facilities. In addition to describing the proposed project and required approvals, this EIR analyzes potential environmental impacts of the proposed project, and identifies mitigation measures where those impacts are significant, addresses cumulative adverse impacts to which the proposed project could make a substantial contribution, and evaluates alternatives to the project that could avoid or reduce significant impacts while still meeting most of the project's objectives.

3.6.1 Approvals Required

The proposed project would require local and state permits and approvals.

Based on the current understanding of the project, the following is a list of the agencies and approvals likely to be required for the San Francisco Groundwater Supply Project.

Federal

The project would not require any discretionary federal permits or approvals.

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 is encountered during construction)

- California Coastal Commission, consideration of an appeal, if any, from the City's approval of the Coastal Development Permit

Local

- San Francisco Planning Commission certification of the Final Groundwater Supply Project Environmental Impact Report (EIR), determination of consistency with the *San Francisco General Plan*, and issuance of a Coastal Development Permit

- SFPUC adoption of California Environmental Quality Act (CEQA) findings; approval of the project; agreement with the SFRPD for construction in and use of SFRPD-managed land for project facilities; approval of construction contracts; and other implementation actions
- San Francisco Board of Supervisors, adoption of CEQA findings, approval of the well facility structures in Golden Gate Park,[14] and appropriation of funding
- San Francisco Recreation and Parks Commission approval of and adoption of findings necessary for construction and maintenance of the well facility structures on park lands, and approval of an agreement with the SFPUC regarding construction in and use of park-managed property
- SFPUC Wastewater Enterprise discharge permit for construction-related discharges to the combined sewer system
- San Francisco Arts Commission, Civic Design Review Committee, approval of exterior design of structures on city property
- San Francisco Department of Public Works approval of any necessary construction permits for work within roadways
- San Francisco Department of Parking and Traffic approval of any necessary construction permits for work within roadways
- SFMTA, MUNI Street Operations Division for review of any construction-related changes to transit service or facilities
- SFPUC Wastewater Enterprise Stormwater Control Plan approval

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3.7 References

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*, April 18, 2012.

San Francisco Municipal Transportation Agency (SFMTA), *San Francisco Truck Traffic Routes* (map), January 29, 2010. Available online at http://www.sfmta.com/cms/venf/documents/SFTruckTrafficRoutes_001.pdf. Accessed May 3, 2011.

San Francisco Planning Department, *Program Environmental Impact Report on the San Francisco Public Utilities Commission's Water System Improvement Program*, San Francisco Planning Department File No. 2005.0159E, October 2008.

San Francisco Public Utilities Commission (SFPUC), *Standard Measures to be Included in Construction Contracts and Project Implementation,* memorandum from Susan Leal, General Manager, and

[14] Section 4.113 of the San Francisco Charter requires a two-thirds vote of the Board of Supervisors to site buildings or structures in Golden Gate Park; thus, Board of Supervisors approval for the new well facility structures in Golden Gate Park proposed as part of the Project is required

Tony Irons, Deputy General Manager, to Michael Carlin, Tom Franza, Barbara Hale, Harlan Kelly, Julie Labonte, Irina Torrey, Ivy Fine, and Tony Winnicker, February 7, 2007.

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San Francisco Public Utilities Commission (SFPUC), *Conceptual Engineering Report, Groundwater Sub-Project B, North Westside Basin Local Supply, Revision 1*, July 20, 2009b.

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U.S. Environmental Protection Agency (USEPA), National Primary Drinking Water Regulations: Ground Water Rule. Available online at http://www.epa.gov/fedrgstr/EPA-WATER/2006/ November/Day-08/w8763.htm. November 8, 2006. Accessed January 16, 2013.

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CHAPTER 4

Plans and Policies

Pursuant to the California Environmental Quality Act (CEQA) Guidelines Section 15125(d), this chapter describes land use plans and policies generally and the manner in which they apply to the San Francisco Groundwater Supply Project (Groundwater Supply Project or project) and discusses potential inconsistencies between the project and the applicable plans. Whether a project is consistent with particular plans for which a consistency determination is required is decided at the time of project approval, by the agency charged with that determination. Land use plans typically contain numerous policies emphasizing differing legislative goals, and an interpretation of consistency requires balancing of all relevant policies. The board or commission that enacted a plan or policy determines the meaning of the policy and whether an individual project satisfies the policy at the time the board considers approval of the project.

The Planning Department or Planning Commission will evaluate the proposed Groundwater Supply Project in accordance with the *San Francisco General Plan*, including Priority Policies and, in this case, the local coastal plan. The Recreation and Park Commission will review the proposed project in accordance with provisions of the *Golden Gate Park Master Plan,* with Board of Supervisors' approval for the construction of well facility structures in Golden Gate Park. The San Francisco Public Utilities Commission (SFPUC) will evaluate the project in accordance with various adopted policies as discussed below. In each case, the approving or reviewing agency will consider any potential inconsistencies between the project and adopted plans or policies in the context of all applicable objectives and policies and will determine consistency based on a balancing of relevant policies as part of the decision process.

This section of the CEQA document discusses land use plans and policies. To the extent these or other plans contain objectives and policies that are designed to avoid or mitigate environmental effects, the applicability of such policies and plan provisions is discussed in the section of this document that discusses the relevant environmental effects that those plans or policies address. For example, Sections 5.2 through 5.19 of this Environmental Impact Report (EIR) describe pertinent resource-specific plans and policies (e.g., Section 5.8, Air Quality discusses air quality management plans; Section 5.14, Biological Resources discusses local tree protection ordinances).

This chapter addresses the following plans and policies:

- **Section 4.1, City and County of San Francisco (CCSF).** *San Francisco General Plan*, including the *Western Shoreline Area Plan*, Accountable Planning Initiative, *San Francisco Bicycle Plan*, and *San Francisco Sustainability Plan*.

- **Section 4.2, SFPUC.** *SFPUC Strategic Sustainability Plan*.
- **Section 4.3, San Francisco Recreation and Parks Department (SFRPD).** *Golden Gate Park Master Plan*.
- **Section 4.4, Other Plans and Policies.** Golden Gate National Recreation Area policies.

In the sections below, each plan, initiative, or policy relevant to the proposed Groundwater Supply Project is described, and discusses potential inconsistencies between the project and the applicable plans.

4.1 City and County of San Francisco Plans and Policies

The proposed project is subject to the *San Francisco General Plan*, which provides policies and objectives to guide land use decisions. In addition, the San Francisco City Charter and other San Francisco plans and policies guide SFPUC decisions. These plans include the *San Francisco General Plan*, as amended, which sets forth the city's comprehensive, long-term planning land use policy; the *Western Shoreline Area Plan,* the local coastal plan which is part of the *General Plan* and provides policies and objectives for the western portion of San Francisco; the Accountable Planning Initiative, which establishes Priority Policies to guide decision makers in balancing the objectives of the *San Francisco General Plan*; the *San Francisco Bicycle Plan*, which includes a citywide transportation plan and specific bicycle improvements; and the *San Francisco Sustainability Plan*, which addresses the long-term sustainability of the city.

In addition, Section 4.2, SFPUC Plans and Policies, describes SFPUC plans and policies. The *SFPUC Strategic Sustainability Plan* provides a framework for planning, managing and evaluating overall SFPUC business performance. Portions of the project are located within Golden Gate Park, which is managed in accordance with the *Golden Gate Park Master Plan*, as described in Section 4.3, San Francisco Recreation and Parks Department Plans and Policies.

4.1.1 San Francisco General Plan

The *San Francisco General Plan* (CCSF, 1988), as amended, sets forth the comprehensive long-term land use policy for the CCSF. The general plan consists of 10 issue-oriented plan elements: Air Quality, Arts, Commerce and Industry, Community Facilities, Community Safety, Environmental Protection, Housing, Recreation and Open Space, Transportation, and Urban Design. Plan elements relevant to the proposed project are briefly described below.

- **Air Quality Element.** This element promotes clean air planning through objectives and policies that ensure compliance with air quality regulations.
- **Commerce and Industry Element.** This element guides decisions related to economic growth and change in San Francisco. The three goals of the element—continued economic vitality, social equity (with respect to employment opportunities), and environmental quality—address citywide objectives as well as those of San Francisco's major economic sectors.

- **Community Safety Element.** This element addresses potential geologic, structural, and nonstructural hazards to CCSF-owned structures and critical infrastructure, with the goal of protecting human life and property from such hazards.

- **Environmental Protection Element.** This element addresses the impact of urbanization on the natural environment by promoting the protection of plant and animal life and freshwater sources and addressing San Francisco's responsibility to provide a permanent clean water supply to meet present and future needs as well as to maintain an adequate water distribution system.

- **Recreation and Open Space Element.** This element comprises several sections, each dealing with a certain aspect of the City's recreation and open space system. The Plan sections are (1) The Regional Open Space System, (2) The Citywide Open Space System, (3) The Shoreline, (4) The Neighborhoods, and (5) Downtown.

- **Urban Design Element.** This element promotes the preservation of landmarks and structures with notable historic, architectural, or aesthetic value and seeks to balance development with the natural environment and visual features.

The *San Francisco General Plan* sets forth the CCSF's comprehensive, long-term land use policy. The proposed project would diversify the SFPUC's water supply portfolio by developing groundwater supplies in San Francisco, which would increase system reliability by developing local water supply sources. In addition, the project would ensure the availability of potable groundwater for an emergency; i.e., in the event of an earthquake or other major catastrophe. Thus, the project would support the health and safety of the communities in the project area as well as the health and safety of SFPUC water customers.

Proposed groundwater wells and pipelines would be below ground and would not permanently affect land uses within CCSF boundaries (also see Section 5.2, Land Use). Land use policies relevant to the aboveground structures, consisting of the well facilities, are included in the Recreation and Open Space and Urban Design elements, and the *Western Shoreline Area Plan* of the *San Francisco General Plan*, as described below. Section 4.3, San Francisco Recreation and Parks Department Plans and Policies, addresses land use policies related to Golden Gate Park.

The Recreation and Open Space element policies address the development, preservation, and maintenance of open spaces; the preservation of sunlight in public open spaces; the elimination of non-recreational uses in parks and the reduction of automobile traffic in and around public open spaces; the maintenance and expansion of the urban forest; and the improvement of the western end of Golden Gate Park for public recreation. Policies specific to the western end of Golden Gate Park are described further under the heading, "Western Shoreline Area Plan," below. The proposed well facility sites would be situated in landscaped or parking areas adjacent to playing fields at the West Sunset and South Sunset playgrounds that do not provide any recreational uses and would therefore not interfere with the existing recreational activities at these locations. A portion of the South Sunset well facility building would be used exclusively by the SFRPD for storage of its recreational and maintenance equipment.The Urban Design element policies include protecting major views of the city; conserving resources that provide a sense of nature, continuity with the past, and freedom from overcrowding; preserving notable landmarks and areas of historic, architectural or aesthetic value;

preserving areas that have not been developed by man; limiting improvements in open spaces having an established sense of nature to those that are necessary; promoting high-quality design for buildings to be constructed at prominent locations; promoting building forms that respect and improve the integrity of open spaces and other public areas; and installing and maintaining landscaping in public and private areas.

Small buildings designed to be compatible with the adjacent recreational uses and open space would house the proposed well facilities at the West Sunset and South Sunset playgrounds. The South Sunset facility would have a water feature trickling down from a cornice into a planter as well as a planted green roof. A portion of the West Sunset well facility would also have a green roof. The proposed Lake Merced well facility would be located adjacent to the existing pump station. As mentioned above, the proposed well facilities in Golden Gate Park are at existing well facilities or are located adjacent to an existing maintenance yard and building and therefore would not affect prominent locations.

Western Shoreline Area Plan

The *Western Shoreline Area Plan*, an area plan within the *General Plan,* is the CCSF plan for the Local Coastal Zone established by the California Coastal Act of 1976. The *Western Shoreline Area Plan* includes objectives and policies pertaining to open space in the area covered by the plan, and includes the western portion of Golden Gate Park and Lake Merced, the locations of the South Windmill Replacement and North Lake, and Lake Merced well facilities, respectively.

Policies related to the western end of Golden Gate Park include strengthening the visual and physical connection between the park and Ocean Beach; emphasizing the naturalistic landscape qualities of the western end of the park for visitor use; and continuing to implement a long-term reforestation program in the western portion of the park. Policies related to the Lake Merced area include preserving recreational facilities, passive activities, playgrounds and vistas of the Lake Merced area; maintaining a recreational pathway around the lake for multiple use; and only allowing activities that will not adversely affect the lake's water quality as a standby reservoir for emergency use.

The proposed project well facilities would be contained in relatively small buildings in locations that would not displace recreational or open space uses (see Section 5.11, Recreation). As discussed in Section 5.10, Wind and Shadow, the proposed project would not create new shadows in a manner that substantially affects outdoor recreational facilities at the Lake Merced well facility, and within Golden Gate Park. As discussed in Section 5.6, Transportation and Circulation, the proposed project would not result in a long-term increase in automobile traffic in and around public open spaces. As discussed in Section 5.14, Biological Resources, the proposed project would result in tree removal at several of the well facilities, but two trees removed in the western end of the park, adjacent to the North Lake well facility would not be in the vicinity of highly used recreation areas. Their removal would not significantly affect the visual and physical connection between the park and Ocean Beach. In addition, tree replacement would be required, as described in Section 5.14, Biological Resources. The proposed well facility locations and the existing well facilities in Golden Gate Park and at Lake Merced are adjacent to developed maintenance yards or buildings that do not provide any designated recreational uses and are not within the viewshed of or physically connected to Ocean Beach. Furthermore, the existing irrigation well facilities in Golden Gate Park are already in use to support park functions and, as described in Section 3.3.2, Proposed Groundwater Well Facility Locations, the Lake Merced well facility would be sited in an area that is restricted from public use access. Other aspects of the project would serve a recreational purpose and support recreational functions. Specifically, the well facilities in Golden Gate Park would serve as sources of back up supply for irrigation of the park and for filling ornamental lakes in the park. Overall, there are no apparent inconsistencies between the *San Francisco General Plan* (including the *Western Shoreline Area Plan*) and the proposed project. Any conflict between the project and *San Francisco General Plan* policies that relate to physical environmental issues are discussed in Sections 5.2 through 5.19. The compatibility of the project with *San Francisco General Plan* policies that do not relate to physical environmental issues will be considered by decision makers as part of their determination to approve or disapprove the proposed project. Any potential conflicts identified as part of the process would not alter the physical environmental effects of the proposed project, as analyzed in this EIR.

Accountable Planning Initiative

In November 1986, San Francisco voters approved Proposition M, the Accountable Planning Initiative, which added Section 101.1 to the City Planning Code to establish eight Priority Policies as a preamble to the *San Francisco General Plan*. The Priority Policies are the basis for resolving inconsistencies in the general plan and state that:

1. Neighborhood-serving retail uses be preserved and enhanced and future opportunities for resident employment in and ownership of such businesses enhanced

2. Housing and neighborhood character be conserved and protected in order to preserve the cultural and economic diversity of the neighborhoods

3. The City’s supply of affordable housing be preserved and enhanced

4. Commuter traffic not impede the Muni transit service or overburden streets or neighborhood parking

5. A diverse economic base be maintained by protecting industrial and service sectors from displacement by commercial office development, and future opportunities for resident employment and ownership in these sectors be enhanced

6. The City achieve the greatest possible preparedness to protect against injury and loss of life in an earthquake

7. Landmarks and historic buildings be preserved

8. Parks and open space and their access to sunlight and vistas be protected from development

The policies established as part of the Accountable Planning Initiative are part of the *General Plan* and will be evaluated by the Planning Department and/or Commission as part of a finding of consistency prior to project approval. As described in Section 5.2, Land Use, because the proposed groundwater pipeline would be below ground and aboveground facilities would be sited adjacent to existing facilities that are not commonly used by the public, retail uses, housing, industrial uses, parks and open space areas would be preserved and protected. The project would also improve the City's earthquake preparedness by ensuring the availability of potable groundwater supplies. Aboveground facilities would be small and would not impede access to sunlight or vistas. As described in Section 5.5, Cultural and Paleontological Resources, landmarks and historical resources in the project vicinity would not be affected by the proposed project. Three well facilities would be located in Golden Gate Park, a National Register Historic District. However, the well facilities would not be located in areas of the park that are contributing features to the park's designation as an historic district. Thus, there are no apparent inconsistencies between the proposed project and these policies.

4.1.2 San Francisco Bicycle Plan

In August 2009, the Board of Supervisors approved the *San Francisco Bicycle Plan* (Bicycle Plan). The Bicycle Plan includes a citywide bicycle transportation plan (comprised of a "Policy Framework" and a "Network Improvement" document) and implementation of specific bicycle improvements identified within the plan. The Bicycle Plan includes objectives and identifies policy changes that would enhance bicycle access and safety in San Francisco's bike-ability. It also describes the existing bicycle route network (a series of interconnected streets in which bicycling is encouraged), and identifies gaps within the citywide bicycle route network that require improvement. The Bicycle Plan updates the 1997 Bicycle Plan. The final EIR analyzing the Bicycle Plan assessed a total of 56 short-term and long-term bicycle improvement projects. The adopted Bicycle Plan would implement minor improvements on the Great Highway, John F. Kennedy Drive, Martin Luther King Jr. Drive, and 47th Avenue; however, the improvements are not in the vicinity of project facilities and construction areas would not affect, or be affected by, the project because the improvements are minor (pavement marking and signage changes).

4.1.3 San Francisco Sustainability Plan

The San Francisco Board of Supervisors endorsed the sustainability plan (CCSF, 1997) in 1997 although the Board has not committed the CCSF to perform the actions addressed in the plan. The plan is a blueprint for sustainability, with many of its individual proposals requiring further development and public comment. The plan's underlying goals are to maintain the physical resources and systems that support life in San Francisco and to create a social structure that will allow maintenance of these resources and systems. The sustainability plan is divided into 15 topic areas. Ten address specific environmental issues (air quality; biodiversity; energy, climate change and ozone depletion; food and agriculture; hazardous materials; human health; parks, open spaces, and streetscapes; solid waste; transportation; and water and wastewater, including recycled water). Five are broad in scope and cover many issues, including the economy and economic development; environmental justice; municipal expenditures; public information and education; and risk management. Each topic area has a set of indicators to be used over time to determine whether San Francisco is moving in a direction that supports sustainability for each particular area.

The proposed project seeks to increase the reliability of the City's water supply, which in turn would help to maintain the physical resources and systems that support life in San Francisco.

4.2 SFPUC Plans and Policies

This section describes the land use plans and policies of SFPUC that are relevant to the proposed project.

4.2.1 SFPUC Strategic Sustainability Plan

The SFPUC's 2011 *Strategic Sustainability Plan* provides a framework for planning, managing and evaluating SFPUC-wide performance that takes into account the long-term economic, environmental and social impacts of the SFPUC's business activities. This plan consists of a "Durable Section," which contains goals, objectives, and performance indicators to implement SFPUC's vision and values. The goals and objectives are then used to drive the "Dynamic Section" of the Sustainability Plan, which contains specific actions, targets, measures, and budgeting. The SFPUC utilizes this document to evaluate its performance semi-annually, to provide an annual score card, and to help the SFPUC measure progress on an annual basis (SFPUC, 2011). The plan contains actions related to building WSIP projects on schedule, within scope and budget; and securing City agency approvals for WSIP projects.

The proposed project is a WSIP facility improvement project that would meet the SFPUC's objective in improving capital facilities.

4.3 San Francisco Recreation and Park Department Plans and Policies

This section describes the land use plans and policies of SFRPD that are relevant to the proposed project.

4.3.1 Golden Gate Park Master Plan

The *Golden Gate Park Master Plan* (Master Plan) was adopted by the Recreation and Park Commission in October of 1998 and is intended to provide a framework and guidelines to ensure responsible stewardship of Golden Gate Park. The Master Plan is a comprehensive planning document that includes general objectives and policies for the park, management strategies, and specific objectives and policies relating to park landscape, circulation, recreation facilities, visitor facilities, buildings and monuments, utilities and infrastructure, park maintenance and operations, and special area plans. The overarching goal of the Master Plan is to manage current and future park and recreation demands while preserving the historic significance of the park (SFRPD, 1998). The Master Plan's elements address the following principal objectives and policies:

- **Land Use and Activities.** Ensure that land uses and activities contribute to the mission and purpose of the park and are appropriate to the land use zone. Naturalistic parkland, as the largest land category in Golden Gate Park, should be preserved to protect the park's character and retain park open space.

  - *Policy H – Maintenance and Operations Areas.* Maintenance and operations areas are necessary within the park to facilitate management, maintenance, and preservation of Golden Gate Park.

    1. Maintenance areas and buildings should be designed for optimal efficiency and minimum impact upon the park, including visual screening. Where possible, maintenance areas should be consolidated and reduced in size.

The proposed well facilities would either replace existing irrigation well buildings with similarly sized structures at the South Windmill Replacement or North Lake well sites or be located adjacent to the Central Pump Station maintenance area. The well facilities in Golden Gate Park would be sited at existing well facility sites and at a site which was selected based upon coordination between the SFPUC and the SFRPD to minimize or avoid interference with active recreational use and loss of high quality open space areas. The Central Pump Station well facility site was selected through such coordination and because, in addition to its capacity for successfully pumping groundwater, it is adjacent to an existing maintenance facility and not in an easily accessible open space area of the park. Thus, the park character would be preserved and park open space would be retained.

- **Landscape Preservation and Renewal.** Provide for the protection and renewal of the park landscape. The design integrity of the pastoral and sylvan landscape must be maintained.

  - ***Policy E – Water Supply and Irrigation System.*** Develop new irrigation water supplies and improve water distribution and application systems.

    3. Improve and maintain the existing well system. Where feasible, restore inoperative wells.
    4. Plan for the future use of reclaimed water where appropriate in the park as mandated by the San Francisco reclaimed water ordinance… Where possible, provide a flexible system that can use reclaimed water or well water.

As discussed above, the proposed project would not introduce features that would alter the existing design and character of the park. As described in Section 3.3, Proposed Project Components, of the Project Description, Phase 2 of the proposed project, would be implemented only after the SFPUC's San Francisco Westside Recycled Water Project is approved and constructed, pipelines would be extended and modified so that the two existing irrigation wells, in addition to the Central Pump Station well facility, could be used for both potable water and backup irrigation supply for Golden Gate Park.

- **Buildings, Structures, and Monuments.** Minimize the impacts that buildings have on the park landscape and preserve open space. Construction of additional buildings should be restricted; designs for any proposed structures should include measures to reduce aesthetic impacts, such as screen fencing and planting.

- *Policy B – Modification of Existing Buildings.* Assure that modifications or replacement of existing park buildings is compatible with the landscape character and historic form of the park, and does not diminish existing open space, in accordance with policies contained in the Recreation and Open Space Element of the City's *General Plan.*

At the South Windmill Replacement and North Lake well facility sites, the project would not introduce additional buildings; buildings would be demolished and replaced. The new structures at the North Lake well facility site would be of similar size to the existing structures, would include two rotary blowers (air compressors) to aerate North Lake. The areas surrounding the buildings would be planted with native grasses. The proposed Central Pump Station well facility would be approximately 800 square feet and 13.5 feet high and would be adjacent to an existing pump station facility and wood waste storage and compost facility in an area which is not highly visible to park visitors. See Section 5.3, Aesthetics for further discussion.

- **Community Involvement.** Decisions involving changes to Golden Gate Park should be made within an open planning process that includes public participation.

The San Francisco Planning Department conducted a public scoping meeting in January 2010 for this Draft EIR. Additional public hearings will be conducted following the Draft EIR release.

- **Special Areas Plan Element.** Although it is not an objective per se of the Master Plan, the West End Plan addresses potential future uses of the former Richmond Sunset Treatment Plant site, a 4.4-acre site in the southwest corner of the park in which the South Windmill Replacement well facility site is located. The recommended plan proposes the expansion of existing recreational uses surrounding the site.

The proposed South Windmill Replacement well facility would be housed within a small (42-foot by 19-foot) building with adjacent parking and landscaping. The site is within a larger 4.4-acre area; the remainder of this area would not be included as part of the project following completion of project construction (see Chapter 3, Project Description).

Consistency with the social resource goals of the *Golden Gate Park Master Plan* will be evaluated by the SFRPD during its review of the proposed project.

4.3.2 Other Plans

The San Francisco Recreation and Park Department is currently completing a Significant Natural Resource Areas Management Plan (SNRAMP) for designated significant natural areas in the City and County of San Francisco. The purpose of the management plan is to establish a maintenance and preservation program related to the protection and enhancement of natural resource values. While the SNRAMP itself has not been finalized and adopted and thus is not yet in effect, the Recreation and Park Department's Natural Areas Program was developed to protect and restore the City's natural areas. In 1995, the Recreation and Park Commission adopted a staff report on the SNRAMP. The staff report set forth general objectives, policies, and management actions to guide development of the SNRAMP. General policies and management actions in the staff report are relevant to biological resources in parts of Golden Gate Park and at Lake Merced, including general policies to maintain/promote indigenous plant species and control/remove invasive species, monitor wildlife populations, etc. See Section 5.14.2, Regulatory Framework, in the Biological Resources section for additional discussion of these policies and management actions.

4.4 Other Plans and Policies

4.4.1 Golden Gate National Recreation Area Management Policies 2006

The National Park Service (NPS) is a bureau of the U.S. Department of the Interior that was created following the signing of the "Organic Act" by President Woodrow Wilson in 1916. The NPS manages the 394 areas called "units" of the National Park System. The NPS also helps administer dozens of affiliated sites, the National Register of Historic Places, National Heritage Areas, National Wild and Scenic Rivers, National Historic Landmarks, and National Trails. The "Organic Act" states that the fundamental purpose of the NPS "is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations."

The National Park System, which includes the GGNRA (inclusive of the Ocean Beach area) but not the project, is guided by Management Policies 2006, a document that contains policies applicable to management of the national park system. According to Management Policies 2006, NPS requires that policies comply with current laws, regulations and executive orders, prevent impairment of park resources and values ensure that conservation will be predominant when there is a conflict between the protection of resources and their use, maintain NPS responsibility for making decisions and for exercising key authorities, emphasize consultation and cooperation with local/state/tribal/federal entities, support pursuit of the best contemporary business practices and sustainability as well as other requirements.

Although the proposed project is not within the GGNRA, it is located within a quarter mile of the Ocean Beach shoreline. With regard to potential effects on historic resources in the general project area resulting from the proposed project, the Management Policies 2006 document states that each NPS superintendent will "consult with outside parties having an interest in the park's cultural resources or in proposed NPS actions that might affect those resources, and provide them with opportunities to learn about and comment on those resources and planned actions" (NPS, 2006). Potential impacts on cultural resources are discussed in Section 5.5, Cultural and Paleontological Resources, including Golden Gate Park's windmills, which are contributing features to the Golden Gate Park National Register Historic District. As determined in Section 5.5, Cultural and Paleontological Resources, the proposed project would not cause impacts on historical resources such as the Murphy Windmill or Millwright's Cottage.

4.5 References

City and County of San Francisco (CCSF), *San Francisco General Plan*. 1988, amended through 1996. Available online at: http://www.sf-planning.org/ftp/General_Plan/index.htm. Accessed July 5, 2012.

City and County of San Francisco (CCSF), *Sustainability Plan for the City of San Francisco*. 1997. Available online at: www.sustainable-city.org. Accessed July 5, 2012.

National Park Service, U.S. Department of the Interior (NPS), *Management Policies 2006*, August 31, 2006. Available online at http://www.nps.gov/policy/mp2006.pdf. Accessed January 16, 2013.

San Francisco Public Utilities Commission (SFPUC), *SFPUC Strategic Sustainability Plan*, March 2011.

San Francisco Recreation and Parks Department (SFRPD), *Golden Gate Park Master Plan*, 1998.

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CHAPTER 5
Environmental Setting and Impacts

5.1 Overview

This chapter provides an analysis of the physical environmental effects of implementing the San Francisco Groundwater Supply Project (Groundwater Supply Project or project) as described in Chapter 3, Project Description. This chapter describes the environmental setting, assesses impacts, and identifies mitigation measures for significant impacts.

5.1.1 Scope of Analysis

This chapter is organized by environmental resource topics, as follows:

Chapter 5 Sections	
5.1 Overview	5.11 Recreation
5.2 Land Use	5.12 Utilities and Service Systems
5.3 Aesthetics	5.13 Public Services
5.4 Population and Housing	5.14 Biological Resources
5.5 Cultural and Paleontological Resources	5.15 Geology and Soils
5.6 Transportation and Circulation	5.16 Hydrology and Water Quality
5.7 Noise	5.17 Hazards and Hazardous Materials
5.8 Air Quality	5.18 Mineral and Energy Resources
5.9 Greenhouse Gas Emissions	5.19 Agricultural and Forest Resources
5.10 Wind and Shadow	(References included at the end of each section)

Each section of Chapter 5 contains the following elements, based on the requirements of the California Environmental Quality Act (CEQA):

- **Setting.** This subsection describes the existing physical environmental conditions in the project area with respect to each resource topic, at an appropriate level of detail to allow the reader to understand the impact analysis.

- **Regulatory Framework.** This subsection describes the relevant laws and regulations that apply to protecting the environmental resources within the project area, and the governmental agencies responsible for enforcing those laws and regulations.

- **Impacts.** This subsection evaluates the potential for the proposed project to result in adverse effects on the physical environment described in the setting. Each impact analysis section defines significance criteria for evaluating environmental impacts, and the Approach to Analysis explains how the significance criteria are applied in evaluating the project impacts. The conclusion of each impact analysis is expressed in terms of the impact significance under CEQA, which is discussed further in Section 5.1.2 below.

- **Mitigation Measures.** Each impact subsection identifies mitigation measures for all of the impacts considered significant, consistent with CEQA Guidelines Section 15126.4, which states that an environmental impact report (EIR), "shall describe feasible measures which could minimize significant adverse impacts…"

- **Cumulative Impacts.** Each subsection discusses cumulative impacts, if applicable, immediately following the description of the direct project-specific impacts and identified mitigation measures. Cumulative impacts, described in detail in Section 5.1.4, consider the effects of the proposed project together with those of other past, present, or reasonably foreseeable future projects proposed by the SFPUC or other jurisdictions. The analysis of cumulative impacts under each resource topic is based on the same setting, regulatory framework, and significance criteria as the project-specific impacts. Additional mitigation measures are identified if the analysis determines that the project's contribution to a significant cumulative impact, even with project level mitigation, would be considerable.

Impacts of Mitigation Measures. Each subsection identifies impacts of mitigation measures for those mitigation measures that could cause secondary environmental impacts, consistent with CEQA Guidelines Section 15126.4, which states that "if a mitigation measure would cause one or more significant effects in addition to those that would be caused by the project as proposes, the effects of the mitigation measure shall be discussed but in less detail than the significant effects of the project as proposed."

5.1.2 Significance Determinations

The significance criteria used in this EIR are based on the San Francisco Planning Department's Environmental Planning section (EP) guidance regarding the thresholds of significance used to assess the severity of the environmental impacts of the proposed project. EP guidance is based on CEQA Guidelines Appendix G, with some modifications. Each section of Chapter 5 presents, before the discussion of impacts, the significance criteria used to analyze each resource topic. The categories used to designate impact significance are as follows:

- **Beneficial.** This determination applies if implementation of the proposed project would result in an improvement or enhancement of an environmental resource compared to existing condition. No mitigation is required for impacts determined to be beneficial.

- **No Impact.** An impact is considered not applicable (no impact) if there is no potential for impacts or the environmental resource does not occur within the project area or the area of potential effect. For example, there would be no impact related to grading if there is no grading proposed at a particular project site.

- **Less than Significant.** This determination applies if there is a potential for some limited impact but not a substantial, adverse effect that qualifies under the significance criteria as a significant impact. No mitigation is required for impacts determined to be LS.

- **Less than Significant with Mitigation.** This determination applies if there is a potential for the project to result in an adverse effect that meets the significance criteria, or if there is certainty that the project would result in an adverse effect that meets the significance criteria, but feasible mitigation is available that would reduce the impact to a less-than-significant level. An impact described as "potentially" significant indicates there is a potential for this impact to occur, but there is either not enough project information or site-specific information to determine definitively whether or not it qualifies under the significance criteria as significant. Impacts identified as "potentially significant" are treated the same as significant impacts in this EIR.

- **Significant and Unavoidable.** This determination applies if the project would result in an adverse effect that meets the significance criteria, but for which there appears to be no feasible mitigation available to reduce the impact to a less-than-significant level.

- **Significant and Unavoidable with Mitigation.** This determination applies if it is certain that the project would result in an adverse effect that meets the significance criteria and there is some mitigation available to lessen the impact, but the residual effect after implementation of the measure would remain significant.

5.1.3 Relationship to the WSIP PEIR

As described in Chapter 2, Introduction and Background, the proposed project is one of the facility improvement projects included in the SFPUC's Water System Improvement Program (WSIP). The Program EIR (PEIR) on the WSIP,[1] which the San Francisco Planning Commission certified on October 30, 2008, addresses the potential environmental impacts of constructing and operating the facility improvement projects in the WSIP as well as the impacts of the proposed systemwide water supply and operations strategy (San Francisco Planning Department, 2008). Because the proposed project is a component of the WSIP, the project would also contribute to the WSIP's systemwide water supply and operations impacts.

The PEIR analyzed potential water supply and system operations impacts (separate from the environmental impacts associated with the facility improvement projects) within the following geographic regions: the Tuolumne River, Alameda Creek and Peninsula watersheds; and the Westside Groundwater Basin. The PEIR also identified the cumulative effects of implementing the WSIP and the associated changes in system operations in combination with other past, present, and reasonably foreseeable future projects within each of these watersheds. It also discussed the potential effects of climate change and global warming on the predicted impacts of the WSIP.

[1] The WSIP PEIR is available for public review at the San Francisco Planning Department, 1650 Mission Street, San Francisco CA 94103, and can be found on the San Francisco Planning Department's website at http://www.sf-planning.org/index.aspx?page=1829. The State Clearinghouse number for the WSIP PEIR is 2005092026.

The PEIR concluded that the WSIP would result in changes in reservoir levels and associated changes in downstream flows in rivers and creeks in the three affected watersheds (Tuolumne River, Alameda Creek, and Peninsula), potentially resulting in impacts on groundwater, water quality, fisheries, and terrestrial biological resources in these watersheds. The PEIR determined that, in the event that water supply deliveries (average annual) to customers from the watersheds exceed current levels, streamflow changes in the Tuolumne River watershed could affect fisheries and terrestrial biological resources. In the Alameda watershed, the WSIP (which includes restoring the historical storage capacity of Calaveras Reservoir) could affect water levels in Calaveras and San Antonio Reservoirs; flow in Alameda, Calaveras, and San Antonio Creeks; and the fisheries and terrestrial biological resources of the reservoirs and creeks. In the Peninsula watershed, the WSIP (which includes restoring the historical storage capacity of Crystal Springs Reservoir) could affect water levels in Crystal Springs, San Andreas, and Pilarcitos Reservoirs; flow in lower San Mateo and Pilarcitos Creeks; and the fisheries and terrestrial biological resources of these reservoirs and creeks. All impacts on these environmental elements in the Peninsula watershed were determined to be either potentially significant but mitigable or less than significant. In addition, the WSIP includes development of groundwater supplies in the North Westside Groundwater Basin and a conjunctive-use program in the South Westside Groundwater Basin, which could result in basin overdraft, seawater intrusion, and changes in the water levels of surface water bodies.

As stated above, the Groundwater Supply Project as a component of the WSIP would contribute to the water supply and system operations impacts identified in the WSIP PEIR. **Tables 5.1-1** through **5.1-5** summarize the WSIP water supply and system operations impacts and the associated mitigation measures for each geographic region as presented in the PEIR. The reader is referred to the complete WSIP PEIR for a detailed explanation of these summary tables. Note that the categories of significance used in the PEIR are slightly different than those used in this EIR (see table footnotes in Table 5.1-1 through 5.1-5). In addition to water supply impacts and mitigation measures, the PEIR provides a program-level analysis of the impacts associated with WSIP facility improvement projects, including construction and operation impacts. This EIR addresses the same issues as the PEIR for the Groundwater Supply Project but at a project level of detail; that is, this EIR provides more project-specific and site-specific descriptions and analysis of project effects based on a much more detailed project description and more information about the project area. **Appendix B** of this EIR compares the programmatic mitigation measures identified for this project in the PEIR and the actual mitigation measures identified for this project in this EIR.

The PEIR also analyzed the growth-inducement impacts of the WSIP's systemwide water supply impacts. The proposed project, as a facility improvement project under the WSIP, would be a contributing factor in the WSIP's growth-inducement potential as well as in the associated indirect effects of growth. The PEIR analysis of growth-inducement impacts accounted for the proposed project in sufficient detail, and no further evaluation of these aspects of the proposed project is required. Section 5.4, Population and Housing, of this EIR summarizes the growth-inducement impacts of the WSIP, and Section 6.1, Growth-Inducing Impacts, discusses them.

TABLE 5.1-1
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
STREAM FLOW						
Impact 5.3.1-1: Effects on flow along the Tuolumne River below O'Shaughnessy Dam.	LS					None required.
Impact 5.3.1-2: Effects on flow along Cherry Creek below Cherry Dam.	LS					None required.
Impact 5.3.1-3: Effects on flow along Eleanor Creek below Eleanor Dam.	LS					None required.
Impact 5.3.1-4: Effects on flow along the Tuolumne River below La Grange Dam.	LS					None required.
Impact 5.3.1-5: Effects on flow along the San Joaquin River and the Sacramento–San Joaquin Delta.	LS					None required.
GEOMORPHOLOGY						
Impact 5.3.2-1: Effects on sediment transport and channel characteristics between O'Shaughnessy Dam and Don Pedro Reservoir.	LS					None required.
Impact 5.3.2-2: Effects on sediment transport and channel characteristics below La Grange Dam.	LS					None required.

NOTES:

PEIR Significance Categories
NA = Not Applicable or No Impact
LS = Less than Significant
PSM = Potentially Significant impact with Mitigation
B = Beneficial
SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

TABLE 5.1-1 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
SURFACE WATER QUALITY						
Impact 5.3.3-1: Effects on water quality in Hetch Hetchy Reservoir and along the Tuolumne River below O'Shaughnessy Dam.	LS					None required.
Impact 5.3.3-2: Effects on water quality in Don Pedro Reservoir and along the Tuolumne River below La Grange Dam.	LS					None required.
Impact 5.3.3-3: Effects on water quality along the San Joaquin River and the Sacramento–San Joaquin Delta.	LS					None required.
SURFACE WATER SUPPLIES						
Impact 5.3.4-1: Effects on Tuolumne River, San Joaquin River, and Stanislaus River water users.	LS					None required.
Impact 5.3.4-2: Effects on Delta water users.	LS					None required.
GROUNDWATER						
Impact 5.3.5-1: Alteration of stream flows along the Tuolumne River, which could affect local groundwater recharge and groundwater levels.	LS					None required.

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TABLE 5.1-1 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
GROUNDWATER (cont.)						
Impact 5.3.5-2: Alteration of stream flows along the Tuolumne River, which could affect local groundwater quality.	LS					None required.
FISHERIES						
Impact 5.3.6-1: Effects on fishery resources in Hetch Hetchy Reservoir.	LS					None required.
Impact 5.3.6-2: Effects on fishery resources along the Tuolumne River between Hetch Hetchy Reservoir and Don Pedro Reservoir.	LS					None required.
Impact 5.3.6-3: Effects on fishery resources in Don Pedro Reservoir.	LS					None required.
Impact 5.3.6-4: Effects on fishery resources along the Tuolumne River below La Grange Dam.	LS when average annual deliveries from the watersheds are maintained at 265 million gallons per day (mgd) or less; PSM if deliveries exceed 265 mgd					**Measure 5.3.6-4a, Avoidance of Flow Changes by Reducing Demand for Don Pedro Reservoir Water:** The SFPUC will pursue a water transfer arrangement with the Modesto Irrigation District or Turlock Irrigation District and/or other water agencies to offset the WSIP's effects on water storage in Don Pedro Reservoir and minimize WSIP-induced changes in releases from La Grange Dam. **If Measure 5.3.6-4a proves to be infeasible, the SFPUC will implement Measure 5.3.6-4b.

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TABLE 5.1-1 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
FISHERIES (cont.)						
Impact 5.3.6-4 (cont.)						**Measure 5.3.6-4b, Fishery Habitat Enhancement:** The SFPUC will implement or fund one of two fishery habitat enhancement projects that are consistent with the Lower Tuolumne River Restoration Plan: augmentation of spawning gravel at three selected sites or the filling or isolation from the river of one of the existing inactive quarry pits.
Impact 5.3.6-5: Effects on fishery resources along the San Joaquin River.	LS					None required.
TERRESTRIAL BIOLOGY						
Impact 5.3.7-1: Impacts on riparian habitat and related biological resources in Hetch Hetchy Reservoir and along the bedrock channel portions of the Tuolumne River from O'Shaughnessy Dam to Don Pedro Reservoir.		LS	LS	LS	LS	None required.
Impact 5.3.7-2: Impacts on alluvial features that support meadow and riparian habitat along the Tuolumne River from O'Shaughnessy Dam to Don Pedro Reservoir.		PSM	PSM	PSM	PSM	The SFPUC will implement Measure 5.3.7-2 to reduce adverse impacts on sensitive habitats, key special-status species, other species of concern, and common habitats and species to a less-than-significant level.

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SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

TABLE 5.1-1 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY (cont.)						
Impact 5.3.7-2 (cont.)						**Measure 5.3.7-2, Controlled Releases to Recharge Groundwater in Streamside Meadows and Other Alluvial Deposits:** The SPPUC will manage releases to the Tuolumne River from Hetch Hetchy Reservoir during the spring with the goal of recharging groundwater that supports meadow and riparian habitat. The SFPUC will periodically survey meadow habitat to determine the efficacy of release management and will modify releases as necessary to sustain meadow habitat.
Impact 5.3.7-3: Impacts on biological resources in Lake Eleanor and along Eleanor Creek.		LS	LS	LS	LS	None required.
Impact 5.3.7-4: Impacts on biological resources in Lake Lloyd and along Cherry Creek.		LS	LS	LS	LS	None required.
Impact 5.3.7-5: Impacts on biological resources in Don Pedro Reservoir.		LS	LS	LS	LS	None required.

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SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

TABLE 5.1-1 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY (cont.)						
Impact 5.3.7-6: Impacts on biological resources along the Tuolumne River below La Grange Dam.		LS when average annual deliveries from the watersheds are maintained at 265 million gallons per day (mgd) or less; PSM if deliveries exceed 265 mgd	LS when average annual deliveries from the watersheds are maintained at 265 mgd or less; PSM if deliveries exceed 265 mgd	LS when average annual deliveries from the watersheds are maintained at 265 mgd or less; PSM if deliveries exceed 265 mgd	LS when average annual deliveries from the watersheds are maintained at 265 mgd or less; PSM if deliveries exceed 265 mgd	The SFPUC will implement Measures 5.3.6-4a or 5.3.7-6 to reduce adverse impacts on sensitive habitats, key special-status species, other species of concern, and common habitats and species to a less-than-significant level. **Measure 5.3.6-4a, Avoidance of Flow Changes by Reducing Demand for Don Pedro Reservoir Water** – see description above. **If Measure 5.3.6-4a proves to be infeasible, the SFPUC will implement Measure 5.3.7-6. **Measure 5.3.7-6, Lower Tuolumne River Riparian Habitat Enhancement:** Consistent with the Lower Tuolumne River Restoration Plan, the SFPUC will protect and enhance 1 mile of riparian vegetation within the contemporary floodplain.
Impact 5.3.7-7: Conflicts with the provisions of adopted conservation plans or other approved biological resources plans for the Tuolumne Wild and Scenic River.		LS				None required.

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SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

TABLE 5.1-1 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – TUOLUMNE RIVER SYSTEM AND DOWNSTREAM WATER BODIES

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
RECREATIONAL AND VISUAL RESOURCES						
Impact 5.3.8-1: Effects on reservoir recreation due to changes in water system operations.	LS					None required.
Impact 5.3.8-2: Effects on river recreation due to changes in water system operations.	LS					None required.
Impact 5.3.8-3: Effects on the aesthetic values of the Tuolumne Wild and Scenic River.	LS					None required.
ENERGY RESOURCES						
Impact 5.3.9-1: Effects on hydropower generation at facilities along the Tuolumne River.	B					None required.

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B = Beneficial
SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

TABLE 5.1-2
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
		Biological Resource Impacts				
	All Impacts (except Biological Resources)	Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
STREAM FLOW						
Impact 5.4.1-1: Effects on flow along Calaveras Creek below Calaveras Reservoir.	LS					None required.
Impact 5.4.1-2: Effects on flow along Alameda Creek below the diversion dam.	LS[a]					**Measure 5.4.1-2, Diversion Tunnel Operation:** The SFPUC will implement operational criteria for the diversion dam requiring that water not needed to fill Calaveras Reservoir would be released to Alameda Creek below the diversion dam.
Impact 5.4.1-3: Effects in San Antonio Reservoir and along San Antonio Creek.	LS					None required.
Impact 5.4.1-4: Effects on flow along Alameda Creek below the confluence of San Antonio Creek.	LS					None required.
GEOMORPHOLOGY						
Impact 5.4.2-1: Effects on channel formation and sediment transport along Calaveras Creek.	LS					None required.
Impact 5.4.2-2: Effects on channel formation and sediment transport along Alameda Creek downstream of the diversion dam and downstream of the San Antonio Creek confluence.	LS					None required.

NOTES:

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LS = Less than Significant
PSM = Potentially Significant impact with Mitigation
B = Beneficial
SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

TABLE 5.1-2 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
		Biological Resource Impacts				
	All Impacts (except Biological Resources)	Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
GEOMORPHOLOGY (cont.)						
Impact 5.4.2-3: Effects on channel formation and sediment transport along San Antonio Creek downstream of San Antonio Reservoir.	LS					None required.
SURFACE WATER QUALITY						
Impact 5.4.3-1: Effects on water quality in Calaveras Reservoir.	LS					None required.
Impact 5.4.3-2: Effects on water quality in San Antonio Reservoir.	LS					None required.
Impact 5.4.3-3: Changes in water quality along Calaveras, San Antonio, and Alameda Creeks.	LS					None required.
GROUNDWATER BODIES						
Impact 5.4.4-1: Changes in groundwater levels, flows, quality, and supplies.	LS					None required.
FISHERIES						
Impact 5.4.5-1: Effects on fishery resources in Calaveras Reservoir.	B					None required.
Impact 5.4.5-2: Effects on fishery resources along Calaveras Creek below Calaveras Dam and along Alameda Creek below confluence with Calaveras Creek.	B					None required.

NOTES:

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LS = Less than Significant
PSM = Potentially Significant impact with Mitigation
B = Beneficial
SU = Significant and Unavoidable, even with mitigation
PSU = Potentially Significant and Unavoidable, even with mitigation

TABLE 5.1-2 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
FISHERIES (cont.)						
Impact 5.4.5-3: Effects on fishery resources along Alameda Creek downstream of Alameda Creek Diversion Dam.	PSM					**Measure 5.4.5-3a, Minimum Flows for Resident Trout in Alameda Creek:** The SFPUC will release a minimum flow of approximately 10 cubic feet per second from the diversion dam and monitor the effects of the release on resident trout spawning and egg incubation. ** If monitoring results for Measure 5.4.5-3a indicate the measure is unsuccessful, the SFPUC will implement Measure 5.4.5-3b. **Measure 5.4.5-3b, Alameda Diversion Dam Restrictions or Fish Screens:** If after 10 years the minimum release does not sustain the resident trout population, the SFPUC will either increase releases from the diversion dam or install a fish passage barrier on the diversion tunnel.
Impact 5.4.5-4: Effects on fishery resources in San Antonio Reservoir.	B					None required.
Impact 5.4.5-5: Effects on fishery resources along San Antonio Creek below San Antonio Reservoir.	LS					None required.
Impact 5.4.5-6: Effects on fishery resources along Alameda Creek below confluence with San Antonio Creek.	LS					None required.

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TABLE 5.1-2 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY						
Impact 5.4.6-1: Effects on riparian habitat and related biological resources in Calaveras Reservoir.		PSM	PSM	LS	LS	The SFPUC will implement Measure 5.4.6-1 to reduce adverse impacts on sensitive habitats and key special-status species to a less-than-significant level. **Measure 5.4.6-1, Compensation for Impacts on Terrestrial Biological Resources:** The SFPUC will protect, restore, and enhance existing riparian habitat and/or create new habitat that compensates for WSIP-induced habitat losses at Calaveras Reservoir. Compensatory habitat may be provided as part of the SFPUC's Habitat Reserve Program.
Impact 5.4.6-2: Effects on riparian habitat and related biological resources along Alameda Creek, from below the diversion dam to the confluence with Calaveras Creek.		LS	PSM	LS	N/A	The SFPUC will implement Measures 5.4.1-2 and 5.4.5-3a to reduce adverse impacts on key special-status species to a less-than-significant level. **Measure 5.4.1-2, Diversion Tunnel Operation** – see description above. **Measure 5.4.5-3a, Minimum Flows for Resident Trout in Alameda Creek** – see description above.
Impact 5.4.6-3: Effects on riparian habitat and related biological resources along Calaveras Creek, from Calaveras Reservoir to the confluence with Alameda Creek.		LS	PSM	LS	LS	The SFPUC will implement Measure 5.4.6-3 to reduce adverse impacts on key special-status species to a less-than-significant level. **Measure 5.4.6-3, Operational Procedures for Calaveras Dam Releases:** The SFPUC will manage releases from Calaveras Reservoir to mimic a more natural hydrologic regime in the creek for the benefit of terrestrial biological resources. The specifics of this mitigation measure will be determined as part of project-level CEQA review.

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TABLE 5.1-2 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY (cont.)						
Impact 5.4.6-4: Effects on riparian habitat and related biological resources along Alameda Creek, from the confluence with Calaveras Creek to the confluence with San Antonio Creek.		LS	PSM	LS	LS	The SFPUC will implement Measures 5.4.6-3 and 5.4.5-3a to reduce adverse impacts on key special-status species to a less-than-significant level. **Measure 5.4.6-3, Operational Procedures for Calaveras Dam Releases** – see description above. **Measure 5.4.5-3a, Minimum Flows for Resident Trout on Alameda Creek** – see description above.
Impact 5.4.6-5: Effects on riparian habitat and related biological resources in San Antonio Reservoir.		LS	LS	LS	LS	None required.
Impact 5.4.6-6: Effects on riparian habitat and related biological resources along San Antonio Creek between Turner Dam and the confluence with Alameda Creek.		LS	LS	LS	N/A	None required.
Impact 5.4.6-7: Effects on riparian habitat and related biological resources along Alameda Creek below the confluence with San Antonio Creek.		LS	LS	LS	N/A	None required.
Impact 5.4.6-8: Conflicts with the provisions of adopted conservation plans or other approved biological resources plans.		LS				None required.

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TABLE 5.1-2 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – ALAMEDA CREEK WATERSHED

Impact	Significance Determination					Mitigation Measures
		Biological Resource Impacts				
	All Impacts (except Biological Resources)	Sensitive Habitats	Key Special Status-Species	Other Species of Concern	Common Habitats and Species	
RECREATIONAL AND VISUAL RESOURCES						
Impact 5.4.7-1: Effects on recreational facilities and/or activities.	LS					None required.
Impact 5.4.7-2: Visual effects on scenic resources or visual character of the water bodies.	LS					None required.

[a] Impact 5.4.1-2 was determined to be LS subsequent to certification of the WSIP PEIR, this mitigation measure is no longer required for program implementation. Based on the best available information at that time, the PEIR made the conservative determination that the WSIP would result in a significant and unavoidable impact related to flow along Alameda Creek below the Alameda Creek Diversion Dam ("Alameda Creek Hydrologic Impact") (see PEIR Chapter 4, Section 5.4.1, Impact 5.4.1-2). Based upon more detailed site-specific data and analysis, the project-level analysis in the Calaveras Dam Replacement Project EIR modified this PEIR impact determination to be less than significant (San Francisco Planning Department, 2011).

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TABLE 5.1-3
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
STREAM FLOW						
Impact 5.5.1-1: Effects on flow along San Mateo Creek.	LS					None required.
Impact 5.5.1-2: Effects on flow along Pilarcitos Creek.	LS					None required.
GEOMORPHOLOGY						
Impact 5.5.2-1: Changes in sediment transport and channel morphology in the Peninsula watershed.	LS					None required.
WATER QUALITY						
Impact 5.5.3-1: Effects on water quality in Crystal Springs Reservoir, San Andreas Reservoir, and San Mateo Creek.	LS					None required.
Impact 5.5.3-2: Effects on water quality in Pilarcitos Reservoir and along Pilarcitos Creek.	PSM					**Measure 5.5.3-2a, Low-head Pumping Station at Pilarcitos Reservoir:** The SFPUC will install a permanent low-head pumping station at Pilarcitos Reservoir that would enable the SFPUC to access and use an additional 350 acre-feet of water from Pilarcitos Reservoir. In years when the WSIP would cause releases from Pilarcitos Reservoir to Pilarcitos Creek to be reduced to reservoir inflow earlier in the summer than under the existing condition (about 25 percent of years in the hydrologic record), the SFPUC will use the pumping station to augment flow in Pilarcitos Creek with water from the reservoir. The pumping station will draw water from the cool pool of water below the thermocline during times when the reservoir is stratified. The pumping station outlet will be designed to ensure that water discharged to the creek is adequately aerated.

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TABLE 5.1-3 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
WATER QUALITY (cont.)						
Impact 5.5.3-2 (cont.)						**Measure 5.5.3-2b, Aeration System at Pilarcitos Reservoir:** The SFPUC will install a permanent aeration system at Pilarcitos Reservoir. The SFPUC will operate the aeration system as necessary to avoid anoxic conditions and maintain good water quality conditions at the reservoir.
GROUNDWATER						
Impact 5.5.4-1: Alteration of stream flows along Pilarcitos Creek, which could affect groundwater levels and water quality.	LS					None required.
FISHERIES						
Impact 5.5.5-1: Effects on fishery resources in Crystal Springs Reservoir (Upper and Lower).	PSU					**Measure 5.5.5-1, Create New Spawning Habitat Above Crystal Springs Reservoir:** The SFPUC will survey the extent and quality of fish spawning habitat lost due to inundation and, if feasible, create new spawning habitat at a higher elevation. The specifics of this mitigation measure will be determined as part of project-level CEQA review.
Impact 5.5.5-2: Effects on fishery resources in San Andreas Reservoir.	LS					None required.
Impact 5.5.5-3: Effects on fishery resources along San Mateo Creek.	LS					None required.
Impact 5.5.5-4: Effects on fishery resources in Pilarcitos Reservoir.	PSM					**Measure 5.5.3-2b, Aeration System at Pilarcitos Reservoir** – see description above.

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TABLE 5.1-3 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHED

Impact	Significance Determination					Mitigation Measures
		Biological Resource Impacts				
	All Impacts (except Biological Resources)	Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
FISHERIES (cont.)						
Impact 5.5.5-5: Effects on fishery resources along Pilarcitos Creek below Pilarcitos Reservoir.	LS[a]					**Measure 5.5.3-2a, Low-head Pumping Station at Pilarcitos Reservoir** – see description above. **Measure 5.5.5-5, Establish Flow Criteria, Monitor and Augment Flow:** The SFPUC will develop a monitoring and operations plan for Stone Dam to ensure WSIP-related flow reductions downstream of Stone Dam do not impair steelhead passage and spawning during the winter months of normal and wetter hydrologic years.
TERRESTRIAL BIOLOGY						
Impact 5.5.6-1: Impacts on biological resources in Upper and Lower Crystal Springs Reservoirs.		PSM	PSM	PSM	PSM	The SFPUC will implement Measures 5.5.6-1a and 5.5.6-1b to reduce adverse impacts on sensitive habitats, key special-status species, other species of concern, and common habitats and species to a less-than-significant level. In addition, the SFPUC will implement Measure 5.5.6-1c to mitigate adverse impacts on key special-status plant species (i.e., fountain thistle) adapted to serpentine seeps. **Measure 5.5.6-1a, Adaptive Management of Freshwater Marsh and Wetlands at Upper and Lower Crystal Springs Reservoirs:** The SFPUC will develop an adaptive management plan to minimize adverse effects of the WSIP-induced rise in average water levels, and the periodic drawdown of reservoir water levels for maintenance, on San Francisco garter snakes and California red-legged frogs. **Measure 5.5.6-1b, Compensation for Impacts on Terrestrial Biological Resources:** The SFPUC will protect, restore, and enhance existing wetland and upland habitat and/or create new habitat that compensates for WSIP-induced habitat losses at Crystal Springs Reservoir. Compensatory habitat may be provided as part of the SFPUC's Habitat Reserve Program.

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TABLE 5.1-3 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHED

Impact	Significance Determination					Mitigation Measures
	All Impacts (except Biological Resources)	Biological Resource Impacts				
		Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
TERRESTRIAL BIOLOGY (cont.)						
Impact 5.5.6-1 (cont.)						**Measure 5.5.6-1c, Compensation for Serpentine Seep-Related Special-Status Plants:** The SFPUC will protect, restore, and enhance existing habitat and/or create new habitat that compensates for WSIP-induced habitat losses for plant species adapted to serpentine seeps.
Impact 5.5.6-2: Impacts on biological resources in San Andreas Reservoir.		LS	PSM	LS	LS	None required.
Impact 5.5.6-3: Impacts on biological resources along San Mateo Creek below Lower Crystal Springs Dam.		LS	LS	LS	LS	None required.
Impact 5.5.6-4: Impacts on biological resources in Pilarcitos Reservoir.		LS	PSM	LS	LS	**Measure 5.5.3-2c, Habitat Monitoring and Compensation:** The SFPUC will protect, restore, and enhance existing habitat and/or create new habitat that compensates for WSIP-induced habitat losses at Pilarcitos Reservoir. Compensatory habitat may be provided as part of the SFPUC's Habitat Reserve Program.
Impact 5.5.6-5: Impacts on biological resources along Pilarcitos Creek below Pilarcitos Reservoir.		LS	LS	LS	LS	None required.
Impact 5.5.6-6: Impacts along Pilarcitos Creek below Stone Dam.		LS	LS	LS	LS	None required.
Impact 5.5.6-7: Conflicts with the provisions of adopted conservation plans or other approved biological resource plans.		LS				None required.

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TABLE 5.1-3 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – PENINSULA WATERSHED

Impact	Significance Determination					Mitigation Measures
		Biological Resource Impacts				
	All Impacts (except Biological Resources)	Sensitive Habitats	Key Special-Status Species	Other Species of Concern	Common Habitats and Species	
RECREATIONAL AND VISUAL RESOURCES						
Impact 5.5.7-1: Effects on recreational facilities and/or activities.	LS					None required.
Impact 5.5.7-2: Visual effects on scenic resources or the visual character of water bodies.	LS					None required.

[a] Based on the best available information at that time, the PEIR made the conservative determination that the WSIP could result in a significant and unavoidable impact on fishery resources in Crystal Springs Reservoir related to inundation of spawning habitat upstream of the reservoir (see PEIR Chapter 5, Section 5.5.5, Impact 5.5.5-1). Project-level review of updated, site-specific information that was developed following certification of the PEIR was incorporated into the project-level EIR for the Lower Crystal Springs Dam Improvements Project, and the project-level analysis determined that impacts on fishery resources due to inundation effects would be less than significant (San Francisco Planning Department, 2010b).

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TABLE 5.1-4
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – WESTSIDE GROUNDWATER BASIN

Impact	Significance Determination		Mitigation Measures
	North Westside Groundwater Basin	South Westside Groundwater Basin	
HYDROLOGY AND WATER QUALITY			
Impact 5.6-1: Basin overdraft due to pumping from the Westside Groundwater Basin.	PSM	LS	The SFPUC will implement Measure 5.6-1 to reduce adverse impacts on the North Westside Groundwater Basin to a less-than-significant level. **Measure 5.6-1, Groundwater Monitoring to Determine Basin Safe Yield:** The SFPUC will continue ongoing 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.
Impact 5.6-2: Changes in water levels in Lake Merced and other surface water features, including Pine Lake, due to decreased groundwater levels in the Westside Groundwater Basin.	PSM	N/A	The SFPUC will implement Measures 5.6-1 and 5.6-2 to reduce adverse impacts on the North Westside Groundwater Basin to a less-than-significant level. **Measure 5.6-1, Groundwater Monitoring to Determine Basin Safe Yield** – see description above. **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 augmenting lake levels to maintain Lake Merced water levels within the desired long-term range.
Impact 5.6-3: Seawater intrusion due to decreased groundwater levels in the Westside Groundwater Basin.	PSM	LS	The SFPUC will implement Measure 5.6-1 to reduce adverse impacts on the North Westside Groundwater Basin to a less-than-significant level. **Measure 5.6-1, Groundwater Monitoring to Determine Basin Safe Yield** – see description above.
Impact 5.6-4: Land subsidence due to decreased groundwater levels in the Westside Groundwater Basin if the historical low water levels are exceeded.	LS	LS	None required.
Impact 5.6-5: Contamination of drinking water due to groundwater pumping in the Westside Groundwater Basin.	PSM	PSM	The SFPUC will implement Measure 5.6.5 to reduce adverse impacts on the North Westside and South Westside Groundwater Basins to a less-than-significant level. **Measure 5.6-5, Drinking Water Source Assessments for Groundwater Wells:** The SFPUC will develop and implement a source water protection program for wells constructed under the Local and Regional Groundwater Projects that are considered vulnerable to contamination on the basis of the drinking water source assessment prepared in accordance with Department of Health Services regulations.

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TABLE 5.1-4 (Continued)
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – WESTSIDE GROUNDWATER BASIN

Impact	Significance Determination		Mitigation Measures
	North Westside Groundwater Basin	South Westside Groundwater Basin	
HYDROLOGY AND WATER QUALITY (cont.)			
Impact 5.6-6: Drinking water contaminants above maximum contaminant levels and adverse effects of adding treated groundwater to the distribution system.	LS	LS	None required.

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TABLE 5.1-5
SUMMARY OF WSIP WATER SUPPLY IMPACTS AND MITIGATION MEASURES – CUMULATIVE WATER SUPPLY

Cumulative Water Supply Impact	Cumulative Impact Significance Determination							Mitigation Measures
	Hydrology	Geomorphology	Surface Water Quality	Groundwater	Fisheries	Terrestrial Biology	Recreational / Visual Quality	
Impact 5.7.2-1: Tuolumne River – Hetch Hetchy Reservoir to Don Pedro Reservoir.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.2-2: Tuolumne River – Don Pedro Reservoir to the San Joaquin River.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.2-3: San Joaquin River, Stanislaus River, and the Delta.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.3-1: Alameda Creek watershed.	N/A	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.4-1: San Mateo Creek watershed.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.4-2: Pilarcitos Creek watershed.	LS	LS	LS	LS	LS	LS	LS	None required.
Impact 5.7.5-1: North Westside Groundwater Basin.	LS							None required.
Impact 5.7.5-2: South Westside Groundwater Basin.	LS							None required.

NOTE: Significance determinations presented in this table assume implementation of all mitigation measures presented in WSIP PEIR Chapter 5, Section 5.6, and in PEIR Chapter 6.

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This project-level EIR tiers from the WSIP PEIR and also incorporates by reference the relevant analyses of the WSIP PEIR with respect to the impacts and mitigation measures, as applicable to this project. CEQA permits tiering from a program EIR in order to allow agencies to broadly consider the environmental effects of a series of actions and/or policies and then to provide a more detailed examination of project-specific impacts in project-level EIRs. As noted above, this project-level EIR provides more detailed information about the proposed project, its impacts, and project-specific mitigation measures. This EIR summarizes and incorporates by reference the WSIP PEIR's analysis of the impacts associated with the WSIP's water supply strategy, including the WSIP PEIR analysis and conclusions regarding impacts on City and County of San Francisco (CCSF) watersheds as well as the WSIP's growth-inducement impacts.

5.1.4 Approach to Cumulative Impact Analysis and Cumulative Projects

Cumulative impacts, as defined in Section 15355 of the CEQA Guidelines, refer to two or more individual effects that, when taken together, are "considerable" or that compound or increase other environmental impacts. A cumulative impact from several projects is the change in the environment that would result from the incremental impact of the project when added to those of other closely related past, present, or reasonably foreseeable future projects. Section 15130 of the CEQA Guidelines provides pertinent guidance for cumulative impact analysis:

- An EIR shall discuss cumulative impacts of a project when the project's incremental effect is "cumulatively considerable" (i.e., the incremental effects of an individual project are considerable when viewed in connection with the effects of past, current, and probable future projects, including those outside the control of the agency, if necessary).
- An EIR should not discuss impacts that do not result in part from the project evaluated in the EIR.
- A project's contribution is less than cumulatively considerable, and thus not significant, if the project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.
- The discussion of impact severity and likelihood of occurrence need not be as detailed as for effects attributable to the project alone.
- The focus of analysis should be on the cumulative impact to which the identified other projects contribute, rather than on attributes of the other projects that do not contribute to the cumulative impact.

Each subsection of this chapter describes the cumulative impact analysis for each individual resource topic, immediately following the description of the direct project impacts and identified mitigation measures. Section 6.2, Summary of Cumulative Impacts, summarizes the project's cumulative impacts.

Approach to Cumulative Impact Analysis

CEQA Guidelines Section 15130(b)(1) provide two approaches to a cumulative impact analysis: (a) the analysis can be based on a list of past, present, and probable future projects producing related or cumulative impacts, or (b) a summary of projections contained in a general plan or related planning document can be used to determine cumulative impacts. The analysis in this EIR employs the list-based approach. The following factors were used to determine an appropriate list of projects to be considered in this cumulative analysis:

- **Similar Environmental Impacts.** A relevant project contributes to effects on resources that are also affected by the proposed project. A relevant future project is defined as one that is "reasonably foreseeable," such as a proposed project for which an application has been filed with the approving agency or that has approved funding.
- **Geographic Scope and Location.** A relevant project is located within the defined geographic scope for the cumulative effect.
- **Timing and Duration of Implementation.** Effects associated with activities for a relevant project (e.g., short-term construction or demolition, or long-term operations) would likely coincide in timing with the effects of the proposed project.

Other Projects with Similar Environmental Impacts

Projects that are relevant to the cumulative analysis include those that could contribute incremental effects on the same environmental resources and would have similar environmental impacts as those discussed in this EIR. Sections 5.2 through 5.19 in this chapter analyze the potential cumulative impacts from the combination of the impacts of the proposed project and impacts of other past, present, and reasonably foreseeable future projects. It should be noted that the reasonably foreseeable future projects are subject to independent environmental review and consideration by approving agencies. Consequently, it is possible that some of the projects will not be approved or will be modified prior to approval (e.g., as a result of the CEQA alternatives process). For the purposes of assessing worst-case cumulative impacts, however, the cumulative impact analysis in this EIR is premised on the approval and construction of all of the following potential projects. **Table 5.1-6** lists the relevant projects used in the cumulative impact analysis; **Figure 5.1-1** shows their locations.

Geographic Scope and Location

The geographic scope of cumulative projects depends on the resource topic affected and is identified at the beginning of each cumulative impact discussion. The geographic scope, which generally coincides with the physical environment described in the setting, includes the areas adjacent to the proposed construction activities that are within and adjacent to the project area. However, for some resource topics, such as impacts on groundwater resources, the regional roadway network, or the regional air basin, the geographic scope can extend farther.

TABLE 5.1-6
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
1	San Francisco Planning Department	Beach Chalet Athletic Fields Renovation Project	The project proposes the renovation of the Beach Chalet Athletic Fields facility including the conversion of the four existing grass soccer fields to synthetic turf and the installation of ten 60-foot-tall athletic field light standards to allow for evening use. The project would include installation and construction of the following: • Pedestrian lighting at the pedestrian paths north of the site, the parking lot, and the proposed picnic area; • Black vinyl fencing around the fields; • Player benches and bleachers at all fields; • Picnic tables and barbeque pits at the southeastern corner of the fields; • A maintenance shed; • Three new pedestrian pathways paved in a crushed stone aggregate; • The existing restroom building involving modification of existing openings; • A concrete paved entry plaza surrounding the restroom building with metal railings, seating, and planters; • A concrete raised platform designed to accommodate pedestrian traffic across the fields and spectator seating; • A new play area and structure; • New bicycle racks, drinking fountains, and trash/recycling receptacles; irrigation and storm drainage improvements; and, re-configuration and expansion of the existing 50-space parking lot to accommodate approximately 20 additional stalls.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; geology; and public services. **Long-term:** Impacts on biological resources; cultural resources; and hazardous materials.	Project located in the Groundwater Supply Project vicinity	South Windmill well facility; Pipeline Segment 5	**Status of environmental review:** Draft EIR published in October 2011, and project approval and approval of findings were granted in May 2012. **Construction schedule:** Approximately 10 months beginning summer/fall 2013.

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
2	San Francisco Planning Department	San Francisco Westside Recycled Water Project	The primary purpose of the project is to reduce San Francisco's reliance on potable water for nonpotable uses, such as irrigation, through the production and distribution of highly treated recycled water. The project would include the following components: • Construction of recycled water treatment facility to be located on a proposed site that combines land in the vicinity of the Oceanside Water Pollution Control Plant. • Proposed secondary effluent storage; • Proposed on-site treated recycled water reservoir; • Proposed tank for decarbonation of recycled water; • Use and potential modification of the existing central reservoir located in Golden Gate Park; • Proposed water storage tank in the Presidio Golf Course; • Replacement and upgrade of pumps at the Oceanside Water Pollution Control Plant; • Proposed pump station at the recycled water treatment facility; • Upgrade of existing irrigation booster pumps in the Panhandle; • Use of existing irrigation pump station at Lincoln Park; • Reverse osmosis concentrate disposal pipeline to convey brine from the recycled water treatment facility to the Oceanside Water Pollution Control Plant outfall.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; geology; and public services. **Long-term:** Impacts on hydrology and water quality.	Project located in the Groundwater Supply Project vicinity	Pipeline Segment 5, 6a, and 6b, Central Pump Station well facility	**Status of environmental review:** Notice of Preparation published in September 2010 **Construction schedule:** To be determined

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
2 cont.			• Proposed pipeline to connect the recycled water treatment facility to proposed customers in Lincoln Park, the Presidio, and Golden Gate park/Panhandle; and • Use and potential upgrade of existing irrigation pipelines within Golden Gate Park.				
3	San Francisco Planning Department	Murphy Windmill/ Millwright's Cottage Restoration	Renovation of the Murphy Windmill will be completed in two phases. The first phase, which has been completed, consists of the windmill cap removal and refurbishment by Lucas Verbij in the Netherlands with the remaining structure documented, partially dismantled and stored for reuse. The second phase consists of the stabilization and restoration of the tower structure, interior structures and internal mechanisms so the windmill can function as it was originally designed. Interpretive panels to educate the public about the windmill and how it works would be installed at the site. Renovation of Millwright's Cottage would include the structural retrofit of the building, restroom remodel, Americans with Disabilities Act compliance work, and minor interior repair work. The SFRPD envisions a full- service restaurant to operate within the Millwright's Cottage.	**Long-term:** Impacts to recreation and aesthetics.	Project located in the Groundwater Supply Project vicinity	South Windmill well facility; Pipeline Segment 5	**Status of environmental review:** Completed August 2009 **Construction schedule:** Phase 1 complete; Phase 2 to be completed early 2013
4	San Francisco Planning Department	San Francisco Botanical Gardens: Center for Sustainable Gardening	Replacement of two greenhouses with a one-story 13,000 square foot Center for Sustainable Gardening. Project is located at the San Francisco Botanical Gardens on Martin Luther King Jr. Drive in Golden Gate Park. The new facility would consist of a greenhouse, shadehouse, and headhouse, contains meeting spaces and restrooms. The new facility would replace 10 parking spaces and remove a number of trees for enlarged building footprint.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; geology; and public services.	Project located east of Groundwater Supply Project	Central Pump Station well facility	**Status of environmental review:** Final Mitigated Negative Declaration published November 2011 **Construction schedule:** begin construction in the winter of 2013 or 2014

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
5	San Francisco Planning Urban Research Association (with assistance from the Ocean Beach Task Force and Ocean Beach Vision Council, and funding from the California State Coastal Conservancy, SFPUC and National Park Service)[b]	Ocean Beach Master Plan	The Ocean Beach Master Plan will address the impact of rising seas, the physical and ecological processes shaping the beach, and improved integration with its natural, recreational, and urban contexts.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; geology; and public services.	Project located west of the Groundwater Supply project	South Windmill well facility; Pipeline Segment 5	**Status:** Plan published May, 2012. **Construction schedule:** To be determined
6	National Parks Service	Golden Gate National Recreation Area General Management Plan	Golden Gate National Recreation Area General Management Plan creates the vision and framework that would guide the management of the park for the next 20 years, including land use policies, etc.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; geology; and public services.	Project located north and west of the Groundwater Supply project	Lake Merced well facility	**Status of environmental review:** Plan approved. Draft Plan/Environmental Impact Statement published in September 2011. **Construction schedule:** The Plan will be implemented over the next 20 years upon completion of the planning process. More detailed study and implementation planning will be required.

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
7	San Francisco Planning Department	2800 Sloat Boulevard	Development of 3 new five-story buildings on Sloat Boulevard at 46th Avenue. The project would require demolition of existing buildings. The new buildings would include a total of 55 dwelling units, 48 parking spaces in an underground parking garage, 26,000 gsf of ground floor retail, and 34 covered spaces for the commercial use.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; and public services. **Long-term:** Traffic and circulation impacts.	Project located west of Groundwater Supply Project	South Sunset well facility; Pipeline Segment 4	**Status of environmental review:** Final Mitigated Negative Declaration Approved **Construction schedule:** to be determined
8	San Francisco Planning Department	Significant Natural Areas Management Plan	Fragments of unique plant and animal habitats within San Francisco and Pacifica, known as Significant Natural Resource Areas, have been preserved within parks that are managed by the San Francisco Recreation and Park Department (SFRPD). The management areas (MAs) are designated by differing levels of sensitivity, species presence, and habitat complexity within the 31 Natural Areas. Three levels of MAs have been defined as MA-1, MA-2 and MA-3. Lake Merced is designated as an MA-1 natural area. Management actions within areas designated MA-1 may include: • The most focused restoration work, possibly to the degree of manipulating individual plants and vegetation series; • Reintroduction of sensitive species; • Tree removal in conformance with forestry statements; • Implementation of erosion-control measures as problems arise, including the closure of informal and social trails; and • Prohibition of planting nonnative species.	**Temporary:** Construction-related impacts on sensitive species and sensitive habitats; aesthetics; recreation; and public services.	Project located in the Groundwater Supply Project vicinity	Lake Merced well facility	**Status of environmental review:** Draft EIR published in August 2011 **Construction schedule:** 2012 or later

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
9	Daly City	Harding Park Recycled Water Project	North San Mateo County Sanitation District, a subsidiary of Daly City, has been producing recycled water at its wastewater treatment plant since 2004. The plant provides recycled water used for irrigation purposes at the Lake Merced Golf Club, the Olympic Club, and the San Francisco Golf Club, as well as other landscaped areas in Daly City. With the Harding Park Recycled Water Project, Daly City and the SFPUC are expanding the North San Mateo County Sanitation District's recycled water distribution system to provide recycled water for irrigation purposes to Tournament Players Cup Harding Park and Fleming Golf Courses (referred to as Harding Park). Recycled water will replace potable water from the SFPUC's Regional Water System currently being used for irrigation. The project facilities include: • A new pump station at the Harding Park Maintenance Yard; • Approximately 4,800 feet of 18-inch distribution pipeline along Lake Merced Boulevard; • A new 700,000 gallon underground recycled water storage tank at the Harding Park Maintenance Yard; and • A back-up connection to the SFPUC potable water distribution system.	**Temporary:** Construction-related impacts on air quality; noise; hydrology and water quality; aesthetics; geology and soils.	Project located in the Groundwater Supply Project vicinity	Lake Merced well facility	**Status of environmental review:** Final EIR published October 2009. **Construction schedule:** Construction completed fall-2012
10	San Francisco Planning Department	Lake Merced Pump Station Essential Upgrade	Upgrades of the pump station would comply with new seismic standards, Americans with Disabilities Act requirements, and current building codes and regulations. The new facility will consist of two new structures - a new pump building and an electrical utility building, each approximately 8,000 square feet. Site improvements include new landscaping and security fencing. An innovative flow-through	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; geology; and public services.	Project located in the Groundwater Supply Project vicinity	Lake Merced well facility	**Status of environmental review:** Completed **Construction schedule:** June 2009 through early 2013

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
10 cont.			planter system will naturally filter storm water runoff for diversion into the lake, instead of allowing it to enter the sanitary collection system.				
11	San Francisco Planning Department	3711 19th Avenue (Parkmerced)	The proposed Parkmerced Project is a long-term mixed-use development program to comprehensively re-plan and redesign the site. The Proposed Project would: • Increase residential density, • Provide a neighborhood core with new commercial and retail services, • Modify transit facilities which include rerouting the existing Muni Metro M Ocean View line from its current alignment along 19th Avenue, • Install renewable energy sources such as wind turbines and photovoltaic cells; and • Improve utilities and open space within the development site including a new Pre kindergarten to 5th grade school and day care facility, a fitness center, new open space uses, an approximately 2-acre organic farm, and community gardens. Over a period of approximately 20 years, 1,538 existing apartments would be demolished in phases and fully replaced, and an additional 5,679 net new units would be added to the Project Site, resulting in a total of about 8,900 units on the Project Site. In addition to installation of renewable resources, stormwater runoff from buildings and streets would be captured and filtered through a series of bioswales, ponds, and other natural filtration systems. The filtered stormwater would then either percolate into the groundwater that feeds the North Westside Groundwater Basin and Lake Merced or be released directly into Lake Merced.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; cultural resources, land use; geology; and public services. **Long-term:** Impacts on aesthetics; recreation; noise; traffic and transportation; and biological resources.	Project located east of the Groundwater Supply Project	Lake Merced well facility, Westside Groundwater Basin	**Status of environmental review:** EIR published June 2010 **Construction schedule:** Phased construction begins 2010 through 2030

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
12	San Francisco Planning Department	Regional Groundwater Storage and Recovery Project	The purpose of the WSIP Regional Groundwater Storage and Recovery Project is to further the use of the South Westside Groundwater Basin as an underground storage reservoir by storing water in the basin during wet periods for subsequent recapture during dry periods. This new dry-year water supply would be made available to the cities of Daly City and San Bruno, the California Water Service Company in its South San Francisco service area and San Francisco Public Utilities Commission wholesale water customers. The proposed Project facilities would include up to 16 new groundwater production well facilities	**Long-term:** Impacts on Recreation, Biological Resources, Hydrology and Water Quality	Project located south of the Groundwater Supply Project area	Westside Groundwater Basin	**Status of environmental review:** Notice of Preparation published in June 2009 **Construction schedule:** June 2014 through May 2016
12 cont.			within the South Westside Groundwater Basin. Each groundwater well facility site would contain a groundwater production well, pump station, underground distribution piping, utility connections, and disinfection unit. Well facilities would be connected to Daly City, San Bruno, Cal Water, or SFPUC distribution systems. In addition, upgrades to the existing Westlake Pump Station in Daly City are planned as part of the project.				
13	San Francisco Municipal Transportation Agency	Ortega Street Traffic Calming and Bicycle Lanes	Traffic calming measures, including speed humps, pedestrian islands and additional crosswalk markings, would be installed along Ortega Street between 24th and 28th Avenue. Bicycle lanes are proposed for Ortega Street between 20th Avenue and the Great Highway.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts;	Co-located with Project	Pipeline Segment 1 (West Sunset to Sunset Reservoir)	**Construction Schedule:** early 2013 (traffic calming) and approximately summer 2013 (bicycle lanes)
14	San Francisco Planning Department	San Francisco State University Campus Master Plan	The San Francisco State University Campus Master Plan (SFSUCMP) proposes physical changes and improvements to the campus to address increased enrollment. Some existing buildings and facilities would be upgraded and expanded, while others would be demolished and replaced. Some new buildings and facilities would	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics;	Project located in the Groundwater Supply Project vicinity	Lake Merced well facility, Westside Groundwater Basin	**Status of environmental review:** Final EIR published August 2007

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
14 cont.			be constructed. In total, these proposed physical improvements would result in the net addition of approximately 972,400 square feet and approximately 660 dwelling units to the campus. On November 14, 2007, the California State University Board of Trustees certified the Final EIR and approved the 2007-2020 SFSUCMP. Implementation of the 2007-2020 SFSUCMP is currently under way. The renovation and expansion of the existing library was completed in March 2012, and Lot 20 Seismic Repairs & Access Modifications was completed in March 2012. **Recreation Wellness Center.** Funded through a student fee, the proposed Recreation Wellness Center is a significant addition to San Francisco State University, revitalizing the northern edge of campus and providing a major new student activity center. The campus master plan located the project on North State Drive. However, given the continued useful life of the Library Annex buildings currently on that site, the Recreation Wellness Center project has been relocated to the former Sutro Library /Lot 25 site on Winston Drive. The program for the 112,000-square-foot facility includes a two-court gym, one-court multi-activity gym (for basketball, volleyball, badminton, soccer, and hockey), climbing wall, weight and fitness space, elevated jogging track.	recreation; geology; and public services **Long-term**: impacts on transportation and circulation			**Construction schedule:** unknown but could be initiated at any time
15	Daly City	Vista Grande Drainage Basin Improvement Project	The proposed project would improve existing facilities and construct new facilities to screen storm water, route flows to the existing Vista Grande Canal and to Lake Merced, route a portion of low flows through a constructed wetlands treatment system, control the water surface elevation in Lake Merced, and reduce the potential for localized flooding within the Vista Grande watershed.	**Temporary:** Construction-related traffic impacts on access roads and associated air quality and noise impacts; sensitive habitats and species; water quality; aesthetics; recreation; geology; and public services	Project located in the Groundwater Supply Project vicinity	Lake Merced well facility	**Status of environmental review:** Notice of Preparation published February 2013 **Construction schedule:** approximately 2015 through 2017

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

Map Key	Lead Agency	Project Name	Project Description	Potential Cumulative Impact Topics	Approximate Distance to Project Site	Potentially Affected Project Components/ Areas of Overlap[a]	CEQA Status and Estimated Construction Schedule
15 cont.			The project would consist of the following: • Improvements within the Vista Grande watershed collection system to improve the quality of stormwater runoff; • Partial replacement of the existing Vista Grande Canal to incorporate a gross solid screening device, a treatment wetland, and diversion and discharge structures to route some stormwater (and authorized non-storm water) flows from the Vista Grande Canal to South Lake Merced; • Replacement of the existing Vista Grande Tunnel to expand its capacity; and Replacement of the existing outfall structure at Fort Funston	**Long-term**: impacts on transportation and circulation, and hydrology and water quality			
None[c]	Holy Cross Cemetery	Holy Cross Cemetery	The Holy Cross Cemetery owns adjacent land which it expects to convert to gravesites over the next 20 years. The cemetery is located in the Town of Colma in San Mateo County, bounded by Hillside Boulevard to the northeast, Mission Road to the southwest, and Lawndale Blvd to the southeast.	**Long-term**: Impacts on hydrology	Project located approximately 3.5 miles from the Groundwater Supply Project vicinity	Westside Groundwater Basin	**Status of environmental review:** None **Construction schedule:** No current plans; however, buildout is projected to occur at approximately 1.5 acres per year from 2010 to 2030 (a total of 30 acres over 20 years).

TABLE 5.1-6 (Continued)
CUMULATIVE PROJECTS AND IMPACTS IN OR NEAR THE SAN FRANCISCO GROUNDWATER SUPPLY PROJECT

[a] Construction schedules were estimated based on information obtained in project-related documents such as initial studies and EIRs; city, county, and regional agency websites; and communication with representatives from local jurisdictions. As with all proposed development projects, estimated construction schedules are subject to revisions and delays and therefore could vary from the time periods indicated.
[b] San Francisco Planning Urban Research Association is the project proponent, but not the Lead Agency. This project is in the planning phase and environmental evaluation, if any, has not yet begun.
[c] The Holy Cross Cemetery project is not shown on Figure 5.1-1, Cumulative Projects because the only potential cumulative effects are related to long-term groundwater-related effects. The cemetery site itself is substantially south of the project area.

TBD = To be determined

SOURCES: City of Daly City, 2009a; City of Daly City, 2009b; National Park Service, 2011; San Francisco Planning Department, 2007; San Francisco Planning Department, 2009; San Francisco Planning Department, 2010a; San Francisco Planning Department, 2011a; San Francisco Planning Department, 2011b; San Francisco Planning Department, 2011c; San Francisco Planning Department, 2012a; San Francisco Planning Department, 2012b; San Francisco Planning Urban Research Association, 2012; San Francisco State University, 2012, SFPUC, 2013.

NOTE: Locations of cumulative projects are approximate.

SOURCE: ESA

San Francisco Groundwater Supply Project EIR

Figure 5.1-1
Cumulative Projects

Timing and Duration of Implementation

The SFPUC would construct the project over an estimated 26-month period. Based on available project planning information, in the short-term, project construction could overlap with construction of other projects in the immediate vicinity, including the Beach Chalet Athletic Fields Renovation Project, San Francisco Westside Recycled Water Project, the Vista Grande Drainage Basin Improvement Project, and the Regional Groundwater Storage and Recovery Project. In addition, long-term operations of the project would overlap with operation of some of these projects. For temporal impacts such as noise and traffic, this analysis considers cumulative short- and long-term effects from other projects if the planned construction and/or operation of those projects could overlap with that of the Groundwater Supply Project or could take place immediately prior to or after construction of the Groundwater Supply Project and would affect the same environmental resources and sensitive receptors.

5.1.5 Overview of Groundwater Modeling Approach

As described in Chapter 3, Project Description, the SFPUC proposes to pump 3 mgd of groundwater from the North Westside Groundwater Basin[2] under Phase 1 of the Groundwater Supply Project, and 4 mgd under Phase 2. The analyses presented in Sections 5.11, Recreational Resources, 5.14, Biological Resources, and 5.16, Hydrology and Water Quality assess the impacts associated with changes in groundwater and surface water levels in response to this pumping based on groundwater and lake-level modeling conducted in support of the project. This section describes the development of models used to approximate changes in groundwater and surface water levels, including modeling assumptions and calibration.

Groundwater Modeling

The Westside Basin Groundwater Model, Version 3.1, was used to model groundwater-level changes for 47 years using initial conditions from 2009. Four scenarios were modeled, including modeled existing conditions (continuation of existing pumping without the project), Phases 1 and 2 of the San Francisco Groundwater Supply Project, and cumulative conditions, which include the continuation of existing pumping, the proposed project, and other reasonably foreseeable groundwater pumping and surface water projects in the groundwater basin (Kennedy/Jenks, 2012a). Changes in Lake Merced water levels were further modeled using a spreadsheet-based Lake-Level Model. Both of these models are described below.

The Westside Basin Groundwater Model was developed using MODFLOW 2000[3] over a period of several years under the oversight of Daly City, San Bruno, Cal Water, and the SFPUC. Each entity contributed and ultimately agreed upon information regarding the hydrologic conditions and groundwater pumping in the Westside Groundwater Basin. Version 3.1 of the model was

2 The Westside Groundwater Basin underlies much of western San Francisco and portions of northern San Mateo County. For discussion purposes, the portion of the Westside Groundwater Basin north of the San Francisco/San Mateo County line is referred to in this EIR as the North Westside Groundwater Basin, and the portion of the Westside Groundwater Basin south of the San Francisco/San Mateo County line is referred to as the South Westside Groundwater Basin.

3 MODFLOW 2000 is a finite-difference numerical modeling software developed by the USGS.

calibrated to observed groundwater conditions within the basin for 51 years, from October 1958 through September 2009 (HydroFocus, 2011). The calibration used available records of historical hydrologic and pumping data, including more than 2,000 observed monthly water levels in 125 wells representing a broad range of locations, depths, and hydrologic conditions. The hydrology used in the calibration relied on observed monthly rainfall and temperature data from various climate stations throughout the Westside Groundwater Basin, and included conditions ranging from wet periods to droughts of different magnitude and duration. The model reports groundwater elevations based on the National Geodetic Vertical Datum of 1929 (NGVD 29, see Section 5.16, Hydrology and Water Quality for a description of the various datums used in San Francisco). Because natural groundwater systems are dynamic and vary from year to year, use of this long-term historical record (consistent with standard industry practice) is considered representative of the range of hydrological conditions that may be expected in the future and contributes to the accuracy of predicting future changes in the groundwater system by the model.

The adequacy of the model calibration was assessed by calculating the average difference between modeled and observed groundwater levels. The calibrated groundwater levels were on average within 19 feet of the observed water levels (throughout the entire modeled area), which is approximately 4 percent of the total range in observed groundwater levels across the modeled area. Typically, calibration is considered adequate when this difference is less than 15 percent (Kennedy/Jenks, 2012a). Based on these results, the Westside Groundwater Basin Model is considered reasonably well calibrated and a tool that may be used for basin-scale analyses and comparison of water resources management alternatives.

Using the calibrated model, the SFPUC conducted modeling scenarios with initial conditions beginning at the end of June, 2009, the year that the Notice of Preparation of the Environmental Impact Report (NOP) was issued (the NOP is provided in **Appendix A**). The scenarios were used to evaluate the potential changes in groundwater levels if existing groundwater pumping were to continue; the potential effects of both phases of the proposed Groundwater Supply Project; and the potential cumulative effects of pumping under the proposed project together with existing pumping and other reasonably foreseeable groundwater pumping and surface water projects in the groundwater basin (see **Table 5.1-6**). The cumulative projects included in the model are the Regional Groundwater Storage and Recovery Project, the Vista Grande Drainage Basin Improvement Project, and the potential buildout of the Holy Cross Cemetery (described below), as well as continuation of existing pumping within the basin.

As discussed in Section 5.16, Hydrology and Water Quality, the Westside Groundwater Basin contains three aquifers[4] known as the Shallow Aquifer, Primary Production Aquifer, and Deep Aquifer. The Westside Basin Groundwater Model simulates groundwater conditions in five layers, which represent the underlying geology. Not all layers are present across the entire groundwater basin. In general, Layer 1 approximates the Shallow Aquifer in the North Westside Groundwater Basin and the upper saturated portion of the Primary Production Aquifer in the South Westside

[4] An aquifer is a geologic unit that transmits and stores water and yields a substantial quantity of water to wells or springs. In the Westside Groundwater Basin, aquifer materials are typically sand ranging in grain size from medium to fine.

Groundwater Basin; Layer 4 approximates the Primary Production Aquifer; and Layer 5 approximates the Deep Aquifer. Therefore, the discussion of the modeling results focuses on these three layers.

For each model scenario, groundwater levels were projected for a 47-year simulation period using the pumping assumptions listed in **Table 5.1-7,** and the SFPUC report documenting the modeling effort describes how these assumptions were derived (Kennedy/Jenks, 2012a). For the modeled existing conditions, the modeled pumping includes existing groundwater uses. In the South Westside Groundwater Basin, this includes municipal, irrigation, and residential pumping. In the North Westside Groundwater Basin, this includes irrigation pumping in Golden Gate Park, irrigation pumping at the San Francisco Golf Course, and use of groundwater at the Zoo, Edgewood Development Center, and Stern Grove as described in more detail in Section 5.16, Hydrology and Water Quality.

For cumulative conditions, the modeling considered the SFPUC's proposed Regional Groundwater Storage and Recovery Project, which would use the South Westside Groundwater Basin as an underground storage reservoir by storing water in the basin during wet periods for subsequent use during dry periods (see Table 5.1-7). This new dry-year water supply would be made available to the cities of Daly City and San Bruno, and the California Water Service Company (Cal Water) in its South San Francisco service area (collectively referred to as Partner Agencies), and SFPUC wholesale water customers. The cumulative modeling scenario includes a Put/Take/Hold sequence for the proposed Regional Groundwater Storage and Recovery Project to simulate in-lieu groundwater recharge during wet years and groundwater extraction during dry years under that project. This approach is defined as follows:

- A Put Period is a period when the SFPUC would provide supplemental surface water to the Partner Agencies. The surface water would be used by the Partner Agencies in lieu of groundwater, allowing them to reduce the amount of groundwater they pump. During a Put Period, the reduced pumping would effectively increase the amount of groundwater in storage in the South Westside Groundwater Basin, and these supplemental surface water deliveries would make up the SFPUC Storage Account. The SFPUC Storage Account is the accounting of surface water deliveries made by the SFPUC to the Partner Agencies and groundwater pumping in the Partner Agency service area. During a Put Period, the SFPUC and the Partner Agencies would only operate the project wells periodically for maintenance purposes.

- A Take Period is a dry period when water shortages could occur, and the SFPUC would not provide supplemental surface water to the Partner Agencies. During a Take Period, the volume of water pumped by the project wells would be limited to the total amount of groundwater included in the SFPUC Storage Account, and the Partner Agencies could also pump their municipal wells for municipal supply.

- A Hold Period is a period when the SFPUC Storage Account is full and there would be no supplemental surface water deliveries by the SFPUC. The SFPUC Storage Account is full when 60,500 acre feet have been stored after accounting for Regional Groundwater Storage and Recovery Project-related losses from the Account. During a Hold Period, the Partner Agencies could pump their municipal wells at their typical rate for municipal supply, but Project wells would be operated by the SFPUC or the Partner Agencies periodically to exercise the wells for maintenance purposes.

TABLE 5.1-7
SUMMARY OF PUMPING ASSUMPTIONS FOR MODEL INPUT

Pumped Wells		Pumping Rate, mgd			
		Modeled Existing Conditions	**SFGW Phase 1**	**SFGW Phase 2**	**Cumulative Conditions**
MUNICIPAL PUMPING					
PA Municipal Wells					
	Take Periods	6.84	6.84	6.84	6.90
	Put Periods	6.84	6.84	6.84	1.38
	Hold Periods	6.84	6.84	6.84	6.90
GSR-Proposed Municipal Wells					
	Take Periods	0.0	0.0	0.0	7.23
	Put Periods	0.0	0.0	0.0	0.04
	Hold Periods	0.0	0.0	0.0	0.04
SFGW-Proposed Municipal Wells					
	Year-round Pumping	0.0	3.0	4.0	4.0
Total Municipal Pumping (PA + GSR + SFGW)					
	Take Periods	***6.84***	***9.84***	***10.84***	***18.13***
	Put Periods	***6.84***	***9.84***	***10.84***	***5.42***
	Hold Periods	***6.84***	***9.84***	***10.84***	***10.94***
Golden Gate Park	Elk Glen	0.081	0.081	0.0	0.0
	South Windmill	0.498	0.498	0.0	0.0
	North Lake	0.563	0.563	0.0	0.0
	Subtotal	**1.142**	**1.142**	**0.0**	**0.0**
Golf Courses	Burlingame Golf Course	0.150	0.150	0.150	0.150
	California Golf Club No. 2	0.192	0.192	0.192	0.192
	Green Hills No. 5	0.099	0.099.	0.099.	0.099.
	Lake Merced Golf Club No. 1	0.004	0.004	0.004	0.004
	Lake Merced Golf Club No. 2	0.004	0.004	0.004	0.004
	Lake Merced Golf Club No. 3	0.010	0.010	0.010	0.010
	Olympic Golf Club No. 9[a]	0.002	0.002	0.002	0.002
	San Francisco Golf Club West	0.035	0.035	0.035	0.035
	Subtotal	**0.495**	**0.495**	**0.495**	**0.495**
Cemeteries	Cypress Lawn No. 2	0.020	0.020	0.020	0.020
	Cypress Lawn No. 3	0.144	0.144	0.144	0.144
	Eternal Home	0.013	0.013	0.013	0.013
	Hills of Eternity No. 2	0.020	0.020	0.020	0.020
	Holy Cross No. 3	0.190	0.190	0.190	0.230
	Home of Peace No. 2	0.039	0.039	0.039	0.039
	Italian Cemetery	0.033	0.033	0.033	0.033
	Olivet	0.098	0.098	0.098	0.098
	Woodlawn No. 2	0.085	0.085	0.085	0.085
	Subtotal	**0.641**	**0.641**	**0.641**	**0.681**
Other	Hillsborough Residents 1–12	0.291	0.291	0.291	0.291
	Edgewood Development Center	0.009	0.009	0.009	0.009
	Zoo No. 5	0.321	0.321	0.321	0.321
	Stern Grove	0.004	0.012	0.013	0.013
	Subtotal	**0.626**	**0.634**	**0.635**	**0.635**
Total Irrigation and Other Nonpotable Pumping		***2.90***	***2.91***	***1.77***	***1.81***

KEY:
mgd – million gallons per day
PA – Partner Agencies
SFGW – San Francisco Groundwater Supply Project
GSR – Regional Groundwater Storage and Recovery Project

[a] Olympic Golf Club Well No. 9 values include pumping for both Olympic Club wells.

SOURCE: Kennedy/Jenks, 2012a

The modeled pumping rates are described below:

- **Modeled Existing Conditions.** To predict the results of existing pumping rates (i.e., without operation of the proposed project) into the future over the varying hydrologic conditions, this model scenario assumes that all existing pumping would continue at its current rate for the entire simulation (as indicated in Table 5.1-7), which shows the rate of pumping by each pumper.

  In this scenario, it is assumed that municipal pumping by the Partner Agencies in the South Westside Groundwater Basin would continue to be 6.84 million gallons per day (mgd) combined, which would occur year round. This total pumping includes five wells operated by San Bruno, five wells operated by Daly City, and five wells operated by Cal Water.

  Irrigation pumping in the South Westside Groundwater Basin is estimated to be 0.46 mgd by the golf courses and 0.641 mgd by the cemeteries. However, it should be noted that these numbers represent annual averages; actual pumping rates during the winter would be lower, and in the summer season would be higher. The only other pumping in the South Westside Groundwater Basin under modeled existing conditions would be 0.291 mgd to account for irrigation wells at residences in Hillsborough.

  In the North Westside Groundwater Basin, the existing pumping includes 1.142 mgd of irrigation pumping in Golden Gate Park, 0.009 mgd of pumping for irrigation at the Edgewood Development Center, 0.321 mgd of pumping at the San Francisco Zoo, 0.004 mgd of pumping at Stern Grove to maintain Pine Lake water levels, and 0.035 mgd of pumping for irrigation at the San Francisco Golf Club. As for the irrigation pumping listed above, these pumping volumes represent an annual average and actual pumping rates during the irrigation season would be higher. Under modeled existing conditions, it is assumed that pumping would continue at the existing rates, and the total pumping from the North Westside Groundwater Basin is estimated to be 1.51 mgd.

- **Groundwater Supply Project Only – Phase 1.** Under this model scenario, project-related municipal groundwater pumping in the North Westside Groundwater Basin would be 3 mgd from four wells (the Lake Merced, South Sunset, West Sunset, and Central Pump Station well facilities). The Lake Merced well facility would pump entirely from the Primary Production Aquifer, and the South Sunset well facility also would pump from the Primary Production Aquifer. In Golden Gate Park to immediately south of the Ortega monitoring well, there is no clay layer separating the various model layers, and model layers 1 through 5 could be considered one aquifer. The West Sunset and Central Pump Station well facilities would draw groundwater from this single aquifer.

  The total irrigation pumping in Golden Gate Park and at the San Francisco Zoo, Edgewood Development Center, and San Francisco Golf Club would be the same as under the modeled existing conditions. For Pine Lake, pumping at the Stern Grove well would be increased from 0.004 mgd to 0.012 mgd to allow for an increase in the volume of water needed to maintain water levels in Pine Lake. Under Phase 1 of the Groundwater Supply Project, the total pumping from the North Westside Groundwater Basin would be 4.51 mgd. In the South Westside Groundwater Basin, the pumping would be the same as under modeled existing conditions.

- **Groundwater Supply Project Only – Phase 2.** Under this model scenario, project-related municipal pumping in the North Westside Groundwater Basin would be 4 mgd from six wells (including the South Windmill Replacement and North Lake well facilities in Golden

Gate Park, in addition to the four facilities used during Phase 1). The two additional wells (the South Windmill Replacement and North Lake well facilities) would draw groundwater from the merged aquifer, similar to the West Sunset and Central Pump Station well facilities.

Irrigation pumping in Golden Gate Park would not occur, as described in Chapter 3, Project Description, while pumping at the San Francisco Zoo, Edgewood Development Center, and San Francisco Golf Club would be the same as under modeled existing conditions. For Pine Lake, pumping at the Stern Grove well would be increased from 0.004 mgd to 0.013 mgd to allow for an increase in the volume of water needed to maintain water levels in Pine Lake. Under Phase 2 of the Groundwater Supply Project, the total pumping from the North Westside Groundwater Basin would be 4.37 mgd. In the South Westside Groundwater Basin, the pumping would be the same as under the modeled existing conditions.

- **Cumulative Conditions.** This model scenario combines the existing pumping in the Westside Groundwater Basin and project pumping described above for Phase 2 of the Groundwater Supply Project with other reasonably foreseeable changes in pumping in the basin, including pumping that would occur with implementation of the Regional Groundwater Storage and Recovery Project and the Holy Cross Cemetery buildout. The Vista Grande Drainage Basin Improvement Project does not propose groundwater pumping but is included as a cumulative project because it calls for additions of stormwater to Lake Merced, which would increase Lake Merced water levels and associated groundwater levels in the Shallow Aquifer. Table 5.1-7 provides pumping assumptions for each project that involves groundwater pumping.

  Under the proposed Regional Groundwater Storage and Recovery Project, the SFPUC would install 16 wells to recover groundwater stored during Put Periods. Pumping would vary according to the Put/Take/Hold sequence discussed above, as indicated in Table 5.1-7, and would be as follows:

  - Municipal pumping by the Partner Agencies during Take and Hold Periods would be 6.90 mgd compared to 6.84 mgd under modeled existing conditions. During Put Periods, total municipal pumping by the Partner Agencies would be reduced to 1.38 mgd because of supplemental surface water deliveries by the SFPUC. During a Put Year, the SFPUC would deliver up to 5.52 mgd of supplemental water deliveries for in-lieu recharge of the basin.
  - Project pumping by the SFPUC and Partner Agencies during Take Periods would be 7.23 mgd of water from the 16 wells installed under the Regional Groundwater Storage and Recovery Project. During Put and Hold Periods, project pumping would be reduced to 0.04 mgd for well maintenance.
  - With the exception of the Holy Cross Cemetery buildout, described below, the total irrigation pumping would be the same as under modeled existing conditions.

  For the Holy Cross Cemetery, the groundwater model assumes that groundwater pumping would be increased from 0.190 mgd to 0.230 mgd to accommodate the potential buildout of the cemetery (Kennedy/Jenks, 2012a). Buildout of the Holy Cross Cemetery is included in the cumulative conditions because the cemetery owns undeveloped land adjacent to its current operations, which it expects to convert to gravesites over the next 20 years. For the purpose of the Westside Basin Groundwater Model, this expansion is projected to occur at approximately 1.5 acres per year from 2010 to 2030 (a total of 30 acres over 20 years). Using a conservative irrigation rate of 1.5 acre-feet per year (afy), the Westside Basin Groundwater Model estimates future demand for irrigation at 45 afy (or 0.04 mgd), and this amount of pumping was included in the cumulative conditions modeling.

Using the above pumping quantities, during Put Periods when the SFPUC Storage Account is being replenished, total pumping from the South Westside Groundwater Basin would be 2.89 mgd, including 1.38 mgd of municipal pumping by the Partner Agencies, 0.04 by the SFPUC to exercise their wells, 0.495 mgd for irrigation of golf courses, 0.681 mgd for irrigation of cemeteries, and 0.291 mgd by the Hillsborough residents. During Hold Periods, when the SFPUC Storage Account is full, the total pumping would be 8.41 mgd – pumping for irrigation and Hillsborough residents would stay the same as would pumping by the SFPUC, but municipal pumping by the Partner Agencies would increase to 6.90 mgd. During Take Periods, the total pumping would be 15.60 mgd because the SFPUC pumping would be increased to 7.23 mgd while the Partner Agency municipal pumping would remain at 6.90 mgd.

For the Vista Grande Drainage Basin Improvement Project, the groundwater model assumes that the Lake Merced spillway would be lowered from an elevation of 13 feet City Datum to 9.5 feet City Datum, and the total diversion of stormwater flow to Lake Merced would average 429 afy. The Vista Grande Drainage Basin Improvement Project would be implemented by Daly City to manage stormwater and reduce flooding in this 2.5-square-mile Vista Grande Drainage Basin in Daly City (City of Daly City, 2011). The final design of the project has not been determined, but the alternatives analysis for the project considered four options to achieve the project goals. Currently, stormwater from the drainage basin is conveyed to the Vista Grande Canal, located adjacent to John Muir Drive in San Francisco. From the canal, the stormwater flows to the Vista Grande Tunnel and Outfall Structure, which ultimately discharges to the Pacific Ocean south of Fort Funston. Rainstorms sporadically produce stormwater runoff that exceeds the 170-cubic foot per second (cfs) capacity of the tunnel and the 500-cfs capacity of the canal, resulting in upstream flooding and overtopping of John Muir Drive in San Francisco. The excess water flows across John Muir Drive to Lake Merced and other areas of lower elevation.

The Vista Grande Drainage Basin Improvement Project's Lake Merced Alternative (which is included in this analysis as part of the cumulative conditions) involves the diversion of stormwater flows from the Vista Grande Canal to Lake Merced via direct discharge to the lake and through an engineered wetland, as well as lowering of the Lake Merced spillway from an elevation of 13 feet City Datum to 9.5 feet City Datum. The Vista Grande Drainage Basin Improvement Project alternatives analysis considered potential options for diversion of stormwater flows to Lake Merced in excess of 35, 50, 75, 100, 125, 150, and 170 cubic feet per second (cfs) and spillway elevations of 7.5, 8.5, and 9.5 feet City Datum (City of Daly City, 2011). The average total combined additions to Lake Merced range from 299 afy under the 170-cfs option to 560 afy under the 35-cfs option (Kennedy/Jenks, 2012b).[5] The cumulative modeling scenario prepared for the San Francisco Groundwater Project assumes the lake addition volumes that would occur under the 75 cfs option. Total annual additions to Lake Merced resulting from stormwater inflow under this option would range from 19 to 681 acre-feet, with an average of 209 acre-feet per year (afy), and annual additions of baseflow from an onsite engineered wetland would range from 78 to 277 acre-feet, with an average of 220 afy. The total average diversions to Lake Merced under these

[5] Note that the title of each Vista Grande option under the Lake Merced Alternative refers to volume capacity of the proposed Vista Grande Tunnel, and that flows in excess of this capacity would be diverted to Lake Merced. Therefore, the smaller the capacity of the tunnel, the greater the diversions to Lake Merced.

assumptions are therefore estimated to be 429 afy. The range of diversion volumes under each of the options evaluated is within ±30 percent of this value. The cumulative modeling scenario prepared for the San Francisco Groundwater Project incorporated the highest spillway elevation under consideration for the Vista Grande Drainage Basin Improvement Project alternatives analysis (i.e., 9.5 feet City Datum), such that the greatest potential range of water fluctuations could therefore be considered in the impact analysis.

There are two cumulative projects listed in Table 5.1-6 that could also include additions to Lake Merced and, if the stormwater project component is implemented, would also contribute to raising water levels in the lake: the Parkmerced and San Francisco State University master plan projects. The Parkmerced project includes construction of a series of transportation and infrastructure improvements in an existing neighborhood adjacent to Lake Merced on the east side (San Francisco Planning Department, 2011a). As part of these improvements, stormwater runoff from buildings and streets could be captured and filtered through a series of bioswales, ponds, and other natural filtration systems. The filtered stormwater would then either percolate into the groundwater or be released directly into Lake Merced. The San Francisco State University master plan projects include rain gardens, bio-swales, pervious pavements, and vegetated open channels for stormwater management; the entire network of projects would connect to Lake Merced (SFSU, 2007). However, the amount of water that would be discharged to Lake Merced under these projects has not been quantified and would depend on the extent and timing of implementation of housing, support facilities, and other developments under the Parkmerced project and San Francisco State master plan. Further, the timing of implementation of the resulting stormwater management project components is uncertain. Therefore, these projects are addressed qualitatively in the cumulative impact analyses, but contributions to Lake Merced from these projects are not included in the modeling.

The hydrologic sequence, which is the same for all model scenarios, uses temperature and rainfall data taken from the historical period of 1958 through 2005. During this period, northern California has experienced drought periods, most notably the droughts from 1976 to 1977 and from 1987 to 1992. After the 1987 to 1992 drought, the SFPUC reevaluated and modified its operating procedures and developed a design drought to use in system planning to ensure an adequate water supply during a drought. The design drought is a planning and operational tool that water supply agencies use to define a reasonable worst-case drought scenario based on known hydrology in order to establish design and operating parameters for the water system. It is a more severe drought than any that occurred during the historical data period that was analyzed and was simulated by placing a repeat of the hydrologic conditions that occurred from December 1975 through March 1978 (encompassing the 1976 to 1977 drought) after the dry hydrologic conditions of July 1987 to November 1992. The hydrologic sequence was then rearranged to allow for the SFPUC Storage Account under the Regional Groundwater Storage and Recovery Project to be filled during Put Years prior to pumping groundwater during a Take Period (Kennedy/Jenks, 2012a). In the simulations, the design drought is followed by a period of three Put Years to evaluate the rate of recovery after the design drought. These alterations do not compromise the accuracy of the model, because hydrologic conditions would not necessarily occur in the same sequence in the future as they did in the past, and as discussed above, the historical period used for model calibration encompasses a representative range of hydrological conditions that may be expected in the future.

Pumping under the Groundwater Supply Project was modeled for both project phases over the entire 47-year simulation period to allow for evaluation of the full range of effects that could occur under either scenario. Because the effects of both phases are similar, the timing of Phase 2 implementation would not result in substantially different effects than are indicated by modeling of the separate model scenarios for each phase.

Lake Merced Surface Water Modeling

As discussed in Section 5.16, Hydrology and Water Quality, Lake Merced is incised in the Shallow Aquifer, and the lake surface is essentially considered an exposed part of the water table. Because of this, changes in groundwater levels as a result of pumping under the Groundwater Supply Project could adversely affect water levels in Lake Merced. To evaluate potential effects on Lake Merced, the lake package of the MODFLOW software (MODFLOW 2000 LAK3 Package) was used to simulate the hydraulic interaction between Lake Merced and the adjoining groundwater system; to estimate inflow and outflow across the bed of Lake Merced; and to evaluate the relative effects of groundwater pumping on lake water levels. The MODFLOW Lake Package considered runoff to Lake Merced from Tournament Players Cup Harding Park and adjacent land areas immediately surrounding the lake. To ensure consistency between the modeling and mass balance[6] calculations, the initial Lake Merced level for all model scenarios was set to match the simulated June 2009 lake level from the model calibration. However, because the MODFLOW Lake Package does not take into account the site-specific geometry of the lakebed, the simulation of Lake Merced surface water levels is not always accurate.

Similarly, the MODFLOW Lake Package does not allow an input for the maximum elevation of Lake Merced. For each modeled scenario, this limitation resulted in instances when lake levels could exceed the existing spillway elevation of 13 feet City Datum (or 9.5 feet City Datum for the cumulative scenario), thus causing an artificial filling of the lake above physically possible levels and potentially affecting simulated groundwater levels in the Shallow Aquifer, which is in direct hydraulic communication with Lake Merced. To address this model limitation, the model scenarios were run iteratively by manually adjusting the Lake Package input file to remove excess water from the lake as “lake spills” until the level of the lake remained below the spillway elevation.

Further, while the modeled Lake Merced water levels using the MODFLOW Lake Package are generally accurate to within approximately 2 to 3 feet of the observed historical water levels during years 1 through 14 and 39 to 51 of the historical simulation, some of the differences during other periods are as high as 7 feet. Therefore, the modeled lake levels should be considered representative

[6] A mass balance is an application of the conservation of mass principle (i.e., that matter cannot disappear or be created spontaneously) to the analysis of physical systems. By accounting for material entering and leaving a system, mass flows can be identified that might have been unknown or otherwise difficult to measure. Therefore, mass balances are used widely in engineering and environmental analyses.

of relative changes in lake levels in response to groundwater pumping, but not suitable for estimating absolute changes in lake levels.

To provide a more accurate estimate of Lake Merced surface water levels in response to changes in groundwater levels, the output from the Westside Basin Groundwater Model was used as input to the Lake-Level Model, a spreadsheet-based mass balance model that has been calibrated to 70 years of historical water levels in Lake Merced (Kennedy/Jenks, 2012a).[7] Use of the Lake-Level Model allows for changes in the surface area of Lake Merced as a function of lake level, a dynamic simulation of changes in lake volume, a more complete evaluation of stormwater runoff, and evaluation of occasional flooding events resulting from overflows of the Vista Grande Canal. The hydrology used for each model scenario was the same as that used for the Westside Basin Groundwater Model, and the measured water level of 5.7 feet City Datum in Lake Merced in June 2009 was used as the initial lake level for the model.

Use of the Westside Basin Groundwater Model

The Westside Basin Groundwater Model simulates changes in groundwater levels and storage; the strongest predictive ability of the model is estimating relative changes over a broad area rather than providing absolute predictions of groundwater elevations at local areas or at a single well (Kennedy/Jenks, 2012a). As such, the relative difference between the effects estimated under modeled existing conditions is compared to pumping under the proposed project and cumulative conditions to evaluate effects related to the project. This approach allows separation of project effects from those due just to the natural hydrology or normal conditions at the time the effect occurs. Using this approach, the model provides useful information to inform basin management decisions and monitoring requirements and to identify data gaps, rather than merely predicting specific effects at a single location.

Relative changes in groundwater levels are also useful for assessing changes in surface water levels, groundwater storage, water quality, and the potential for seawater intrusion and land subsidence in response to pumping. These related effects are assessed based on the modeling results as supplemented by various analytical approaches, as summarized in the impact analyses in Section 5.16, Hydrology and Water Quality.

Limitations of the Westside Basin Groundwater Model

While the model provides useful information to inform basin management decisions and monitoring requirements, there are some specific areas of weakness and/or limitations in the model and model calibration (Kennedy/Jenks, 2012a). One limitation is in the Colma and San Bruno subareas of the modeled area where there was the greatest difference between the

[7] The calibration period extends from October 1939 to June 2005. This period includes a wide range of conditions including high and low lake level elevations; droughts and above-average rainfall; increased pumping in the South Westside Groundwater Basin; increased urbanization that caused stormwater runoff to be diverted to the city's combined sewer system; decreased golf course pumping as a result of recycled water deliveries; reduced groundwater pumping as a result of the In-Lieu Recharge Demonstration Study; and water additions by the SFPUC.

modeled and historical groundwater elevations during the model calibration. These differences are likely due to limitations in available historical groundwater-level data, model scaling, and the uncertainty in particular aquifer parameters in these subareas. Because of the higher level of error, the model results for these subareas contain a higher degree of uncertainty. Although this is a limitation of the model, it does not alter the analysis because these subareas are too far south to be affected by pumping in the North Westside Groundwater Basin.

In the Golden Gate Park area, the aquifer thickness used in the Westside Groundwater Basin Model is substantially less than that observed in the test well drilled at the proposed Central Pump Station well facility. Also, the model uses only Layer 1 in the central and eastern parts of Golden Gate Park which represents unconfined conditions.[8] However, pump test results for some test wells indicate that confined conditions[9] may exist, and the tests also provide different values for the hydraulic conductivity[10] of the aquifer than were used in the model. As a result of these differences, the model may overestimate the project-related drawdown[11] in the well facilities planned in Golden Gate Park. This limitation is addressed in Section 5.16, Hydrology and Water Quality, Impact HY-8, which evaluates project effects related to seawater intrusion.

Another limitation pertains to the areas where the Westside Groundwater Basin interacts with the Pacific Ocean and San Francisco Bay. In these areas the model establishes a constant groundwater elevation (head) of zero where the groundwater aquifer meets the ocean or bay. However, as discussed in Section 5.16, Hydrology and Water Quality, the modeled constant head boundary (where groundwater levels would remain the same) is located on the landward side of the coast rather than on the seaward side, which is overly rigid because groundwater levels near the coast would be dynamic and would change during operation of the project. In addition, the shape of the seawater wedge formed during seawater intrusion is partially dependent on the density difference between salt water and fresh water, and the modeled characterization does not fully account for the density difference. To address these limitations, additional analytical tools were used to assess the potential for seawater intrusion, as discussed in Section 5.16, Hydrology and Water Quality, Impact HY-8.

For evaluating the potential effects of future pumping, the model assumes that historical hydrology can be used, although the hydrology sequence has been altered to include the design drought and then re-sequenced, as described above. Inclusion of the design drought (which is more severe than any drought in the hydrologic record) allows the SFPUC to plan for a drought that is more severe than any recorded droughts. However, as in any other modeling study used for long term planning purposes, the actual future conditions such as pumping, temperature, and rainfall will not occur exactly as modeled, and the response to pumping will depend on actual hydrological conditions

8 Unconfined conditions occur when the aquifer containing water is not overlain by a confining layer, such as a clay layer, and the aquifer is not under pressure.
9 Confined conditions occur when the aquifer is overlain by a confining layer, such as a clay layer. When the aquifer is completely filled with water, the water can be confined under pressure.
10 The hydraulic conductivity refers to the ability of the aquifer to transmit water.
11 The lowering of the level of water body, such as a reservoir or a groundwater basin.

taking place at that time. Despite this inherent uncertainty, the use of historical data provides a wide range of annual variations in hydrology that could be experienced in the future.

The Westside Basin Groundwater Model does not explicitly include changes in hydrologic parameters in response to climate change. However, the use of the design drought does allow some indication of how the Westside Groundwater Basin would respond to a prolonged dry period, the likes of which has not occurred in the available record. In addition, it is possible that climate change might have occurred during the period of the observed rainfall and temperature record. If so, then the observed rainfall and temperature data would include the effects of climate change as part of the overall data record. Since the observed rainfall and temperature data are used to drive the Westside Basin Groundwater Model, then the possible effects of climate change upon the historical record would be included implicitly in the simulations. Other possible climate change-induced effects in the future could include a rise in sea level and changes to groundwater levels (as a result of changes in recharge from changes to rainfall and temperature). These changes would have a related effect on the potential for seawater intrusion. The potential for climate change to exacerbate seawater intrusion is discussed in Section 5.16, Hydrology and Water Quality, Impact HY-8.

5.1.6 References

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5.2 Land Use

This section describes existing land uses in the vicinity of the San Francisco Groundwater Supply Project and the potential for implementation of the project to adversely affect established land uses or land use activities. This impact analysis evaluates the potential land use impacts of the proposed project and identifies mitigation measures to avoid or reduce adverse impacts, as appropriate.

5.2.1 Setting

Existing Land Use

The improvements proposed under the project would be located entirely within San Francisco (as shown in Figure 3-1 in Chapter 3, Project Description). San Francisco encompasses approximately 46.7 square miles of land and is home to approximately 859,658 people. The city is generally densely populated and urbanized except for publicly owned open space areas that make up approximately 20 percent of the city's total land area. The city has 3,400 acres of open space managed by the San Francisco Recreation and Park Department (SFRPD), more than 250 acres of open space owned and managed by the State of California, and another 1,600 acres of federally owned open space (CCSF, 2011).

The project area would be located on the western side of the city, in the Outer Parkside and the Outer Sunset neighborhoods. As shown in Figure 3-1, the project area is generally situated between 19th Avenue (Highway 1) to the east, the Great Highway to the west, Fulton Street to the north, and Lake Merced to the south. The project area overlies the North Westside Groundwater Basin.[1] It also includes four city parks: Golden Gate Park, Lake Merced, West Sunset Playground, and South Sunset Playground, as well as public open space at Sunset Reservoir. These park areas are described in Section 5.11, Recreation.

Portions of the project area would be located in the coastal zone and identified as the Western Shoreline in the *San Francisco General Plan*, which consists mostly of public open space and is covered by the *Western Shoreline Area Plan* (CCSF, 1998). The northern portion of the project would be located within Golden Gate Park, which is covered by the *Golden Gate Park Master Plan* (SFRPD, 1998). Refer to Chapter 4, Plans and Policies, for additional information about these plans.

Because certain land uses are more sensitive to construction-related impacts, this analysis identifies existing schools, recreational facilities, places of worship, and other publicly accessible facilities that are adjacent to or within ¼ mile of the proposed project sites; **Table 5.2-1** lists these facilities.

1 The State Water Resources Control Board identifies the basin as the Westside Groundwater Basin; however, for the purpose of this project, the portion of the groundwater basin within San Francisco is called the North Westside Groundwater Basin, and the portion within San Mateo County is called the South Westside Groundwater Basin.

TABLE 5.2-1
LAND USES IN THE VICINITY OF PROPOSED PROJECT SITES

Project Component / Staging Area	Location	Land Uses at the Project Site and Vicinity	Approximate Construction Area / Pipeline Length
Well Facilities – Phase 1			
Lake Merced Well Facility Staging Area: onsite	West of Lake Merced Boulevard and approximately 100 feet southeast of existing Lake Merced Pump Station (managed by SFPUC)	• Well facility site is restricted from public use and access • Harding Park and Lake Merced recreational and open space uses to the north, west, and south • Large-lot residential uses to the east • High-density residential at Park Merced development to the east • Holy Trinity Greek Orthodox Church (999 Brotherhood Way) • Armenian School-Krouzian (825 Brotherhood Way)	22,140 square feet
South Sunset Well Facility Staging Areas: Wawona St. (north), 40th Avenue (west)	40th Avenue and Wawona Street (on the corner of the South Sunset Playground) (managed by SFRPD)	• Public/recreational uses at the well facility site • Low-density residential uses to the east, north, and south • Ulloa Elementary School (2640 42nd Avenue) to the west • San Francisco Zoo to the southwest • Starlight Two Christian Preschool (3155 Vicente Street) • St. Gabriel Elementary School (2550 41st Avenue) • St. Gabriel Church (2559 40th Avenue)	3,400 square feet
West Sunset Well Facility Staging Area: Quintara Street (north)	40th Avenue and Quintara Street (at the northeast corner of the West Sunset Playground parking lot) (managed by SFRPD)	• Public/recreational uses at the well facility site • St. Ignatius College Preparatory (2001 37th Avenue) to the east -southeast • Sunset Elementary School (1920 41st Avenue) to the north • A.P. Giannini Middle School (3151 Ortega Street) • Ortega Branch Library (3223 Ortega Street) • Low-density residential uses to the south • Robert Louis Stevenson Elementary School (2051 34th Avenue) to the east	11,300 square feet
Central Pump Station Well Facility Staging Area: onsite	South of Overlook Drive and east of Middle Drive West/Overlook Drive intersection (within Golden Gate Park) (managed by SFRPD)	• Open space/park uses at the well facility site and in the vicinity of the site • Central Pump Station and SFRPD's wood waste storage and composting operations to the east of well facility site	Up to 15,200 square feet

TABLE 5.2-1 (Continued)
LAND USES IN THE VICINITY OF PROPOSED PROJECT SITES

Project Component / Staging Area	Location	Land Uses at the Project Site and Vicinity	Approximate Construction Area / Pipeline Length
Well Facilities – Phase 2			
South Windmill Replacement Well Facility Staging Area: onsite	Western area of Golden Gate Park and north of Martin Luther King Jr. Drive, and east of Murphy Windmill and Millwright's Cottage (managed by SFRPD)	• Facility would be sited at the former Richmond-Sunset Water Pollution Control Plant • Garage and storage structure are located south of the well facility site • Open space/park uses in the vicinity of the facility site • Facility would be sited east of the Murphy Windmill and Millwright's Cottage (contributing features to the Golden Gate Park National Register Historic District).	Up to 12,000 square feet
North Lake Well Facility Staging Area: onsite	Next to Chain of Lakes Drive within western area of Golden Gate Park and south of Fulton Street (managed by SFRPD)	• Open space/park uses adjacent to the well facility site and in the vicinity of the site • Low-density residential to the north along Fulton Street	Up to 9,900 square feet
Pipeline Segments – Phase 1			
1. West Sunset Well Facility to Sunset Reservoir	• Quintara Street (west) to 41st Avenue • 41st Avenue (north) to Ortega Street • Ortega Street (east) to 24th Avenue • 24th Avenue (south) to Sunset Reservoir	• Low-density family residential • Abraham Lincoln High School (2162 24th Avenue) to the south • Sunset Recreation Center (2201 Lawton Street) • Sunset Elementary School (1920 41st Avenue) to the north • A.P. Giannini Middle School (3151 Ortega Street) • Ortega Branch Library (3223 Ortega Street) • Congregation Adath Israel (1851 Noriega Street) to the north • Lutheran Church-Holy Spirit (2400 Noriega Street) • Hope Evangelical Free Church (2701 Noriega Street) • Sunset Ministry (3010 Noriega Street) • New Nation Mission Baptist Church (1750 29th Avenue) • Episcopal Church-Incarnation (1750 29th Avenue) • Or Shalom Jewish Community Center (1250 Quintara Street)	6,860 feet
2. Golden Gate Park Pipeline Junction to West Sunset Playground	• Chain of Lakes Drive East/41st Avenue (south) to Quintara Street • Quintara Street (east) to 40th Avenue	• Predominantly low-density residential, one-story commercial development • Sunset Elementary School (1920 41st Avenue) • A.P. Giannini Middle School (3151 Ortega Street)	4,920 feet

TABLE 5.2-1 (Continued)
LAND USES IN THE VICINITY OF PROPOSED PROJECT SITES

Project Component / Staging Area	Location	Land Uses at the Project Site and Vicinity	Approximate Construction Area / Pipeline Length
Pipeline Segments – Phase 1 (cont.)			
2. Golden Gate Park Pipeline Junction to West Sunset Playground (cont.)		• Francis Scott Key Elementary (1530 43rd Avenue) • Sunset Chinese School (3635 Lawton Street) • Holy Name School (1560 40th Avenue) • Holy Name of Jesus Church (1555 39th Avenue) • Sunset Church (3638 Lawton Street) • ABC's Child Development Center (1555 39th Avenue) • St. Paul's Presbyterian Church (1399 43rd Avenue)	
3. Central Pump Station Well Facility to Golden Gate Park Pipeline Junction	• Overlook Drive /Middle Drive West (west) to Martin Luther King Jr. Drive • Martin Luther King Jr. Drive (west) to Chain of Lakes Drive	• Open space/park uses	5,800 feet
4. South Sunset Well Facility to West Sunset Well Facility	• 40th Avenue (north) to Vicente Street • Vicente Street (west) to 41st Avenue • 41st Avenue (north) to Quintara Street • Quintara Street (east) to 40th Avenue	• Predominantly low-density residential, mixed residential, and one-story commercial development • St. Gabriel Elementary School (2550 41st Avenue) • Ulloa Elementary School (2640 42nd Avenue) • Independence High School (3045 Santiago Street) • St. Gabriel Church (2559 40th Avenue)	4,460 feet
Pipeline Segments – Phase 2			
5. North Lake Well Facility to Golden Gate Park Pipeline Junction	• Chain of Lakes Drive East (south) to Martin Luther King Jr. Drive	• Open space/park uses • Low-density residential uses to the north of Pipeline Segment 5	2,740 feet
6. South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction	• Martin Luther King Jr. Drive (east) to Chain of Lakes Drive	• Open space/park uses	2,080 feet

SOURCE: CCSF, 2010.

Lake Merced Vicinity

Lake Merced is located in the southwestern corner of San Francisco, just north of the San Mateo County jurisdictional boundary. Existing land uses in the Lake Merced vicinity include public/industrial, recreational, residential, educational/social, and commercial facilities. Recreational activities at Lake Merced include picnicking, walking, hiking, running, biking, boating/rowing, fishing, golfing at the Tournament Players Cup (TPC) Harding Park (formerly Harding Park Golf Course), and shooting at the Pacific Rod & Gun Club, which is located on the southwestern shore of the lake. As described below, the main project component proposed in the vicinity of Lake Merced is the Lake Merced well facility. Nearby recreational trails and facilities include a paved multi-use trail that follows the perimeter of Lake Merced; the Juan Bautista de Anza Historical Corridor Trail; designated bikeways[2] along Lake Merced Boulevard and Skyline Boulevard; Fort Funston, located 0.25 miles west of Lake Merced; the TPC Harding Park, which is located along the eastern shore of Lake Merced; the San Francisco Golf Course, located approximately 0.25 miles east of Lake Merced; and the San Francisco Zoo, located 0.25 miles northwest of Lake Merced.

Lake Merced Well Facility Site

The proposed Lake Merced well facility would be sited south of the TPC Harding Park and just south of the existing Lake Merced Pump Station (managed by the SFPUC). The well facility site is zoned for public uses; public access to both the well facility site and the pump station is restricted. High-density residential uses at the Parkmerced housing development are located east of the Lake Merced well facility site. The closest residences are located at Vidal Drive and Garces Drive, approximately 500 feet east of the well facility site, and on Lake Merced Hill North Drive, approximately 1,100 feet east of the well facility site. As indicated in Table 5.2-1, the nearest school and church to the Lake Merced well facility is the Armenian School-Krouzian and the Holy Trinity Greek Orthodox Church, both of which are located on Brotherhood Way (southeast of the project site).

Sunset Neighborhood Vicinity

The Sunset Neighborhood is located on the mid-western side of San Francisco, south of Golden Gate Park and north of Lake Merced. The primary land use in the Sunset District is low-density residential, with secondary land uses including public/industrial, recreational, educational, and neighborhood commercial facilities. The following project components would be located within the Sunset Neighborhood: the South Sunset well facility, the West Sunset well facility, and Pipeline Segments 1, 2, and 4. Land uses in the vicinity of the abovementioned project components are summarized below and in Table 5.2-1.

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2 The CCSF classifies bicycle routes in the project area based on the bikeway classifications defined by the State of California in the California Streets and Highway Code, Section 890.4. See Sections 5.6, Transportation and Circulation, and 5.11, Recreation, for additional information regarding designated bikeways.

South Sunset Well Facility Site

The South Sunset well facility site is located on the corner of the SFRPD-managed South Sunset Playground at 40th Avenue and Wawona Street next to public recreational fields used for softball, baseball, and soccer. The well facility site is zoned for public uses; land uses immediately adjacent to the well facility site consist of residences along 40th Avenue and Wawona Street. As indicated in Table 5.2-1, other surrounding land uses include Ulloa Elementary School to the west and the San Francisco Zoo approximately ¼ mile to the southwest.

West Sunset Well Facility Site

The West Sunset well facility site is at the SFRPD-managed West Sunset Playground at the intersection of 40th Avenue and Quintara Street adjacent to public recreational fields used for softball, baseball, and soccer. Across from the site are residences along Quintara Street. The proposed well facility site is zoned for public uses and would occupy a small portion of the northeast corner of the parking lot, south of the existing recreational (baseball) field. Land uses in the vicinity of the well facility site include the St. Ignatius College Preparatory School to the east, Sunset Elementary School and Ortega Branch Library to the north, and Robert Louis Stevenson Elementary School to the east.

Pipeline Segment 1 (West Sunset Well Facility to Sunset Reservoir)

Land uses adjacent to Pipeline Segment 1 (primarily along Ortega Street) consist of low-density residential uses; and small-scale commercial uses line Noriega Street (one block north of Ortega Street). Sunset Reservoir is located at the southeast corner of Ortega Street and 28th Avenue with Quintara Street to the south and 24th Avenue to the east. This SFPUC-managed reservoir is completely enclosed and public use and access are restricted, except for a grassy area at the corner of Ortega Street and 28th Avenue, which is open to the public. Schools in the immediate vicinity of the pipeline alignment include Sunset Elementary, A.P. Giannini Middle School, and Abraham Lincoln High School. As shown in Table 5.2-1, several places of worship are in the vicinity of Pipeline Segment 1, including Sunset Ministry, Hope Evangelical Free Church, New Nation Mission Baptist Church, Episcopal Church-Incarnation, and Or Shalom Jewish Community.

Pipeline Segment 2 (from Golden Gate Park Pipeline Junction to West Sunset Playground)

Land uses adjacent to Pipeline Segment 2 include low-density residential interspersed with one-story commercial developments. Schools located within 1/4 mile of the alignment include Sunset Elementary School, A.P. Giannini Middle School, Francis Scott Key Elementary, Sunset Chinese School, and ABC's Child Development Center. Several churches are also in the vicinity including Sunset Ministry, Sunset Chinese Church, Sunset Church, Holy Name of Jesus Church, and St. Paul's Presbyterian Church.

Pipeline Segment 4 (South Sunset Well Facility to West Sunset Well Facility)

Land uses adjacent to Pipeline Segment 4 primarily consist of low-density residential; many families live in this area. Several schools are in the near vicinity of the proposed alignment, including Ulloa Elementary School, St. Gabriel Elementary School, Independence High School, and Sunset Elementary School. St. Gabriel Church is the nearest church to Pipeline Segment 4.

West End of Golden Gate Park Vicinity

Golden Gate Park is located on the western side of San Francisco with the Great Highway to the west, Stanyan Street to the east, Fulton Street to the north, and Lincoln Way to the south. Golden Gate Park is designated for public use and contains numerous recreational facilities and trails. The project area is located in the west end of Golden Gate Park, which is characteristically more wooded and less refined parkland than the eastern park. The *Golden Gate Park Master Plan's* original design envisioned the western park to be "simply treated as a woodland or forest, with all the hills and ridges more or less heavily timbered, and the valleys covered with lower-growing shrubs or field grasses" (CCSF, 1998). Although, as discussed below, this area of the park has several outdoor recreational areas, it generally lacks recreational activity centers and has less visitor traffic compared to the east end of Golden Gate Park.

Recreational uses at Golden Gate Park include outdoor activities such as walking, running, biking, fishing, archery, equestrian riding, golfing, picnicking, and recreational sports associated with playing fields and children's play areas. Additionally, passive outdoor activities such as nature watching are popular in the western end of the park. Nearby recreational trails include paved multi-use pathways adjacent to Martin Luther King Jr. Drive, Middle Drive West, and John F. Kennedy Drive; a paved multi-use path way adjacent to Chain of Lakes Drive; the Juan Bautista de Anza Historical Corridor Trail; and designated bikeways along Martin Luther King Jr. Drive, John F. Kennedy Drive, Middle Drive West, Overlook Drive, and Transverse Drive. Section 5.11, Recreation gives more detailed information about recreation resources in Golden Gate Park. The following project components would be located in the vicinity of the western end of Golden Gate Park: the Central Pump Station well facility; South Windmill Replacement well facility; North Lake well facility; and pipeline segments 3, 5, and 6. The subsections below summarize land uses in the vicinity of project components in Golden Gate Park.

Central Pump Station Well Facility Site

The Central Pump Station site is located south of Overlook Drive (see Figure 3-9) and east of the Middle Drive West/Overlook Drive intersection. The proposed well facility site is zoned for public uses and is located to the west of the existing fenced Central Pump Station. The SFRPD's wood waste storage and composting operations currently use the fenced yard area at the Central Pump Station. Recreational activities in the vicinity of the Central Pump Station site consist of picnicking, bicycling, walking, and jogging. A designated bikeway is located north of Middle Drive West and Overlook Drive and is commonly used by bicyclists and pedestrians.

South Windmill Replacement Well Facility Site

The existing South Windmill Replacement well facility is within the western area of Golden Gate Park north of Martin Luther King Jr. Drive (see Figure 3-7 in Chapter 3, Project Description) and approximately 300 feet east of the Murphy Windmill and Millwright's Cottage, both of which are contributing features to the Golden Gate Park National Register Historic District. The existing well facility is located at the site of the former Richmond-Sunset Water Pollution Control Plant, which was largely removed in 1996, and currently distributes groundwater for irrigation in Golden Gate Park. The site is zoned for public uses and is currently utilized by SFRPD as a log storage area. A garage/storage structure located to the south of the well facility still remains. Other recreational facilities in the vicinity of the South Windmill Replacement well facility include the Beach Chalet Soccer Fields to the north, the Golden Gate Park Golf Course to the northeast, a children's play area to the east, and the multi-use pathway along Martin Luther King Jr. Drive.

North Lake Well Facility Site

The existing North Lake well is next to Chain of Lakes Drive within the western area of Golden Gate Park, south of Fulton Street (see Figure 3-8 in Chapter 3, Project Description) and north of North Lake. The existing well site is zoned for public uses, and the well facility distributes groundwater for irrigation within Golden Gate Park. An access road adjacent to the well facility is used by pedestrians, runners, and bicyclists. Residences are located along Fulton Street to the north. Recreational facilities and activities in the vicinity of North Lake well facility include a picnic area at North Lake, the Golden Gate Park Golf Course to the southwest, and a bison paddock to the southeast (located at Chain of Lakes Drive and John F. Kennedy Drive). There is paved multi-use path along the westbound side of John F. Kennedy Drive and a dirt path on the eastbound side of this road.

Pipeline Segment 3 (Golden Gate Park Pipeline Junction to Central Pump Station Well Facility)

As described in Chapter 3, Project Description, Pipeline Segment 3 would connect to the Central Pump Station well facility. The pipeline would be installed in Martin Luther King Jr. Drive from Chain of Lakes Drive East, east to Middle Drive West, then east to Overlook Drive to the Central Pump Station well facility. As described in the paragraphs above, recreational facilities in the vicinity of Pipeline Segment 3 include picnic areas, grassy areas, and multi-use pathways adjacent to Martin Luther King Jr. Drive and along Middle Drive West.

Pipeline Segment 5 (North Lake Well Facility to Golden Gate Park Pipeline Junction) and Pipeline Segment 6 (South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction)

Pipeline Segment 5 would be installed beneath Chain of Lakes Drive East and would continue south to Martin Luther King Jr. Drive. Pipeline Segment 6 would follow Martin Luther King Jr. Drive east towards Chain of Lakes Drive. Land uses in the immediate vicinity of both pipeline segments are open space/recreational as both segments are located in Golden Gate Park. Low-density residential uses are located along Fulton Street north of Pipeline Segment 5 and along Lincoln Way south of Pipeline Segment 6.

5.2.2 Regulatory Framework

Land use plans and policies applicable to the proposed project are addressed in Chapter 4, Plans and Policies.

5.2.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect on land use if it were to:

- Physically divide an existing community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect; or
- Have any substantial impact on the existing character of the vicinity.

Approach to Analysis

This section describes the impacts that have been screened out from further analysis and the reasons why; and describes the approach to impact analysis.

Because of the nature of the proposed project, it would have no impacts related to the following criteria; therefore, this EIR does not discuss impacts related to these topics for the reasons described below:

- ***Physically Divide an Established Community.*** The proposed project would construct new groundwater production well facilities, pipelines, and associated infrastructure. After construction, sections of the pipeline installed during the project would be underground and would not divide an established community. The new groundwater well structures would be above ground at both existing and proposed groundwater well sites. Because the groundwater well facilities would be relatively small in size, would be constructed in areas that are not commonly used by the public, and would not block access between adjacent land uses, operation of these facilities would not divide an established community. During Phase 1 construction, access to neighborhoods, commercial areas, industrial uses, schools, and parks could be temporarily modified by pipeline construction and lane closures. These activities would be temporary and completed within 15 to 18 months at each well facility site. Pipeline installation would progress at a rate of approximately 300 to 600 feet per week. For additional information, see Section 5.6, Transportation and Circulation.
- ***Conflict with Applicable Land Use Plans, Policies, or Regulations.*** As described in Chapter 4, Plans and Policies, no inconsistencies between the project and the applicable plans have been identified. Therefore, this criterion is not discussed further in this section.

This analysis considers the proposed project's potential to adversely affect the existing character of the vicinity; it evaluates the potential for as long-term impacts resulting from a change in land use at project sites with new facilities and operations. Long-term impacts on the existing land use character in the project vicinity could result if the project made a long-term change in land use that was incompatible or conflicted with established land uses.

Impact Summary

Table 5.2-2 summarizes potential land use impacts associated with implementation of the proposed project and shows the significance determination for each impact.

TABLE 5.2-2
SUMMARY OF IMPACTS – LAND USE

Impacts	Significance Determinations
Impact LU-1: Project operations would not result in substantial long-term or permanent impacts on the existing character of the vicinity.	LS
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.	LS

LS = Less than Significant impact, no mitigation required
LSM = Less than Significant impact with Mitigation

Impact Analysis

Facility Siting, Operations, and Maintenance Impacts

Impact LU-1: Project operations would not result in substantial long-term or permanent impacts on the existing character of the vicinity. (Less than Significant)

● Impacts on the existing land use character in the project vicinity could result if the Groundwater Supply Project were to result in a long-term change in land use that would be incompatible or conflict with established land uses. The proposed project would be constructed entirely within lands zoned for public uses that the CCSF owns. Although the proposed 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 installed below ground and would not be visible upon completion of construction. Sunset Reservoir facilities would be adjacent to or near existing reservoir structures and buildings. Therefore, operation of the new pipelines and Sunset Reservoir facilities would not substantially alter the existing character of the project area.

As described above and in Section 5.14, Biological Resources, the Lake Merced well facility would be constructed in an undeveloped area of SFPUC-managed land adjacent to an existing pump station and adjacent to Lake Merced. The Central Pump Station well facility would be constructed within Golden Gate Park, adjacent to an area currently used for wood waste storage and composting storage and an existing pump station. The South Windmill Replacement and North Lake well facility sites would be located in Golden Gate Park in areas that consist of existing irrigation well facilities; thus replacement of these well facilities would not substantially alter existing land uses within these sites. The South Sunset well facility would be constructed in a landscaped berm adjacent to the South Sunset Playground sports field, and the West Sunset well facility would occupy a small portion of the West Sunset Playground parking lot, just south of an existing baseball field. In the long-term, although implementation of the proposed well facilities would slightly alter existing land uses, all well facilities would be consistent with existing land use and zoning designations.

Some of the proposed well facilities would be visible from publically accessible vantage points, which could affect the existing character of these areas. However, all of these aboveground facilities would either be sited near other SFPUC water infrastructure (i.e., the Lake Merced well facility), near existing SFRPD facilities that are screened from public view (i.e., the Central Pump Station well facility), or adjacent to non-visually sensitive areas such as parking lots at parks (i.e., West Sunset well facility). As described in Section 5.3, Aesthetics, the appearance of proposed facilities would maintain the visual character of their surrounding areas and would not result in any substantial blockage of a publically accessible vista, or otherwise result in significant impacts on scenic resources or the visual character or quality of the areas surrounding the well sites. Thus, the land use character of the proposed well facilities would be consistent with existing land uses in their immediate vicinities. Therefore, implementation of the proposed project would not substantially affect the character of the project vicinity. As a result, the long-term impact on the existing character of the project vicinity would be less than significant.

Cumulative Impacts

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. (Less than Significant)

The geographic scope for potential cumulative land use impacts encompasses land uses in the vicinity of the various well facility sites, Sunset Reservoir, and the proposed groundwater pipeline alignments. The area generally includes the eastern side of Lake Merced, the Sunset District, and the western end of Golden Gate Park. Section 5.1.4, Cumulative Impacts, describes the approach to the cumulative analysis used throughout this EIR; Table 5.1-6 and Figure 5.1-1 summarize cumulative projects in the vicinity of the Groundwater Supply Project.

Long-Term Effects on Existing Land Use Character of the Vicinity

Long-term or permanent cumulative impacts on the existing character of the project vicinity could occur if the Groundwater Supply Project and cumulative projects in the western portion of

San Francisco were to involve the construction of permanent aboveground facilities or altered the landscape in the same area. However, as described under Impact LU-1, above, the Groundwater Supply Project would not result in long-term adverse effects on the existing character of the project vicinity because all of the proposed well facilities would be adjacent to existing SFPUC water infrastructure (i.e., the Lake Merced well facility); near existing SFRPD facilities that are out of public view (i.e., the Central Pump Station); adjacent to non-visually sensitive areas such as parking lots at parks or within a landscaped berm (i.e., West Sunset and South Sunset well facilities); or would entail replacement of existing well facilities with similarly sized structures and would therefore not substantially alter the existing uses or character of these areas (i.e., the South Windmill Replacement and the North Lake well facility sites). The Regional Groundwater Storage and Recovery Project also involves construction of well facilities south of the project area (within the South Westside Groundwater Basin) that may be publicly visible., but not from the same publically accessible vantage points as the proposed project, due to the large intervening distance between these two projects. Therefore, the existing uses or character of these areas would not be substantially altered cumulatively. Other cumulative projects that include development of aboveground structures adjacent to proposed well facilities include the Beach Chalet Athletic Fields Renovation Project and the Murphy Windmill/Millwright's Cottage Restoration. However, these projects would not contribute to cumulative impacts related to the existing land use character of the project vicinity because the Beach Chalet Athletic Fields and the Murphy Windmill and Millwright's Cottage already exist and the projects do not propose a change in land use. Thus, no significant cumulative land use impacts related to the existing character of the project vicinity would occur.

5.2.4 References

City and County of San Francisco (CCSF), *San Francisco General Plan*, 1988, amended through 1996. Available online at http://www.sf-planning.org/ftp/general_plan/I6_Environmental_Protection.htm. Accessed May 2011.

City and County of San Francisco (CCSF), Zoning Map of the City and County of San Francisco, updated November 2010. Available online at http://www.sf-planning.org/index.aspx?page=1569. Accessed April 2011.

City and County of San Francisco (CCSF), San Francisco Planning Department, *Recreation and Open Space Element Revised Draft – An Element of the General Plan of the City and County of San Francisco,* June 2011. Available online at http://openspace.sfplanning.org/docs/Recreation_and_Open_Space_Element_APRIL_2011.pdf. Accessed June 6, 2012.

San Francisco Recreation and Parks Department (SFRPD). *Golden Gate Park Master Plan*, Adopted October 1998.

5.3 Aesthetics

This section provides an assessment of the visual character and quality of the project area, identifies affected viewers, and evaluates the potential visual impacts that could result from construction and operation of the proposed Groundwater Supply Project. Mitigation measures to reduce significant impacts to less-than-significant levels are also identified.

5.3.1 Setting

Concepts and Terminology

Visual or aesthetic resources are generally defined as both the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Depending on the extent to which a project's presence would alter the perceived visual character and quality of the environment, a visual or aesthetic impact may occur. Familiarity with the following terms and concepts will aid the reader in understanding the content of this chapter.

Visual Character is a general description of the visual attributes of a particular land use setting. The purpose of defining the visual character of an area is to provide the context within which the visual quality of a particular site or locale is most likely to be perceived by the viewing public. For urban areas, visual character is typically described on the neighborhood level or in terms of areas with common land use; intensity of development; socioeconomic conditions; and/or landscaping and urban design features. For natural and open space settings, visual character is most commonly described in terms of areas with common landscape attributes (such as landform, vegetation, water features, etc.).

Visual Quality is defined as the overall visual impression or attractiveness of a site or locale as determined by its aesthetic qualities (such as color, variety, vividness, coherence, uniqueness, harmony, and pattern). For this analysis, the visual quality of a site or locale is defined according to three levels:

- **Low.** The location is lacking in natural or cultural visual resource amenities typical of the region. A site with low visual quality will have aesthetic elements that are relatively unappealing and perceptibly uncharacteristic of the surrounding area.

- **Moderate.** The location is typical or characteristic of the region's natural or cultural visual amenities. A site with moderate visual quality maintains the visual character of the surrounding area, with aesthetic elements that do not stand out as either contributing to or detracting from the visual character of an area.

- **High.** The location has visual resources that are unique or exemplary of the region's natural or cultural scenic amenities. A site with high visual quality is likely to stand out as particularly appealing and makes a notable positive contribution to the visual character of an area.

The identification of *viewer types* and *volumes* describes the type and quantity of potentially affected viewers within the visual study area (defined below). Land uses that derive value from the quality of their settings are considered potentially sensitive to changes in visual conditions. S*ensitive viewers* are those who have a strong stake or interest in the quality of the landscape and have a greater sensitivity to changes that degrade or detract from the visual character of an area. Examples of sensitive viewers include travelers on designated scenic routes, park visitors, bikers, pedestrians, and tourists.

Viewer Exposure addresses the variables that affect the viewing conditions of a site. Viewer exposure considers some or all of the following factors: landscape visibility (the ability to see the landscape); viewing distance (i.e., the proximity of viewers to the project); viewing angle (whether the project would be viewed from a superior, inferior, or level line of sight); extent of visibility (whether the line of sight is open and panoramic to the project area or restricted by terrain, vegetation, and/or structures); and duration of view.

Visual Sensitivity is the overall measure of a site's susceptibility to adverse visual changes. Visual sensitivity is rated as high, moderate, or low and is determined based on the combined factors of visual quality, viewer types and volumes, and viewer exposure to the proposed project.

Visual Study Area

The visual study area for the proposed project is the area from which either groundwater well facilities or pipeline locations (during visible construction activities) would come into view. Because the proposed project area is located in both urban and heavily vegetated open space settings, trees, shrubs, and buildings quickly restrict or block views of project components as viewers move away from project sites; consequently, these elements limit the visual study area in most places to publicly accessible locations immediately surrounding proposed project components. In some locations, however, favorable topographic relationships or the lack of intervening features extends the distance from which a viewer would be able to observe features of the proposed project. While the exact boundaries of the visual study area depend on site conditions (i.e., viewshed,[1] structures, and vegetation) and are highly site-specific, performing an assessment of the visual study area is important in identifying potentially affected viewers and describing the visual quality and character of relevant locations.

In April 2011, a site reconnaissance of proposed groundwater well facilities and pipeline locations was performed to identify the visual study area and take representative photographs of existing visual conditions. A set of 27 photographs is included in this section to document the existing visual conditions of the project sites and adjacent areas. **Figure 5.3-1** provides an overview of photo locations; **Figures 5.3-2** through **5.3-9** depict views of project sites and surrounding locations.

1 A viewshed is an area of land, water, or other urban or environmental element that is visible to the human eye from a fixed vantage point.

SOURCE: ESRI, 2010; ESA, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-1
Photo Location Map

Photo 1 - West-facing View from Lake Merced Boulevard toward Lake Merced

Photo 2 - Northwest-facing View from Lake Merced Boulevard toward the Lake Merced Well Facility Site and Access Road

Photo 3 - North-facing View of Site Access Road and Lake Merced Boulevard from Lake Merced Boulevard Sidewalk

Photo 4 - West-facing View from Lake Merced Boulevard Sidewalk across Security Fence

SOURCE: ESA, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-2
Public Views of the Lake Merced Well Facility Site

Photo 5 - East-facing View along Wawona Street of South Sunset Playground and Utility Boxes

Photo 6 - North-facing View from 40th Avenue and Wawona Street Intersection

Photo 7 - North-facing View of 40th Avenue towards Wawona Street and the South Sunset Well Facility Site from 40th Avenue and Wawona Street intersection

SOURCE: ESA, 2011

Figure 5.3-3
Public Views of the South Sunset Well Facility Site

Photo 8 - East-facing View along Quintara Street towards 41st Avenue and the West Sunset Playground from 41st Avenue and Quintara Street Intersection

Photo 9 - North-facing View across Quintara Street of the West Sunset Well Facility Site

Photo 10 - East-facing View from the Bleachers of West Sunset Playground

SOURCE: ESA, 2011

Figure 5.3-4
Public Views of the West Sunset Well Facility Site

Photo 11 - East-facing View from Overlook Drive

Photo 12 - West-facing View along Overlook Drive toward Central Pump Station

Photo 13 - West-facing View of Overlook Drive North of Central Pump Station

SOURCE: ESA, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-5
Public Views of the Central Pump Station Facility Site

Photo 14 - Northeast-facing View along Martin Luther King Jr. Drive towards South Windmill Replacement Well Facility Site

Photo 15 - East-facing View of Martin Luther King Jr. Drive towards South Windmill Replacement Well Facility Site

Photo 16 - East-facing View from Entrance of Log Storage Area

SOURCE: ESA, 2011

Figure 5.3-6
Public Views of the South Windmill Replacement Well Facility Site

Photo 17 - Northeast-facing View of the Existing North Lake Well Facility site along Chain of Lakes Drive towards Site Access Road

Photo 18 - East-facing View of the Existing North Lake Well Facility Site from Park Access Road

Photo 19 - South-facing View of the Existing North Lake Well Facility site from Fulton Street Sidewalk

SOURCE: ESA, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-7
Public Views of the North Lake Well Facility Site

Photo 20 - West-facing View along Taraval Street toward 41st Avenue

Photo 21 - North-facing View along 41st Avenue toward Santiago Street

Photo 22 - North-facing View along 41st Avenue toward Quintara Street

Photo 23 - East-facing View along Ortega Street toward 28th Avenue

SOURCE: ESA, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-8

Public Views of the Pipeline Route in the Sunset Neighborhood

Photo 24 - East-facing View at Overlook Drive and Middle Drive

Photo 25 - Northwest-facing View at Intersection of 41st Avenue and
Martin Luther King Jr. Drive

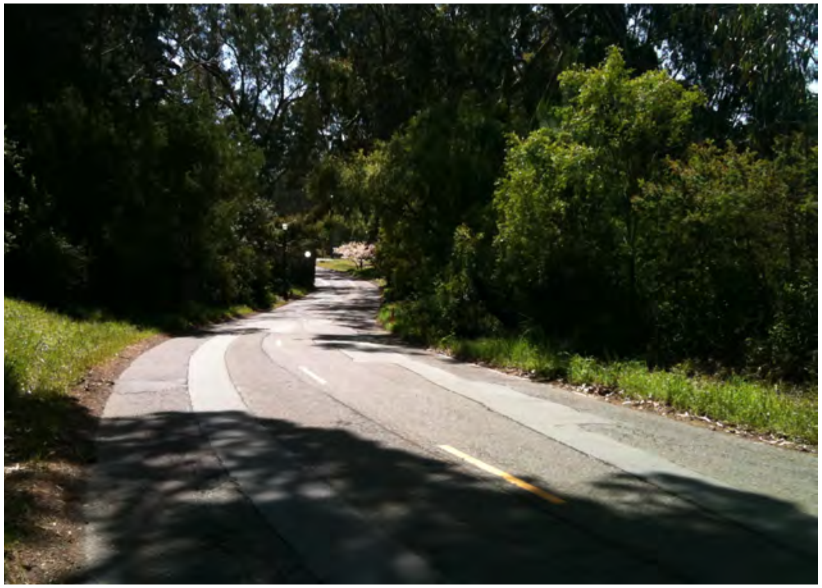


Photo 26 - South-facing View along Chain of Lakes Drive

Photo 27 - West-facing View along Martin Luther King Jr. Drive

SOURCE: ESA, 2011

Figure 5.3-9
Public Views of the Pipeline Route in Golden Gate Park

Visual Character

The visual study area is large enough such that it encompasses several parks and neighborhoods with distinct visual character, including (1) Lake Merced and associated open/recreational spaces, (2) the Outer Sunset and Outer Parkside neighborhoods, and (3) Western Golden Gate Park. The visual study area also includes three city parks: Golden Gate Park, West Sunset Playground, and South Sunset Playground, as well as Lake Merced and public open space at Sunset Reservoir. The general visual character of each area is described as follows:

- The *Lake Merced* area consists of several large lakes surrounded by trees, open space areas, several golf courses, and pedestrian paths and trails. The lakes and adjacent areas are closely bounded by major thoroughfares, including Lake Merced Boulevard, John Muir Boulevard, and Skyline Boulevard. Aside from golf courses, the Lake Merced area is not highly manicured/landscaped, and it does not have an untouched natural setting due to the scattered presence of structures, utilities and roads. Nevertheless, the area is largely undeveloped, with trees, water, and vegetation providing visual variety, uniqueness, and a respite from San Francisco's urban setting. Because many of the surrounding roadways and neighborhoods are elevated relative to Lake Merced, the lake and the bordering open space is also an important visual resource offering aesthetically pleasing views for motorists, adjacent residents, and users of the perimeter pedestrian path.

- The *Outer Sunset* and *Outer Parkside Neighborhoods* are largely residential neighborhoods occupied mainly by closely spaced, two-story, single-family homes that are fronted by small landscaped yards. Most homes were built during the same time period with a similar architectural style, giving the neighborhood visual coherence and harmony. Exterior details such as materials, paints, trims, and other finishes vary greatly from home to home, providing variety and uniqueness in color and texture. The neighborhood is interspersed with schools and parks (including the West Sunset Playground and South Sunset Playground), both of which contain sporting facilities, trees, and lawns. These areas provide open spaces (i.e., at Sunset Reservoir) that break up the visual pattern of homes and open up views for motorists, pedestrians, and residents. The neighborhood slopes gently downward toward the west, offering views of the Pacific Ocean or Golden Gate Park from areas with favorable topography. The Pacific Ocean and Golden Gate Park are scenic resources. On most streets, aboveground powerlines present considerable visual clutter into available views. Several streets—including Taraval and Judah—are lined with businesses, higher density residential lots, and a municipal rail line. The proposed pipeline alignment is along or intersects streets that provide views of the Pacific Ocean or Golden Gate Park. There are no other scenic vistas or resources within the Outer Sunset and Parkside areas of the project area.

- Western *Golden Gate Park* is a heavily wooded and otherwise vegetated open space setting. It represents more wooded and less refined parkland than portions of the park that are east of Transverse Drive, although major intersections, ponds and meadows are maintained and landscaped. Golden Gate Park is considered a scenic resource as a whole. However, the South Windmill Replacement well facility site is within a visually degraded area within the larger scenic resource. The original design of the park envisioned the western park to be "simply treated as a woodland or forest, with all the hills and ridges more or less heavily timbered, and the valleys covered with lower-growing shrubs or field grasses" (CCSF, 1998a). Due to the heavily wooded and vegetated nature of the area, open views are limited, except where ponds or meadows free up the skyline and increase the depth of available views.

Visual Sensitivity

The overall visual sensitivity of each project site is described in terms of its visual quality, potentially affected viewers, and exposure conditions. **Table 5.3-1** summarizes these attributes, which are described in more detail in the remainder of this section.

TABLE 5.3-1
SUMMARY OF VISUAL SENSITIVITY FINDINGS

Project Site	Visual Quality	Affected Viewers and Exposure Conditions	Visual Sensitivity
Lake Merced Well Facility	Low	Poorly exposed. Inaccessible to the public. Passing motorists or pedestrian path users may have distant, brief, and screened views of the site.	Low
South Sunset Well Facility	Moderate	Highly exposed to numerous viewer groups, including residents and park users who may be exposed for longer periods.	Moderate to High
West Sunset Well Facility	Low	Moderately exposed to several viewer groups, including brief exposure by passing motorists and park users and several residences to the south.	Low to Moderate
Central Pump Station Well Facility	Moderate	Partially exposed for brief periods to small numbers of passing recreationists.	Moderate
South Windmill Replacement Well Facility	Low	Poorly exposed site screened on all sides by trees.	Low
North Lake Well Facility	Low	Highly exposed to numerous viewer groups, including close-up views for park users. However, views would be brief.	Moderate
Pipeline Locations	Visual sensitivity, visual quality, and viewing conditions are highly variable and site-specific. Generally, in-road areas along city streets are well exposed, moderately sensitive to visual change, and representative of the surrounding visual character. Roads within the park have a higher degree of visual sensitivity.		

Lake Merced Well Facility Site

Figure 5.3-2 provides photographs of the proposed Lake Merced well facility site and its immediate surroundings. Photo 1 provides a view of the lake from the site's access road at Lake Merced Boulevard. The purpose of this photo is to demonstrate the broader scenic value of Lake Merced. Photos 2, 3, and 4 provide views towards the site from several publicly accessible vantage points. However, note that the proposed well facility site is not visible from adjacent public viewpoints, with the exception of Photo 4 where the well facility site where the proposed well facility site is to the lake side of the entrance road, across from the temporary construction trailer in the foreground.

Visual Quality

The Lake Merced well facility site, which is restricted from public use and access, is along an access road off of Lake Merced Boulevard leading to the Lake Merced Pump Station. The site is immediately west of the access road between the security gate and the existing pump station (see Photos 2 and 3). The site is characterized by the presence of vehicles and equipment, an existing wellhead, two temporary trailers, and graded areas of bare ground or gravel. A narrow area closer to the lakeshore has not been disturbed and contains shrubs and several trees. Because the appearance of the Lake Merced well facility site is relatively unappealing and perceptibly uncharacteristic of the surrounding open space areas, the visual quality is considered low.

Affected Viewers and Exposure Conditions

Numerous factors limit public views of the Lake Merced well facility site. A security fence around the site restricts unauthorized individuals from entering, thereby limiting the availability of direct and unencumbered public views into the site (as evident in Photos 2, 3, and 4). Also, the site is substantially lower in elevation than the adjacent Lake Merced Boulevard and is bordered on the east side by numerous trees. Therefore, views of the site are screened or blocked by topography and/or vegetation for most motorists traveling southbound on Lake Merced Boulevard. Runners, bicyclists, and pedestrians along the Lake Merced perimeter pedestrian path and motorists traveling northbound on Lake Merced Boulevard might have limited or distant views of the site for brief periods. Because this portion of Lake Merced Boulevard is part of the 49-Mile Scenic Drive, and users of the pedestrian path expect a high-quality environment, these pedestrian path users, motorists, and bicyclists are considered sensitive viewers. Nevertheless, the site has low viewer exposure and would be seen only briefly as viewers pass by.

Visual Sensitivity

Because the site has low visual quality and low viewer exposure, it is considered to have low visual sensitivity.

South Sunset Well Facility Site

Figure 5.3-3 provides photographs of the South Sunset well facility site and its immediate surroundings. Photo 5 provides an east-facing view along Wawona Street from the south side of the South Sunset Playground and baseball field. Photo 6 provides a direct view of the site from the intersection of Wawona Street and 40th Avenue. Photo 7 is a similar view showing the east side of the site.

Visual Quality

The South Sunset well facility site is bordered on its south and east sides by a black vinyl fence and city sidewalks, and on its north and west sides by the park's baseball field and bleacher structure. The site is primarily occupied by a sloped landscaped area that contains the baseball field's floodlights. Landscaping and greenery provide positive aesthetic elements; however, fencing, bleachers, and tall light poles introduce a number of human-made structures into views of the site. In context, the site maintains the visual character of the surrounding area and is generally representative of the natural and cultural amenities that exist in the neighborhood. Thus, the visual quality of the site is considered moderate.

Affected Viewers and Exposure Conditions

The site is lower in elevation relative to both 40th Avenue and Wawona Street, and somewhat screened by vegetation (see Photos 6 and 7). However, the site is highly visible to park users, and from bordering streets and sidewalks. Residents along 40th Avenue and Wawona Street could have a direct view of the site, particularly from second-floor windows. These residences, due to topography, are also likely to have more distant views of the Sunset/Parkside neighborhoods and the Pacific Ocean. Sensitive viewers would include park users in addition to residents. Motorists would have views of the site only briefly as they pass by and are therefore unlikely to be particularly sensitive to the visual quality of the site.

Visual Sensitivity

Because the site is exposed to numerous sensitive viewers and is judged to have moderate visual quality, the visual sensitivity of the site is moderate to high.

West Sunset Well Facility Site

Figure 5.3-4 provides photographs of the West Sunset well facility site and its immediate surroundings. Photo 8 provides an east-facing view along Quintara Street of the south side of the West Sunset Playground and play field. Photo 9 provides a direct view of the site across Quintara Street near the intersection of 40th Avenue. Photo 10 is the view from the field bleachers toward the site.

Visual Quality

The West Sunset well facility site is occupied by a parking lot and bordered on the north and east sides by retaining walls and trees, and on the south and west sides by streets and sidewalks. San Francisco Recreation and Park Department frequently uses the area shown in Photo 9 to stockpile soil and other landscaping materials. Fences in this area appear to be rusted or damaged. While the bordering trees and vegetation provide a pleasing aesthetic quality to the site, the site in its current condition is essentially a parking lot. In the context of its surroundings, the site is determined to have low visual quality because it neither strongly contributes to nor detracts from the general visual character and quality of the neighborhood.

Affected Viewers and Exposure Conditions

Affected viewers include motorists, pedestrians, and park users in close proximity to the site. Residents on the south side of Quintara Street have direct views of the site as well, but the views are unlikely to be of great or high quality. Park users would only see the site as they park vehicles or access the playground, as views of the site from the playground and ballpark are generally screened from view by a line of tall trees (see Photo 10). Likewise, motorists and pedestrians would only briefly see the site as they walk or drive by. Most affected viewers would experience views of the site briefly.

Visual Sensitivity

The visual sensitivity of the West Sunset well facility site is considered to be low to moderate because: (1) the site has a low visual quality; (2) park users are only exposed to the parking lot (the proposed well facility site is not visible from the playing field and playground); and (3) other affected viewers are only exposed briefly.

Central Pump Station Well Facility Site

Figure 5.3-5 provides photographs of the Central Pump Station well facility site and its immediate surroundings. Photo 11 shows a view of the site from Overlook Drive looking southeast. The pump station would be placed over the existing wellhead, marked by yellow posts on the right side of the photograph. Photo 12 provides a southwest view from Overlook Drive showing a portion of the San Francisco Recreation and Parks Department (SFRPD) wood waste storage and composting facility. The site area is behind the facility and screened from view by trees and vegetation. Photo 13 is a view from Overlook Drive looking west.

Visual Quality

The proposed well facility site is located to the west of the existing fenced Central Pump Station and the SFRPD's wood waste storage and composting operations. The site is semi-natural in appearance, although ground clearing and earthmoving activities are frequently present in the vicinity of the site, with several large finished compost stockpiles often present west of and adjacent to the site. However, several large trees and grassy areas maintain the predominantly open space and natural appearance of the site itself. Because of the frequent presence of landscaping materials and equipment in the foreground view of the forested area the well facility site is within, the site itself does not particularly stand out as either contributing to or detracting from the area's aesthetic qualities and visual character. For these reasons, the site is considered to have moderate visual quality.

Affected Viewers and Exposure Conditions

The site is in the middle of the park, distant and completely shielded from view from nearby residences, although the site is exposed to park users looking south along Overlook Drive. The road appears to be used mainly by park maintenance staff vehicles, pedestrians, and cyclists. Overlook Drive is an elevated east-to-west road that affords views of Hellman Hollow to the north, in areas where this meadow is unscreened by trees and shrubs. Pedestrians and cyclists visiting the park would be sensitive to visual changes, as Overlook Drive generally maintains a natural open-space feel; however, the site, which is somewhat removed from the road, is partially screened by trees and seen only briefly as park users pass by. The project site is adjacent to the existing pump station and wood waste storage area. There are no stationary viewing locations along this portion of Overlook Drive (such as a park bench or interpretive sign).

Visual Sensitivity

Because the Central Pump Station well facility site has moderate visual quality and is seen briefly as park users pass by, it is considered to have moderate visual sensitivity.

South Windmill Replacement Well Facility Site

Figure 5.3-6 provides photographs of the South Windmill Replacement well facility site and its immediate surroundings. Photos 14 and 15 provide north and northeast views of the entrance to the site along Martin Luther King Jr. Drive, but the site itself is screened from view in these photos. Photo 16 provides a direct view of the site from within the former site of the Richmond-Sunset Water Pollution Control Plant (WPCP).

Visual Quality

The former Richmond-Sunset WPCP, which was largely demolished and removed in 1996. Consistent with use of the area as a log storage area, numerous soil piles, concrete blocks, and other debris appear scattered across the site. The existing irrigation well facility and several concrete structures that remain onsite are dilapidated and often covered in graffiti, although SFRPD periodically paints over the graffiti. For these reasons, the visual quality of the site is low.

Affected Viewers and Exposure Conditions

The South Windmill Replacement well facility site is within the fenced area that was formerly the Richmond-Sunset WPCP. The log storage area is surrounded on all sides by dense stands of trees and, therefore, visibility of the site is limited (see Photos 14 and 15). Motorists, pedestrians on nearby trails, visitors to the Murphy Windmill grounds, and other park users may catch brief glimpses of the site, but the location of the well facility is screened from most views.

Visual Sensitivity

Because the South Windmill Replacement well facility site has low visual quality and is poorly exposed to the viewing public, the visual sensitivity is considered low.

North Lake Well Facility Site

Figure 5.3-7 provides photographs of the North Lake well facility site and its immediate surroundings. Photo 17 provides a northeast view of the access road to the site from Chain of Lakes Drive. Photo 18 provides a direct view of the site from a park trail looking east. Photo 19 is a view of the site from the sidewalk on Fulton Street looking south.

Visual Quality

The site contains a small building and fenced-in area that houses irrigation well appurtenances. The structures on the site are uncharacteristic of the surrounding open space areas that contain predominantly grasses, shrubs, and trees. The door, sign, and rooftop of the building are painted green, which helps to blend the structure with its surroundings. However, the exterior walls are a yellowish tan color with several surfaces of painted-over graffiti. The fenced-in area and pipeline introduce visual clutter that has an industrial feel. Generally, the aesthetic qualities of the site are relatively unappealing and perceptibly out of character with the surrounding parkland. For these reasons, the site is considered to have low visual quality.

Affected Viewers and Exposure Conditions

An access road passes by the south side of the site and is used by pedestrians, runners, and bicyclists (see Photo 15). These would be considered sensitive viewers because of the assumption that they have a strong interest in the visual quality of their environment; however, there are no stationary viewing areas (e.g., benches), so these recreationists are likely to be exposed to the site only briefly as they pass by. Travelers, including motorists and bicyclists, using Chain of Lakes Drive would see the site's access area briefly, but the site itself is screened by topography and vegetation (see Photo 17). Travelers on Fulton Street would have brief views of the site that are screened by shrubs and trees. Further, the site as seen from Fulton Street is inferior to travelers' line of sight (see Photo 14). Finally, several apartment buildings on the north side of Fulton Street may have relatively distant and screened or shadowed views of the site.

Visual Sensitivity

While the site has low visual quality, it is exposed to a high number of different viewer groups, and the access road trail offers direct and unencumbered views of the site. For these reasons, the visual sensitivity of the site is considered moderate.

Pipeline Segments 1, 2, and 3 and Sunset Reservoir (South of Golden Gate Park)

Figure 5.3-8 provides photographs of pipeline locations in the Outer Sunset neighborhood. The visual quality of city streets along the pipeline route is generally representative of the neighborhood as a whole, although the road condition, number and extent of sidewalk trees, and the presence of overhead electrical lines all influence the visual quality. Photo 20 provides an example of a perpendicular view of the pipeline route along Taraval Street, which is one of the several streets with commercial uses that cross the proposed pipeline route. Photo 21 provides a view down 41st Avenue in a location with a number of overhead powerlines. Numerous residences lining the street have direct, unshielded views of the pipeline route. Photo 22 provides another example of a segment along 41st Avenue where there are no overhead powerlines and the sidewalk is lined with trees. Motorists and local residents are the primary users of 41st Avenue. There are no designated bike lanes, and it is not identified as a scenic route. Photo 23 provides a view of the pipeline route and Sunset Reservoir along Ortega Street. The visual quality and sensitivity of this area is greater due to the well-manicured park area and availability of high-quality views of the city and ocean.

Pipeline Segments 4, 5, and 6 (Golden Gate Park)

Figure 5.3-9 provides photographs of pipeline locations in the Golden Gate Park area. The visual quality of roads along the pipeline route is generally representative of park roadways in general, although the road conditions, aesthetic style of the streetlamps, and the presence of other visual amenities along sidewalks (e.g., benches, manicured landscapes, etc.) have an important influence on the visual quality. Roadways have high visual exposure to park visitors, whether they are pedestrians, cyclists, tourists, or motorists. Many of the park's important pathways parallel the pipeline routes, and as such park visitors could be exposed to the pipeline locations for longer durations, especially where benches or other attractions provide stationary viewing points along the road. Motorists may also be sensitive to visual changes along roadways, especially Martin Luther King Jr. Drive between Sunset Boulevard and 41st Avenue, and Chain of Lakes Drive between Martin Luther King Jr. Drive and John F. Kennedy Drive. These road segments are part of San Francisco's 49-Mile Scenic Drive and are bordered by aesthetically appealing lakes, flowering trees, and decorative lamp-posts.

5.3.2 Regulatory Framework

Federal Regulations

There are no applicable federal regulations related to aesthetics.

State Regulations

The California Department of Transportation (Caltrans) designates highways as scenic highways based on how much of the landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which views are compromised by development. There are no state designated scenic highways in San Francisco (Caltrans, 2007). Highway 1 and Highway 35 are identified as eligible state scenic highways; however, the proposed project would not be visible from these highways. Therefore, there are no state regulations related to aesthetics that are relevant to this project.

Local Regulations

Locally Designated Roads

In 1938, San Francisco's Downtown Association created the 49-Mile Scenic Drive to highlight San Francisco's beauty and to promote the city as a tourist destination (San Francisco Convention and Visitors Bureau, 2013). This scenic roadway encircles Lake Merced, and the portion of Lake Merced Boulevard adjacent to the Lake Merced well facility site is part of the designated scenic roadway. Martin Luther King Jr. Drive between Sunset Boulevard and 41st Avenue, and Chain of Lakes Drive between Martin Luther King Jr. Drive and John F. Kennedy Drive, are also part of the 49-Mile Scenic Drive. These streets are recognized for their aesthetic value.

San Francisco General Plan

The Urban Design Element of the *San Francisco General Plan* rates city streets as "excellent," "good," or "average" for the quality of their views. In the project area, Lake Merced Boulevard is rated as having average-quality street views, with the exception of a small segment north of Brotherhood Way, where open views of Lake Merced are available. This segment of Lake Merced Boulevard is designated as having excellent-quality street views. Along 41st Avenue, view quality is generally average to good. The Urban Design Element also identifies streets that are important to the "perception" of San Francisco. A majority of San Francisco's streets have pleasing views of the bay, the ocean, distant hills, or other parts of San Francisco. However, where good views are not available, streets can still function as open space for use by neighborhood residents and for landscaping to bring a sense of nature to the area (CCSF, 1998b).

Lake Merced Boulevard and a short segment of 41st Avenue near the entrance of Golden Gate Park are identified as "Streets that Extend[s] the Effect of Public Open Space." The Urban Design Element also identifies both Lake Merced and Golden Gate Park as areas where it is important to preserve the existing landscape.

Western Shoreline Area Plan

The *Western Shoreline Area Plan*, an area plan within the *General Plan,* is the CCSF local coastal plan for the Local Coastal Zone established by the California Coastal Act of 1976. Policies related to the western end of Golden Gate Park include strengthening the visual and physical connection between the park and Ocean Beach; emphasizing the naturalistic landscape qualities of the western end of the park for visitor use; and continuing to implement a long-term reforestation program in the western portion of the park. Policies related to the Lake Merced area include preserving recreational facilities, passive activities, playgrounds, and vistas of the Lake Merced area.

Golden Gate Park Master Plan

The *Golden Gate Park Master Plan* (Master Plan) was adopted by the Recreation and Park Commission in October of 1998. The Master Plan, discussed in more detail in Chapter 4, Plans and Policies, provides a framework and guidelines to ensure responsible stewardship of the park. As discussed in the Master Plan, all activities, features, and facilities in Golden Gate Park must respect the unique design and character of the park. Further, the impacts that buildings and monuments have on the park landscape should be minimized.

5.3.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect on aesthetic resources if it were to:

- Have a substantial adverse effect on a scenic vista[2];
- Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and other features of the built environment or natural environment which contribute to a scenic public setting;
- Substantially degrade the existing visual character or quality of the site and its surroundings; or
- Create a new source of substantial light or glare that would adversely affect day or nighttime views in the area, or which would substantially impact other people or properties.

[2] A scenic vista is generally considered to be a location from which the public can experience unique and exemplary high-quality views—typically from elevated vantage points that offer panoramic views of great breadth and depth.

Approach to Analysis

The visual quality impact analysis is based on field observations conducted by ESA in April 2011; review of project maps and drawings; aerial and ground-level photographs; simulations of the project within photographs; and review of a variety of data in the record, such as local planning documents. The analysis identifies potential temporary (short-term) and permanent (long-term) project impacts on scenic vistas or the visual character and quality of a site as seen from urban locales, recreational facilities, and open space areas. The approach to evaluating the effect of the proposed project under each CEQA significance criterion is briefly clarified below:

- ***Have a substantial adverse effect on a scenic vista*****:** This criterion is applicable only to projects that would be located on or disrupt access to a scenic vista, or result in visual changes within its viewshed. Scenic vistas may be officially recognized or designated (e.g., within local planning documents or the Caltrans scenic highway program), or they may be informal in nature (e.g., mountain peaks or coastal bluffs). The project's effect would be considered substantial if it would appreciably damage or remove the visual qualities that make the view unique, unobstructed and/or exemplary.

- ***Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings which contribute to a scenic public setting***: Damage to a scenic resource is substantial when it is reasonably perceptible to affected viewers; and when it appreciably degrades one or more of the aesthetic qualities that contributes to a scenic setting. The presence of and potential damage to scenic resources in this analysis is considered along with project-related effects on the existing visual character and quality of a site or surroundings (see next bullet).

- ***Substantially degrade the existing visual character or quality of the site and its surroundings***: This criterion is applicable to all locations where the project would result in either temporary or permanent visual change. The project is considered to "substantially degrade" the visual character or quality of a site if it would have a strongly negative influence on the public's experience and appreciation of the visual environment. As such, visual changes are always considered in the context of a site or locale's visual sensitivity (as described in the setting). Visual changes caused by the project are evaluated in terms of their visual contrast with the area's predominant landscape elements and features, their dominance in views relative to other existing features, and the degree to which they could block or obscure views of aesthetically pleasing landscape elements. Visual changes are also evaluated in terms of potential damage to or removal of features of the natural or built environment that contribute to a scenic public setting. The magnitude of visual change that would result in a significant impact (i.e., substantial degradation) is influenced by its degree of permanence, and is inversely related to the visual sensitivity of a site.

- ***Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area***: This criterion is applicable to projects that require nighttime lighting (either during construction or operation), or that involve structures or finishes that could create substantial glare.

Impact Summary

Table 5.3-2 summarizes the aesthetics impacts associated with implementation of the proposed project and shows the significance determination for each impact.

TABLE 5.3-2
SUMMARY OF IMPACTS – AESTHETICS

Impacts	Significance Determinations
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.	LS
Impact AE-2: Temporary construction would not result in substantial sources light or glare and would not adversely affect day or nighttime views in the area.	LS
Impact AE-3: The proposed project would not have an adverse effect on a scenic vista.	LS
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.	LSM
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.	LS
Impact C-AE: The proposed project would have a cumulatively considerable contribution to a significant cumulative aesthetic impact.	LSM

NOTES:
LS = Less than Significant impact, no mitigation required
LSM = Less than Significant impact with Mitigation

Impact Analysis

Construction Impacts

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. (Less than Significant)

Lake Merced Well Facility Site

As discussed in Section 5.3.1, Setting, although the site is located adjacent to Lake Merced, which is a scenic resource, the well facility site itself has low visual quality and is poorly exposed, and is thus considered to have a low visual sensitivity. Construction at this site would last approximately 15 to 18 months and would involve clearing and grubbing, removal of one tree, and soil-moving activities. Exposed soil, staging areas, as well as construction vehicles, materials, and equipment would temporarily introduce unappealing visual features into the site. Affected viewers near Lake Merced Boulevard would be closer to, and more likely to notice construction of the proposed overlook recreation area and excavation of the utility trench in Lake Merced Boulevard, than construction of the well facility itself. Construction of these more noticeable components would occur over a shorter length of time than construction of the well facility, which, again, is poorly exposed and not readily visible from public vantage points. Given that the site has low visual sensitivity, project activities would not adversely affect a scenic vista or scenic resource, and given the relatively short duration of the construction of the Lake Merced well facility, its construction would not have a substantial adverse effect on the visual character or quality of the site and its surroundings. Therefore, the construction impacts on aesthetic resources would be less-than-significant at this site.

South Sunset Well Facility Site

There are no scenic views or resources within the vicinity of the South Sunset well facility. Landscaping and greenery provide positive aesthetic elements; however, fencing, bleachers, and tall light poles introduce human-made structures into views of the site, and the visual quality of the site is considered moderate. The visual features introduced by construction activities would be similar or the same as described above for the Lake Merced well facility (e.g., exposed soil and stockpiles, construction vehicles/equipment, demolition debris, and staging areas). Staging areas would be in the parking lane along 40th Street across from the site and in both the parking lane and westbound travel lane along Wawona Street. Construction would primarily affect 40th Avenue and Wawona Street, 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.); therefore, the construction impacts on aesthetic resources would be less than significant at this site.

West Sunset Well Facility Site

There are no scenic views or resources within the vicinity of the West Sunset well facility. The bordering trees and vegetation at this site enhance the visual quality of this area, the parking lot, fencing, and soil stockpiles reduce the visual quality of the area. The site is therefore determined to have low visual quality. The visual changes resulting from construction would be similar or the same as those described above for the Lake Merced well facility (e.g., exposed soil and stockpiles, construction vehicles/equipment, demolition debris, and staging areas) and would include removal of three trees. Construction would primarily affect Quintara Street, 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.); therefore, the construction impacts on aesthetic resources would be less than significant at this site.

Central Pump Station Well Facility Site

As discussed Section 5.3.1, the Central Pump Station well facility site has moderate visual quality and is partially exposed for brief periods to sensitive viewers. Therefore, the site has moderate visual sensitivity. While Golden Gate Park as a whole may be considered a scenic resource, the Central Pump Station well facility site would be located adjacent to an existing park maintenance area and pump station, and this area is not highly used by park visitors.

The visual changes associated with construction of this facility would be similar to or the same as described above for the Lake Merced well facility (e.g., exposed soil and stockpiles, construction vehicles/equipment, demolition debris, and staging areas). Because construction activities would be temporary, and potential viewers would be affected only briefly as they pass the site, the construction impact on aesthetic resources would be less than significant at this site.

South Windmill Replacement Well Facility Site

As discussed Section 5.3.1, the South Windmill Replacement well facility site has low visual quality and is poorly exposed to the viewing public. Therefore, it is considered to have low visual sensitivity. The visual changes associated with construction of this facility would be similar or the same as described above for the Lake Merced well facility (e.g., exposed soil and stockpiles, construction vehicles/equipment, demolition debris, and staging areas). Because construction activities would be temporary, and this location is not highly used by the public as a recreation or sightseeing location, potential viewers would be affected only briefly as they pass the site along Martin Luther King Jr. Drive and nearby trails. Therefore, construction impacts on aesthetic resources would therefore be less than significant at this site.

North Lake Well Facility Site

As discussed Section 5.3.1, the North Lake well facility site has moderate visual sensitivity because, while the site has low visual quality, it is exposed to a high number of different viewer groups, and the access road used by pedestrians, runners, and bicyclists offers direct and unencumbered views of the site.

The visual changes associated with construction of this facility would be similar or the same as described above for the Lake Merced well facility (e.g., exposed soil and stockpiles, construction vehicles/equipment, demolition debris, and staging areas) and would include removal of two trees on the east side of the existing facility. Construction of the site access road and well facility would introduce substantial clutter into the park area that would be visible to recreationists using the access road immediately south of the facility construction area. Pedestrians could also briefly see the construction area on the south sidewalk along Fulton Street. However, given that construction activities would be temporary, and that potential viewers would be affected only briefly as they pass the site, construction impacts on aesthetic resources would be less than significant at this site.

Pipeline Segments 2 and 3, and Sunset Reservoir (South of Golden Gate Park)

The proposed pipeline alignments run along and cross streets within the Outer Sunset that include views of the Pacific Ocean and Golden Gate Park. However, views of these scenic resources are dominated by intervening urban development. The open-cut trench method would be used for most of the pipeline construction. This method involves initial delineation and ground-clearing of the work area; grading or pavement cutting; excavation of the trench; placement of the pipe; backfilling of the trench; and restoration of the work surface. The appearance of pipeline construction sites, including pipelines at Sunset Reservoir would include open trenches, soil stockpiles, and heavy construction vehicles and equipment. While pipeline construction sites are likely to be unsightly, similar construction activities are fairly typical of the urban setting and occur periodically for other reasons (such as road improvements or other utility upgrades/maintenance, etc.). Further, the location of the pipeline excavation would advance along pipeline segments as work progresses, generally at a rate of 60 to 120 feet per day (approximately two weeks per city block; see Section 3.4.2, Pipeline Construction). Given that construction activities would be temporary, construction impacts on aesthetic resources would be

● less than significant at pipeline segments outside Golden Gate Park. Construction activities associated with the pH adjustment facility at Sunset Reservoir would be northeast of an existing building that is sited between the proposed construction area and public areas to the west along 28th Avenue; however, equipment and construction vehicles would be visible from adjacent roadways and reservoir lawn areas available to the public. Nevertheless, the construction area would be within a fenced portion of the reservoir facility, in the vicinity of storage sheds, waste receptacles, and other structures associated with the reservoir. Because construction activities would be temporary, and most construction activities would be within an existing building, construction impacts on aesthetic resources would be less than significant at this site.

Pipeline Segments 4, 5, and 6 (Golden Gate Park)

The appearance and rate of pipeline construction activities within Golden Gate Park would be similar to those described above for Pipeline Locations 1, 2, and 3. Portions of the proposed pipeline segments within the park are located on the 49-Mile Scenic Drive, and as such the appearance of pipeline construction activities along Martin Luther King Jr. Drive, between Sunset Boulevard and 41st Avenue, and along Chain of Lakes Drive, between Martin Luther King Jr. Drive and John F. Kennedy Drive, could be negatively perceived by motorists using the scenic drive. However, the construction activity would be visible for only several hundred feet at a time—a minor fraction of the drive as a whole. Therefore, given that construction activities would be temporary, and that potential viewers would be affected only briefly as they pass the work area, construction impacts on aesthetic resources would be less than significant along pipeline locations within Golden Gate Park.

Impact AE-2: Temporary construction would not result in substantial sources light or glare and would not adversely affect day or nighttime views in the area. (Less than Significant)

The project would require use of construction equipment and vehicles that would have small amounts of reflective material, such as mirrors and windows on vehicles. However, there would be no substantial sources of light or glare associated with construction of the project that would adversely affect daytime views in the area, and nighttime construction work would not be required. Therefore, aesthetic impacts associated with light and glare during construction would be less than significant and no mitigation is required.

Facility Siting, Operations, and Maintenance Impacts

Impact AE-3: The proposed project would not have an adverse effect on a scenic vista. (Less than Significant)

Lake Merced Well Facility Site

As described under Impact AE-1, some locations near the proposed Lake Merced well facility could be considered vista points due to their unique and high-quality views. The Urban Design Element of the *San Francisco General Plan* identifies a small segment of Lake Merced Boulevard near

Brotherhood Way as having excellent-quality street views, and as having value as a street that extends the effect of public open spaces. This is primarily due to the unobstructed view of Lake Merced which—in San Francisco's urban context—provides a unique and exemplary visual setting (see Photo 1 in Figure 5.3-2). Stationary viewpoints are available along the Lake Merced pedestrian path between Brotherhood Way and the access road to the Lake Merced Pump Station. In this location, a gap in trees opens up views of the lake. However, existing vegetation and trees and the gate to the access road substantially screen views of the well facility site from this location. Upon completion of construction of the Lake Merced well facility, a small portion of the facility would potentially be visible from these locations due to removal of one tree that partially screens views of the site from the path. Trees and shrubs further south along the access road would be retained and would continue to screen most of the view of the facility (See Figure 5.3-2, Photo 2). Therefore, visual changes associated with the well facility from this viewpoint would not be adverse because: (1) viewer attention would be focused on views across the lake, which would be in the foreground of views from this location (and not on views of the site), and (2) the well facility is co-located with an existing industrial-like facility (the pump station).

As discussed in Section 5.3.1, Setting, under existing conditions runners and pedestrians along the Lake Merced perimeter pedestrian path north of Brotherhood Way, and motorists and bicyclists traveling northbound on Lake Merced Boulevard, might have limited or distant views of the site for brief periods. The site is at a lower elevation than the roadway and adjacent pedestrian path and there is security fencing adjacent to the path. Under the proposed project, views from the roadway and pedestrian path would remain limited and brief. However, under the proposed project, an overlook would be installed east of the well facility along Lake Merced Boulevard and would extend from the existing pedestrian path near the roadway. This area would consist of an approximately 20-foot by 20-foot level pad finished with decomposed granite and furnished with two benches and an interpretive sign. This feature would benefit the area's potential as a scenic vista by providing a stationary viewing location from which to observe the lake, which would provide an improved scenic viewing opportunity compared to that which currently exists at this location. As further discussed in Impact AE-4, the proposed well facility also incorporates a green roof that seeks to visually blend the well facility with the landscape to the west and south of the facility. Therefore, the project's effect on the scenic vista at this location would be less than significant.

All Other Facility Sites

There are no scenic vistas, as identified in the Urban Design Element of the *San Francisco General Plan,* near any of the other proposed project components (CCSF, 1998b). Some high-quality views of the Pacific Ocean, Golden Gate Park and the western side of San Francisco are available from the tops of hills in the Outer Sunset and Parkside neighborhoods. Portions of the proposed project may be visible within the foreground or middleground portions of these views. However, similar views are available throughout much of the western side of San Francisco, these areas have no formalized viewing facilities, and viewer attention would be focused on long views rather than foreground elements. Further, there are no areas within Golden Gate Park that possess high quality scenic vistas associated with the natural features of the park within or adjacent to the well facility sites. For these reasons, project areas (other than Lake Merced, described above) do not include scenic vistas or unique views and therefore, construction of the proposed project would have a less than significant impact on scenic vistas.

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. (Less than Significant with Mitigation)

Lake Merced Well Facility Site

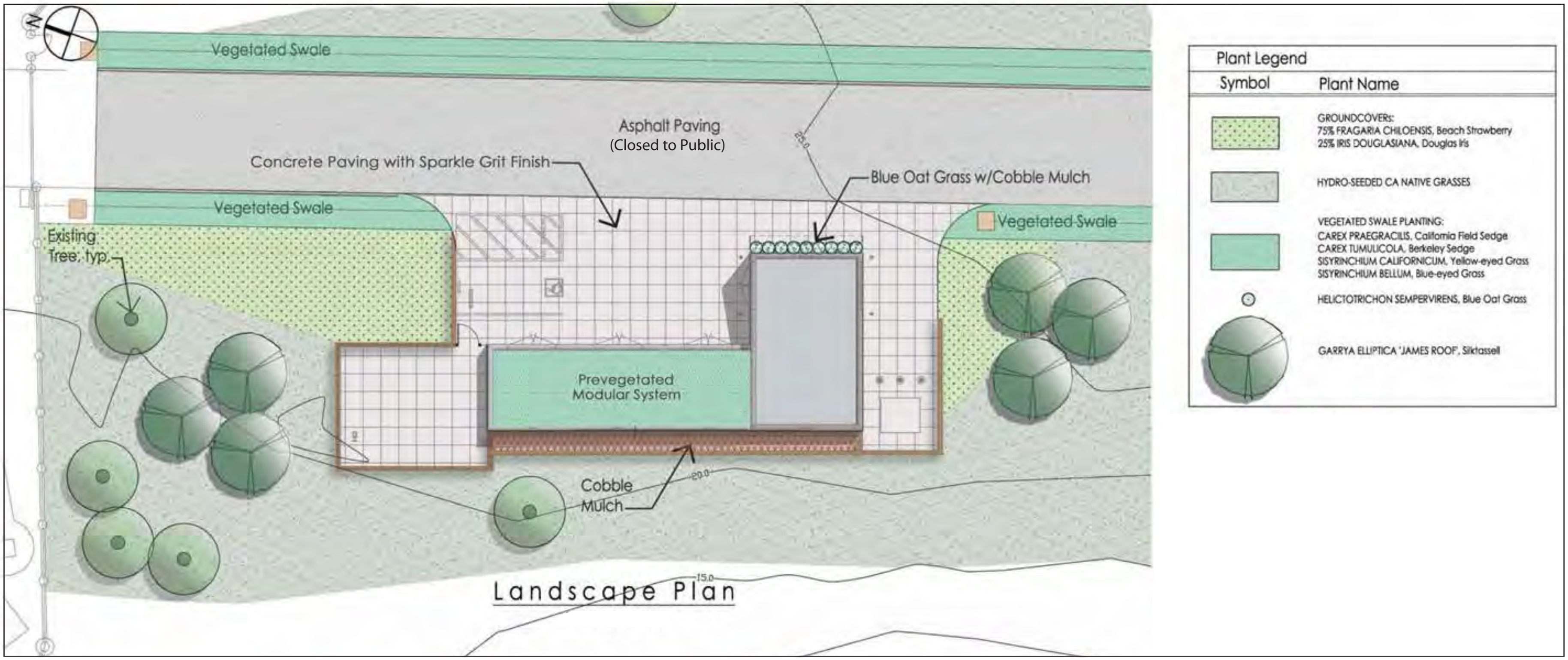
As discussed in Section 5.3.1, Setting, while Lake Merced itself is be considered a scenic resource, the well facility site has low visual quality and is poorly exposed, and is thus considered to have low visual sensitivity.

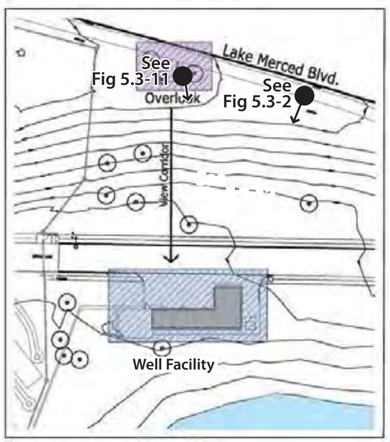
The conceptual landscape plan[3] for the Lake Merced well facility and proposed overlook is presented in **Figure 5.3-10**, and a visual simulation of the facility is shown in **Figure 5.3-11**. Removal of the one tree from views of Lake Merced under the project would be permanent and adverse, but this is not the only tree in the viewshed, and other vegetation is proposed as part of the project. Therefore, the removal of one tree would not substantially degrade scenic resources or the visual character of the area.

The building would have board-form concrete and metal panel walls, hollow metal doors, and louvered vents. The concrete walls would be a dark stone-gray color; the metal panels would have a lighter gray finish; and the doors would be a charcoal (darker) gray color. The southern (pump room) portion of the building would have a roof that slopes toward the lake, with metal-clad roofing panels and a removable skylight. This roofline height along this portion of the building would be approximately 20 feet above grade facing Lake Merced Boulevard, and approximately 14 feet above grade facing Lake Merced. The roof of the remaining portion of the building would be approximately 12 feet above grade. This portion of the roof would be flat and covered by a green roof, which was proposed as an aesthetic amenity during design of the proposed project. The proposed viewing platform and the pruning of trees near the platform would increase visual exposure of the site from public areas.

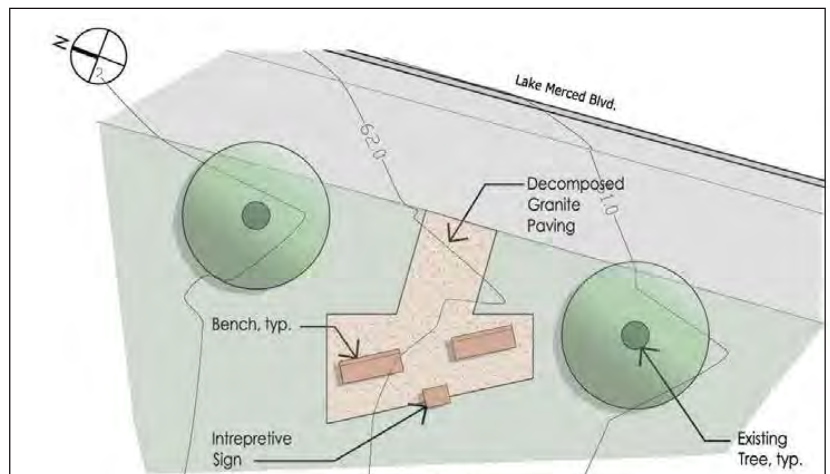
The visual simulation of the well facility shown in Figure 5.3-11 represents the proposed appearance of the well facility as viewed from the proposed viewing platform. Users of the Lake Merced Boulevard sidewalk/pedestrian path would have opportunities to observe the from the proposed overlook recreation area. The view from the overlook area would be an elevated view, which would consist primarily of the lake; whereas the well facility would be inferior to the main

[3] As described in Section 3.4.1, Groundwater Well Facilities, the landscaping plans in the EIR figures are conceptual. However, some modifications may be made to the details of the landscaping plans as they are finalized, such as changes to the specific types of native plants to be installed. Nevertheless, the site footprint and general landscaping plan would remain as presented in the EIR.





Key Plan
NTS



Overlook

SOURCE: SFPUC, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.3-10
Lake Merced Well Facility and Overlook
Draft Landscape Plan

SOURCE: SFPUC, 2010

Figure 5.3-11
Lake Merced Well Facility Simulation

view of interest toward the lake. Furthermore, the green roof and landscaping would aid in providing visual continuity with the landscape to the west and south of the facility and would reduce the potential for the well facility to detract from the quality of the view from this location. Users of the pedestrian path traveling north past the site's access road would have relatively distant and brief views of the site, which would also be screened by the existing security fence and within the current view of the Lake Merced Pump Station (which is a low-quality view). Motorists traveling northbound on Lake Merced Boulevard are unlikely to notice the site due to its distance, poor exposure, and the brief period of time that the view would be available (mere seconds). The grass, pavement, and bordering vegetated swales used for the access road would represent an improvement over existing aesthetic conditions.

However, as discussed in Section 5.11, Recreation, an analysis was conducted to determine the lake depth and surface area, and approximate shoreline location during project operations over a modeled 47-year hydrologic sequence. Lake levels are generally expected to be approximately 10 feet lower than water levels expected without the project (referred to as 'modeled existing conditions'; see Section 5.1.5, Overview of Groundwater Modeling Approach) during the majority of the modeled 47-year hydrologic sequence as a result of groundwater pumping. Reduced water levels cwould 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. After a sequence of high precipitation years, lake levels and water surface area resulting from the proposed project's pumping would be less than under modeled existing conditions. However, lake levels would not be reduced such that resulting water levels of North, East, and South Lakes would substantially detract from the scenic quality of the lake. However, because of the smaller size and depth of Impound Lake, the shallow southern end of the lake would likely be dewatered, reducing the visual quality of that lake as seen from the paved path around the lake perimeter and the picnic areas on John Muir Drive and Lake Merced Boulevard. Thus, operation of the proposed project would result in a substantial adverse effect on a scenic resource and on the visual character and quality of the Lake Merced area.

The lowest estimated lake level, predicted at the end of the design drought, is approximately -10 feet City Datum, which would be below the bottom of Impound Lake at -6 feet City Datum and near the bottom of East Lake at -11 feet City Datum. Under the proposed project, at the end of the design drought, East Lake would likely nearly dry-up and Impound Lake would likely dry up altogether, which would reduce the visual quality of that lake as seen from the paved path around the lake perimeter and the picnic areas on John Muir Drive and Lake Merced Boulevard. While Lake Merced conditions would be reduced naturally (under modeled existing conditions during the design drought), the proposed project's pumping would exacerbate such conditions at Lake Merced, a scenic resource, and the visual character and quality of Lake Merced area would therefore be degraded substantially. Thus, operation of the proposed project would result in a significant aesthetic impact.

However, **Mitigation Measure M-HY-9, Lake Level Management for Lake Merced** (see Section 5.16, Hydrology and Water Quality) requires the SFPUC to implement lake level management procedures to maintain Lake Merced at water levels similar to conditions that would occur without the project. These corrective actions include the additions of supplemental water and/or alteration of pumping patterns, as necessary. Therefore, with implementation of Mitigation Measure M-HY-9, Lake Merced would be maintained at conditions similar to those that are predicted to occur without project-related pumping. As a result, no additional aesthetic resources-specific mitigation is required at this location.

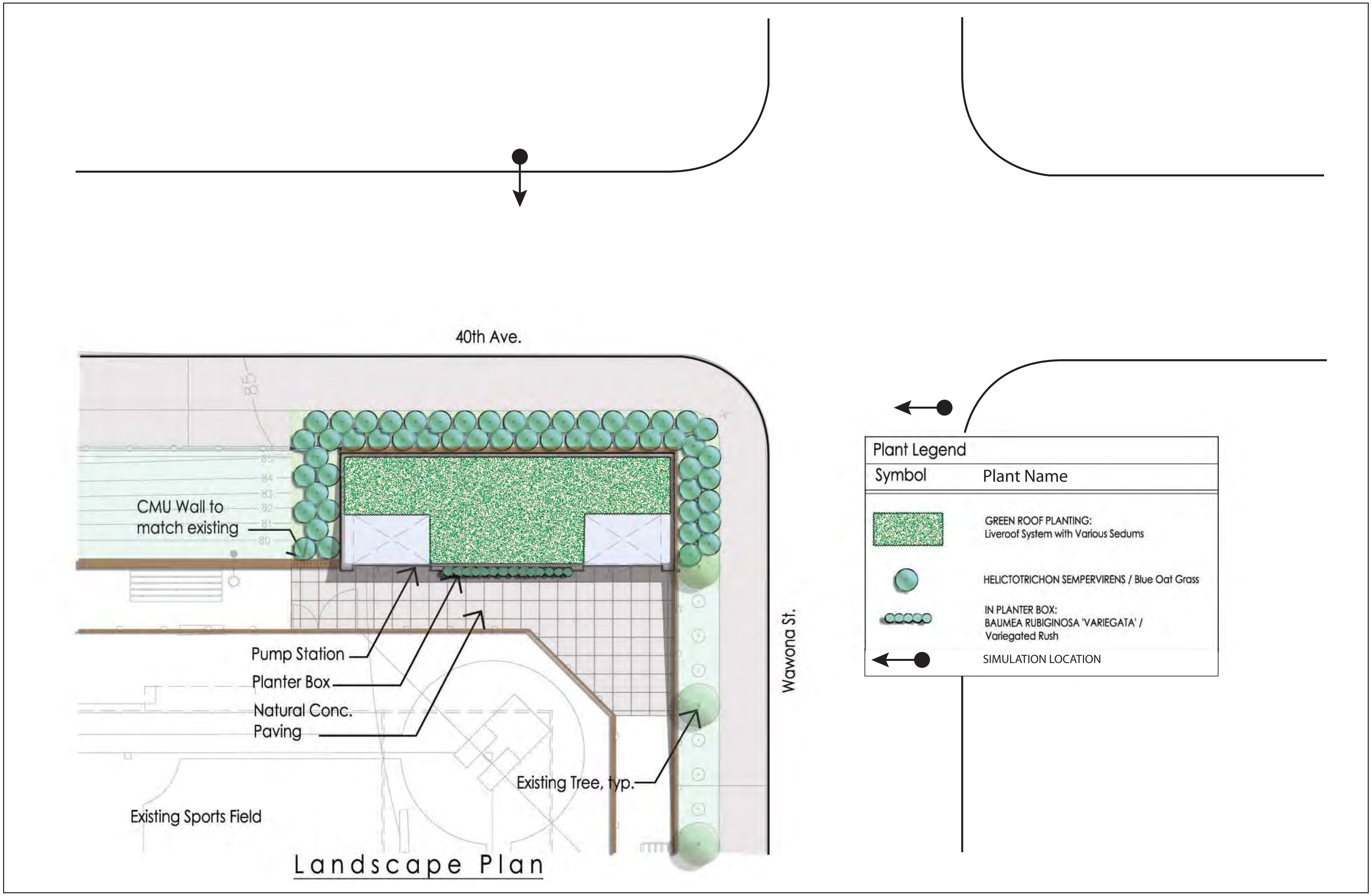
Mitigation Measures

Mitigation Measure M-HY-9: Lake Level Management for Lake Merced. (see Section 5.16, Hydrology and Water Quality, for description)

South Sunset Well Facility Site

As discussed in Section 5.3.1, Setting, there are no scenic resources within the vicinity of this facility. However, because the South Sunset well facility site is exposed to numerous sensitive viewers and is judged to have a moderate visual quality, the site is considered to have moderate-to-high visual sensitivity. **Figure 5.3-12** presents the landscape plan for the South Sunset well facility, and **Figure 5.3-13** shows the two visual simulations of the facility. The building would have board-form concrete walls and a roof that slopes toward 40th Avenue. The wall along 40th Avenue would be approximately 5 feet above the sidewalk grade. The roofline of the southern wall facing Wawona Street and the northern wall would slope up to a height of approximately 14 feet above the playground field. Doors along the west façade facing the playground would provide building access. The west façade would have a metal-clad cornice above an overhead door, and the central portion of the façade would incorporate a water feature. The fence would have “South Sunset Playground” stenciled in black paint along the 40th Avenue side. The concrete walls would be a dark stone-gray color; the metal panels would have a lighter gray finish; and the doors would be a charcoal (darker) gray color. The building walls along the north, east, and south faces would also serve as retaining walls. As shown in the landscape plan, planting areas would be located around the well facility, including planter strips along the sidewalks that would be planted with California native species such as blue oat grass. The planter box associated with the water feature on the western façade would be planted with variegated rush.

Given the moderate-to-high sensitivity of the site, the well facility has been designed to result in minimal adverse visual effects. Exterior finishes and textures serve to avoid an industrial or indistinct appearance to the structure, and the green roof would enhance the visual continuity with the adjacent baseball field. The stenciled sign for the playground on the east side of the building would enhance the perception that the facility is an integrated part of the park rather than a separate facility and use. Furthermore, the building would not extend higher above the sidewalk than the existing fenceline (see Photos 6 and 7 in Figure 5.3-3), which would aid in maintaining the existing space and form. Finally, the proposed landscaping would either maintain or enhance the current landscaping around the site. Given the design considerations, the main visual effect of the well facility would be to eliminate views of the ballpark from segments of Wawona Street and 40th Avenue that the building faces. Because similar views are available from other sidewalk areas bordering the park, and the facility is only 55 feet long by 19 feet wide, the view blockage would not be substantial.



SOURCE: SFPUC, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.3-12
South Sunset Well Facility Draft Landscape Plan

SOURCE: SFPUC, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.3-13
South Sunset Well Facility Simulations

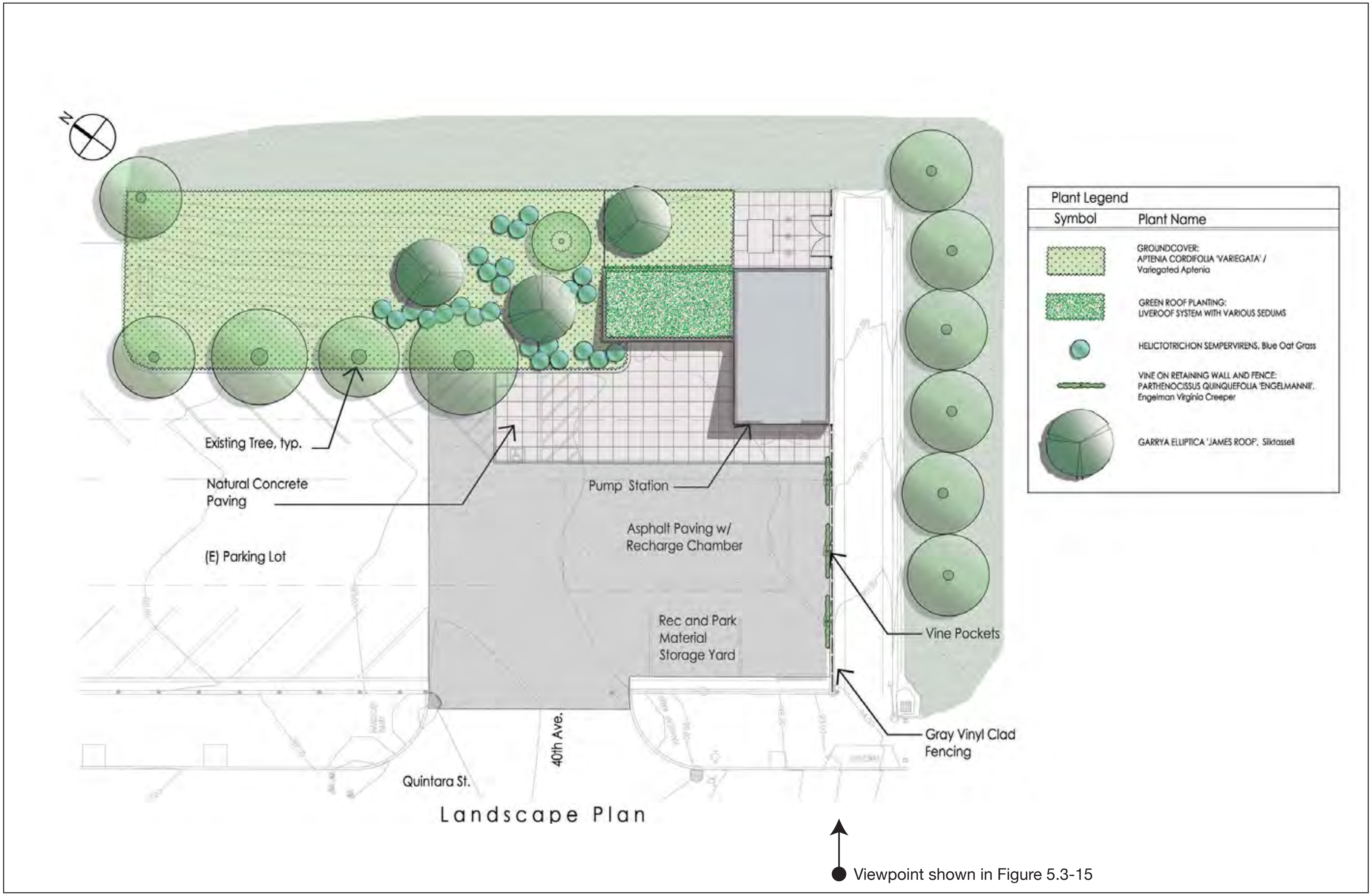
Because the facility maintains the visual character of the area and would not result in substantial view blockage, construction of the South Sunset well facility would result in a less-than-significant impact on scenic resources or the visual character or quality of the site.

West Sunset Well Facility Site

As discussed in Section 5.3.1, Setting, there are no scenic resources within the vicinity of this facility. The West Sunset well facility site is considered to have low-to-moderate visual sensitivity because: the site has moderate visual quality; park users are only exposed to the site as they access it; and other affected viewers are only exposed briefly.

Figure 5.3-14 presents the draft landscape plan for the West Sunset well facility, and Figure 5.3-15 shows a visual simulation of the facility along with the existing condition of the site. The building would consist of a 31-foot by 45-foot L-shaped building. The building site would be excavated into a slope that lies between the playing field and the lower-level street. The roofline height of the south face of the building would be approximately 17 feet above grade facing Quintara Street, and the east face would be approximately 7 feet above grade facing the playground. The roof of the central portion of the building would be flat and planted as a green roof. The roofline height of this portion of the building would be approximately 5 feet above grade facing the playing field, and approximately 12 feet above grade facing Quintara Street. A fenced enclosure would be located along the northern side of the building facing the playing field. This 8-foot-high, gray chain-link fence would enclose an electrical transformer to be installed on a 15-foot by 20-foot concrete slab, as well as a satellite antenna mounted on a concrete footing. The electrical transformer would be located behind the visible face of the building and shielded from view. In addition, the existing damage at the top of the playfield fence immediately north of the well facility would be repaired as part of the project (see Section 3.4.1, Groundwater Well Facilities). The building style, color, and finish would be similar to those described above for the South Sunset well facility.

As shown in Figure 5.3-15, the facility would replace a sloping vegetated area between the parking lot and the playing field, and part of the parking lot itself. Three trees would be removed. The additional mass introduced by the well facility would not be substantial, as it would not extend far above the existing fencelines. The sloping green roof shown in Figure 5.3-14 would extend the color and texture of the existing playing field as viewed from the opposite side of the northern fence. The building's surface treatments would have a color and texture that are slightly inconsistent with the surrounding area, but would nevertheless avoid a strongly industrial or negative aesthetic. The removed trees would only slightly reduce the tree coverage as seen from the playing field (shown in Photo 10 of Figure 5.3-4), and might actually benefit views for residents on the opposite side of Quintara Street by opening up north views of the playing field and the Sunset neighborhood. Trees and differences in elevation would continue to screen the West Sunset well facility site from park facilities. For users of the parking lot and residences along Quintara Street, the visual change would be moderate.



SOURCE: SFPUC, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.3-14
West Sunset Well Facility Draft Landscape Plan

Existing Condition

Simulation

SOURCE: ESA, 2011; SPFUC, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.3-15
West Sunset Well Facility Simulation

Because the visual change would be moderate in a site with low-to-moderate sensitivity, construction of the West Sunset well facility would result in a less-than-significant impact on scenic resources or the visual character or quality of the site.

Central Pump Station Well Facility Site

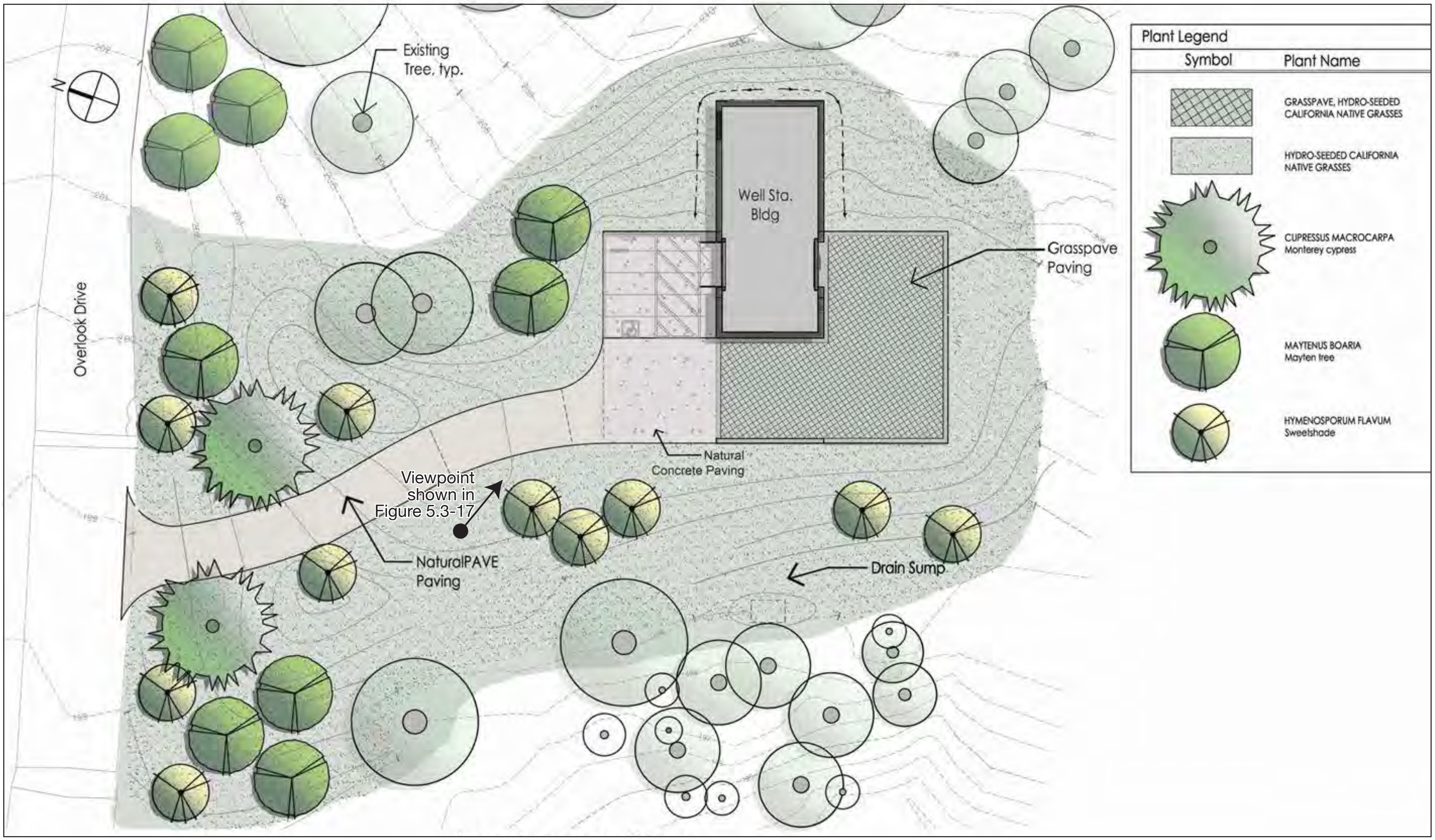
While Golden Gate Park as a whole may be considered a scenic resource, the well facility would not be located in an area that is highly used by park visitors and is adjacent to an existing wood waste storage and compost facility and pump station facility. As discussed Section 5.3.1, the Central Pump Station well facility site has moderate visual quality and is partially exposed for brief periods to sensitive viewers, and therefore the site has moderate visual sensitivity.

Trees would not be removed at this location. **Figure 5.3-16** presents the landscape plan for the Central Pump Station well facility, and **Figure 5.3-17** shows a visual simulation of the facility along with the existing condition of the site. The Central Pump Station well facility would be approximately 120 feet west of the existing Central Pump Station. The proposed facility would be a rectangular 42-foot by 19-foot building. The eastern portion (pump room) would be approximately 32 feet by 17 feet. The western portion of the building (electrical room) would be approximately 8 feet by 17 feet. The height of the building would be approximately 13.5 feet. The building style and exterior materials and finishes of the well facility would be similar to the other well facilities. As the site is currently forested and vegetated open space, the well facility would represent a slight visual change to the area. However, given that it would be adjacent to the Central Pump Station and park wood waste storage and compost facility, that it would be visible to park users only briefly, would not be located in a highly visited area, and it would be partially screened by trees and vegetation, it would not have a negative influence on the public's experience and appreciation of the visual environment at this location. For these reasons, the impact on scenic resources and visual character at this site would be less than significant.

South Windmill Replacement Well Facility Site

As discussed in Section 5.3.1, the South Windmill Replacement well facility site has low visual quality and is poorly exposed to the viewing public, and therefore is considered to have low visual sensitivity.

Construction of the South Windmill Replacement well facility would not require tree removal. The type and style of the well facility would be similar to Golden Gate Park buildings in the vicinity, such as the Millwright's Cottage and the Beach Chalet field house. **Figure 5.3-18** presents the conceptual landscape plan for the South Windmill Replacements well facility, and **Figure 5.3-19** shows a visual simulation of the facility along with the existing condition of the site. Because the well facility would be in a location that is difficult to view from publicly accessible locations, and because it would replace an older structure with a structure that would be in keeping with other buildings in the vicinity and would include the planting of grass around the facility and access road, construction and operation of the facility would have a less-than-significant impact on the visual character or quality of the site. The completed South Windmill Replacement well facility would represent an improvement in the site's visual quality over existing conditions.



SOURCE: SFPUC, 2011

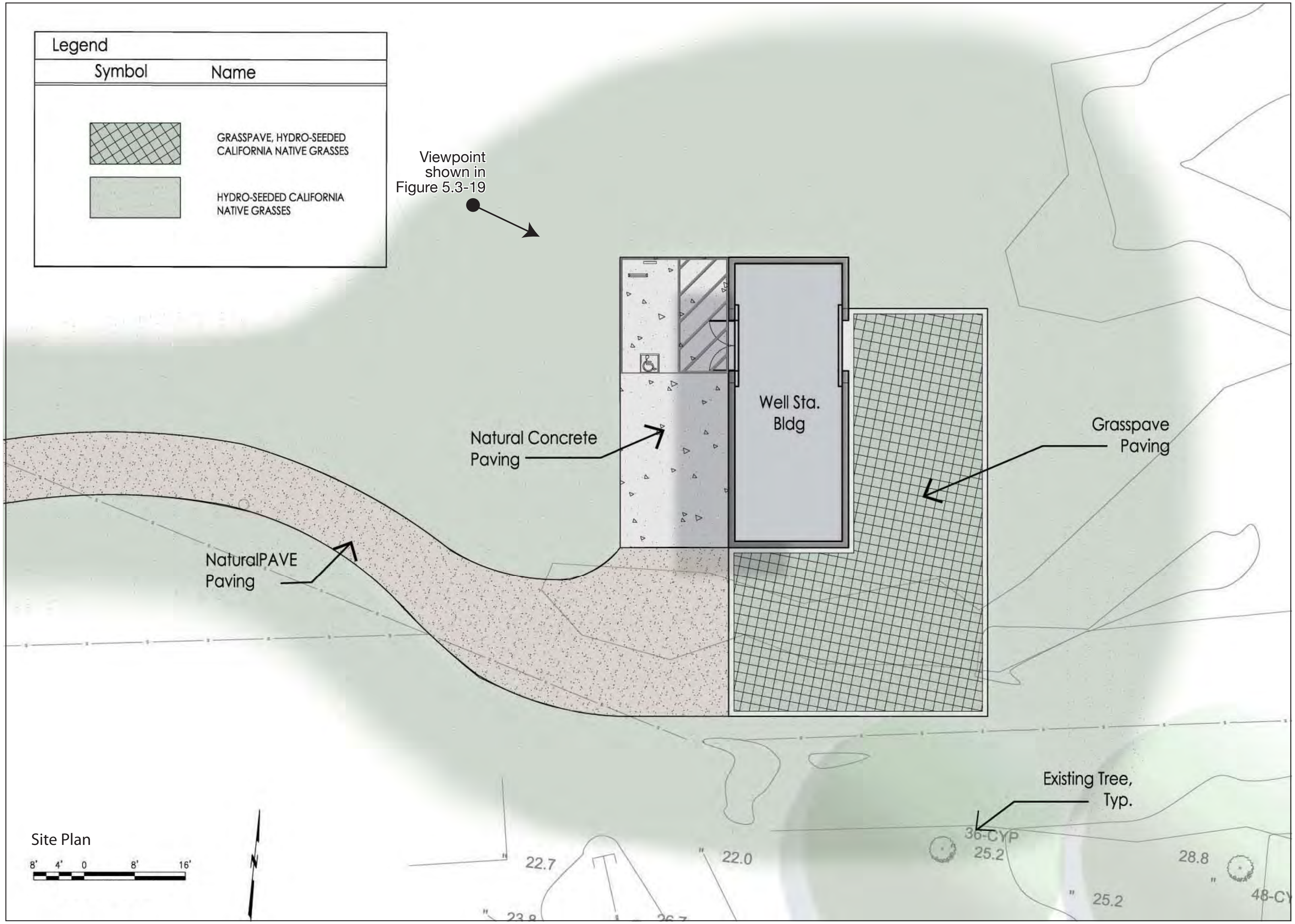
San Francisco Groundwater Supply Project EIR

Figure 5.3-16

Central Pump Station Well Facility Draft Landscape Plan

SOURCE: SFPUC, 2011

Figure 5.3-17
Central Pump Station Well Facility Simulation



SOURCE: SFPUC, 2012

San Francisco Groundwater Supply Project EIR

Figure 5.3-18
South Windmill Replacement Well Facility Draft Landscape Plan


Existing Condition


Simulation

SOURCE: SFPUC, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-19
South Windmill Replacement Well Facility Simulation

North Lake Well Facility Site

As discussed Section 5.3.1, the North Lake well facility site has moderate visual sensitivity because, while the site has low visual quality, it is exposed to a high number of different viewer groups and the access road offers direct and unencumbered views of the site. As such, only a minor-to-moderate degree of visual change could occur without causing a substantial adverse impact.

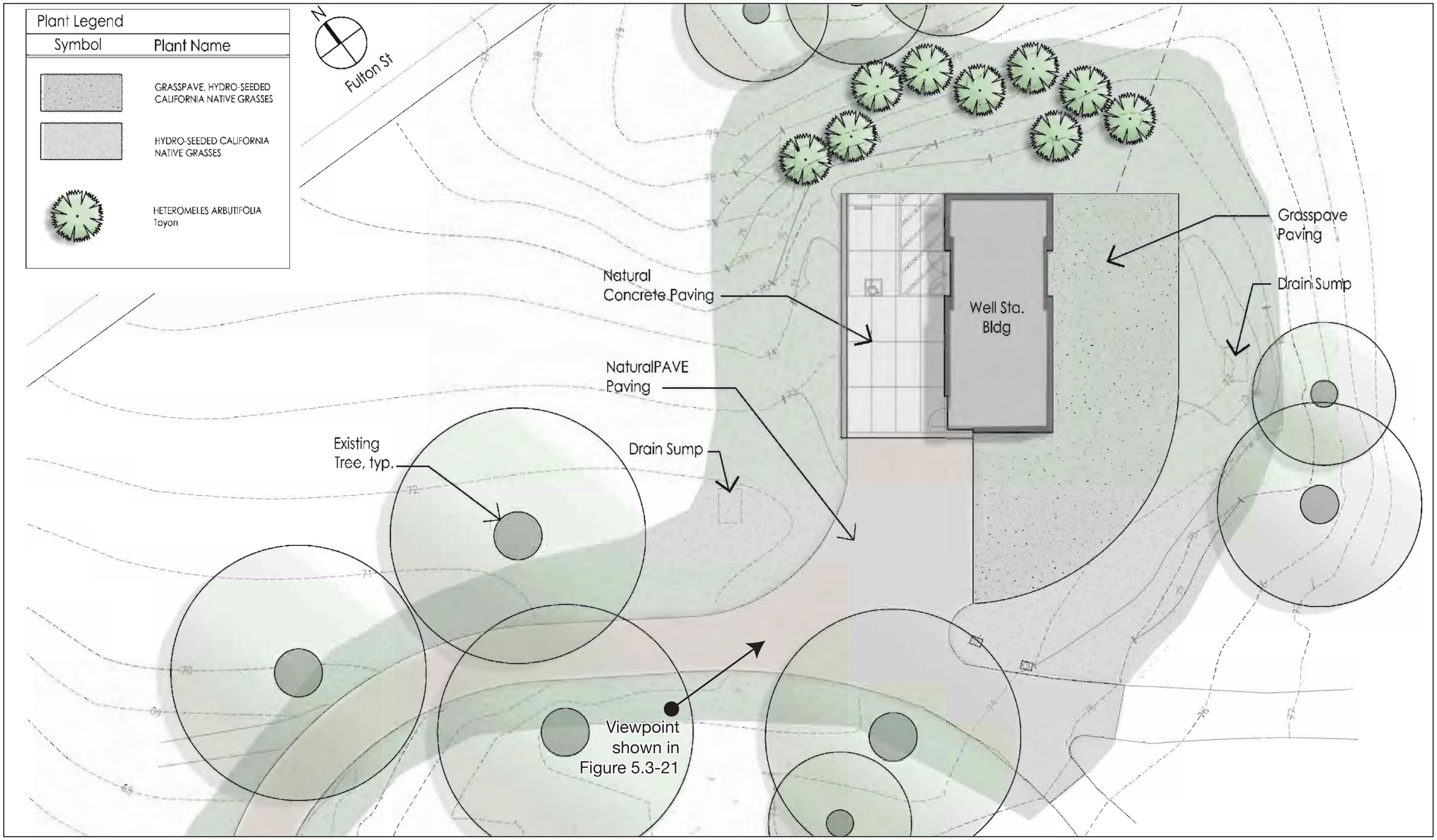
Figure 5.3-20 presents the landscape plan for the North Lake well facility, and **Figure 5.3-21** shows a visual simulation of the facility along with the existing condition of the site. While the North Lake well facility site is more readily visible than the South Windmill Replacement well facility site, the proposed facility would likewise replace an older structure. The type and style of the well facility would be similar to the buildings described for the other well facilities, but without the green roof. Green pavement, site landscaping, and the selected building color and texture would represent an improvement over the existing condition. Two trees would be removed east of the facility, but since the area is already heavily vegetated it is unlikely that removing these trees would substantially alter views of the area. For these reasons, operation and maintenance of the facility would have a less-than-significant impact on scenic resources or the visual quality of the site and its surroundings.

Pipelines

● Upon completion of construction, pipelines would be below ground, and the sites would be returned to their general preexisting conditions. A proposed sample station and chlorine analyzer would be located on the northwest corner of Sunset Reservoir (see Photo 23 in Figure 5.3-8). This facility would be a small utility box on the sidewalk, similar to other utility boxes scattered throughout the Sunset District. The proposed pH adjustment facility would be located to the northeast of the existing Sunset Chlorine Station. The proposed facility would be smaller in size and height than the existing chlorine station, which would screen views of the proposed facility as seen from public areas to the west. The access vault would be at grade, and piping/electrical conduits would be below ground. While the visual quality of this area is high relative to other areas of the Sunset, the sample station, chlorine analyzer, and pH adjustment facility would be a minor addition and is therefore not likely to be negatively perceived by the viewing public. For these reasons, the scenic resources and visual character impact of pipeline locations would be less than significant.

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. (Less than Significant)

The only permanent light source for the proposed well facilities would be recessed lights above the doors of each building and lighted bollards adjacent to the pump room at the Lake Merced well facility. 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. Further, these sites are bordered by trees or other facilities that are similar in nature to existing facilities and structures that are nearby. 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; rather, a viewer 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. Furthermore, building materials and finishes would be light grey or dark in color,



SOURCE: SFPUC, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-20
North Lake Well Facility Draft Landscape Plan

Existing Condition

Simulation

SOURCE: SFPUC, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.3-21

North Lake Well Facility Simulation

would consist of dull, nonreflective surfaces, and would not have glass windows facing affected viewers. Such building finishes are not substantial sources of glare, such as mirrors, polished metallic surfaces, or windows. For these reasons, operation of the proposed project would have a less-than-significant impact with respect to daytime or nighttime light and glare.

Cumulative Impacts

Impact C-AE: The proposed project would have a cumulatively considerable contribution to a significant cumulative aesthetic impact. (Less than Significant with Mitigation)

Section 5.1.4, Cumulative Impacts, describes the approach to the cumulative analysis used throughout this EIR and Table 5.1-6 summarizes the present and reasonably foreseeable future projects in the vicinity of the Groundwater Supply Project. The geographic scope for cumulative aesthetics impacts includes all projects that would be located within the publicly accessible viewshed of the proposed project. The cumulative project sites do not necessarily need to be visible simultaneously with the proposed project site from one fixed vantage point, but for an impact to occur the sites must be visible in the same general vicinity as a viewer looks around or travels about. None of the projects in the cumulative scenario would result in aesthetic impacts that would overlap with the South Sunset well facility; the West Sunset well facility; Pipeline Locations 1, 2, and 3; the Central Pump Station well facility; or the North Lake well facility.

Projects that could have a cumulative aesthetic impact in combination with the Lake Merced well facility, given their proximity to it, include:

- Significant Natural Areas Resource Management Plan
- Harding Park Recycled Water Project
- Lake Merced Pump Station Essential Upgrade
- Parkmerced Project
- Daly City Vista Grande Basin Improvement Project
- Regional Groundwater Storage and Recovery Project

As discussed above, outside of this cumulative analysis, the less-than-significant aesthetic impact determination for the Lake Merced well facility (both during construction and operation) is primarily due to the site's low visual sensitivity. Both the Significant Natural Areas Management Plan and the Parkmerced Project (in the Lake Merced Boulevard area) would generally maintain or eventually improve the visual character of the area and therefore would not adversely contribute to a permanent cumulative aesthetic impact in the Lake Merced area. However, both the Harding Park Recycled Water Project and the Lake Merced Pump Station Essential Upgrade would potentially contribute adversely to a cumulative aesthetic impact because they include facilities that would affect the primarily open-space aesthetic setting of the area. However, because the Groundwater Supply Project's impact at Lake Merced would be less than significant, and because both of the other projects would involve work on, or replacement of, existing facilities with those of a similar visual character (i.e., in existing operations and maintenance areas), the projects would not combine to create a significant adverse visual environment as compared to existing conditions and, therefore, the cumulative aesthetic impact of all these projects considered together would be less than significant.

- Daly City's proposed Vista Grande Drainage Basin Improvement Project involves the addition of stormwater to maintain Lake Merced levels. The SFPUC's proposed Regional Groundwater Storage and Recovery project would operate with reduced groundwater pumping during above-average rainfall years and increased groundwater pumping during drought years (see "Approach to Analysis" in Section 5.16, Hydrology and Water Quality for an explanation of cumulative operational scenarios considered in the modeling conducted for the proposed project). With operation of the identified cumulative projects, the estimated Lake Merced water levels are expected to be mostly higher than under existing conditions projected to occur without operation of the cumulative projects. However, during some years, Lake Merced water levels would likely be less than levels that would be expected to occur without operation of the cumulative projects. Under cumulative conditions, Impound Lake would likely be substantially reduced during the design drought, reducing the visual quality of that lake as seen from the paved pedestrian path around the lake perimeter and the picnic areas on John Muir Drive and Lake Merced Boulevard. While Lake Merced water level conditions would be naturally reduced under modeled existing conditions, 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, which would likely be substantially degraded under cumulative conditions at the end of the design drought. Therefore, cumulative impacts on Lake Merced, as a scenic resource, and on the visual character and quality of the Lake Merced area would be significant. However, the contribution to this cumulative aesthetic impact would be reduced to a less-than-cumulatively considerable (less-than-significant) level with implementation of **Mitigation Measure M-HY-9, Adaptive Management Program for Lake Merced**, which requires the SFPUC to implement lake level management procedures to maintain Lake Merced at water levels similar to conditions predicted to occur without the project. Therefore, Lake Merced would be maintained at conditions similar to that which would be expected without project-related pumping. Therefore, the Groundwater Supply Project's contribution to significant cumulative impacts on aesthetic resources at Lake Merced would not be cumulatively considerable.

Other present and reasonably foreseeable future projects that could have a cumulative aesthetic impact with the South Windmill Replacement well facility and Pipeline Locations 4 and 5, given their proximity to it, include:

- Beach Chalet Athletic Fields Restoration
- Murphy Windmill/Millwright's Cottage Restoration

These projects would eventually improve the aesthetic conditions of the area through restoration and renovation of the existing area and replacement of the existing well structure at the South Windmill Replacement well facility site. The Beach Chalet Athletic Fields Renovation would be screened from views of the other cumulative projects by intervening vegetation. The renovated Murphy Windmill could be partially seen, in conjunction with the proposed project, by visitors to the windmill. However, views of the renovated windmill area with the project area in the foreground or background would arguably be better as compared with those currently experienced because the existing South Windmill Replacement well facility is somewhat dilapidated. These other cumulative projects would either not include substantial night lighting or would be too far away from sites associated with the proposed project, such that there would be no discernible accumulation of nighttime lighting from their implementation. For these reasons, the overall cumulative aesthetics impact of these projects considered together would be less than significant.

5.3.4 References

California State Department of Transportation (Caltrans), *Map of Officially Designated Scenic Highways for the San Francisco County*, December 7, 2007. Available online at http://www.dot.ca.gov/hq/LandArch/scenic_highways/index.htm. Accessed May 3, 2011.

City and County of San Francisco (CCSF), *Golden Gate Park Master Plan*, p. 4-5, 1998a.

City and County of San Francisco (CCSF), *General Plan, Urban Design Element*, 1998b.

San Francisco Convention and Visitors Bureau, *Official Visitors Website, San Francisco 49-mile Scenic Drive*. Available online at http://www.sanfrancisco.travel/maps/49-Mile-Scenic-drive.html?c=y&product=&showMain=. Accessed January 16, 2013.

5.4 Population and Housing

This section discusses the potential for the proposed San Francisco Groundwater Supply Project to induce substantial population growth, displace housing, create a substantial demand for additional housing in the project area, or necessitate the construction of housing outside the project area.

5.4.1 Setting

The project area would be located on the western side of the city, in the Outer Sunset and Outer Parkside neighborhoods. As shown in Figure 3-1, the project area is generally situated between 19th Avenue (Highway 1) to the east, the Great Highway to the west, Fulton Street to the north, and Lake Merced to the south. This urban area lies between 0.25 and 1.5 miles from the Pacific Ocean and is characterized by a mix of residential, commercial, and public open space and recreational facilities. The project area overlies the Westside Groundwater Basin. It also includes three city parks: Golden Gate Park, West Sunset Playground, and South Sunset Playground, as well as Lake Merced and public open space at Sunset Reservoir. (See Section 5.2, Land Use, for additional information regarding land uses in the project vicinity.)

In 2010, San Francisco was home to approximately 859,658 residents and had approximately 368,136 housing units (State of California, Department of Finance, 2010). Between 2000 and 2010, the total population of the city increased by approximately 0.9 percent, and the total number of housing units increased by approximately 6.2 percent.

5.4.2 Regulatory Framework

There are no federal, State, or local regulations governing population and housing that apply to the Groundwater Supply Project.

5.4.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect related to population and housing if it were to:

- Induce substantial population growth in an area, either directly or indirectly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure);
- Displace substantial numbers of existing housing units or create demand for additional housing, necessitating the construction of replacement housing; or
- Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere.

Approach to Analysis

The Program EIR (PEIR) on the SFPUC's Water System Improvement Program (WSIP), parts of which are incorporated into this EIR by reference (San Francisco Planning Department, 2008), evaluated the growth-inducement effects of the Groundwater Supply Project within the context of the WSIP and the overall regional water system as well as the indirect effects of that growth. Refer to Section 2.2.2, SFPUC Water System Improvement Program, and Section 6.1, Growth-Inducing Impacts, of this EIR for more information.

Due to the nature of the proposed project, there would be no impacts related to the following criteria; therefore, no impact discussion is provided for these topics for the following reasons:

- ***Induce Substantial Population Growth in an Area, either Directly or Indirectly.*** During the estimated 24-month construction period (September 2014 through September 2016), the proposed project would employ up to 63 workers for construction at new groundwater well facilities and pipeline installation sites (see Section 3.4.1, Groundwater Well Facilities, and Section 3.4.2, Pipeline Construction). It is expected that the construction workforce requirements could be met using Bay Area labor. Although some workers might temporarily relocate from other areas, any population increase due to this relocation would be minor (fewer than 63 workers) and temporary (estimated at 24 months). The existing SFPUC workforce would carry out long-term operation and maintenance of the groundwater facilities and pipelines without the need for additional personnel. The proposed project would not construct new homes or businesses in the area or extend new roads or other infrastructure into undeveloped areas. Therefore, construction and operation of the proposed project would not result in a substantial increase in the local population, and no growth-inducement impacts would result from the project, apart from a contribution to the WSIP's overall growth-inducement potential (described below and in Chapter 6).

  As a WSIP facility improvement project, the Groundwater Supply Project would contribute to the growth-inducement potential of the overall WSIP. The proposed project's growth inducement within the context of the WSIP and the regional water system is discussed in Section 6.1, Growth-Inducing Impacts. The project's indirect effects on population and housing growth due to growth inducement and secondary effects of growth are discussed in Section 6.1.4, Indirect Effects of Growth.

- ***Displace Substantial Numbers of Housing Units or Create Demand for Additional Housing.*** The proposed project would improve the existing water supply infrastructure and would not displace any housing units. The project would employ up to 63 construction workers (see Section 3.4.1, Groundwater Well Facilities, and Section 3.4.2, Pipeline Construction), but it is expected that local Bay Area labor could meet the construction workforce requirements. Therefore, the project would not create demand for additional housing, and impacts related to the displacement of housing and the need to construct replacement housing are not applicable.

- ***Displace Substantial Numbers of People.*** The proposed project would improve the existing water supply infrastructure, and the project's construction or operational activities would not displace housing units or people or necessitate the construction of replacement housing elsewhere. Therefore, this impact criterion is not applicable.

Impact Analysis

As described above, the project itself would not cause growth-inducement impacts, and implementation of the proposed project would not result in impacts related to population and housing. Therefore, no impacts are identified under this topic.

Cumulative Impacts

Because the proposed project would not result in project-specific impacts related to growth inducement and housing, implementation of the project would not contribute to cumulative impacts beyond the secondary and indirect impacts of growth associated with the proposed project within the context of the WSIP, as described in Section 6.1, Growth-Inducing Impacts, of this EIR.

5.4.4 References

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.

State of California, Department of Finance, *California County Population Estimates and Components of Change by Year, July 1, 2000–2010*, December 2010.

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5.5 Cultural and Paleontological Resources

Cultural resources include historic architectural resources, archeological resources, and human remains. Paleontological resources[1] include fossilized remains of vertebrate and invertebrate organisms, fossil tracks and trackways, and plant fossils. This section provides an assessment of potential impacts on cultural and paleontological resources that might be present in the vicinity of the proposed project. Mitigation measures to reduce impacts to a less-than-significant level are identified.

5.5.1 Setting

Definitions

Historical Resources

Based on the CEQA Guidelines, Section 15064.5(a), historical resources include, but are not limited to, any object, building, structure, site, area, place, record, or manuscript that is historically or archeologically significant or that is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California. Generally, a resource is considered by a lead agency to be "historically significant" if the resource meets the criteria for listing on the California Register of Historical Resources (Public Resources Code 5024.1).

Under federal regulations, historic properties are defined as any prehistoric or historic district, site, object, building, or structure included in or eligible for inclusion in the National Register (Title 36 of the Code of Federal Regulations [CFR], Section 800.16[l]). Historic properties that meet federal criteria are also considered historical resources under CEQA, as in accordance with California per Public Resources Code Section 5024.1(d)(1). Historical resources and historic properties refers to both significant architectural/structural resources and significant archeological resources.

Area of Potential Effects

Federal regulations require the identification of historic properties within the "area of potential effects" (APE) of a project, defined as the geographic area within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties (36 CFR 800.16[d]). For compliance with CEQA, the San Francisco Planning Department, Environmental Planning section (EP) uses the term CEQA-APE (C-APE). This analysis uses the term C-APE, which is synonymous with APE for this project.

The C-APE includes all areas of proposed ground-disturbing activity and associated staging areas. Project activities that are considered to be within the C-APE include trenching for pipelines, foundation excavations for groundwater facilities, and any grading activities that may be required for construction site preparation. The C-APE at the proposed well facilities and all areas for pipeline

1 Paleontology is the science of the forms of life existing in prehistoric times, as represented by fossilized animals and plants.

trenching includes the proposed area of disturbance as well as a 30-foot buffer zone around these areas to encompass a construction vibration impact zone. Pipeline locations would generally be placed along one side of the paved roadway (subject to separation requirements between water pipelines and sanitary sewers); however, the entire roadway is considered part of the C-APE because the horizontal placement of the pipeline within the roadway has not been precisely defined. In the vicinity of Sunset Reservoir, the proposed pipeline alignments surrounding the structure and within Ortega Street, 24th Avenue, and 28th Avenue, as well as two landscaped areas at the northwest corner of the reservoir property at the corner of Ortega Street and 28th Avenue and along the northeast corner at Ortega Street and 24th Avenue, are located in the C-APE. Per the WSIP Archaeological Guidance requirements, SFPUC and EP approved the C-APE on November 17, 2009 (Dean, 2009)

The C-APE for paleontological resources is similar to the C-APE for architectural and archeological resources; however, surface-disturbing activities (e.g., vegetation clearing) would not disturb or destroy bedrock where paleontological resources could be located. Therefore, areas of surface disturbance are not considered to be within the C-APE for paleontological resources.

Environmental Setting

The C-APE is located in the Bay Area–Delta Bioregion. This bioregion consists of a variety of natural communities that range from the open waters of San Francisco Bay and the Sacramento–San Joaquin River Delta to salt and brackish marshes to chaparral and oak woodlands. The temperate climate is Mediterranean in nature, with relatively mild, wet winters and warm, dry summers. The C-APE is less than 0.5 mile from the Pacific Ocean in a residential part of western San Francisco. At one time the C-APE was a sand dune environment, but today very little native vegetation remains in the vicinity. Lake Merced was historically a single body of water that was fed by several groundwater springs and seeps on the eastern and southern sides of the lake (Oakland Museum of California, 2012). Natural vegetation communities in the C-APE are classified based on Holland's *Preliminary Descriptions of the Terrestrial Natural Communities of California* (1986) and include barren/ruderal, non-native forest, developed, landscaped, pond, and freshwater marsh. "Barren," "developed," and "pond" are not natural vegetation communities per se, as they lack natural vegetation, but are used in this EIR to describe areas that cannot be classified under any of Holland's vegetation communities.

Non-native forest throughout the C-APE comprises mostly bluegum eucalyptus, Monterey pine, and Monterey cypress trees. The proposed well facility sites in Golden Gate Park and at Lake Merced are adjacent to non-native forest. Landscaped areas supporting cypress, pines, eucalyptus, and a variety of other ornamental trees and non-native vegetation are present throughout Golden Gate Park, adjacent to the South Sunset well facility, around Sunset Reservoir, and at the edge of several proposed pipeline routes (although most of the pipeline routes themselves are in paved streets). There are large areas of irrigated grasslands throughout these landscaped areas. While not part of the project footprint, there are several lakes in the vicinity of the project (e.g., Lloyd Lake, North Lake, and Lake Merced). Some of the lakes are man-made, while others (such as Lake Merced and North Lake) have been modified from historical conditions. Freshwater marsh has largely vanished from San Francisco, but there are still areas of bulrush-cattail marsh at Lake Merced, and an ongoing effort is underway to restore marshes at the Chain of Lakes. In particular, there is a healthy freshwater marsh less than 0.1 mile west of the proposed Lake Merced well facility, and freshwater marsh less than 0.1 mile west of the proposed groundwater pipeline to the North Lake well facility.

Geoarcheological Context

With the exception of the Lake Merced well facility site area (described below), the C-APE is located in an area of San Francisco that is underlain by Holocene[2] dune sands, some of which may be Pleistocene[3] in age. Prior to development, the western part of the city was the site of one of the largest dune fields in the San Francisco Bay Area—in large part due to its high exposure to westerly winds blowing from the Pacific Ocean and the abundant supply of sediment to Ocean and Baker Beaches. Beach sand is typically derived locally by wave abrasion of sea cliffs and by stream erosion in adjacent hills. Wave action winnows silt and clay from rock debris supplied to the beaches and leaves a residuum of clean, well-sorted sand (Helley et al., 1979). In areas exposed to high winds, sands supplied to beaches undergo a cycle of wind-erosion, transport, and deposition that forms transverse, ridge-shaped dunes that can extend many miles inland from the coast. Two generations of dunes have been recognized on the eastern side of San Francisco separated by bay mud and clay (Schlocker, 1974), where relatively intact concentrations of archeological materials have been buried and preserved by dune migration, especially in more inland locations that exhibit multiple and geologically more recent episodes of deposition. In contrast, dunes on the western side of the city and in the current C-APE consist of older, non-stratified dune formations.

Most dune fields can be described as being in a state of dynamic equilibrium. There may be no net accumulation or depletion of material within a system as a whole, but constant winds cause continual erosion on the windward side of dunes and deposition on their leeward side. Natural bedrock highlands within the western and northern portions of the city have in many places been mantled with windblown sand, with a thin veneer on their windward side, and deposits as thick as 150 feet on their leeward side (Schlocker, 1974). Because human habitation began during a time when the dune field was already established, the presence of buried evidence of prehistoric human use or occupation is more likely to be restricted to the protected side of the dunes —where significant amounts of dune wind-blown sand are more likely to have accumulated. Although Holocene dune sands as a whole are described as having a moderate potential to contain buried archeological sites (Meyer and Rosenthal, 2007), for the reasons described above, dunes sands in the highlands on the eastern side of the city may be more sensitive than those on the unprotected western side. However, fewer documented archeological investigations have been conducted on the western side of the city, especially in the vicinity of the C-APE.

The Lake Merced well facility site is located in an area mapped (Whitter et al., 2006) as the Pleistocene-age Colma Formation.[4] The geologic mapping depicts the regional distribution of Quaternary surficial deposits. The upper 3 feet of the Colma Formation has a moderate potential to

2 The Holocene is a geological epoch that began 11,700 years ago and continues to the present.
3 The Pleistocene is the epoch from 11,700 years before present to 2.5 million years before present.
4 The Colma Formation consists of loose to dense, fine- to medium-grained sands deposited in a shallow-marine environment.

contain prehistoric deposits (Meyer and Rosenthal, 2007). At least two known prehistoric archeological sites are located on the surface in the vicinity of the Lake Merced well facility (unnumbered Lake Merced site and CA-SFR-25), but outside the C-APE. The results of the Lake Merced well facility site geotechnical study indicate that the C-APE is underlain by artificial fill, consisting of loose to medium dense sand and silty sand, to a depth of 6.5 to 16 feet below ground surface (Treadwell & Rollo, 2007). Streams and ravines historically cut into the slope east of Lake Merced, and in many places, these have been capped by artificial fill associated with urban development and roads. Below the fill, the C-APE is underlain by loose to medium dense sand and sand with silt to a depth of approximately 24 feet, where it becomes dense to very dense silty sand. The geotechnical report does not indicate the age or extent of the native sands, and as noted above, prehistoric archeological sites have been uncovered in Holocene-age sand dune deposits on the eastern side of San Francisco. Additionally prehistoric archeological sites located on the surface of the Pleistocene-age Colma Formation may be covered by native sand deposits and by various amounts of modern artificial fill and/or built upon.

Archeological/Prehistoric-Period Setting

Archeological resources include both prehistoric and historic-period archeological resources. This discussion of prehistoric archeology addresses cultural patterns in the project C-APE through the time of European contact. Historic-period archeological resources, starting with the Mission period, are discussed below under the heading Historic-Period Setting.

Prehistoric Context

Archeologists have developed individual cultural chronological sequences tailored to the archeology and material culture of each subregion of California. Each of these sequences is based principally on the presence of distinctive cultural traits and stratigraphic separation of deposits. Milliken, et al. (2007), provide a framework for interpreting the San Francisco Bay Area by dividing human history in California into three broad periods: the Early Period, the Middle Period, and the Late Period. Economic patterns, stylistic aspects, and regional phases further subdivide cultural patterns into shorter phases. This scheme uses economic and technological types, sociopolitics, trade networks, population density, and variations of artifact types to differentiate between cultural periods.

The *Paleoindian Period* (13,500 to 10,000 before present [B.P.]) was characterized by big-game hunting over broad geographic areas. Evidence of human habitation during the Paleoindian Period has not yet been discovered in the San Francisco Bay Area. During the *Lower Archaic* (10,000 to 5500 B.P.), geographic mobility continued from the Paleoindian Period and is characterized by use of the millingslab and handstone as well as large, wide-stemmed and leaf-shaped projectile points. Cut shell beads and the mortar and pestle are first documented in burials during the *Early Period* (*Middle Archaic*; 5500 to 2500 B.P.), indicating the shift to sedentism. During the *Middle Period*, which includes the *Lower Middle Period* (*Initial Upper Archaic*; 2500 to 1570 B.P.) and *Upper Middle Period* (*Late Upper Archaic*; 1570 to 950 B.P.), geographic mobility may have continued, although groups began to establish longer-term base camps in localities from which a more diverse range of resources could be exploited. The first rich black middens are recorded from this period. The addition of milling tools as well as obsidian and chert concave-base projectile points, and the occurrence of sites in a wider range of environments suggest that the economic base was more diverse. By the Upper Middle Period, mobility began to be replaced by the development of numerous small villages. A "dramatic cultural disruption" occurred around 1570 B.P., evidenced by the sudden collapse of the *Olivella* saucer bead trade network (Milliken et al., 2007). During the *Initial Late Period* (*Lower Emergent*; 950 to 450 B.P.), social complexity developed toward lifeways within large, central villages with resident political leaders and specialized activity sites. Artifacts associated with the period include the bow and arrow, small corner-notched projectile points, and a diversity of beads and ornaments.

Ethnographic Context

This ethnohistorical review has been adapted from Meyer, et al. (2001).

The C-APE is within the traditional territory of the Costanoan people, also referred to as Ohlone, Mutsun, and Rumsun (Levy, 1978:485–495). These people, collectively referred to by ethnographers as Costanoan, were actually distinct sociopolitical groups that spoke at least eight languages of the same Penutian language group. The Ohlone occupied a large territory from San Francisco Bay in the north to the Big Sur and Salinas Rivers in the south. The primary sociopolitical unit was the tribelet, or village community, which was overseen by one or more chiefs (Levy, 1978:485).

The San Francisco peninsula is located within former Ramaytush Costanoan territory, where little ethnographic data have been collected due to severe population reductions during the historic period (Levy, 1978). Information applicable to the Ramaytush Costanoan ethnographic record must be taken from secondary sources (Cook, 1943a–c; Levy, 1978) and from Milliken's (1983, 1995) work with mission records. Subsistence practices, tribelet boundaries and village locations, and local population-density estimates provide the basic data for assessing the likelihood of cultural remains in the form of middens or resource-procurement sites within the C-APE. In the absence of these data, prehistoric land use can be reconstructed to some degree by viewing the prehistoric natural features of the study area in the context of the lifeways of the most recent indigenous San Francisco peninsula occupants.

While Costanoan ethnographic data lack breadth, according to Levy, 18th-century explorers' accounts provide "a good deal of ethnographic information that can be located in time and space" (1978:495). In particular, J.P. Harrington's field notes provided Levy with "the most extensive single body of Costanoan ethnographic and linguistic material" (1978:495). From these sources and extant statements of Costanoans during the period between 1878 and 1933, Levy developed a cultural sketch of the Costanoan whose ancestors moved into the San Francisco and Monterey bay areas about A.D. 500. Of the eight Costanoan languages, Ramaytush, or San Francisco Costanoan, was spoken by about 1,400 people in San Mateo and San Francisco Counties (Levy, 1978:485). The Olhone, or Ohlone, was a name native people used historically to refer to San Francisco Bay, although it reportedly is derived from a San Mateo group (Levy, 1978:494).

Based on mission records, Milliken (1983) proposes the tribelet name *Aguazio* for the single political group consisting of six important villages that controlled the San Francisco peninsula north of the San Bruno Mountains. The villages *Amuctac*, *Pentlenuc*, *Sitlintac*, *Tubsinte*, and *Yemalu* occupied sheltered bayshore valleys, while the village *Chutchui* was inland, near the initial Mission San Francisco de Asis (Dolores) (Milliken, 1983:72-74). According to Milliken, *Sitlintac* and *Chutchui* may have been used as alternate living sites by the same group of people. *Sitlintac* was situated on the San Francisco bayshore between Telegraph Hill and China Basin. Although its exact location remains uncertain, Milliken (1983:74) proposes that *Sitlintac* may have been located in the area of Portsmouth Square near the shore of former Yerba Buena Cove, or, alternatively, farther south in China Basin near the mouth of the former Mission Bay. No ethnographic sites are located in the vicinity of the C-APE.

Events of the early historic period completely disrupted native lifeways and ultimately resulted in the decimation of all Costanoan language groups. In 1776, both San Francisco de Asis and the San Francisco Presidio were established on the peninsula. The six villages noted above supplied the earliest Mission San Francisco de Asis converts (Milliken, 1983:72). Indian labor was important in the construction and repair of the Presidio and the related fortification, Castillo de San Joaquin (now occupied by Fort Point); Native Americans also worked as household servants, vaqueros, soldiers, shipbuilders, and skilled navigators and pilots (Meyer et al., 2001).

The mission San Francisco de Asis president, Senan, reported more than 300 deaths due solely to an 1806 measles epidemic (Cook, 1943a:22), and Bancroft stated that by 1820, the combined San Rafael *asistencia* and Mission San Francisco de Asis deaths (2,100) could not be compared elsewhere in the mission system. The San Francisco mission's death rate "was nearly seventy-five percent" of its population (Bancroft, 1884[2]:374).

In addition to incredibly high native death rates, missionization profoundly impacted Costanoan lifeways. Ritual and social activities were discouraged or prohibited and, due to missionization efforts in nearby areas, San Francisco Costanoan commingled at the mission with people of differing linguistic and cultural traditions who had occupied the north and east bay areas (Levy, 1978:486). During the Mexican period and the subsequent mission secularization, surviving native people were again forced to relocate, most turning to labor on surrounding ranchos (Levy, 1978:486). Due to the extraordinary changes that occurred in rapid succession—beginning with the earliest European settlement of the San Francisco peninsula and continuing through the American period—Costanoan culture virtually vanished from study area environs by the mid-1800s. An example of these losses is seen in an 1849 account that describes a large, abandoned "Indian" village, including structural ruins, bones and shells, and a cremation pit on the east shore of Yerba Buena Island (Rudo, 1982:10, 21). Some small groups of Native Americans remained in the city during the Gold Rush, however, "camping in the open air," gathering what they could, and begging from the settlers (Meyer et al., 2001).

Historic Period Setting

Brief histories of the various project areas in western San Francisco are presented below, as summarized from the historic resources evaluation (HRE) report prepared for this project (ESA, 2011).[5] From north to south, they include Golden Gate Park, the Sunset District, and Lake Merced.

5 This report is available for public review at the San Francisco Planning Department, 1650 Mission Street, Suite 400, San Francisco, CA. File No. 2008.1122E.

The western edge of San Francisco, including today's Sunset District and Golden Gate Park, was in a natural state of sand dunes with a sparse covering of chaparral for most of recorded history. The last Mexican governor of California, Pio Pico, granted Rancho Punta de los Lobos, encompassing most of today's western San Francisco, to a man named Benito Diaz in June 1846. Diaz left his lands unimproved, although a few squatters laid claims to what was then a remote part of San Francisco (VerPlanck, 2013).

In 1868, the San Francisco Board of Supervisors passed the Outside Lands Ordinance, which affected all unsurveyed "outside lands" within the city's corporate boundaries, including the Richmond and Sunset Districts. The new legislation was intended to facilitate the orderly development of areas within the city's path of expansion; settle land claims; and set aside public lands for parks (including a 999-acre tract that would eventually become Golden Gate Park), schools, fire stations, and a city cemetery (now Lincoln Park). In 1870, the "Official Map of the Outside Lands" was published, extending the grid of downtown San Francisco and the Western Addition into the western portions of San Francisco (VerPlanck, 2013).

Development of these outside lands was slow until the establishment of Golden Gate Park in the 1890s, and accelerated after 1906 as thousands of refugees from the earthquake and fire fled to these undeveloped areas of the city. The residential portions of the project area were almost entirely developed within the 15-year timeframe from the mid-1930s to the late 1950s.

Golden Gate Park

At 1,017 acres, Golden Gate Park is San Francisco's second largest urban park after the Presidio. The park is approximately 3.5 miles long by 0.5 mile wide, extending from the east at Stanyan Street to its western boundary at the Great Highway next to the Pacific Ocean. The northern boundary of Golden Gate Park is Fulton Street; the park extends south to Lincoln Way and includes the Panhandle, which runs from Stanyan Street on the west to Baker Street on the east.

By the 1860s, the need was apparent for a large public park to accommodate the substantial population growth of San Francisco during that decade. San Francisco's mayor and the Board of Supervisors approved a legal settlement between the City and County of San Francisco (CCSF), the squatters, and other land owners in the area of present-day Golden Gate Park in January 1868, and the state legislature ratified the settlement in March 1868. An April 1870 act of the state legislature set the park boundary and proclaimed the inception of Golden Gate Park. The first park commissioners appointed William Hammond Hall to survey and prepare maps of the park area, and Mr. Hall was appointed the first park superintendent in August 1871 (NPS, 2004).

The creation of Golden Gate Park started in the Panhandle at the eastern end of the park because it was in the area closest to the city. Subduing the sandy soil initially posed a great challenge for the park's designers. The first stage involved stabilizing the ocean dunes, which covered three-quarters of the park area, by planting trees. By 1875, about 60,000 trees—mostly blue gum eucalyptus, Monterey pine, and Monterey cypress—were planted. By 1879, that number more than doubled, to 155,000 trees over 1,000 acres (NPS, 2004).

In 1873, some 15,000 people visited the park, and by 1876 development had reached the middle of the park near today's Conservatory of Flowers. By the late 1880s, several streetcar lines made the park accessible and increased its popularity. The McAllister and Haight Street cable car lines brought people to the eastern end of the park for recreation, which made the area a desirable residential district (NPS, 2004).

The establishment of the California Midwinter International Exposition of 1894, also referred to as the "Midwinter Exposition" or the "Midwinter Fair," provided the largest increase to attendance and development within the park. The Midwinter Fair was the idea of M.H. de Young, who was the editor and owner of the San Francisco Chronicle at the time. The fair operated for six months in the eastern portion of Golden Gate Park, and its most enduring legacies are the Music Concourse, the M.H. de Young Memorial Museum (which was remodeled over the years and recently replaced with the new M.H. de Young Museum), the Japanese Tea Garden, and Stow Lake (NPS, 2004).

Two men share the credit for the creation of Golden Gate Park; engineer William Hammond Hall (1846–1934) for the park framework and initial landscaping, and horticulturist John McLaren (1846–1943), who presided over the park as its superintendent for 53 years. Hall designed the curving roadways that took advantage of the terrain, kept driving speeds low, and sheltered users from the wind. McLaren wanted to create naturalistic landscape features by working with nature, which he did by establishing plants and trees that could tolerate the sandy soil and foggy conditions (NPS, 2004).

Although it is almost entirely a man-made landscape, Golden Gate Park is a balance of natural features and recreational amenities. The more developed portions of the park are generally on the eastern side, while the park's more naturalistic forms are located toward the middle and western edges. Today the park is home to 10 city landmarks, including one building—the Golden Gate Park Conservatory (built in 1879), which is listed in the National Register as well as the California Register of Historical Resources. In 2004, Golden Gate Park in its entirety, including 137 contributing resources, was listed in the National Register as a historic district (NPS, 2004).

The park's circulation system is considered one of many character-defining features of the historic district. Other character-defining features of the district include the park's spatial relationships, topography and grading, vegetation, natural features, recreational facilities, buildings and structures, and utilities and infrastructure. Two meandering east-west roads, John F. Kennedy Drive and Martin Luther King Jr. Drive, were originally named Main Drive and South Drive, respectively. These roadways were part of Hall's original design, which created curving paths that provided a series of ever-changing vistas as visitors moved through the park. Construction of most of the park roads began in the 1870s and was completed by the turn of the 20th century.

Golden Gate Park's Windmills

Conceived by John McLaren, Adolph B. Spreckles, and Reuben Lloyd, the two windmills near the Pacific Ocean in the western corners of Golden Gate Park were built at the beginning of the 20th century to pump water into the park's irrigation system. Powered by the reliable west wind off the ocean, the windmills pumped as many as 1.5 million gallons daily, rapidly transforming sand dunes into a park (Landmark 210, 2013). In 1902, the Park Commission constructed the North Windmill (later renamed the Dutch Windmill) in the northwestern corner of the park near Ocean Beach. By this time the windmill had become so popular with the Park Commission and park attendees that a second one was built at the southwest corner of the park near 48th and Lincoln Avenues. The new mill was named after Samuel G. Murphy, a local banker, who donated the $20,000 needed for its construction. At a meeting of the Park Commission in June 1907, the members voted to name the new windmill the "Samuel G. Murphy Windmill." In August 1907, the plans were approved, and Superintendent McLaren was ordered to begin the construction on the windmill and a lake that would serve as an irrigation reservoir when the new windmill was built. The windmill and reservoir were not completed until April 1908 (ESA, 2011).

At 95 feet tall and 114 feet wide, the Murphy Windmill was the largest windmill in the world when it was completed (NPS, 2004). The structure had a massive concrete foundation supporting a wood-framed tower covered by slate roofing shingles. It was said to be designed after English-style windmills and is sometimes referred to as the English Windmill. The windmill was only used to pump water for a few years. When electric pumps were installed in 1913, both windmills ceased being used to pump water (NPS, 2004), and they quickly fell into disrepair. The Dutch Windmill was restored in 1981 and is now paired with the Queen Wilhelmina Tulip Garden. Restoration of the Murphy Windmill is underway as of 2010.

The Millwright's Cottage, located immediately east of the Murphy Windmill, was erected in 1909 to house the mill's operator. The house is a small, two-story brick building with a slate shingle roof. The house was designed by Reid Brothers architects, and is most significant when viewed in context with the windmill (NPS, 2004). Murphy Windmill and the associated Millwright's Cottage are listed as City of San Francisco Landmark No. 210, and are contributing features to the Golden Gate Park National Register Historic District.

Utilities, Infrastructure, and the Richmond-Sunset Water Pollution Control Plant

Golden Gate Park has a network of utilities, including water, electricity, telephone, and storm water/sanitary sewer. Various parts of the original systems have been rebuilt over the years. Although vital to the functioning of the park, these facilities are largely out of view and do not contribute to the historical significance of the park. Water and electrical systems have undergone a major reconstruction over the past two decades, funded by the 1992 Golden Gate Park Infrastructure Bond. Because of the mixed heritage of the utilities and infrastructure, these facilities are not considered a contributing element to the Golden Gate Park National Register Historic District (NPS, 2004).

The Golden Gate Park Central Pump Station is accessed via Transverse Drive and is sometimes referred to as the "Compost Area and Reservoir Pump Station." The Central Pump Station, built in 2002, is considered a non-contributing element to the Golden Gate Park National Register Historic District (NPS, 2004).).

Located within the grounds of the former Richmond-Sunset Water Pollution Control Plant (discussed below) is the South Windmill Replacement well facility, a small concrete building that was constructed in 2001 and is operated by the SFRPD. The North Lakewell facility, also built in 2001 and operated by the SFRPD, is located next to Chain of Lakes Drive in the western area of Golden Gate Park, south of Fulton Street. Neither of these facilities has been identified as contributing elements to the Golden Gate Park National Register Historic District (NPS, 2004).

Richmond-Sunset Water Pollution Control Plant

In 1935, the City and County of San Francisco (CCSF) adopted a new sewage facilities plan, which recommended construction of three separate sewage treatment plants to serve the city's three natural drainage basins (western, northeastern, and southeastern). By this time the city's wastewater system had expanded to 700 miles of combined sanitary stormwater sewers, and all sanitary waste and runoff from storms were diverted to 35 overflow structures situated around the city's shoreline. In 1938, the first sewage treatment plant—the Richmond-Sunset Water Pollution Control Plant (WPCP), then called the Richmond-Sunset Sewage Treatment Plant—was completed and put into operation to serve the western part of San Francisco. Located in the southwest corner of Golden Gate Park near the Murphy Windmill, the plant had a dry-weather capacity of 22 million gallons per day and provided primary treatment, including screening, grit removal, sedimentation, and disinfection (SFDPW, 1994).

The reinforced-concrete plant had an Art Deco–style administration building, two digester tanks, a pretreatment building with grit screens, a primary treatment building with sedimentation tanks, and a small garage/storage structure organized around a central fountain and lawn area. In 1937, the CCSF Department of Public Works, Bureau of Engineering designed the plant, and City Engineer John J. Casey approved the plans (SFDPW, 1937). According to a bronze plaque installed on the administration building, the plant contractors were Clinton Construction Company and Anderson & Rowe. The plaque notes that the plant was built with funds from the Federal Emergency Administration of Public Works (SFDPW, 1938). This program was also known as the Public Works Administration, a Depression-era public works program that lasted from 1933 through 1939. The plant treated wastewater from San Francisco's west side for 48 years until its functions were replaced by the Oceanside WPCP, which began operation in 1986 (SFDPW, 1994). The majority of the plant was demolished in 1995 (SFDPW, 1995). The only remaining aboveground structure at the plant site is the garage/storage building. Much of the subterranean concrete structures remained in place and were filled in to the existing grade level.

Sunset District

The Sunset District is generally bounded by Golden Gate Park to the north, Sloat Boulevard to the south, the Pacific Ocean to the west, and Stanyan Street/Golden Gate Heights to the east. Similar to all of western San Francisco, the majority of the Sunset District was covered with sand dunes until the late 19th century and well into the early 20th century. The Oceanside neighborhood was situated within the Sunset District, east of the Great Highway, west of 40th Avenue, south of Lincoln Way, and north of Sloat Boulevard. The name "Oceanside" was used by area residents of the area from the early 1900s until about 1930. Because the Oceanside neighborhood was located east of the Great Highway, west of 40th Avenue, south of Lincoln Way, and north of Sloat Boulevard; because Oceanside was geographically isolated, its early history is distinct from that of the rest of the Sunset (SPEAK, 2010).

Development in the Sunset began primarily in the eastern section, which was more accessible from the city center, and in the outer Sunset, which people could reach from the south. The Central Ocean Toll Road appears on the 1869 U.S. Coast Survey map. The toll road traversed the Sunset, starting south of Sloat Boulevard at about 36th Avenue, and meandered northeast through the Sunset between 17th and 18th Avenues and then east toward downtown. The first building in the Oceanside neighborhood (now the Sunset District) was the Ocean Side House. In 1866, a local squatter named George Green, Sr. built this roadhouse on the Great Highway between present-day Ulloa and Vicente Streets. In 1883, Leland Stanford began running a steam train along H Street (now Lincoln Way) from Stanyan Street to the beach. In 1898, the line changed to electric train cars and then later to streetcars. The trains made access to the beach easier and encouraged population growth in what was then a remote part of San Francisco (Unagaretti, 2004; SPEAK, 2010).

By 1895, a cluster of buildings referred to as "Carville" began to emerge on (and in the vicinity of) land bounded by Lincoln Way, Irving Street, 48th Avenue, and La Playa, near the southwest corner of Golden Gate Park. This cluster consisted of former horse-cars and cable-cars that were sold as surplus by streetcar companies and moved out to the beach. Within a few years this community expanded to other blocks near the ocean. By about 1910, the community stretched along the Great Highway from Lincoln Way south to Moraga Street and had a population of 2,000, with its own stores, restaurants, churches, and hotels (SPEAK, 2010).

New residents to the outer Sunset began building conventional wood-frame houses amid the converted streetcars shortly after 1900. The residents of these houses regarded the streetcar residences as an embarrassment and an impediment to progress. In 1913, Alexander Russell, president of the Oceanside Improvement Club, received permission from Emma Sutro Merritt, Adolph Sutro's daughter, to demolish the original cluster of Carville houses on her land at Lincoln Way and the Great Highway. Many other Carville houses still stood in 1915, but few were left by the end of the 1920s. Today only one house made of streetcars, at 1632 Great Highway between Lawton and Moraga Streets, is known to remain (SPEAK, 2010).

A housing construction boom from the 1920s through the 1950s linked Oceanside with the rest of the Sunset District. The 1930s brought developers such as Ray Galli, the Stoneson Brothers, Chris McKeon, Henry Doelger Enterprises, and others to construct affordable row housing in the outer Sunset. The postwar period saw another wave of housing construction in the outer Sunset, supported primarily by low-interest loans and accessible lending policies. This postwar-housing boom filled in the last of the undeveloped sand lots with stucco-clad houses, blurring the boundary between the earlier Oceanside neighborhood and today's outer Sunset neighborhood (SPEAK, 2010). The homes produced by the various builders were remarkably similar.

Henry Doelger Enterprises built about 25,000 houses in San Francisco, mostly in the Sunset District (Zinns, 1983). Like his competitors, Doelger provided well-built but inexpensive homes for middle-income families. The area between 27th and 39th Avenues and Kirkham and Quintara Streets was developed primarily by Doelger from the late 1920s to the early 1940s, and was nicknamed "Doelger City." Between 1934 and 1941, Doelger was the largest homebuilder in the United States. During peak periods such as the late 1930s, the Doelger organization completed homes at the rate of two per day (Zinns, 1983).

Sunset Reservoir

Sunset Reservoir is one of three terminal reservoirs in the SFPUC regional water system that is located in San Francisco; the other two are Merced Manor Reservoir on Sloat Boulevard and University Mound Reservoir near John McLaren Park. At eight city blocks in size, Sunset Reservoir is the largest of San Francisco's reservoirs, and stores 60 percent of the water delivered to homes and businesses in the city. The subterranean reservoir has an 11-acre concrete roof, a maximum depth of 33 feet, and a capacity of 270 acre-feet of water (SFPUC, 2011). The SFPUC maintains the reservoir, which is located between Ortega and Quintara Streets and 24th and 28th Avenues. The northern reservoir basin was constructed in 1938, while the south reservoir basin was constructed in 1959, greatly expanding the storage capacity of the original reservoir (City and County of San Francisco, 2008). A small, single-story utility building known as the Sunset Chlorine Station, located near the intersection of Pacheco and 28th Streets, was also completed as part of the reservoir expansion in the 1950s.

South and West Sunset Playgrounds

The South Sunset Playground is located immediately northwest of the intersection of Wawona Street and 40th Avenue in the Sunset District. The playground is about one city block in size, fronting 40th Avenue between Wawona and Vicente Streets. The playground is historically associated with Ulloa Elementary School, which covers the western half of the lot, and fronts on 42nd Avenue between Wawona and Vicente Streets. The San Francisco Unified School District built Ulloa Elementary School and the playground in 1952 as part of a 1948 school bond measure to accommodate the increasing numbers of children who resided in the Sunset District (SFUSD, 1992). After completion, management of the playground was transferred to the San Francisco Recreation and Park Department (SFRPD), which maintains the playground today for baseball and soccer activities. The SFRPD renovated the playground in about 2008, adding a new baseball diamond, turf, and fencing/landscaping.

The West Sunset Playground, approximately one city block in size, is located north and northeast of the intersection of Quintara Street and 40th Avenue in the Sunset District. The playground contains two sets of fields located north of 40th Avenue and Quintara Street, and two fields located northeast of 40th Avenue and Quintara Street. The playground is part of a larger complex of schools and parks/playgrounds that includes Sunset Elementary School, A.P. Giannini Middle School, and St. Ignatius Preparatory High School. This complex covers approximately 10 city blocks, from Ortega to Rivera Streets and 37th to 41st Avenues. The playground is historically associated with Sunset Elementary School and A.P. Giannini Middle School, all of which were constructed in 1952 to serve the local Sunset community. After completion, management of the playground was transferred to the SFRPD, which maintains the playground today for use as a baseball park. St. Ignatius Preparatory High School, located immediately east of the playground, was constructed in 1969.

The West Sunset Playground was constructed on a raised earthen berm to accommodate the east-west-sloping local topography. Reinforced-concrete bleachers surround one of the baseball diamonds, and public restrooms beneath the bleachers are accessed via concrete stairs and ramps. The remainder of the playground is comprised of open lawn areas and is encircled by chain-link fencing and mature trees. A small parking lot to the south of the playground can accommodate approximately 35 cars. There are mature cypress trees in the area between the playground and the parking lot.

41st Avenue and Ortega Street

Similar to the Sunset District as a whole, the residential areas surrounding 41st Avenue, as well as Ortega Street from 41st to 24th Avenues, were not constructed until after the 1906 earthquake, with the vast majority of the construction taking place during a residential building boom that lasted from about 1920 to about 1945. Prior to this time, the area was covered by sand dunes and was relatively inaccessible. Today the area is generally comprised of two-story, single-family row houses, built mainly in the 15 years from 1935 to 1950 in the various revivalist architectural styles popular at the time. Some infill residences and apartments were constructed in the late 1950s. The local north-south roadway of 41st Avenue was designed to have paved asphalt surfaces with concrete "armored" curbs (i.e., with curved metal edges), concrete sidewalks, and standard rights-of-way of approximately 40 feet. The east-west collector roadway of Ortega Street was designed in a similar manner to 41st Avenue, but with a slightly wider right-of-way of approximately 50 feet. The homes that line Ortega Street are architecturally similar as those along 41st Avenue, and were built during the same period.

Lake Merced

In 1777, Spanish explorers led by Don Fernando Rivera and Father Francisco Palou reportedly camped just north of where present-day Lake Merced Boulevard intersects the San Francisco–San Mateo County line (in the vicinity of the proposed project). The following year, Father Palou returned and named the lake La Laguna de Nuestra Señora de la Merced, or The Lake of Our Lady of Mercy. Mission Dolores of San Francisco used the lands around the lake for cattle grazing. In September 1835, a land grant of 2,200 acres, including the lake, was given to Jose Antonio Galindo, who named it Laguna de la Merced. Two years later, Galindo sold the grant to Don Francisco de Haro for 100 cattle and $25.00 in goods. In 1835, de Haro had been elected San Francisco's (then Yerba Buena) first city mayor. He built a house at the southern end of the lake, but traveled between the lake house and other property he owned (Shoup, 1981).

As the closest freshwater source to the growing city of San Francisco, Lake Merced was one of the first places developed to meet the city's growing demand for water. The Spring Valley Water Works was incorporated in 1858, and soon the company had a monopoly over the city's water supply. In 1868, Spring Valley bought the water rights to Lake Merced for $150,000, and in 1877 the company began purchasing the watershed land around the lake. As early as 1875, there were three hotel-resorts or "lake houses" built around the lake (Shoup, 1981). The company later became Spring Valley Water Company.

The expansion and dominance of the Spring Valley Water Company over the city's water supply continued throughout the remaining century and into the next. By the turn of the 20th century, the Spring Valley Water Company owned 2,000 acres, stretching from the county line to Sloat Boulevard and from Junipero Serra to the ocean. By the 1920s, Spring Valley was the largest privately owned company in the United States. Following a popular movement for control of its water supply, the CCSF decided to look for its own source of water, eventually turning to federal lands in the Sierra Nevada, including the Hetch Hetchy Valley and the Tuolumne River.

The Spring Valley Water Company foresaw its eventual sale to San Francisco, and from the 1890s to the 1920s began selling pieces of property around Lake Merced for recreational and residential development around the lake; that, in the view of the CCSF, these properties were not needed to protect the quality of water in Lake Merced. Several golf courses, residential tracts as well as Fleishhacker Pool were developed in the 1920s. Skyline, Sloat, and Lake Merced Boulevards were constructed through this area in the mid-1920s to provide access between the growing residential areas north of Lake Merced and parts south (Shoup, 1981). Metropolitan Life Insurance Company constructed Parkmerced, a large real estate development located just east of Lake Merced Boulevard, in the mid-1940s. Since 1950, the SFPUC has managed the water aspects of Lake Merced while the SFRPD manages the lake's recreational areas under a 1950 resolution giving the SFRPD management of the surface of the Lake Merced tract for recreational purposes. The SFPUC maintains Lake Merced as a nonpotable emergency water supply for the city to be used for firefighting or sanitation purposes if no other sources of water are available (SFPUC, 2011).

The Lake Merced Pump Station is located on the southeastern shore of Lake Merced, near the intersection of Lake Merced Boulevard and Brotherhood Way. Built in 1953 by the SFPUC, the station pumped water to the Sunset and Sutro Reservoirs, which in turn distributed water to other regions in the city. The facility was critical to the delivery of water to about 60 percent of San Francisco (SFPUC, 2011). In 2009, the 1950s-era facility was removed from service because the building, pumping equipment, and mechanical and electrical systems had exceeded their useful life and were in need of replacement (SFPUC, 2011). Construction of a new replacement pump building began in June 2009, with completion targeted for early 2013. The replacement facility will consist of two new structures—a pump building and an electrical utility building, each approximately 8,000 square feet in size (SFPUC, 2011).

Paleontological Setting

Paleontological resources are the fossilized remains of plants and animals, including vertebrates (animals with backbones), invertebrates (e.g., starfish, clams, ammonites, and marine coral), and fossils of microscopic plants and animals (microfossils). The age and abundance of fossils depend on the location, topographic setting, and particular geologic formation in which they are found. Fossil discoveries not only provide a historical record of past plant and animal life but can assist geologists in dating rock formations. In addition, fossil discoveries can expand our understanding of the time periods and the geographic range of existing and extinct flora or fauna.

Assessment Standards

The Society of Vertebrate Paleontology (SVP) has established guidelines for the identification, assessment, and mitigation of adverse impacts on nonrenewable paleontological resources (SVP, 1995). The SVP has helped define the value of paleontological resources and, in particular, states the following:

- Vertebrate fossils and fossiliferous (fossil-containing) deposits are considered significant nonrenewable paleontological resources, and are afforded protection by federal, state, and local environmental laws and guidelines.

- A paleontological resource is considered to be older than recorded history, or 5,000 years before present, and is not to be confused with archeological resource sites.
- Invertebrate fossils are not significant paleontological resources, unless they are present with an assemblage of vertebrate fossils or they provide previously unknown information on the origin and character of the plant species, past climatic conditions, or the age of the rock unit itself.
- A project paleontologist, special interest group, lead agency, or local government can designate certain plant or invertebrate fossils as significant.

Based on these principles, the SVP has outlined criteria for screening the paleontological potential of rock units and has established assessment and mitigation procedures tailored to accommodating such potential. High and low potential rocks are determined by applying the following criteria (SVP, 1995):

- **High Potential.** Rock units (or formations) in which vertebrate or significant invertebrate fossils have been found. These rock units include sedimentary and some volcanic formations that contain significant fossil resources anywhere within their geographic extent and sedimentary deposits formed in a time period or composed of materials suitable for the preservation of fossils. Only invertebrate fossils that provide new information on existing flora or fauna or on the age of a rock unit would be considered significant.
- **Low Potential.** Rock units that have few, if any, records of vertebrate fossils in institutional collections, or that have been shown in surveys or paleontological literature to be largely absent of fossil resources. Low potential rocks also include metamorphic and most volcanic rocks.

Although not discussed in SVP standards, artificial fills, slope deposits (such as colluvium,[6] landslides, and earth flows), and soils are materials with little or no potential to contain paleontological resources. While such materials were originally derived from rocks, they have been weathered or reworked such that fossils would not likely be preserved.

Geologic Setting and Paleontological Potential

Unconsolidated Holocene-age dune sands underlie the entire project area, with the exception of the Lake Merced well facility site (see Section 5.15, Geology and Soils, Figures 5.15-1a and 5.15-1b). These deposits consist of windblown, loose to medium dense, poorly graded sands. Dune sand in this area was derived predominantly from Ocean Beach and transported by the prevailing wind across the relatively level topography, which imposed few obstructions. Dune sand deposits are estimated to be at least 100 feet thick in the project area, although the depth can become much more shallow on the windward side of topographic highs such as Sunset Reservoir (Schlocker, 1974). There are no recorded fossil sites within the dune sands that underlie the proposed project area, and, geologically speaking, dune sands are very young deposits that are unlikely to contain remains old enough to be considered fossilized. For these reasons, dune sand is considered to be of low paleontological productivity and, therefore, of low scientific importance. The thickness of artificial fill at the West Sunset and South Sunset well facility sites is approximately 2.5 feet (Treadwell & Rollo, 2008).

[6] A loose deposit of rock debris accumulated through the action of gravity at the base of a cliff or slope.

The Lake Merced well facility site is underlain by the Colma Formation and artificial fill. The Colma Formation consists of loose, fine- to medium-grained sands deposited in a shallow-marine environment (Bonilla, 1998). The Pleistocene-age Colma Formation contains no record of vertebrate fossil discoveries and is thus also considered to have low potential to yield significant fossils. Artificial fill at the Lake Merced well facility site was observed to be approximately 6.5 to 16 feet deep, depending on location (Treadwell & Rollo, 2007).

Based on the descriptions provided above, the entirety of the C-APE is considered to have a low potential for paleontological resources.

Research Methods and Results

Historic Architectural Resources

The research methods for historic architectural resources in or near the C-APE included a records search at the Northwest Information Center (NWIC) of the California Historical Resources Information System (CHRIS), a windshield survey of the C-APE, and correspondence with historical society contacts. Each of these methods, and their results, are described below.

Records Search Methods and Findings

A records search was conducted at the CHRIS NWIC on August 9, 2010 (File No. 10-0143). The purpose of the records search was to: (1) determine whether known cultural resources have been recorded within or near the C-APE; (2) assess the likelihood for unrecorded cultural resources to be present based on historical references and the distribution of nearby sites; and (3) develop a context for the identification and preliminary evaluation of cultural resources. The records search consisted of examining the following documents:

- **CHRIS NWIC Base Maps.** U.S. Geological Survey San Francisco North and San Francisco South 7.5-minute topographic maps.

- **Resource Inventories.** California Department of Parks and Recreation (1976), *California Inventory of Historical Resources.* California Department of Parks and Recreation, Sacramento; California Office of Historic Preservation (2008), *Historic Properties Directory Listing by City* (through August 2008).

- **Historic Background Sources.** Plans, maps, and historical overviews from the San Francisco Department of Public Works (1937–1994), National Park Service National Register Nomination for Golden Gate Park (2004), San Francisco Public Library Historic Photo Collection (2009–2010), published sources by the Sunset-Parkside Education and Action Committee (SPEAK), and online sources at the Western Neighborhoods Project and Outside Lands (2009). Olmsted, Nancy (1991), *Guide to Historic Research in San Francisco*. Prepared for Caltrans District 4, Oakland.

- **Prehistoric Archeology Resources.** Stewart, Suzanne (2003), An Overview of Research Issues for Indigenous Archaeology. In *Archaeological Research Issues for the Point Reyes National Seashore – Golden Gate National Recreation Area*, edited by Suzanne Stewart and Adrian Praetzellis. Prepared for the National Park Service; T.L. Jones and K.A. Klar (2007) *Prehistoric California: Colonization, Culture, and Complexity.* pp. 99–124, AltaMira Press; San Francisco Planning

Department, Major Environmental Analysis Division (now EP) Prehistoric Site Geographic Information System Project provided by Environmental Planning Archeologist Randall Dean.

- **Ethnographic Sources.** Richard Levy (1978), Costanoan. In *California, Handbook of North American Indians, Vol. 8*, edited by Robert F. Heizer, pp. 485–495; William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.; L. Kroeber (1925) *Handbook of the Indians of California.* Bureau of American Ethnology Bulletin 78. Smithsonian Institution, Washington, D.C.

- **Historic Maps.** An extensive online historic map collection with over 300 maps and views of San Francisco is available online at http://davidrumsey.com; H.W. Faust (1890), *Map of the City and County of San Francisco, California,* H.W. Faust publisher, San Francisco; Sanborn Insurance Company (n.d.), Fire Insurance Maps of San Francisco, available online at http://sanborn.umi.com/splash.html; General Land Office/Rancho plats of San Francisco Pueblo and Rancho Laguna de la Merced.

- **Environment.** Keith L. Knudsen, Janet M. Sowers, Robert C. Witter, Carl M. Wentworth, and Edward J. Helley (2000), Preliminary Maps of Quaternary Deposits and Liquefaction Susceptibility, Nine-County San Francisco Bay Region, California: A Digital Database. U.S. Geological Survey Open-File Report 00-444, Online Version 1.0, Menlo Park, California, available online at http://pubs.usgs.gov/of/2000/of00-444/; U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) (2008), Web Soil Survey, available online at http://websoilsurvey.nrcs.usda.gov; Jack Meyer (2002), An Overview of Geoarchaeological Research Issues. In Archaeological Research Issues for the Point Reyes National Seashore – Golden Gate National Recreation Area, edited by Suzanne Stewart and Adrian Praetzellis. Prepared for National Park Service; Jack Meyer and Jeffery Rosenthal (2007), Geoarchaeological Overview of the Nine Bay Area Counties, Prepared for Caltrans District 4, Oakland.

- **SFPUC and City Records.** A review of other historical reports prepared for the SFPUC's Water System Improvement Program (WSIP), which are not currently on file with the NWIC, was also completed (these other historical reports are not currently on file with the NWIC). A review of information on San Francisco historical landmarks, as well as city tax assessor records, was also reviewed.

The records search indicated that one historical resource has been recorded within C-APE: the Golden Gate Park National Register Historic District, including multiple contributing resources (see **Table 5.5-1**).

The roadways within the C-APE that contribute to the Golden Gate Park National Register Historic District are Martin Luther King Jr. Drive, Middle Drive, and Chain of Lakes Drive. The National Register Nomination Form emphasizes that the park's "circulation system" contributes to the historical significance of the park. As such, the roadway's alignment within the park, but not the recent roadway materials, is the character-defining feature that contributes to the park's significance.

The Murphy Windmill and Millwright's Cottage are outside of, but immediately adjacent to, the Golden Gate Park portion of the C-APE. Because of their proximity to the C-APE, this EIR discusses these historical resources. The windmill and Millwright's Cottage are listed as San Francisco Landmark No. 210 and are contributors to the Golden Gate Park National Register Historic District. The Murphy Windmill and the associated Millwright's Cottage are considered historical resources for CEQA purposes.

TABLE 5.5-1
RECORDED HISTORICAL ARCHITECTURAL RESOURCES WITHIN OR IMMEDIATELY ADJACENT TO THE C-APE

Name	Age	Register Status	Location
Golden Gate Park National Register Historic District	1871–1943	Listed on the National Register; 137 contributing resources, 9 city landmarks	Fulton Street, Lincoln Way, Stanyan Street, and Great Highway
Martin Luther King Jr. Drive (South Drive)	1890 (altered)	Part of the circulation system that contributes to the Golden Gate Park National Register Historic District	From Stanyan Street to Great Highway
Middle Drive	1890 (altered)	Part of the circulation system that contributes to the Golden Gate Park National Register Historic District	Parallel to John F. Kennedy Drive and Martin Luther King Jr. Drive
Chain of Lakes Drive (North Lake Road)	1902 (altered)	Part of the circulation system that contributes to the Golden Gate Park National Register Historic District	Between Fulton Street and Lincoln Way
Murphy Windmill and Millwright's Cottage	1908, 1909 (altered, restored)	Contributor to the Golden Gate Park National Register Historic District and City Landmark No. 210	Martin Luther King Jr. Drive near 48th Avenue – southwest corner of Golden Gate Park; outside of, but immediately adjacent to, the C--APE

SOURCE: NPS, 2004; CHRID, 2010.

There are nine previously recorded historical resources and one historic district located outside of the C-APE but within the 0.5-mile records search radius (a total 10 historical resources). The majority of these are contributing resources to the Golden Gate Park National Register Historic District. These resources range from the meadows and ponds located along the historic roadways in the C-APE, to other more distant resources such as the Beach Chalet, Conservatory of Flowers, and the Music Concourse.

Historic Architectural Survey Methods and Results

The entire C-APE was the subject of reconnaissance-level and intensive-level surveys by Brad Brewster, ESA architectural historian, on May 21, 2009 and January 28, 2010. Both pedestrian and windshield surveys were conducted to identify the presence and condition of previously recorded resources in the C-APE, as well as to identify any potentially historic materials within the primarily paved C-APE.

The architectural historian performed a reconnaissance-level survey of paved roadways in the C-APE and recorded his findings through the use of photography and field notes. The architectural historian also performed an intensive-level pedestrian survey of specific architectural or engineering features and evaluated them for potential historical significance; these features included a remnant structure of the Richmond-Sunset WPCP, and brick-lined gutters along 41st Avenue between Irving Street and Lincoln Way in the Sunset District. DPR Forms 523 A and B were prepared for these potential resources and are included in Appendix B of the HRE (ESA, 2011). The following section summarizes the findings of the intensive-level survey and the evaluation of these properties.

Lake Merced Well Facility Site. The Lake Merced portion of the C-APE, which was the subject of a pedestrian survey, includes a single-lane gravel road that provides access to the Lake Merced Pump Station from Lake Merced Boulevard. The proposed Lake Merced well facility would be constructed in a sloped and wooded area near the lakeshore. This area contains a modern concrete-and-steel test wellhead and protective bollards, surrounded by sawn eucalyptus logs that act as vehicle barriers. The staging area for the proposed project would be located on a sloped and vegetated strip of land on the opposite side of the access road from the proposed well facility. No historic-period materials were observed during the field survey.

Sunset District. The reconnaissance-level survey of the Sunset District included a windshield survey of the pipeline alignment, including 41st Avenue and Ortega Street, a one-block segment of 40th Avenue between Wawona and Vicente Streets, as well as a pedestrian survey of the South and West Sunset Playgrounds and Sunset Reservoir. The findings for each of these areas are described below.

Based on the survey of the pipeline alignment, these roadways are 40 to 50 feet wide from curb-to-curb and consist of modern paved asphalt materials; the concrete curbs are mostly original (1930s to 1940s) and have steel "armored" edges. Curb cuts for driveways are located at regularly spaced intervals, with on-street parking in between. Concrete sidewalks, immediately adjacent to but outside of the C-APE, are about 20 feet wide. Newer wheelchair ramps have been installed at many intersections. While all other blocks along 41st Avenue are paved from curb-to-curb, the single block between Irving Street and Lincoln Way has brick-lined gutters on both sides of the street, which appear to date from circa 1910. Aside from these brick-lined gutters, no potentially historic period materials were identified in the Sunset District roadway C-APE. The following section provides an evaluation of the brick-lined gutters.

No historic-period resources were observed at the South or West Sunset Playgrounds within the C-APE. The West Sunset Playground has modern, paved parking lots and a landscaped berm, and the South Sunset Playground has a newer concrete retaining wall and recently landscaped areas.

All materials in the C-APE adjacent to Sunset Reservoir were observed to be either modern roadway materials (in the case of Ortega Street and 28th and 24th Avenues), or recently landscaped areas (such as the areas between 24th Avenue and the reservoir fence, and the landscaped area at the corner of Ortega Street and 28th Avenue). No historic-period materials were observed in the C-APE near Sunset Reservoir.

Golden Gate Park. Golden Gate Park is historically significant as a 19th Century designed picturesque park landscape that was influence by the work of Frederick Law Olmstead Sr. Many of the original features and elements from the park's period of significance (1871 – 1943) are still present, and the park retains a high degree of integrity. There are 137 contributing resources and 60 non-contributing resources to the Golden Gate Park Historic District. Contributing elements of the Golden Gate Park Historic District's circulation system that are within the C-APE, including Martin Luther King Jr. Drive, Middle Drive, and Chain of Lakes Drives, were the subject of a windshield survey, while the three production well facility sites within the park were the subject of a pedestrian survey. The windshield survey found that the three contributing roads within the Golden Gate Park C-APE generally follow the original alignments shown on early park maps. The asphalt roadway surfaces are thoroughly modern, and no historic roadway materials were observed within the C-APE. While the roadway materials have been altered and would not be considered historical resources, the alignments are considered historical resources because they are crucial aspects of the park's original circulation system, which is a character-defining feature of the Golden Gate Park National Register Historic District.

Other buildings or structures in Golden Gate Park, such as the South Windmill Replacement and the North Lakewell facilities, were identified during the pedestrian field survey but were not recorded or evaluated because of the recent construction dates (both built in 2001) and their simple, utilitarian design. The former Richmond-Sunset WPCP garage/storage building, built in 1938, was evaluated at an intensive level. It does not appear to meet the criteria for listing in the federal, state, or local registers (see evaluation of the former Richmond-Sunset WPCP garage/storage building, below, under the heading Evaluation of Potential Historic Architectural Resources).

The survey confirmed that these and the other well facility site (Central Pump Station well facility) are located in areas that are considered non-contributing to the historical significance of the Golden Gate Park National Register Historic District.

Evaluation of Potential Historic Architectural Resources

The former Richmond-Sunset WPCP garage/storage building in Golden Gate Park and a single-block stretch of brick-lined gutters along 41st Avenue in the Sunset District—both of which are within the C-APE—were the subject of an intensive-level survey and evaluation. The findings are summarized below.

Brick-Lined Gutters along 41st Avenue between Irving Street and Lincoln Way. Along a single block of 41st Avenue between Irving Street and Lincoln Way, the approximately 1.5-foot-wide gutters are constructed of common-bond brick and extend the entire length of the block on both sides of the street. These gutters date to circa 1910, around the time when the first homes on the block were constructed. The blocks adjacent to the southern boundary of Golden Gate Park, generally between Irving Street and Lincoln Way, were developed earlier than other streets in the Sunset District, primarily because they were next to the park, which was mostly complete by the 1880s.

Many of these earlier residential streets adjacent to Golden Gate Park, as well as other streets elsewhere in the city, were developed with a combination of macadamized road surfaces and brick-lined gutters, which was the typical road-building technology employed in the late 19th and early 20th centuries. This method of gutter construction was relatively common during this period as roads evolved from all-masonry surfaces to macadamized surfaces, but by the 1920s the method appears to have been discontinued in favor of all-concrete gutters. Brick-lined gutters are visible on many streets throughout San Francisco, such as those surrounding the Civic Center and on the smaller streets in Chinatown, both of which were reconstructed in the 1910s after the devastation of the 1906 earthquake and fire.

Some of the brick-lined gutters in the C-APE vicinity are still present, while others have been paved over with modern asphalt or replaced with concrete curbs and gutters. A windshield survey of the blocks just south of Golden Gate Park indicated that many of the avenues have brick-lined gutters. In addition to the brick-lined gutters found along 41st Avenue, 43rd and 44th Avenues between Irving Street and Lincoln Way also have brick-lined gutters. While indicative of an older method of road-building that was more common in the late 19th and early 20th centuries, the brick-lined gutters within the 41st Avenue C-APE do not appear to be historically significant in themselves; rather, the gutters are part of a pattern of road-building materials and technologies that were fairly typical for the location (immediately south of Golden Gate Park) and period of construction (1910s), and were generally phased out by the 1920s. As such, the brick-lined gutters on 41st Avenue are not recommended eligible for listing in the California Register or National Register, and would not qualify as a historical resource. DPR Forms 523 A and B were prepared for this potential resource and are included in Appendix B of the HRE report.

Former Richmond-Sunset WPCP Garage/Storage Building. Located at the South Windmill Replacement well facility site in Golden Gate Park, the former Richmond-Sunset WPCP garage/storage building is a single-story, multi-bay garage constructed of reinforced-concrete with a wood-frame storage shed addition, constructed in 1938 (with later additions). The Richmond-Sunset WPCP was the first of three treatment plants to be constructed in San Francisco under the 1935 Sewer Master Plan. Completed in 1938 in the Art Deco style of architecture, the plant treated wastewater from San Francisco's west side for 48 years, until its functions were replaced by the Oceanside WPCP in 1986. The majority of the Richmond-Sunset WPCP was demolished in 1995. The garage and storage structure is the only remaining feature of this plant. Although this feature is a remnant support structure that is indirectly related to San Francisco's first wastewater treatment plant, it does not appear to be individually eligible for listing in the National Register under Criterion A. Research did not reveal any associations with important historical figures. As such, the building does not appear to be individually eligible for listing in the National Register under Criterion B. As a utilitarian garage with minimal Art Deco features, the structure does not appear to be individually eligible for listing in the National Register under Criterion C. With the demolition of the remaining portions of the plant in 1995, the integrity of the water treatment plant's setting and design has been substantially compromised. The integrity of the garage plan and materials was also compromised with the addition of a concrete block storage building to the east, a woodshed frame addition farther to the east, and replacement plywood garage doors. Due to a lack of significant historical and architectural associations, and a lack of historical integrity, the garage and storage structure at the former Richmond-Sunset WPCP site does not appear to meet the criteria for listing in the National Register. For similar reasons, the structure also does not appear eligible for listing in the California Register, nor does it qualify as a San Francisco landmark, and thus is not a historical resource for the purposes of CEQA (see DPR Forms 523 A and B in Appendix B of the HRE report for additional information).

Summary of Survey and Evaluation Findings

The results of the field survey and evaluation indicate that all previously recorded historical resources in the Golden Gate Park portion of the C-APE continue to be eligible for listing in the National and California Registers and thus are considered historical resources under CEQA, including the alignments of Martin Luther King Jr. Drive, Middle Drive, and Chain of Lakes Drive. The survey found the garage/storage building associated with the former Richmond-Sunset WPCP to be ineligible for listing in the California Register or National Register due to a lack of important historical associations and a reduced level of integrity. The survey also found no historic-period resources within any of the proposed well facility sites in Golden Gate Park.

The field survey and evaluation identified no historic-period resources in the Sunset District portion of the C-APE. The circa 1910 brick-lined gutters along 41st Avenue between Irving Street and Lincoln Way are recommended ineligible for listing in the California Register or National Register due to a lack of important historical associations. No historic-period materials were identified in any of the other Sunset District portions of the C-APE, including 41st Avenue, Ortega Street, the South and West Sunset Playgrounds, and the areas surrounding the Sunset Reservoir.

Historical Society Contacts

The San Francisco Architectural Heritage was contacted by letter on December 3, 2010 to solicit input on the proposed project. Other organizations and interested parties were also contacted, especially those with concerns about the Golden Gate Park National Register Historic District. A total of 14 letters were transmitted; however, no responses from these organizations or interested parties have yet been received. Copies of these letters are available in Appendix C of the HRE.

Archeological Resources

The research methods for archeological resources included a records search at the NWIC, preparation of a CEQA [archeological] Area of Potential Effects and of an archeological survey plan (C-APESP) (ESA, 2010), a limited pedestrian survey, and contact with Native American groups that may have interest in the project area and preparation of an Historic Context and Archaeological Survey Report (HCASR) (ESA, 2011). These methods, and their results or findings, are described below.

Records Search Methods and Results

The records search completed at the NWIC indicated that three archeological resources studies have been completed within or immediately adjacent to the C-APE. These studies are on file at the NWIC (see **Table 5.5-2**). Twelve archeological resources have been recorded within one mile of the project C-APE, including five prehistoric sites, six historic-period sites, and one multicomponent site. No archeological resources have been recorded within the C-APE.

TABLE 5.5-2
CULTURAL RESOURCES STUDIES PERFORMED WITHIN OR ADJACENT TO THE C-APE

Study No.	Title	Author	Year
S-3242	San Francisco Water Management Archaeological Report	Heid	n.d.
S-19127	Cultural Resources Investigation for the Bayside Phase III Discharge Alternatives EIR	Hupman and Chavez	1993
S-22657	Phase 1 Archaeological Survey Along Onshore Portions of the Global West Fiber Optic Cable Project	Science Applications International Corporation	2000

Archeological Field Survey Methods and Results

A mixed-strategy survey was proposed for the C-APE. Because a high percentage of the pipeline alignments would be constructed within paved roadways, standard pedestrian methods for identifying archeological materials are not effective. However, the C-APE contains areas where the ground surface is exposed, including the well facility locations. Each of these areas was examined on-foot to determine whether archeological materials and/or features were present. A registered professional archeologist inspected these locations on December 1, 2009 using 5- to 10-meter transects to examine as much exposed surface as possible. The unpaved staging area adjacent to the Lake Merced well facility site was also examined on-foot. The survey findings for each of these areas are described below.

Lake Merced Well Facility Site. The C-APE at the Lake Merced well facility site is very disturbed as a result of past and current construction activities. The soil is sandy with good surface visibility. Several recently excavated trenches in the C-APE were examined for cultural materials and soil stratigraphy. No archeological resources were observed.

South Sunset Well Facility Site. There are newly constructed baseball fields within the C-APE at South Sunset Playground. The surface is paved and landscaped, with no native ground surface visibility. No archeological resources were observed.

West Sunset Well Facility Site. The C-APE occupies the northeast corner of the parking lot and the adjacent sloped hillside. The hillside was cut to construct the parking lot. The C-APE is landscaped and paved. No archeological resources were observed.

Central Pump Station Well Facility Site. Heavy groundcover limited surface visibility in portions of the C-APE; vegetation was periodically scraped to reveal native soils. The compost yard is disturbed and paved. No archeological resources were observed.

South Windmill Replacement Well Facility Site. The C-APE in this location is highly disturbed as a result of the former wastewater treatment plant and facilities and is currently used for maintenance storage. Piles of soil, gravel, scrap metal, and concrete are present throughout the C-APE; the northern section is paved. Wooded areas offered lower visibility, and the vegetation was periodically scraped to reveal the ground surface. No archeological resources were observed.

North Lake Well Facility Site. The current well facility and pavement cover a large portion of the C-APE at the North Lake well facility. There was limited surface visibility in vegetated areas. Vegetation and the graveled access road adjacent to the well facility were periodically scraped to reveal the ground surface. No archeological resources were observed.

Sunset Reservoir Facilities. The C-APE includes two landscaped areas adjacent to the reservoir property at the corner of Ortega Street and 28th Avenue and along the northeast corner at Ortega Street and 24th Avenue. These locations are covered in turfgrass, paved walkways, and landscaped areas with ornamental shrubs. No archeological resources were identified.

Native American Contact

A sacred lands search request was submitted to the Native American Heritage Commission (NAHC) on September 14, 2009. A response was received on October 8, 2009. A records search of the sacred lands file failed to indicate any NAHC-listed Native American resources of Native American concern in the C-APE. The Native American Heritage Commission provided a list of Native American individuals and organizations that might have additional information or concerns. Each person on the list was contacted by letter on November 9, 2009. No response from these individuals had been received as of Draft EIR publication.

5.5.2 Regulatory Framework

State Regulations

The State of California implements the National Historic Preservation Act (NHPA) of 1966, as amended (16 United States Code 470f), through its statewide comprehensive cultural resource surveys and preservation programs. The California Office of Historic Preservation, as an office of the California Department of Parks and Recreation, implements the policies of the NHPA on a statewide level. The Office of Historic Preservation also maintains the California Historic Resources Inventory. The State Historic Preservation Officer is an appointed official who implements historic preservation programs within the state's jurisdictions.

California Public Resources Code and Health and Safety Code

Several sections of the California Public Resources Code (PRC) protect cultural resources. Under Section 5097.5, no person shall knowingly and willfully excavate upon, or remove, destroy, injure, or deface, any historic or prehistoric ruins, burial grounds, archeological or vertebrate paleontological site (including fossilized footprints), inscriptions made by human agency, rock art, or any other archeological, paleontological, or historical feature situated on public lands, except with the express permission of the public agency that has jurisdiction over the lands. Violation of this section is a misdemeanor. Section 5097.98 states that if Native American remains are identified within a project area, the lead agency must work with the appropriate Native Americans as identified by the Native American Heritage Commission and develop a plan for the treatment or disposition of, with appropriate dignity, the human remains and any items associated with Native American burials. These procedures are also addressed in Section 15046.5 of the CEQA Guidelines. California Health and Safety Code Section 7050.5 prohibits disinterring, disturbing, or removing human remains from a location other than a dedicated cemetery. Section 30244 of the PRC requires reasonable mitigation for impacts on paleontological and archeological resources that occur as a result of development on public lands.

PRC Section 5024.1[a] states that the California Register is "an authoritative listing and guide to be used by state and local agencies, private groups, and citizens in identifying the existing historical resources of the state and to indicate which resources deserve to be protected, to the extent prudent and feasible, from substantial adverse change." PRC Section 5024.1[b]) states that the criteria for eligibility to the California Register are based on National Register criteria, and that certain resources are determined by the statute to be automatically included in the California Register, including California properties formally eligible for or listed in the National Register.

Title 14, Section 4307 of the California Code of Regulations also prohibits any person from removing, inuring, defacing, or destroying any object of paleontological, archeological, or historical interest or value.

California Environmental Quality Act

CEQA, as codified in PRC Section 21000, et seq., is the principal statute governing the environmental review of projects in the state. The CEQA Guidelines define a historical resource as: (1) a resource listed in, or determined to be eligible by the State Historical Resources Commission for listing in, the California Register; (2) a resource included in a local register of historical resources, as defined in PRC Section 5020.1(k) or identified as significant in a historical resource survey meeting the requirements of PRC Section 5024.1(g); or (3) any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the lead agency's determination is supported by substantial evidence in light of the whole record.

CEQA Section 15064.5(3) states that any object, building, structure, site, area, place, record, or manuscript that a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California may be considered a historical resource, provided the lead agency's determination is supported by substantial evidence in light of the whole record. Generally, a lead agency considers a resource to be "historically significant" if the resource meets the criteria for listing in the California Register (PRC Section 5024.1, Title 14 of the California Code of Regulations, Section 4852[b]), including the following:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;
2) Is associated with the lives of persons important in our past;
3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
4) Has yielded, or may be likely to yield, information important in prehistory or history.

For a resource to be eligible for the California Register, it must also retain enough integrity to be recognizable as a historical resource and to convey its significance. A resource that does not retain sufficient integrity to meet the National Register criteria may still be eligible for listing in the California Register.

CEQA requires lead agencies to determine if a proposed project would have a significant effect on important archeological resources, either historical resources or unique archeological resources. If a lead agency determines that an archeological site is a historical resource, the provisions of PRC

Section 21084.1 and CEQA Guidelines Section 15064.5 would apply. If an archeological site does not meet the CEQA Guidelines criteria for a historical resource, then the site may meet the threshold of PRC Section 21083.2 regarding unique archeological resources. A unique archeological resource is "an archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

1) Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information.

2) Has a special and particular quality such as being the oldest of its type or the best available example of its type.

3) Is directly associated with a scientifically recognized important prehistoric or historic event or person [PRC Section 21083.2 (g)]."

The CEQA Guidelines note that if a resource is neither a unique archeological resource nor a historical resource, the effects of the project on that resource shall not be considered a significant effect on the environment (CEQA Guidelines Section 15064.5[c][4]).

Local Regulations

San Francisco Historic Preservation Commission and Planning Code Articles 10 and 11

Created in 2008, the Historic Preservation Commission is a seven-member body that makes recommendations to the Board of Supervisors on the designation of landmark buildings, historic districts, and significant buildings. The Historic Preservation Commission replaces and retains most of the responsibilities of the former Landmarks Preservation Advisory Board (Landmarks Board). The Landmarks Board was a nine-member body, appointed by the mayor, which served as an advisory board to the Planning Commission and the Planning Department. The Landmarks Board was established in 1967 with the adoption of Article 10 of the Planning Code. The work of the Landmarks Board, the Planning Department, and the Planning Commission has resulted in an increase of public awareness about the need to protect CCSF's architectural, historical, and cultural heritage.

The Historic Preservation Commission reviews and approves Certificates of Appropriateness for building permit applications that involve construction, alteration, or demolition of landmark sites and resources located within historic districts. The Historic Preservation Commission may also review and comment on projects affecting historical resources that are subject to environmental review under the CEQA.

Article 10 of the Planning Code describes procedures regarding the preservation of sites and areas of special character or special historic, architectural, or aesthetic interest or value, such as officially designated city landmarks and buildings included within locally designated historic districts. Article 11 of the Planning Code designated six downtown conservation districts.

5.5.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect on cultural resources if it were to:

- 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;
- Cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature; or
- Disturb any human remains, including those interred outside of formal cemeteries.

Approach to Analysis

The analysis considers direct and indirect impacts on both known cultural and paleontological resources as well as inadvertent discoveries within the C-APE. Potential impacts on architectural resources are assessed by determining whether project activities would affect any such resources that have been identified as historical resources for the purposes of CEQA. While most historic buildings and many historic-period archeological resources are generally significant because of their association with important events, people, or styles (National Register Criteria A, B, and C / California Register Criteria 1, 2, and 3), the significance of most prehistoric and historic-period archeological resources is usually assessed under National Register Criterion D / California Register Criterion 4. This criterion stresses the potential for discovering important historical information within the site rather than the resource's significance as a surviving example of a type of construction or its association with an important person or event.

Once a resource has been identified as significant, it must be determined whether the project would "cause a substantial adverse change in the significance" of the resource (CEQA Guidelines 15064.5[b]). A substantial adverse change in the significance of a historical resource or unique archeological resource means "physical demolition, destruction, relocation, or alteration of the resource or its immediate surroundings such that the significance of the historical resource would be materially impaired" (CEQA Guidelines Section 15064.5[b][1]). The significance of an historical resource is materially impaired through the demolition or alteration of the resource's physical characteristics that convey its historical significance and that justify its inclusion in, or eligibility for inclusion in, the California Register (CEQA Guidelines Section 15064.5[b][2]).

The impact analysis for paleontological resources is based on the paleontological potential of the rock units to be disturbed by project-related excavations.

Impact Summary

Table 5.5-3 summarizes the potential cultural resource impacts associated with implementation of the proposed project and shows the significance determination for each impact.

TABLE 5.5-3
SUMMARY OF IMPACTS – CULTURAL AND PALEONTOLOGICAL RESOURCES

Impacts	Significance Determinations
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.	LS
Impact CP-2a: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5.	LSM
Impact CP-2b: Construction of the proposed Lake Merced well facility would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5.	LSM
Impact CP-3: The proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature.	LS
Impact CP-4: The proposed project would potentially disturb human remains, including those interred outside of formal cemeteries.	LSM
Impact CP-5: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5.	LSM
Impact C-CP: The proposed project would possibly result in cumulatively considerable impacts related to historical, archeological, or paleontological resources or human remains.	LSM

NOTES:
LS = Less than Significant impact, no mitigation required
LSM = Less than Significant impact with Mitigation

Impact Analysis

Construction Impacts

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. (Less than Significant)

Lake Merced Well Facility Site

The footprint of the proposed well facility would be approximately 63 feet long by about 30 feet wide, and the facility would be located on a vegetated slope to the west of the access road. There are no buildings or structures located within the C-APE.

South Sunset Well Facility Site

The footprint of the proposed well facility would be about 55 feet long and about 19 feet wide. The project site is within a landscaped berm and adjacent to a baseball diamond, all of which the SFRPD recently renovated. There are no buildings or structures located within the C-APE.

West Sunset Well Facility Site

The footprint of the proposed well facility would be approximately 1,400 square feet. The project site is within a parking lot adjacent to a concrete retaining wall, and about 20 feet from the playground field. There are no buildings or structures located within the C-APE.

Central Pump Station Well Facility Site

The Central Pump Station well facility site is located in Golden Gate Park, to the south of Overlook Drive and, southwest of the John F. Kennedy Drive/Transverse Drive intersection. There is an existing test well installed near the center of this site. The proposed well facility site is in a wooded area to the west of the existing fenced Central Pump Station. The yard area at the Central Pump Station is used for the SFRPD's wood waste storage and composting operations. The pump station building was constructed in 2002. Given its recent date of construction and utilitarian function and style, it was not evaluated for listing in the National Register or California Register, and for these reasons is not identified as contributors to the Golden Gate Park National Historic District.

Although the footprint of the proposed well facility would be about 800 square feet, the facility would not be within or near any features that contribute to the Golden Gate Park National Register Historic District. The closest contributor to the district is John F. Kennedy Drive (about 200 feet north). The proposed facility would not be visible from John F. Kennedy Drive due to distance, intervening vegetation, and topography (which slopes from south to north in this location). The Central Pump Station and compost area is not considered a contributing feature of the district. No historic-period materials were observed during the survey. As such, the new structure would have no direct or indirect impact on the significance of the Golden Gate Park National Historic District, which would remain listed in the National Register after completion of the proposed project.

South Windmill Replacement Well Facility Site

The existing South Windmill Replacement well facility in Golden Gate Park was constructed in 2001 and is operated by the SFRPD. Under the proposed project, the existing well facility would be demolished and replaced with an approximately 800 square-foot well facility. Given the existing well facility's recent date of construction and utilitarian function and style, the well facility was not evaluated for listing in the National Register or California Register, and is not identified as a contributor to the Golden Gate Park National Historic District. No historic materials were observed at the South Windmill Replacement well facility site during the survey. As a result, it is not expected that the proposed demolition and new construction would cause impacts on historical resources in Golden Gate Park, including the Murphy Windmill, Millwright's Cottage, or Beach Chalet Athletic Fields, due to the distance between the construction area and the resources, and the intervening vegetation which screens these areas from view.

North Lake Well Facility Site

The existing North Lake well facility was constructed in 2001 and is operated by the SFRPD. The North Lake well facility is adjacent to Chain of Lakes Drive in the western area of Golden Gate Park, south of Fulton Street. Under the project, the existing well facility would be demolished and replaced with an approximately 875 square-foot well facility. The proposed well facility site is not within or near any features that contribute to the Golden Gate Park National Register Historic District. Given the existing well facility's recent date of construction and utilitarian function and style, the well facility was not evaluated for listing in the National Register or California Register, and is not identified as a contributor to the Golden Gate Park National Historic District. No historic materials were observed at the North Lake well facility site.

Sunset Reservoir

● Project connections to Sunset Reservoir would be made on 24th Avenue (south of Pacheco) where the pipeline would enter the reservoir at a subterranean level. The project would also include a sample station and chlorine analyzer in the northwest corner of the reservoir property. This cabinet-sized facility would be installed on a new concrete pad within the landscaped, park-like area adjacent to the intersection of Ortega Street and 28th Avenue. A small stream of water from the groundwater pipeline would be routed to the sample station to test chlorine content and ensure levels are acceptable before blending the water into the Sunset Reservoir supply at the 24th Avenue location. In addition, a pH adjustment facility would be located to the northeast of the existing Sunset Chlorine Station, along with chemical injection piping between the pH adjustment facility and the north and south basins of the Sunset Reservoir and an electrical conduit between an access vault located near the existing fence along 28th Avenue and Pacheco Street and the existing Sunset Chlorine Station. Finally, a new flow meter in a subterranean vault would be installed behind the reservoir fence line near 24th Avenue. These activities would not result in physical changes to the Sunset Reservoir structure. All pipeline connections and electrical conduits surrounding the reservoir and connecting to it would be located below ground, and the landscaped ground surface would be restored to pre-project conditions. During the survey, no historic-period materials were observed within the C-APE adjacent to Sunset Reservoir (ESA, 2011).

Pipeline Distribution System

The proposed project calls for the installation of approximately 25,000 linear feet of new groundwater transmission pipelines. The SFPUC would install a new pipeline along 41st Avenue between Vicente and Quintara Streets, along 40th Avenue between Wawona and Vicente Streets, and along Vicente Street between 40th and 41st Avenues to connect the South Sunset and West Sunset well facilities. The pipeline would continue north along 41st Avenue to Ortega Street, and then east along Ortega Street for approximately one mile to 24th Avenue, then connect to the Sunset Reservoir, where water would be stored and distributed to local customers.

Within Golden Gate Park, potable water wells would be connected to a single new pipeline within existing road rights-of-way (with some exceptions, as discussed below under the evaluation of the well facilities). The pipeline would exit the park at Lincoln Way and 41st Avenue and continue within 41st Avenue to the West Sunset well facility site at Quintana Street. Most areas would have a single, 8-inch-diameter groundwater transmission pipeline be installed within existing roads in a trench (approximately 4 to 8 feet-wide and 6 feet-deep (16 foot-wide construction corridor), using the open-trench construction method. For multiple pipelines (on 41st Avenue and Quintara Streets) and for points where there are multiple utilities, the trench would be 8 feet wide (20 foot-wide construction corridor), and a trench depth of 6 feet. Following pipeline installation, the trench would be backfilled with soil and the roadway surface returned to general preconstruction conditions.

No historically significant roadway materials were observed within any of the streets in the C-APE, including roads in Golden Gate Park. The roadway surfaces consist entirely of modern asphalt materials (ESA, 2011).

Pipeline construction would not affect the alignment of the historic circulation system that is a contributing feature of the Golden Gate Park National Register Historic District, including Martin Luther King Jr. Drive, Middle Drive, or Chain of Lakes Drive. The new pipelines would be constructed entirely within the road rights-of-way and would not alter their historic alignment. As described above, no historic-period materials were identified during the survey of the affected roadways in Golden Gate Park. All park roadway materials consist of modern asphalt surfaces and asphalt curbs (or no curbs in some cases in Golden Gate Park). Pipeline construction activities within these modern roadway surfaces and features would not have a significant impact on historical resources, as none were identified in the area. As such, the new pipelines have no direct or indirect impact on the significance of the Golden Gate Park National Historic District, which would remain listed in the National Register after completion of the proposed project.

The proposed pipeline along 41st Avenue between Lincoln Way and Irving Street could require demolition of a brick-lined gutter, depending on the pipeline's final location within the right-of-way. These gutters were not identified as historical resources, and as such their removal and replacement with concrete or asphalt pavement would not have a significant impact.

Impact Summary

As described above, construction of the proposed well facilities and the new groundwater supply pipeline would not affect any historical resources, including those within the Golden Gate Park National Historic District. The staging areas for the Central Pump Station, North Lake, and South Windmill Replacement well facilities would be contained to their respective sites and outside of areas that are considered contributory landscape features of the District. Thus, the impact related to an adverse change in the significance of a historical resource as defined in CEQA Guidelines Section 15064.5 would be less than significant, and no mitigation would be required.

Impact CP-2a: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5. (Less than Significant with Mitigation)

Based on the results of the background research, geoarcheological assessment, and survey results, there is generally, throughout the C-APE, a low potential for uncovering archeological resources during project construction (ESA, 2011). However, it is possible that previously unrecorded and buried (or otherwise obscured) archeological deposits could be discovered during project construction. Excavation, grading, and the movement of heavy construction vehicles and equipment could expose and cause impacts on unknown archeological resources, which would be a significant impact. However, this impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-CP-2a, Accidental Discovery of Archeological Resources,** which requires avoidance measures or the appropriate treatment of archeological resources if accidentally discovered during project implementation.

Mitigation Measures

Mitigation Measure M-CP-2a: Accidental Discovery of Archeological Resources. The following measures shall be implemented should construction activities result in the accidental discovery of a cultural resource:

Construction activities will immediately be suspended within 50 feet of the find if there is any indication of a potential archeological resource.

To avoid the potential for adverse effects on accidentally discovered buried or submerged historical resources, as defined in CEQA Guidelines Section 15064.5(a), the SFPUC shall distribute the Planning Department's archeological resource "ALERT" sheet to the project prime contractor; to any project subcontractor firms (including demolition, excavation, grading, foundation, pile driving, etc.); and/or to utilities firms involved in soil-disturbing activities within the project site. Prior to undertaking any soil-disturbing activities, each contractor shall be responsible for ensuring that the ALERT sheet is circulated to all field personnel, including machine operators, field crew, pile drivers, supervisory personnel, etc. The SFPUC shall provide the Environmental Review Officer (ERO) with a signed affidavit from the responsible parties (prime contractor, subcontractor(s), and utilities firm) confirming that all field personnel have received copies of the ALERT sheet.

If the ERO determines that an archeological resource may be present within the project site, the SFPUC shall retain the services of a qualified archeological consultant, based on standards developed by the Planning Department archeologist. The archeological consultant shall advise the ERO as to whether the discovery is an archeological resource that retains sufficient integrity and is of potential scientific/historical/cultural significance. If an archeological resource is present, the archeological consultant shall identify and evaluate the archeological resource and make a recommendation as to what action, if any, is warranted. Based on this information, the ERO may require specific additional measures to be implemented by the SFPUC.

Measures could include: in-situ preservation of the archeological resource; an archeological monitoring program; or an archeological evaluation program. The ERO might also require that the SFPUC immediately implement a site security program if an archeological resource is at risk from vandalism, looting, or other damaging actions.

If an archeological resource is discovered, the archeological consultant shall submit an Archeological Data Recovery Report (ADRR) to the ERO which, in addition to the usual ADRR contents, will evaluate the historical significance of any discovered archeological resource, as well as describe the archeological and historical research methods employed in the archeological monitoring/data recovery program(s) undertaken, and present, analyze, and interpret the recovered data. Information that may put at risk any archeological resource shall be provided in a separate removable insert within the final report.

Once approved by the ERO, copies of the ADRR shall be distributed as follows: the relevant California Historical Resources Information System Information Center shall receive one copy, and the ERO shall receive a copy of the transmittal letter of the ADRR to the Information Center. The San Francisco Planning Department, Environmental Planning section shall receive three copies of the ADRR along with copies of any formal site recordation forms (DPR 523 series) and/or documentation for nomination to the National Register /California Register. The SFPUC shall receive copies of the ADRR in the number requested. In instances of high public interest in or high interpretive value of the resource, the ERO may require a different final report content, format, and distribution than that presented above.

Impact CP-2b: Construction of the proposed Lake Merced well facility would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5. (Less than Significant with Mitigation)

Ground-disturbing activities associated with the proposed Lake Merced well facility include excavation with recompaction to a depth of 5 to 8 feet throughout most of the site. Some areas could require vibrocompaction/stone columns (up to a depth of 24 feet) to stabilize potentially liquefiable soil. In consultation with the San Francisco Environmental Planning Environmental Review Officer for archeology, it has been determined that based on the geologic profile of the Lake Merced well facility C-APE and archeological site distribution in the Lake Merced vicinity, ground-disturbing and -modifying activities associated with the proposed project may adversely impact legally-significant prehistoric deposits, a significant impact. However, this impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-CP-2b, Archeological Testing Program,** which requires the development of presence or absence investigation for archeological resources and evaluation of whether any archeological resource encountered in the C-APE constitutes an historical resource under CEQA.

- **Mitigation Measure M-CP-2b:** Based on a reasonable presumption that archeological resources may be present within the project site, the following measures shall be undertaken to avoid any potentially significant adverse effect from the proposed project on buried historical resources. The project sponsor shall retain the services of a qualified archeological consultant, based on standards developed by the Planning Department archeologist. The archeological consultant shall undertake an archeological testing program as specified herein. In addition, the consultant shall be available to conduct an archeological monitoring and/or data recovery program if required pursuant to this measure. The archeological consultant's work shall be conducted in accordance with this measure at the direction of the Environmental Review Officer (ERO). All plans and reports prepared by the consultant as specified herein shall be submitted first and directly to the ERO for review and comment, and shall be considered draft reports subject to revision until final approval by the ERO. Archeological monitoring and/or data recovery programs required by this measure could suspend construction of the project for up to a maximum of four weeks. At the direction of the ERO, the suspension of construction can be extended beyond four weeks only if such a suspension is the only feasible means to reduce to a less than significant level potential effects on a significant archeological resource as defined in CEQA Guidelines Sect. 15064.5 (a)(c).

Consultation with Descendant Communities. On discovery of an archeological site[7] associated with descendant Native Americans or the Overseas Chinese an appropriate representative[8] of the descendant group and the ERO shall be contacted. The representative of the descendant group shall be given the opportunity to monitor archeological field investigations of the site and to consult with ERO regarding appropriate archeological treatment of the site, of recovered data from the site, and, if applicable, any interpretative treatment of the associated archeological site. A copy of the Final Archeological Resources Report shall be provided to the representative of the descendant group.

Archeological Testing Program. The archeological consultant shall prepare and submit to the ERO for review and approval an archeological testing plan (ATP). The archeological testing program shall be conducted in accordance with the approved ATP. The ATP shall identify the property types of the expected archeological resource(s) that potentially could be adversely affected by the proposed project, the testing method to be used, and the locations recommended for testing. The purpose of the archeological testing program will be to determine to the extent possible the presence or absence of archeological resources and to identify and to evaluate whether any archeological resource encountered on the site constitutes an historical resource under CEQA.

At the completion of the archeological testing program, the archeological consultant shall submit a written report of the findings to the ERO. If based on the archeological testing program the archeological consultant finds that significant archeological resources may be present, the ERO in consultation with the archeological consultant shall determine if additional measures are warranted. Additional measures that may be undertaken include additional archeological testing, archeological monitoring, and/or an archeological data recovery program. If the ERO determines that a significant archeological resource is present and that the resource could be adversely affected by the proposed project, at the discretion of the project sponsor either:

A) The proposed project shall be re-designed so as to avoid any adverse effect on the significant archeological resource; or

B) A data recovery program shall be implemented, unless the ERO determines that the archeological resource is of greater interpretive than research significance and that interpretive use of the resource is feasible.

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7 By the term "archeological site" is intended here to minimally include any archeological deposit, feature, burial, or evidence of burial.

8 An "appropriate representative" of the descendant group is here defined to mean, in the case of Native Americans, any individual listed in the current Native American Contact List for the City and County of San Francisco maintained by the California Native American Heritage Commission and in the case of the Overseas Chinese, the Chinese Historical Society of America.

Archeological Monitoring Program. If the ERO in consultation with the archeological consultant determines that an archeological monitoring program (AMP) shall be implemented the archeological monitoring program shall minimally include the following provisions:

- The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the AMP reasonably prior to any project-related soils disturbing activities commencing. The ERO in consultation with the archeological consultant shall determine what project activities shall be archeologically monitored. In most cases, any soils-disturbing activities, such as demolition, foundation removal, excavation, grading, utilities installation, foundation work, driving of piles (foundation, shoring, etc.), site remediation, etc., shall require archeological monitoring because of the risk these activities pose to potential archeological resources and to their depositional context;

- The archeological consultant shall advise all project contractors to be on the alert for evidence of the presence of the expected resource(s), of how to identify the evidence of the expected resource(s), and of the appropriate protocol in the event of apparent discovery of an archeological resource;

- The archeological monitor(s) shall be present on the project site according to a schedule agreed upon by the archeological consultant and the ERO until the ERO has, in consultation with project archeological consultant, determined that project construction activities could have no effects on significant archeological deposits;

- The archeological monitor shall record and be authorized to collect soil samples and artifactual/ecofactual material as warranted for analysis;

- If an intact archeological deposit is encountered, all soils-disturbing activities in the vicinity of the deposit shall cease. The archeological monitor shall be empowered to temporarily redirect demolition/excavation/pile driving/construction activities and equipment until the deposit is evaluated. If in the case of pile driving activity (foundation, shoring, etc.), the archeological monitor has cause to believe that the pile driving activity may affect an archeological resource, the pile driving activity shall be terminated until an appropriate evaluation of the resource has been made in consultation with the ERO. The archeological consultant shall immediately notify the ERO of the encountered archeological deposit. The archeological consultant shall make a reasonable effort to assess the identity, integrity, and significance of the encountered archeological deposit, and present the findings of this assessment to the ERO.

Whether or not significant archeological resources are encountered, the archeological consultant shall submit a written report of the findings of the monitoring program to the ERO.

Archeological Data Recovery Program. The archeological data recovery program shall be conducted in accord with an archeological data recovery plan (ADRP). The archeological consultant, project sponsor, and ERO shall meet and consult on the scope of the ADRP prior to preparation of a draft ADRP. The archeological consultant shall submit a draft ADRP to the ERO. The ADRP shall identify how the proposed data recovery program will preserve the significant information the archeological resource is expected to contain. That is, the ADRP will identify what scientific/historical research questions are applicable to the expected resource, what data classes the resource is expected to possess, and how the expected data classes would address the applicable research questions. Data recovery, in general, should be limited to the portions of the historical property that could be adversely affected by the proposed project. Destructive data recovery methods shall not be applied to portions of the archeological resources if nondestructive methods are practical.

The scope of the ADRP shall include the following elements:

- *Field Methods and Procedures*. Descriptions of proposed field strategies, procedures, and operations.
- *Cataloguing and Laboratory Analysis*. Description of selected cataloguing system and artifact analysis procedures.
- *Discard and Deaccession Policy*. Description of and rationale for field and post-field discard and deaccession policies.
- *Interpretive Program*. Consideration of an on-site/off-site public interpretive program during the course of the archeological data recovery program.
- *Security Measures*. Recommended security measures to protect the archeological resource from vandalism, looting, and non-intentionally damaging activities.
- *Final Report*. Description of proposed report format and distribution of results.
- *Curation*. Description of the procedures and recommendations for the curation of any recovered data having potential research value, identification of appropriate curation facilities, and a summary of the accession policies of the curation facilities.

Final Archeological Resources Report. The archeological consultant shall submit a Draft Final Archeological Resources Report (FARR) to the ERO that evaluates the historical significance of any discovered archeological resource and describes the archeological and historical research methods employed in the archeological testing/monitoring/data recovery program(s) undertaken. Information that may put at risk any archeological resource shall be provided in a separate removable insert within the final report.

Once approved by the ERO, copies of the FARR shall be distributed as follows: California Archaeological Site Survey Northwest Information Center (NWIC) shall receive one (1) copy and the ERO shall receive a copy of the transmittal of the FARR to the NWIC. The Environmental Planning division of the Planning Department shall receive one bound, one unbound and one unlocked, searchable PDF copy on CD of the FARR along with copies of any formal site recordation forms (CA DPR 523 series) and/or documentation for nomination to the National Register of Historic Places/California Register of Historical Resources. In instances of high public interest in or the high interpretive value of the resource, the ERO may require a different final report content, format, and distribution than that presented above.

Impact CP-3: The proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geological feature. (Less than Significant)

Based on the information presented above in the paleontological setting, there is a low potential for project construction to uncover unique or significant fossils within the paleontological C-APE. Construction excavations for pipelines and groundwater facilities, depending on location, could encounter undisturbed dune sands, the Colma Formation, or artificial fills associated with previous development (e.g., road bases, foundations, and previous backfills for underground utilities). Due to their age and origin, these geological materials have little to no likelihood of containing unique or significant fossils. Therefore, the impact related to direct or indirect effects on paleontological resources would be less than significant, and no mitigation would be required.

Impact CP-4: The proposed project would potentially disturb human remains, including those interred outside of formal cemeteries. (Less than Significant with Mitigation)

Based on the background research, geoarcheological assessment, and survey results, there is a low potential for project construction to uncover human remains (ESA, 2011). Although no known human burials have been identified within the project C-APE, the possibility of encountering human remains cannot be entirely discounted. Earthmoving activities associated with project construction could result in direct impacts on previously undiscovered human remains. Therefore, the potential impact regarding disturbance to human remains could be significant. However, this impact would be reduced to a less-than-significant level with implementation of **Mitigation Measure M-CP-4, Accidental Discovery of Human Remains,** which requires avoidance measures or the appropriate treatment of human remains if accidentally discovered during project implementation.

Mitigation Measures

Mitigation Measure M-CP-4: Accidental Discovery of Human Remains. The following measures shall be implemented should construction activities result in the accidental discovery of human remains and associated cultural materials:

The treatment of human remains and of associated or unassociated funerary objects discovered during any soil-disturbing activities shall comply with applicable state laws. This shall include immediate notification of the coroner of the county within which the project is located and, in the event of the coroner's determination that the human remains are Native American, notification of the California Native American Heritage Commission, which shall appoint a Most Likely Descendant (MLD) (PRC Section 5097.98). The archeological consultant, SFPUC, and MLD shall make all reasonable efforts to develop an agreement for the treatment, with appropriate dignity, of human remains and associated or unassociated funerary objects (CEQA Guidelines Section 15064.5[d]). The agreement should take into consideration the appropriate excavation, removal, recordation, analysis, custodianship, curation, and final disposition of the human remains and associated or unassociated funerary objects. The PRC allows 24 hours to reach agreement on these matters. If the MLD and the other parties do not agree on the reburial method, the SFPUC shall follow Section 5097.98(b) of the PRC, which states that "the landowner or his or her authorized representative shall reinter the human remains and items associated with Native American burials with appropriate dignity on the property in a location not subject to further subsurface disturbance."

Facility Siting, Operations, and Maintenance Impacts

Impact CP-5: The proposed project would potentially cause a substantial adverse change in the significance of an archeological resource pursuant to Section 15064.5. (Less than Significant with Mitigation)

Following completion of the proposed project, project operations would not cause additional ground disturbance or generate strong vibrations that would have an effect on cultural resources. As discussed in Section 5.16 (Hydrology and Water Quality), under existing conditions projected to occur with project groundwater pumping, the estimated mean monthly Lake Merced lake level would be reduced and more of the lakebed would be exposed.

One archeological resource has been identified along the shore of Lake Merced (the unnumbered Lake Merced site). The site consists of an undetermined area of shell midden with one isolated milling stone tool. No other archeological sites have been identified on the shores of Lake Merced during this current, or any previous, survey effort. Reduced lake levels resulting from project pumping would not impact the known archeological resource (the unnumbered Lake Merced site). However, reduced lake levels could result in the exposure of and damage to currently undiscovered archeological resources, which would be a significant impact.

The California coast has undergone dramatic landscape changes since humans began to inhabit the region more than 10,000 years ago. Rising sea levels and increased sedimentation into streams and rivers are among some of the changes (Helley and Graymer, 1979). Humans used and occupied the shores of Lake Merced during various periods of shoreline configuration and there is potential that previously occupied areas are currently inundated by Lake Merced's current (but fluctuating) lake level. However, Lake Merced is located in an area mapped as Pleistocene-age Colma Formation. This geological formation has a low potential to contain archeological sites buried by natural alluvial processes. While the upper three feet of the Colma Formation has a moderate potential to contain prehistoric deposits, inundation has likely disturbed any remnant surface archeological materials. However, if present, reduced lake levels resulting from project pumping could result in the exposure of and damage to currently undiscovered archeological resources, which would be a significant impact.

Nevertheless, **Mitigation Measure M-HY-9, Lake Level Management for Lake Merced** (see Section 5.16, Hydrology and Water Quality) requires the SFPUC to implement lake level management procedures to maintain Lake Merced at water levels similar to conditions that would occur without the project. These corrective actions include the additions of supplemental water and/or alteration of pumping patterns, as necessary. Therefore, with implementation of Mitigation Measure M-HY-9, Lake Merced would be maintained at conditions similar to that which would be expected without project-related pumping. As such, the project would not result in exposure of, and potential damage to, unknown archeological resources. Reduced lake levels would not impact the known archeological resource (the unnumbered Lake Merced site). No additional cultural resources-specific mitigation is required.

Mitigation Measures

Mitigation Measure M-HY-9: Lake Level Management for Lake Merced. (see Section 5.16, Hydrology and Water Quality, for description)

Cumulative Impacts

Impact C-CP: The proposed project would possibly result in cumulatively considerable impacts related to historical, archeological, or paleontological resources or human remains. (Less than Significant with Mitigation)

Facility Construction, Siting, Operations, and Maintenance Effects on Cultural Resources

The geographic scope for the analysis of cumulative impacts on cultural resources includes the C-APE for the project and the immediate vicinity. The Groundwater Supply Project would contribute to a cumulative impact on cultural resources, including historical, archeological, and paleontological resources, if the other reasonably foreseeable future projects listed in Table 5.1-6 were to adversely affect the same cultural resources affected by the project or would affect other cultural resources in the project vicinity. Section 5.1.4, Cumulative Impacts, describes the approach to the cumulative analysis used throughout this EIR; Table 5.1-6 and Figure 5.1-1 summarize cumulative projects in the vicinity of the Groundwater Supply Project.

Cumulative projects that would occur in the vicinity of the proposed project include 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.

Historical Resources

Cumulative projects in the Groundwater Supply Project vicinity that could affect historical resources, including the Golden Gate Park Historic District, are 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. Portions of the proposed project that could overlap temporally as well as geographically include the replacement of the South Windmill Replacement well facility and Pipeline Segment 5, along with the Beach Chalet Athletic Fields Renovation Project, and the Murphy Windmill/ Millwright's Cottage Restoration Project. In combination with the proposed project, these surrounding projects could alter the historic character of the western edge of Golden Gate Park and vicinity. However, these projects would not substantially alter the historic character of the area to the extent that the District would no longer be eligible for listing in the National Register, for the reasons that follow.

As described above, the replacement of the South Windmill Replacement well facility, as well as Pipeline Segment 5, would have no impact on historic resources in the southwestern portion of the Park. The Murphy Windmill/ Millwright's Cottage Restoration project would restore a San Francisco Landmark and a District contributor, having beneficial effects on historic resources in this portion of the Park. The Beach Chalet Athletic Fields Renovation Project would have a significant impact on the Beach Chalet Soccer Fields as a contributor to the Golden Gate Park Historic District, but would not have an impact to the overall significance of the District.

Although these cumulative projects together would intensify uses in the southwestern area of the Park, they would not substantially alter the Golden Gate Park Historic District because the changes brought about by these projects would largely be independent of one another; that is, observers of one would not simultaneously be able to see or experience another (due to existing and proposed vegetation). The South Windmill Replacement well facility is not visible from the Beach Chalet Soccer Fields, and vice versa, due to the distance between these areas and the substantial amount of intervening vegetation. The renovated Murphy Windmill could be partially seen by visitors to the Soccer Fields and from the South Windmill Replacement well facility area. However, the renovated windmill would arguably improve the setting of the area because it would restore a historical landmark to its original function and appearance. Due to these factors, the interaction of effects to historical resources would be largely attenuated.

As described above, improvements to the Central Pump Station well facility would have no adverse impacts to historic resources. Changes to the nearby San Francisco Botanical Gardens Center for Sustainable Gardening would also have no impacts to historic resources, as the Garden Center is a non-contributor to the Golden Gate Park Historic District As such, no cumulative impacts in this portion of the Golden Gate Park Historic District would occur. Therefore, the project, in combination with these other projects in Golden Gate Park, would not make a considerable contribution to cumulative cultural impacts.

No other projects are currently known by the Planning Department to be proposed in sufficiently close proximity to the project site, such that cumulative effects related to historic resources would be anticipated.

Archeological Resources and Human Remains

The Groundwater Supply Project could encounter previously unrecorded archeological resources and/or human remains during project excavation. Implementation of **Mitigation Measure M-CP-2a, Accidental Discovery of Archeological Resources** and **Mitigation Measure M-CP-4, Accidental Discovery of Human Remains,** which requires avoidance measures or the appropriate treatment of archeological resources human remains if accidentally discovered during project implementation would reduce impacts to a less-than-significant level. Additionally, due to the potential archeological sensitivity of the Lake Merced well facility C-APE, **Mitigation Measure M-CP-2b**, Archeological Testing Program, would also reduce impacts to a less-than-significant level. This measure requires the development of presence or absence investigation for archeological resources and to evaluate whether any archeological resource encountered in the C-APE constitutes an historical resource under CEQA. Cumulative projects in the proposed project vicinity that would also involve excavation, 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 also encounter previously unrecorded archeological resources or human remains, which would be a potentially significant cumulative impact.

Without project-level mitigation, the project's contribution to this impact would be cumulatively considerable. However, project-related impacts on archeological resources and human remains would be site-specific and limited to the project construction areas, and would be reduced to a less-than-significant level with implementation of Mitigation Measures M-CP-2a (Accidental Discovery of Archeological Resources) and M-CP-4 (Accidental Discovery of Human Remains). These measures require the SFPUC to distribute the San Francisco Planning Department's archeological resource "ALERT" sheet to the project prime contractor, subcontractors, and/or to any utilities firm involved in soil-disturbing activities within the project site. If the ERO determines that an archeological resource may be present within the project site, the SFPUC shall retain the services of a qualified archeological consultant to evaluate the find. With regard to the accidental discovery of human remains, in particular, the county coroner must be immediately notified, and, in the event of the coroner's determination that the human remains are Native American, the Native American Heritage Commission must be notified. Implementation of these measures would effectively avoid damage to or loss of resources, and little to no residual impact would remain after mitigation. **Mitigation Measure M-CP-2b** (Archeological Testing Program) is also site-specific and is designed to reduce impacts to potential archeological resources to a less-than-significant level. Therefore, the project's contribution to this cumulative impact would not be cumulatively considerable with mitigation and would be less than significant.

Paleontological Resources

The geographic scope for cumulative effects on paleontological resources includes all areas underlain by the same geologic unit as the proposed project, because the age, type, and scientific importance of fossils depend on the geologic unit in which they are found. However, only projects that require subsurface excavation have the potential to contribute to a cumulative impact, since excavation is a prerequisite for damaging or destroying a fossil. All projects included in Table 5.1-6 that could contribute to impacts on paleontological resources would likely have a less-than-significant impact due to the low paleontological potential of dune sands and the limited extent and volume of soil-moving activities. Therefore, no cumulative impact on paleontological resources would result.

Groundwater Pumping Operations Effects on Lake Merced Cultural Resources

● Specific additional proposed and existing projects that would affect lake levels were considered in this Lake Merced operational cumulative impact analysis. As described in greater detail in Section 5.1.5, Overview of Groundwater Modeling Approach, these include the SFPUC's proposed Regional Groundwater Storage and Recovery project and Daly City's proposed Vista Grande Drainage Basin Improvement project. The former would affect Lake Merced water surface elevations most directly through groundwater pumping and non-pumping periods, and the latter through direct hydrologic input of stormwater to the lake. With operation of the identified cumulative projects, the estimated Lake Merced water levels are expected to be mostly higher than under existing conditions projected to occur without operation of the cumulative projects. However, during some years, Lake Merced water levels are predicted to be less than levels that are predicted to occur without operation of the cumulative projects as a result of groundwater pumping under the proposed project and the

Regional Groundwater Storage and Recovery Project. Reduced lake levels resulting from cumulative project operations could result in exposure and damage of currently known and unknown archeological resources, which would be a significant cumulative impact. However, similar to the project-specific impact, the project's contribution to this impact would be reduced to a less-than-cumulatively considerable (less-than-significant) level with implementation of Mitigation Measure M-HY-9, Lake Level Management for Lake Merced, which requires the SFPUC to implement lake level management procedures to maintain Lake Merced at water levels similar to conditions that would occur without the project. Therefore, Lake Merced would be maintained at conditions similar to that would be expected without project-related pumping. As such, the project would not result in exposure of and potential damages to known and unknown archeological resources.Therefore, the Groundwater Supply Project's contribution to significant cumulative impacts on archeological resources at Lake Merced would not be cumulatively considerable (less than significant).

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5.6 Transportation and Circulation

This section evaluates the transportation and circulation impacts that could occur during construction and operational activities associated with the proposed well facilities and pipelines. The impact analysis assesses whether construction and operational activities would cause significant impacts on traffic flow (including mass transit and non-motorized travel), traffic safety, or access within the surrounding roadway system.

5.6.1 Setting

The study area for transportation and circulation includes a network of regional and local roadways within the western portion of San Francisco. This roadway network would be used for the construction and operation of well facilities and pipeline installation and/or for access by construction workers' vehicles and other construction vehicles, including trucks that would transport construction materials, excavated spoils, and fill materials to and from the work areas.

Regional Access

Various State and interstate highways provide regional access to the project area and connect to the local roadway network. These roadways are described below.

State Route 1: State Route (SR) 1 is a six- to eight-lane, north-south highway that connects San Francisco with Peninsula communities (and points farther south) and North Bay communities (and points farther north). In the project area, SR 1 is a six-lane divided road (19th Avenue). According to California Department of Transportation (Caltrans) data, the annual average daily traffic on the 19th Avenue portion of SR 1 is about 67,000 vehicles (Caltrans, 2012a).

State Route 35: SR 35 is a six-lane roadway that runs from SR 1 (19th Avenue) in San Francisco to SR 17 on the Peninsula. In the project area, the roadway is an east-west divided road (along Sloat Boulevard) that shifts to a north-south alignment (along Skyline Boulevard) with four travel lanes. According to Caltrans data, the annual average daily traffic on SR 35 is about 24,000 vehicles (Caltrans, 2012a).

Other highways that provide regional access, although not near the project area, include Interstate 280 (I-280), which connects with SR 1 and SR 35 south of the San Francisco/San Mateo county line, and I-80 and U.S. Highway 101, which connects to the local roadway network in the South of Market area of San Francisco (about six miles east of the project area).

Local Access

The project area is served by a network of roads with various purposes: "arterials," designed to carry traffic through an area; "collectors," designed to connect arterials to local roads and land uses; and "local roads," which provide direct access to land uses. The roadways that could be affected by construction and operation of the proposed pipeline projects are primarily two-lane roads, although some of the roads have four travel lanes (two in each direction).

Table 5.6-1 presents the roadway characteristics (e.g., number of lanes, bicycle lanes, parking availability, transit service) of the local roads that are likely to be used by construction workers and vehicles to access the project work sites.

TABLE 5.6-1
CHARACTERISTICS OF ROADWAYS IN THE PROJECT AREA

Roadway / Segment	No. of Lanes	Traffic Volumes[a]	Bicycle Route?[d]	On-Street Parking Permitted?	Public Transit Lines?[e]	Comments[d]
1. West Sunset Well Facility to Sunset Reservoir						
Quintara Street: • 40th Avenue to 41st Avenue	Two lanes	1,000 vpd[b]	No	Yes, both sides	Yes (48 Quintara)	Bus stop on Quintara Street at 41st Avenue.
41st Avenue: • Quintara Street to Ortega Street	Two lanes	2,300 vpd[c]	No	Yes, both sides	No	
Ortega Street: • 41st Avenue to Sunset Boulevard	Three lanes*	3,000 vpd[c]	No	Yes, generally both sides	No	*Eastbound left-turn lane at intersection with Sunset Boulevard.
Ortega Street: • Sunset Boulevard to 24th Avenue	Three lanes*	4,990 vpd[c]	No	Yes, both sides	No (see comments)	*Westbound left-turn lane at intersection with Sunset Boulevard. The 29 Sunset crosses Ortega on Sunset Boulevard.
4. Golden Gate Park Pipeline Junction to West Sunset Well Facility						
Quintara Street: • 40th Avenue to 41st Avenue	Two lanes	1,000 vpd[b]	No	Yes, both sides	Yes (48 Quintara)	Bus stop
41st Avenue: • Quintara Street to Lincoln Way	Two lanes	2,300 vpd[c]	No (see comments)	Yes, both sides	No (see comments)	Class III Bicycle Route 40 crosses 41st Avenue on Kirkham Street. Transit lines (NX, 48, 16X, 71, 71L, N) cross 41st Avenue on Quintara, Noriega, and Judah Streets.
3. Central Pump Station Well Facility to Golden Gate Park Pipeline Junction						
Middle Drive West: • Chain of Lakes Drive East to Overlook Drive	Two lanes	230 vpd[c]	Yes (Route 34)	No	No	Class III bicycle route. Easternmost portion of Middle Drive West is closed to vehicular traffic.
4. South Sunset Well Facility to West Sunset Well Facility						
Wawona Street: • 40th Avenue to 41st Avenue	Two lanes	1,000 vpd[b]	No	Yes, both sides	No	
40th Avenue: • Wawona Street to Vicente Street	Two lanes	1,500 vpd[b]	No	Yes	No	
Vicente Street: • 40th Avenue to 41st Avenue	Two lanes	1,800[b]	Yes (Route 60)	Yes	No	Class III bicycle route.
41st Avenue: • Vicente Street to Quintara Street	Two lanes	2,300 vpd[c]	No	Yes	No (see comments)	The L Taraval MUNI Metro crosses 41st Avenue on Taraval Street.
Quintara Street: • 40th Avenue to 41st Avenue	Two lanes	1,000 vpd[b]	No	Yes	Yes (48 Quintara)	Bus stop on Quintara Street at 41st Avenue.

TABLE 5.6-1 (Continued)
CHARACTERISTICS OF ROADWAYS IN THE PROJECT AREA

Roadway / Segment	No. of Lanes	Traffic Volumes[a]	Bicycle Route?[d]	On-Street Parking Permitted?	Public Transit Lines?[e]	Comments[d]
5. North Lake Well Facility to Golden Gate Park Pipeline Junction						
Chain of Lakes Drive East: • Martin Luther King Jr. Drive to Fulton Street	Two lanes	12,000 vpd[c,f]	No	No	No (see comments)	Park Shuttle route crosses Chain of Lakes Drive East on John F. Kennedy Drive, but on weekends and holidays only.
6. South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction						
Martin Luther King Jr. Drive: • Golden Gate Park Access Road to Chain of Lakes Drive East	Two lanes	3,000 vpd[b]	Yes (Route 34)	No	Park Shuttle	Class III bicycle route Park Shuttle route operates on weekends and holidays only.
7. Lake Merced Well Facility						
Lake Merced Boulevard: • North of Brotherhood Way	Four lanes*	42,000+[b]	Yes (Routes 85 and 86)	No	Yes (18 46th Avenue)	*Two southbound lanes convert to one through lane (from which site access is provided) and left turn lanes at Brotherhood Way intersection. Class I Bicycle Route 86) and Class III Bicycle Route 85.

a vpd = vehicles per day
b Existing traffic volume represents average daily traffic (ADT) count data available from the San Francisco Municipal Transportation Agency (at sfmta.com, accessed March 15, 2012);
c Existing traffic volume represents 48-hour ADT data collected on November 16–17, 2010 (Tuesday–Wednesday), and 48-hour ADT data along 41st Avenue collected on July 16–17, 2008.
d A Class I bicycle path is a dedicated path separated away from traffic. Class II bicycle lane is a lane set aside exclusively for bicycles. Class III facilities are signed bicycle routes on roadways that allow shared use by bicycles and vehicles. Bicycle route number in parentheses.
e MUNI provides transit service in the vicinity of the proposed pipeline project areas. Bus route numbers are in parentheses.
f The traffic volume shown is for the segment between Martin Luther King Jr. Drive and John F. Kennedy Drive. No traffic count data are available for the segment between John F. Kennedy Drive and Fulton Street; while not counted, field observations indicate a traffic volume substantially lower than 12,000 vpd.

SOURCES: ESA, 2008 and 2010; SFMTA, 2012a.

Public Transit

Table 5.6-1 identifies the public transit service on the local roads that would likely be used by construction workers and vehicles to access the project work sites. The San Francisco Municipal Railway (MUNI) provides bus service in proximity to the project area. Several MUNI bus routes, including NX Judah Express, 48 Quintara, 16X Noriega Express, 71 Haight-Noriega, and 71L Haight-Noriega Limited, as well as MUNI Metro streetcar lines N Judah and L Taraval, operate in the project area. A MUNI bus stop (for the 48 Quintara) is located on the westbound approach at the intersection of Quintara Street and 41st Avenue.

MUNI's Transit Effectiveness Project (TEP) presents a thorough review of San Francisco's public transit system, initiated by the San Francisco Municipal Transportation Agency (SFMTA) in collaboration with the City Controller's Office. The TEP is aimed at improving reliability, reducing travel times, providing more frequent service, and updating MUNI bus routes and rail lines to better match current travel patterns. The TEP Implementation Strategy anticipates that many of the service improvements would be implemented sometime between the end of fiscal year (FY) 2013 and FY 2015, and that the remainder of the service improvements would occur in FY 2016 (SFMTA, 2011, pages 3–5). TEP recommendations include new routes and route extensions, more service on busy routes, and elimination or consolidation of certain routes or route segments with low ridership. For the routes mentioned above, TEP proposals include improving service on the N Judah, designated as part of the Rapid Network, and subject to travel time reduction elements (such as frequency increases, bus stop consolidations, etc.). Although not part of the rapid network, service to 48 Quintara and 71L Haight-Noriega Limited would be extended outside the peak hour service now provided. The TEP proposes the discontinuation of the 18 46th Avenue bus route service along Lake Merced Boulevard between John Muir Drive and Font Boulevard, replacing it with the 17 Parkmerced route extension (SFMTA, 2011).

Bicycle/Pedestrian Circulation

Table 5.6-1 identifies the local roads that would likely be used by construction workers and vehicles to access the project work sites. In general, roadways that would be affected by construction activities have developed pedestrian facilities, including raised concrete sidewalks, striped crosswalks, and curb cuts at intersections. Bicycleways are classified as Class I (bicycle paths separated from roads), Class II (striped bicycle lanes within the paved areas of roadways), or Class III (designated and signed bicycle routes where cyclists share street with vehicles). As shown in Table 5.6-1, a Class I designated multi-use pathway runs adjacent to Lake Merced Boulevard (and across the access road to the Lake Merced well facility site), and there are Class III bicycle routes along Middle Drive West, Vicente Street, Martin Luther King Jr. Drive, and Lake Merced Boulevard.

No near-term or long-term bicycle improvement plans are identified in the *San Francisco Bicycle Plan* for implementation in the project area (SFMTA, 2009).

Traffic Volumes

Table 5.6-1 presents the existing average daily traffic (ADT) along local roads that would likely be used by construction workers and vehicles to access the project work sites. Available traffic volume data were obtained from the SFMTA website and from automatic machine (tube) counts conducted for this analysis.[1]

Parking

Table 5.6-1 presents the availability of on-street parking spaces on local roads that would likely be used by construction workers and vehicles to access the project work sites. This information is

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1 ADT count data available from SFMTA (at sfmta.com, accessed March 15, 2012), and 48-hour ADT data collected by ESA in 2008 and 2010.

of interest primarily for those roads where on-street parking spaces could be temporarily displaced to accommodate traffic flow past the construction zone during pipeline installation.

The off-street parking lot at the West Sunset Playground, which is within the proposed work zone for the West Sunset well facility, has 37 parking spaces, accessed from Quintara Street.

5.6.2 Regulatory Framework

Federal Regulations

There are no federal regulations that address transportation impacts associated with the project.

State Regulations

Caltrans manages interregional transportation, including management and construction of the California highway system. In addition, Caltrans is responsible for permitting and regulation of the use of State roadways. Caltrans' facilities that are likely to be used as access routes by construction workers and construction vehicles to the planned work sites include: I-280, U.S. 101, SR 1, and SR 35.

Caltrans' construction practices require temporary traffic control planning "during any time the normal function of a roadway is suspended" (Caltrans, 2012b). Furthermore, Caltrans requires that permits be obtained for transportation of oversized loads and transportation of certain materials, and for construction-related traffic disturbance. Construction and maintenance activities associated with the project would utilize state roadways solely as access routes for construction workers, and construction vehicles and project construction would not occur on state highways or highway rights-of-way; therefore, Caltrans encroachment permits would not be required. Further, oversized vehicles (by weight, height, length, or width) or vehicles carrying hazardous materials that require Caltrans permits would not be used.

Local Regulations

The San Francisco Department of Public Works (SFDPW) regulates work involving excavations in city streets under Public Works Code Article 2.4. The City and County of San Francisco (CCSF) coordinates all street activities through the SFMTA's Transportation Advisory Staff Committee (TASC), which includes representatives from the SFDPW, the SFMTA, and the Fire, Planning, Police, Port, and Public Health Departments. Construction work must abide by the SFDPW's *Regulations for Working in San Francisco Streets (Blue Book)* (SMFTA, 2012b) and must be coordinated through the Street Construction Coordination Center of the SFDPW and the TASC. The *Blue Book* regulations generally pertain to permits required to work on City streets, working on streets with special restrictions, lane closure requirements, parking removal, sidewalk closures, construction zone standards, transit operations, school zones, bicycle routes, use of police officers, detectors in City streets, and emergency procedures. As part of the TASC process, the SFPUC, in conjunction with the SFDPW and SFMTA, is required to develop and incorporate a detailed Construction Management Plan into its contract specifications, and further coordinate with SFMTA Street

Operations division for any work on or near transit facilities. Elements of the Construction Management Plan would include, but not necessarily limited to, the following:

- Circulation and detour routes shall be developed (with flaggers, signage, and safety protocols) to minimize impacts on local street circulation during road and lane closures.
- Truck routes designated by the CCSF shall be identified, and truck trips shall be scheduled during hours of the day other than the peak morning and evening commute hours to the extent possible.
- Sufficient staging areas shall be developed for trucks accessing construction zones to minimize disruption of access to adjacent land uses, particularly within residential neighborhoods.
- Construction vehicle movement shall be controlled and monitored through the enforcement of standard construction specifications by onsite inspectors.
- Roads shall be restored to the pre-project number of lanes, with all trenches covered with steel plates or the equivalent, outside of allowed working hours, or when work is not in progress.
- Pedestrian and bicycle access and circulation shall be maintained where safe to do so.
- All equipment and materials shall be stored in designated contractor staging areas on or adjacent to the worksite, such that traffic obstruction is minimized.
- Portable changeable message signs shall be used to provide advance notice of lane closures.

As described in Chapter 3, Project Description, the majority of planned pipeline alignments would be located within existing public roadways. Prior to the construction of these pipelines, the SFPUC would coordinate with other CCSF departments as described above.

San Francisco General Plan

The Transportation Element of the *San Francisco General Plan* (CCSF, 1995) contains objectives and policies that relate to the nine aspects of the citywide transportation system: general regional transportation, congestion management, vehicle circulation, transit, pedestrian, bicycles, citywide parking, and goods management. The applicability of the *San Francisco General Plan* to the proposed project is addressed in Chapter 4, Plans and Policies. The Transportation Element references San Francisco's Transit-First Policy in its introduction, and contains the objectives and policies that are directly pertinent to consideration of the proposed project.

San Francisco Bicycle Plan

The *San Francisco Bicycle Plan* (SFMTA, 2009) describes a program to provide the safe and attractive environment needed to promote bicycling as a transportation mode within the city. No near-term or long-term bicycle improvement plans are identified in the *San Francisco Bicycle Plan* for implementation in the project area. The applicability of this plan to the proposed project is addressed in Chapter 4, Plans and Policies.

Transit-First Policy

In 1998, San Francisco voters amended the City Charter (Charter Article 8A, Section 8A.115) to include a Transit-First Policy. The Transit-First Policy is a set of principles that underscore the City's commitment that transit, bicycle, and pedestrian travel be given priority over travel by private automobile. These principles are embodied in the policies and objectives of the Transportation Element of the *San Francisco General Plan* and are addressed in Chapter 4, Plans and Policies.

5.6.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect on transportation and circulation if it were to:

- Conflict with an applicable plan, ordinance, or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation, including mass transit, non-motorized travel, and relevant components of the circulation system (including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit);
- Conflict with an applicable congestion management program, including but not limited to level of service (LOS) standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in locations that results in substantial safety risks;
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
- Result in inadequate emergency access; or
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities.

Due to the nature of the proposed project, there would be no impact related to the following topics for the reasons described below:

- ***Change Air Traffic Patterns.*** The project sites are not near an airfield; San Francisco International Airport is about 11 miles to the southeast, and Metropolitan Oakland International Airport is about 15 miles to the southeast. These distances are outside of the limit for objects near airports in the guidance published by the Federal Aviation Administration. Therefore, this criterion is not discussed further.

- ***Substantially Increase Hazards due to a Design Feature.*** Implementation of the project would not permanently change the existing or planned transportation network and would not include any design features that would permanently increase the potential for traffic safety hazards. Therefore, this significance criterion is not applicable to the proposed project and is not discussed further.

As part of implementing CEQA requirements within San Francisco, the CCSF has established additional criteria, as shown below. These criteria are organized by mode of travel to facilitate analysis; however, the transportation significance thresholds are essentially the same as those in Appendix G of the CEQA Guidelines, as listed above:

- The operational impact on signalized intersections is considered significant when project-related traffic causes the intersection level of service to deteriorate from LOS D or better to LOS E or F, or from LOS E to LOS F. The project may result in significant adverse impacts at intersections that operate at LOS E or F under existing conditions depending on the magnitude of the project's contribution to the worsening of the average delay per vehicle. In addition, the project would have a significant adverse impact if it would cause major traffic hazards or contribute considerably to cumulative traffic increases that would cause deterioration in levels of service to unacceptable levels.

- The project would have a significant effect on the environment if it would cause a substantial increase in transit demand that could not be accommodated by adjacent transit capacity, resulting in unacceptable levels of transit service, or cause a substantial increase in delays or operating costs such that significant adverse impacts in transit service levels could result. With the MUNI and regional transit screenlines[2] analyses, the project would have a significant effect on the transit provider if project-related transit trips would cause the capacity utilization standard to be exceeded during the PM peak hour.

- The project would have a significant effect on the environment if it would result in substantial overcrowding on public sidewalks, create potentially hazardous conditions for pedestrians, or otherwise interfere with pedestrian accessibility to the site and adjoining areas.

- The project would have a significant effect on the environment if it would create potentially hazardous conditions for bicyclists or otherwise substantially interfere with bicycle accessibility to the site and adjoining areas.

- The project would have a significant effect on the environment if it would result in a loading demand during the peak hour of loading activities that could not be accommodated within proposed onsite loading facilities or within convenient on-street loading zones, and would create potentially hazardous conditions or significant delays affecting traffic, transit, bicycles, or pedestrians.

- The project would have a significant effect on the environment if it would result in inadequate emergency access.

- Construction-related impacts generally would not be considered significant due to their temporary and limited duration.

2 Identified corridors served by a grouping of transit lines.

Approach to Analysis

Following construction, the SFPUC would restore excavated areas to their general preconstruction conditions, and operation of the project would not generate new daily vehicle trips except for those required for occasional maintenance. As described in Section 3.5.2, Maintenance, the facilities would be monitored remotely during project operations. A facility operator would make daily visits (up to one per day, but possibly less), by truck, to check equipment at each of the groundwater well facilities. Therefore, project operation would not affect the transportation network.

As indicated in the significance criteria above, construction-related transportation impacts are not generally considered significant because of their temporary duration and limited scope. However, because the project would not result in operational impacts on traffic, the analysis focuses solely on the potential short-term effects of construction—including those on traffic operations (including transit), pedestrian/bicycle facilities, commercial and passenger loading facilities, and emergency access. The construction-related information used for the analysis is based on current project specifications, including construction durations (see Chapter 3, Project Description), and similar construction projects throughout the City. Due to the nature of the proposed project, there would be no impacts related to the following criteria, for the reasons described below; therefore, no separate impact discussion is provided for these topics:

- ***LOS Standards.*** The LOS standards established by the San Francisco Planning Department are intended for use in evaluating traffic impacts related to added vehicle trips during project operation and are generally not applicable to construction-related vehicle traffic. Since project construction would be transitory in nature and effects on intersection operations would be temporary, an LOS analysis for construction is not required. Furthermore, project operations following construction of the planned facilities would only require periodic maintenance, and would not result in a substantial change in vehicle trips, as further discussed below. Similarly, following construction, roadways would be restored to their general preconstruction condition; therefore, the project would not result in long-term impacts on the roadways used to access the project area (see Section 3.4.2, Pipeline Construction). Construction-related traffic impacts resulting from the project are discussed under Impact TR-1.

- ***Transit Demand.*** Project operations would not create new transit trips that could affect transit demand or transit service screenlines near the project sites. As described in Section 3.5.2, Maintenance, the facilities would be monitored remotely during project operations. In addition, a facility operator would make daily visits, by truck, to check equipment at each of the groundwater well facilities. As described in Section 3.4.2, Pipeline Construction, the pipeline alignment roadways (inclusive of signage, transit facilities, sidewalks, etc.) would be restored to general preconstruction conditions. Therefore, operation of the planned facilities would not substantially increase the demand or use of transit in the area and would not alter transit facilities in the project areas. Potential conflicts with operational vehicles and transit and construction-related impacts are further discussed below.

- ***Pedestrian/Bicycle Facilities.*** Project operations would not create new pedestrian or bicycle trips that could affect bicycle or pedestrian facilities in the project area, given that maintenance of the project facilities would be conducted by city vehicles. Similarly, following construction, any temporarily affected pedestrian or bicycle facilities would be restored to their general preconstruction condition (see Section 3.4.2, Pipeline Construction); therefore, operation of the planned facilities would not result in overcrowding of or increased demand for pedestrian and bicycle facilities. Potential conflicts with operational vehicles and construction-related impacts are further discussed below.

- ***Loading Demand.*** Project operations would not create new commercial vehicle trips and thus no substantial demand, if any, for commercial parking spaces. Similarly, following construction, any temporarily displaced commercial parking spaces would be restored to their general preconstruction condition (see Chapter 3, Project Description, Section 3.4.2, Pipeline Construction); therefore, operation of the planned facilities would not result in loading impacts. Potential construction-related conflicts with vehicles, including commercial vehicles, are further discussed below.

Construction of the project elements would generate vehicle traffic (construction workers' vehicles, equipment, and trucks) traveling to and from the work sites on area roads. All project elements would generate daily commute trips by construction workers. Truck traffic would include deliveries of materials/equipment to the site and hauling of excavated or fill material, building debris from demolition, trees, and other vegetation away from the site.

The transportation impacts identified below allow for a general assessment of the nature and magnitude of potential impacts associated with the construction of each project component. In addition, the final construction scheduling of specific project components could result in traffic impacts related to concurrent construction activities. Thus, traffic generation is described for individual project components and for potential construction of concurrent project components. Because most of the transportation impacts associated with construction at one of the well facility sites or pipeline segments would be specific to the work site, impacts associated with concurrent construction activities would be limited to construction-generated traffic using the same roads due to the relative proximity of the project work sites.

The CCSF does not consider parking supply to be part of the permanent physical environment, and therefore does not consider changes in parking conditions to be environmental impacts as defined by CEQA. The San Francisco Planning Department acknowledges, however, that parking conditions may be of interest to the public and the decision makers. Therefore, effects on parking are discussed herein for informational purposes.

Construction-related transportation impacts are not generally considered significant because of their temporary and limited duration. However, as discussed above, because project operation would not result in transportation impacts, the analysis focuses on the construction-related impacts of the project.

Impact Summary

Table 5.6-2 summarizes the proposed project's transportation and traffic impacts and significance determinations.

TABLE 5.6-2
SUMMARY OF IMPACTS – TRANSPORTATION AND CIRCULATION

Impact	Significance Determination
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.	LS
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.	LS
Impact TR-3: Project construction would not substantially limit access to adjacent roadways and land uses due to construction within roadways.	LS
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.	LS
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.	LS
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.	LS

NOTES:
LS = Less than Significant impact, no mitigation required

Impact Analysis

Construction Impacts

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. (Less than Significant)

Construction of most of the proposed groundwater well facilities would not require the closure of any travel lanes; therefore, except as discussed below, it would not reduce the roadway capacity on roads that provide access to the well facility sites. The proposed installation of pipelines in roadways; however, would require temporary closures of travel lanes, and the effect of pipeline installation on the performance of the circulation system to accommodate all modes of transportation (auto, transit, and non-motorized modes) is discussed below. Any work within City streets is required to comply with the SFMTA's *Regulations for Working in San Francisco Streets (Blue Book)*, and any travel lane or sidewalk closures are subject to review and approval by the TASC, which consists of representatives from City agencies such as SFMTA, the SFDPW, and the Fire, Planning, Police, Port, and Public Health Departments. Any effects on transit operations would be required to be reviewed by MUNI's Street Operations and Special Events Office prior to construction to further coordinate construction activities and reduce any impacts on transit operations. In addition, the SFPUC's contractor would be required to coordinate with the San Francisco Recreation and Parks Department (SFRPD) to manage construction traffic within Golden Gate Park, as access to some park facilities would be altered due to the temporary closure of the Chain of Lakes Drive East during construction, as further described below under Pipeline Segment 5 (see Section 3.4.2, Pipeline Construction).

Groundwater Well Facility Sites

As stated above, construction of most of the proposed groundwater well facilities would not require the closure of any travel lanes, and therefore would not reduce the roadway capacity on roads that provide access to the well facility sites. The exceptions, where the construction staging area would occupy part of the roadway right-of-way, are described below.

South Sunset Well Facility. Two staging areas would be used during the 15- to 18-month construction phase for the proposed South Sunset well facility. One staging area would be located along the north side of Wawona Street between 41st and 40th Avenues, and would occupy the parking lane. Traffic on Wawona Street would likely be restricted, as part of the Construction Management Plan, to one lane when this staging area is in use, and alternating one-way traffic flow would be maintained, or parking on the south side of Wawona Street on the affected block would be temporarily displaced, and two-way traffic flow would be maintained. In either case, the impact on local traffic would be less than significant given the temporary nature of the construction and the relatively low traffic volume on this street (about 1,000 vehicles per day, as shown in Table 5.6-1).

Central Pump Station Well Facility. Construction of the Central Pump Station well facility(over a period of about 15 to 18 months) would result in the staging of equipment and worker vehicles along the south side of Overlook Drive, northwest of the well facility. Because construction staging would occur along a roadway that is primarily used for Central Pump Station access by park maintenance staff (no public parking permitted and little public use by vehicles), staging would not substantially alter vehicle travel in the park; thus, this impact on vehicle traffic would be less than significant, and no mitigation is required.

Pipeline Alignments

Pipeline construction, both within the Sunset District and Golden Gate Park, would require the temporary closure of one travel lane (i.e., the proposed construction zone would not exceed the width of a single lane) and, in some cases, the temporary prohibition of on-street parking. Generally, the pipeline route would be located in the center of a single lane of each roadway. Project staging areas would be established adjacent to pipeline alignments throughout the project area, and potentially along the eastern curb lane of 37th Avenue, as described in Section 3.4.2, Pipeline Construction. As part of the above-mentioned TASC process and City requirements, the SFPUC, working with the SFDPW and SFMTA, would implement a Construction Management Plan, and would coordinate with the appropriate jurisdictional agencies through the Street Construction Coordination Center of the SFDPW and the TASC to develop procedures for managing lane closures during pipeline construction. Under these procedures, the SFPUC would maintain traffic flow by providing a minimum of one access lane on most streets from 7:00 a.m. to 5:00 p.m., and would maintain local access for residents and businesses along the pipeline alignments throughout construction of the project. All lanes would be available outside of these hours (see Section 3.4.4, Construction Schedule). However, temporary road closure of Chain of Lakes Drive East would be required (see Pipeline Segment 5, below).

In general, construction at any given time along the pipeline alignments (and associated travel lane restrictions) would occur over a length of approximately 60 to 120 feet at a time, for approximately one to two weeks per block (depending on the length of the block), keeping at least one lane of traffic available at all times (see Section 3.4.2, Pipeline Construction). During construction, motorists could choose to divert to other streets, bypassing the construction zone. Lane closures would extend the length of approximately one city block at any given time. The effect on traffic flow and circulation would not be substantial (i.e., less than significant) because the reductions in road capacity would be localized and temporary.

Pipeline Segment 1 (West Sunset Well Facility to Sunset Reservoir). As described in Chapter 3, Project Description (Table 3-5), and shown in Figures 3-1 and 3-9, the planned pipeline would be installed in Quintara Street from 40th Avenue, west to 41st Avenue, then north to Ortega Street, then east to 24th Avenue, and then south to Sunset Reservoir. Construction activities along these affected roadways would temporarily disrupt existing circulation patterns because of lane blockages (travel lane and parking lane), which would temporarily[3] (see Section 3.4.4, Construction Schedule) reduce the number of travel lanes and could require either alternating one-way traffic flow or the removal of parking spaces on one or both sides of the block to maintain two-way traffic flow. The specific treatment to maintain traffic flow would be determined on a case-by-case basis during the TASC process. Construction activities at intersections would temporarily affect cross traffic as well, requiring some travel lane diversion around the construction area. For example, construction across Sunset Boulevard would require phasing of the work to minimize the impact of lane closures on that arterial (see Section 3.4.2, Pipeline Construction).

Therefore, due to the short duration and limited magnitude of traffic disruptions, and the required coordination and review of the project's Construction Management Plan by the multi-agency TASC to address localized construction effects, construction-related impacts related to a temporary reduction in roadway capacity and increased traffic delays would be less than significant, and no mitigation is required.

Pipeline Segment 2 (Golden Gate Park Pipeline Junction to West Sunset Well Facility). As described in Chapter 3, Project Description (Table 3-5), and shown in Figures 3-1 and 3-9, the planned pipeline would be installed in Chain of Lakes Drive East from Martin Luther King Jr. Drive, continuing on 41st Avenue south to Quintara Street, then east to 40th Avenue (at the West Sunset Playground). Construction activities along these affected roadways would temporarily (approximately 60 to 120 feet per day; see Section 3.4.4, Construction Schedule) disrupt existing

[3] Construction would proceed at a rate of approximately 60 to 120 feet per day.

circulation patterns because of lane blockages, which would temporarily reduce the number of travel lanes and could require either alternating one-way traffic flow or the removal of parking spaces on one or both sides of the block to maintain two-way traffic flow. Similarly, to avoid the construction area, vehicle traffic could choose to travel on other nearby streets. Construction activities at intersections would temporarily affect east-west traffic as well, requiring some diversion around the construction area. Augering pits on 41st Avenue (for trenchless pipeline boring under Judah Street) would displace a single travel lane, and possibly on-street parking. The receiving/driving pit would remain open throughout the trenchless pipeline installation at this location. However, steel plates would be placed over the pit to return the travel lane (and parking) to usage at the end of the workday, generally after 5:00 p.m. (see Section 3.4.4, Construction Schedule). The duration of construction using the augering pits (including temporary pavement restoration) would be approximately four weeks for pipeline installation at these locations. Similar to other pipeline segments, temporary asphalt paving would be replaced with final (permanent) paving when the entire pipeline segment is completely installed.

Therefore, due to the short duration and limited magnitude of traffic disruptions and the required coordination and review of the project's Construction Management Plan by the multi-agency TASC to address localized construction effects, construction impacts related to a temporary reduction in roadway capacity and increased traffic delays would be less than significant, and no mitigation is required.

Pipeline Segment 3 (Golden Gate Park Pipeline Junction to Central Pump Station Well Facility). As described in Chapter 3, Project Description (Table 3-5), and shown in Figures 3-1 and 3-9, the planned pipeline would connect to the Central Pump Station well facility. The pipeline would be installed in Martin Luther King Jr. Drive from Chain of Lakes Drive East, east to Middle Drive West, and then east to Overlook Drive to the Central Pump Station well facility. Construction activities along these affected roadways would temporarily (approximately 60 to 120 feet per day; see Section 3.4.4, Construction Schedule) disrupt existing vehicle circulation patterns (with the exception of the portion of Middle Drive West that is closed to vehicular traffic) because of lane closures during construction. Travel lanes would be temporarily reduced and could require alternating one-way traffic flow in portions of Martin Luther King Jr. Drive, Middle Drive West, and Overlook Drive (which is primarily a maintenance/pump station access road). However, the narrowing of Martin Luther King Jr. Drive to one travel lane (and possible temporary loss of on-street parking), and to a lesser extent Middle Drive West, would not be a significant construction-related impact on vehicle traffic because of the relatively low weekday traffic volumes on these roads (see Table 5.6-1).

Therefore, due to the short duration and limited magnitude of traffic disruptions and the required coordination and review of the project's Construction Management Plan by the multi-agency TASC to address localized construction effects, construction-related impacts related to a temporary reduction in roadway capacity and increased traffic delays would be less than significant, and no mitigation is required.

Pipeline Segment 4 (South Sunset Well Facility to West Sunset Well Facility). As described in Chapter 3, Project Description (Table 3-5), and shown in Figures 3-1 and 3-9, the planned pipeline would be installed in 40th Avenue from Wawona Street, north to Vicente Street, then west to 41st Avenue, then north to Quintara Street, and then east to 40th Avenue (at the West Sunset well facility). Construction activities along these affected roadways would temporarily (approximately 60 to 120 feet per day; see Section 3.4.4, Construction Schedule) disrupt existing circulation patterns because of potential lane closures during construction, which could temporarily require either alternating one-way traffic flow or the removal of parking spaces on one or both sides of the block to maintain two-way traffic flow. Similarly, to avoid the construction area, vehicle traffic could choose to travel on other nearby streets. Construction activities at intersections would temporarily affect east-west traffic as well, requiring some diversion around the construction area. In addition, augering pits on 41st Avenue (for trenchless pipeline boring under Taraval Street) would displace a single travel lane, and possibly on-street parking. The driving/receiving pits would remain open throughout the trenchless pipeline installation at this location. However, steel plates would be placed over the pit to return the travel lane (and parking) to usage at the end of the workday (generally after 5:00 p.m.; see Section 3.4.4, Construction Schedule). The duration of construction using the augering pits (including temporary pavement restoration) would be approximately four weeks for pipeline installation at these locations. Similar to other pipeline segments, temporary asphalt paving would be replaced with final (permanent) paving when the entire pipeline segment is completely installed.

Therefore, due to the short duration and limited magnitude of traffic disruptions and the required coordination and review of the project's Construction Management Plan by the multi-agency TASC to address localized construction effects, construction impacts related to a temporary reduction in roadway capacity and increased traffic delays would be less than significant, and no mitigation is required.

Pipeline Segment 5 (North Lake Well Facility to Golden Gate Park Pipeline Junction). As described in Chapter 3, Project Description (Table 3-5), and shown in Figures 3-1 and 3-9, the proposed pipeline would be installed in Chain of Lakes Drive East, from south of Fulton Street to Martin Luther King Jr. Drive. Chain of Lakes Drive East (between Martin Luther King Jr. Drive and John F. Kennedy Drive) provides the only vehicle access to the Bercut Equitation Field and to a parking lot along Chain of lakes Drive East; the segment between John F. Kennedy Drive and the entrance to the North Lake well facility does not provide vehicle access to any recreational facilities or other land uses. Chain of Lakes Drive East is narrower than the other roadways along the proposed pipeline alignments. Full-width closure of Chain of Lakes Drive East from Martin Luther King Jr. Drive to the Equitation Field (for about 10 weekdays), from the Equitation Field to John F. Kennedy Drive (for about 10 weekdays), and between John F. Kennedy Drive and the entrance to the North Lake well facility (for about 22 weekdays) would be required during periods of pipeline construction (weekdays from 7:00 a.m. to 5:00 p.m.). Traffic would be forced to detour to other roads (e.g., Martin Luther King Jr. Drive, Bernice Rodgers Way, 47th Avenue, and 36th Avenue).

Pipeline installation on Chain of Lakes Drive East across John F. Kennedy Drive would be phased so that a full road closure of John F. Kennedy Drive would not be necessary (see "Temporary In-road Work Areas, Permits, and Approvals" within Section 3.4.2, Pipeline Construction).

However, motorists on John F. Kennedy Drive would experience temporary delays on the one or two days that construction would occur at this intersection. In addition, full-time vehicle access to the above-cited Equitation Field and parking lot would be restored after pipeline installation between the access point(s) and Martin Luther King Jr. Drive (or John F. Kennedy Drive, depending on the direction of the installation), and when vehicle access is blocked, people could park on Martin Luther King Jr. Drive or John F. Kennedy Drive, and walk to their destination. Pipeline installation activities along Chain of Lakes Drive East would be phased so that during times of active work between the Equitation Field to John F. Kennedy Drive, vehicle access to the Equitation Field would be maintained from Martin Luther King Jr. Drive, and vice versa. In coordination with SFRPD, access to the Equitation Field and parking lot would be temporarily closed when construction activities occur directly across those access points; however, temporary closures would only take place for a short time period (about one or two days). The full-width closure of Chain of Lakes Drive East would result in a temporary alteration of travel patterns in and surrounding this portion of the park, which could affect local traffic and cause traffic delays.

Therefore, due to the short duration and limited magnitude of traffic disruptions and the required coordination and review of the project's Construction Management Plan by the multi-agency TASC to address localized construction effects, construction impacts related to a temporary reduction in roadway capacity and increased traffic delays would be less than significant, and no mitigation is required.

Pipeline Segment 6 (South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction). As described in Chapter 3, Project Description (Table 3-5), and shown in Figures 3-1 and 3-9, the proposed pipeline would be installed in Martin Luther King Jr. Drive, from east of the Murphy Windmill to Chain of Lakes Drive East. Construction activities along the affected roadway would temporarily disrupt existing vehicle circulation patterns because of lane closures and intermittent delays during construction. Pipeline installation at a rate of approximately 60 to 120 feet per day would temporarily (for about 31 weekdays) reduce the number of travel lanes in the construction area and require alternating one-way traffic flow in the remaining available right-of-way. However, the recreational pathway on the south side of Martin Luther King Jr. Drive and the associated pedestrian and bicycle traffic would not be affected by the travel lane closures, as this pathway would remain open during construction.

Nevertheless, due to the short duration and limited magnitude of traffic disruptions and the required coordination and review of the project's Construction Management Plan by the multi-agency TASC to address localized construction effects, construction impacts related to a temporary reduction in roadway capacity and increased traffic delays would be less than significant, and no mitigation is required.

Construction Management Plan

As described above, the SFPUC would implement a Construction Management Plan as part of the TASC process, and would coordinate with the appropriate jurisdictional agencies through the Street Construction Coordination Center of the SFDPW and the TASC. The Construction Management Plan would, at a minimum, include the following elements. The elements listed below are required under SFMTA Blue Book standard Construction Management Plans, with the exception of the public information plan, ongoing coordination with schools, hospitals and other local businesses (see Section 3.4.4, Construction Schedule), and the encouragement to further reduce trips by construction workers and delivery vehicles.

- Circulation and detour routes shall be developed to minimize impacts on local street circulation during road and lane closures. For example, lane closures shall generally avoid the AM and PM peak commute periods. Flaggers and/or signage shall be used to guide vehicles through and/or around the construction zone. Roadside construction safety protocols shall be implemented.

- Truck routes designated by the CCSF shall be identified. Haul routes that minimize truck traffic on local roadways and residential streets shall be utilized to the extent possible.

- Sufficient staging areas shall be developed for trucks accessing construction zones to minimize disruption of access to adjacent land uses, particularly at entries to onsite pipeline construction within residential neighborhoods.

- Construction vehicle movement shall be controlled and monitored through the enforcement of standard construction specifications by onsite inspectors.

- Truck trips shall be scheduled during hours of the day other than the peak morning and evening commute hours to the extent possible.

- Roads shall be restored to the pre-project number of lanes, with all trenches covered with steel plates or the equivalent outside of allowed working hours or when work is not in progress.

- Pedestrian and bicycle access and circulation shall be maintained during project construction where safe to do so. The contractor shall be required to maintain bicycle lanes/lane widths to accommodate bicycle traffic or seek a permit from the SFMTA to address bicycle route detours and signage for any lane closures. Where construction activities encroach on a bicycle lane, advance warning signs (e.g., "Bicyclists Allowed Use of Full Lane" and/or "Share the Road") shall be posted to indicate that bicycles and vehicles are sharing the lane and to warn bicyclists and drivers of upcoming traffic hazards. If construction activities encroach on a sidewalk, safe crossings and appropriate signage shall be provided for pedestrians.

- All equipment and materials shall be stored in designated contractor staging areas on or adjacent to the worksite, such that traffic obstruction is minimized.

- Construction shall be coordinated with facility owners or administrators of police and fire stations (including all fire protection agencies), transit stations, hospitals, and schools. Facility owners or operators shall be notified in advance of the timing, location, and duration of construction activities and the locations of detours and lane closures. Emergency service vehicles shall be given priority for access.

- A public information plan shall be developed to provide adjacent residents and businesses with regularly updated information regarding project construction in their area, including construction activities, durations, peak construction vehicle activities (e.g., excavation), travel lane closures, and other lane closures. This information shall also be presented on the SFPUC website and shall be updated regularly as construction conditions change.

- Portable changeable message signs shall be used to provide advance notice of lane closures.
- The contractor shall be encouraged to reduce the number of vehicle trips by construction workers by facilitating the use of public transportation and minimizing construction work parking supply.

The Construction Management Plan would serve to inform city agencies of project construction and to minimize temporary effects on traffic in the vicinity of the construction areas. Due to the short duration and limited magnitude of traffic disruptions and required coordination and review of the project's Construction Management Plan by the multi-agency TASC to address localized construction effects, construction impacts related to a temporary reduction in roadway capacity and increased traffic delays would be less than significant, and no mitigation is required.

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. (Less than Significant)

As described in Chapter 3, Project Description, the project would be implemented in two phases. The first phase would involve the construction and operation of four new well facilities, facilities at the Sunset Reservoir, and Pipeline Segments 1, 2, 3, and 4 to deliver groundwater from the new well facilities to the existing municipal water supply system. The second phase, which would be contingent upon approval and implementation of the SFPUC's proposed Westside Recycled Water Project (Case No. 2008.0091E), would involve the conversion and operation of two existing irrigation wells, the demolition of existing structures and construction of new well facility structures, and the extension of pipelines along Segments 5 and 6 to those converted wells to enable delivery of additional groundwater from those wells. Construction of the well facilities would occur in stages and during varying periods of time. It is expected that Phase 1 would begin in fall 2014 and conclude in spring 2016, and that Phase 2 would begin in summer 2015 and conclude in fall 2016. Within these time periods, pipeline installation would be expected to take between 7 and 16 weeks for each planned pipeline segment, well facilities would be expected to be constructed/converted and operational within approximately 15 to 18 months at each site, and construction of the proposed Sunset Reservoir facilities would be expected to take about 8 months (see Table 3-8 in Chapter 3).

Each of the construction activities (excavation, construction of well facility and reservoir facilities, installation of new pipeline, backfilling of excavated area, and site restoration) would generate various types of vehicle trips: construction workers' vehicles traveling to and from the work sites; haul trucks associated with the transfer and disposal of excavation materials; haul trucks associated with the importing of backfill materials; and delivery trucks bringing materials and equipment to the work sites. Construction activities are expected to occur primarily during daytime hours

(7:00 a.m. to 5:00 p.m.), five days a week on normal (non-holiday) weekdays. No nighttime construction work that would require a night noise permit (i.e., between 8:00 p.m. and 7:00 a.m.) would take place. No weekend construction work is anticipated to occur (see Section 3.4.4, Construction Schedule).

Construction-Related Vehicle Trips

Construction of each element of the project would result in short-term increases in the above-described vehicle trips on area roadways. The number of construction-related vehicle trips would vary each day, depending on the type of project component, construction phase, planned activity, and material needs. The addition of construction traffic to the current roadway volumes, without an increase in roadway capacity, could result in increased congestion and delays for vehicles, including public transit. The presence of construction trucks, with their slower speeds and larger turning radii, could result in some vehicle delays and congestion. The actual impact of construction vehicle traffic on local and regional roadways would vary by time of day, the number and type of construction-related vehicles, the number of travel lanes on the affected roadways, and existing traffic volumes on these roadways. Impacts of construction traffic would be most noticeable on roadways in the immediate vicinity of the project work sites and less noticeable on roadways farther away from the sites (as project trips disperse over the road network) and on regional roadways. Furthermore, because construction of the well facilities and pipelines could occur simultaneously within each phase of the project, construction activities could overlap during the same time period and in proximity of each work site, increasing overall traffic volumes that could intermittently worsen traffic conditions along affected roadways.

Worker Vehicle Trips. As described in Chapter 3, Project Description, the construction of the well facilities would require an average of four construction workers, with peak construction having up to eight workers at each site. According to the project schedule, there may be periods when construction activities at all six well facilities would occur at the same time. During those overlap periods, there would be an average of 24 construction workers, with a peak of up to 48 workers, traveling to and from the six work sites. Construction for the facilities to be added to the Sunset Reservoir would require a workforce of three to five construction workers. Construction for sequential (i.e., not simultaneous) installation of pipeline segments would require a workforce of 10 to 15 construction workers, depending on the construction phasing and planned activities per site. Although construction worker travel mode is unknown, for this analysis it was assumed that all workers would travel to and from the project site in their own vehicles.

Haul Truck Trips. The number of construction-related haul truck trips per day would vary depending on the type of construction technique, the volume of spoils and fill, and the pace of work. As presented in Chapter 3, Project Description, open-cut trenching and excavation would be used during pipeline installation, which would require haul trucks to export excavated spoils and import fill material along the alignment. Haul truck trips would also be generated during demolition of the structures at the North Lake and South Windmill Replacement well sites, during well facility construction at all six well sites, and during construction of facilities at the Sunset Reservoir. Table 3-2 and Table 3-5 in Chapter 3 list the quantity of spoils and fill materials per well facility site and pipeline route. As described in Chapter 3, the construction of the facilities at the Sunset Reservoir could generate up to approximately 100 cubic yards of excess spoils; the work at the Sunset Reservoir also could require up to approximately 20 cubic yards of structural fill. Construction truck traffic would be required to follow City-designated truck routes to the project sites (e.g., Sunset Boulevard, Lincoln Way, and Fulton Street), as well as other streets that provide the most direct route to the work site and minimize the use of local streets.

Table 5.6-3 presents the projected number of vehicles that would be generated by project construction activities. These projections include trips to and from the project work sites and account for daily construction worker commutes and total numbers of haul trucks (conservatively assuming a capacity of 9 cubic yards, as larger-volume haul trucks would result in fewer trips). The potential traffic impacts associated with daily vehicle trips generated by facility-specific construction are described in the next paragraph.

As shown in Figure 3-15, the majority of scheduled construction activities would occur during Phase 1, specifically between fall 2014 and spring 2016. During that period, the West Sunset well facility and Central Pump Station well facility would be completed. Pipeline Segments 1, 2, 3, and 4 would also be completed. Additionally the Lake Merced and South Sunset well facilities would be constructed, with completion scheduled for spring 2015. The Sunset Reservoir facilities would also be completed. Based on the estimated amount of traffic generated by each project component during Phase 1, concurrent construction activities for these Phase 1 project components, could result in up to 52 workers and 13 haul trucks per day traveling to and from the work sites, resulting in up to 65 vehicles (130 one-way trips) per day. It is expected that construction activities would occur primarily during the weekday daytime hours (7:00 a.m. to 5:00 p.m.). Worker trips to the work sites would occur prior to the a.m. peak traffic hour, but trips from the work sites would likely occur during the p.m. peak traffic hour. Haul truck trips would be spread over the course of the day. The highest concentration of vehicle trips traveling to and from the well facility sites would be on the roads that provide direct access to the sites (e.g., on Quintara Street for the West Sunset well facility site and Lake Merced Boulevard for the Lake Merced well facility site). However, not all of the four well facilities, four pipelines, and Sunset Reservoir associated with Phase 1 are located near each other, and it is reasonably assumed that workers' residences would be spread among Bay Area cities, and that project trips would be dispersed on different roads. On that basis, the estimated daily vehicle trips associated with concurrent construction activities would represent less than one percent of existing traffic volumes on regional roads (e.g., SR 35 and SR 1), and similarly would not substantially alter the existing operations of local roads (e.g., 41st Avenue). Construction activities associated with other (less trip-generation-intensive) project components would have less of an effect on area roadways than the above-described concurrent project components. Therefore, this impact related to temporary increases in traffic volume associated with construction vehicle traffic would be a minor lessening of their traffic-carrying capacities due to the slower movement and larger turning radii of trucks, which could affect traffic and transit operations. However, due to its temporary nature and limited magnitude, the effect of this

TABLE 5.6-3
WEEKDAY CONSTRUCTION VEHICLE TRIP GENERATION[a]

Project Component	Daily Workers[b]	Total Trucks[c]	
		Spoils	Fill
Well Facility			
West Sunset	4 to 8	13	0
Central Pump Station	4 to 8	0	0
Lake Merced	4 to 8	0	8
South Sunset	4 to 8	16	0
North Lake	4 to 8	0	0
South Windmill Replacement	4 to 8	13	0
Sunset Reservoir Facilities			
Total construction	3 to 5	11	3
Pipeline Segment			
West Sunset well facility to Sunset Reservoir	10 to 15	53	33
Golden Gate Park pipeline junction to West Sunset Well Facility	10 to 15	57	34
Golden Gate Park pipeline junction to Central Pump Station well facility	10 to 15	67	44
South Sunset well facility to West Sunset well facility	10 to 15	41	18
North Lake well facility to Golden Gate Park pipeline junction	10 to 15	27	17
South Windmill Replacement well facility to Golden Gate Park pipeline junction	10 to 15	20	13

[a] The numbers in this table represent vehicle round trips; one-way vehicle trips (i.e., two times the number of round trips) are described in the text under each project component.
[b] The range of daily workers (and worker vehicle round trips, assuming all workers would travel to and from the project site in their own vehicles) represent average and peak construction activities (e.g., construction of well facilities would require an average of four workers and a peak of eight workers for each site).
[c] The number of haul trucks (total over the construction period for each project component), based on the estimated quantities of spoils and structural fill material presented in Table 3-2 (well facilities) and Table 3-5 (pipelines), assumes that the capacity of haul trucks would average 9 cubic yards of material.

SOURCES: SFPUC, 2009; ESA.

construction-related increase in traffic and truck volume on traffic and transit operations would not be substantial. Furthermore, if deemed necessary by the SFMTA/SFDPW during the TASC review, a measure could be included in the project-specific Construction Management Plan to limit project-related truck trips and deliveries during the peak commute periods for particular project components. Although rerouting of transit vehicles is not anticipated, construction would be coordinated with the SFMTA Muni Operations to determine any temporary rerouting for bus lines in work zones (if needed). Considering all of the above, the impact would be less than significant, and no mitigation is required.

Impact TR-3: Project construction would not substantially limit access to adjacent roadways and land uses due to construction within roadways. (Less than Significant)

Construction along affected roadways and temporary roadway and lane closures could result in temporarily impaired access to adjacent land uses, driveways, and cross-streets along the pipeline construction routes in the vicinity of the work sites. Similar to other traffic-related impacts discussed above, the proposed lane closures along the proposed pipeline alignments during construction could slow, but would not prevent, traffic access (including emergency vehicle access). As described in Section 3.4.4, Construction Schedule, pipeline construction would progress at a rate of about 60 to 120 feet per day. The range of daily progress takes into account the potential for non-continuous construction activities. 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. As described under Impact TR-1, access to the Equitation Field from Chain of Lakes Drive East would be maintained for most of the construction duration along this roadway; however, access to the field would be closed for a short time period (about one or two days) when construction activities are occurring directly across the access driveway. The project would restore access and travel or parking lanes during non-construction hours by covering trenches with steel plates or the equivalent whenever feasible. Furthermore, motor vehicle laws require that emergency vehicles (police, fire, and ambulance) be given priority access during lane closures. In addition, the SFPUC or its contractor would be required to provide notification to all emergency service providers prior to lane closures, and detour signs and flaggers would be in place during the lane closure periods. The project's effects on access to adjacent land uses and roadways, including emergency vehicle access, would therefore be less than significant, and no mitigation is required.

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. (Less than Significant)

Similar to the effects on automobile traffic from pipeline construction activities (see Impact TR-1), temporary closures of travel lanes and sidewalks during project construction would temporarily increase delays experienced by riders of public transit, bicyclists and pedestrians. Specific impacts on alternative transportation (public transit, bicycle, or pedestrian facilities) are described below. Effects on bicyclists and pedestrians due to temporary increases in traffic volumes associated with construction of well facilities, pipeline installations, and Sunset Reservoir facilities would be temporary in nature and of limited magnitude, similar to those described in Impact TR-2 for traffic and transit operations (i.e., less than significant), and no mitigation is required.

Transit Impacts

The proposed project would not create additional demand for local or regional transit lines, but construction could cause temporary and intermittent impacts on the operation of local MUNI routes through the project area. Because streets that accommodate public transit lines would remain open to through traffic during construction activities, the NX Judah Express, 16X Noriega Express, 18 46th Avenue, 29 Sunset, 48 Quintara, 71 Haight-Noriega, and 71L Haight-Noriega Limited bus lines, as well as the Metro streetcar lines N Judah and L Taraval, would not be substantially delayed during construction. Any disruptions to local bus service along project streets would be temporary in nature, affecting only the immediate area surrounding the construction zone, lasting approximately one to two weeks per block (depending on the length of the block). The Golden Gate Park Shuttle would not be affected by project-related temporary lane closures because it operates only on weekends and holidays, and construction work is anticipated to occur only on non-holiday weekdays (see Section 3.4.4, Construction Schedule).

Although rerouting of transit vehicles is not anticipated, as part of the project's Construction Management Plan, the SFPUC would coordinate with the SFMTA Muni Operations to determine the appropriateness of any potential temporary rerouting of bus lines and relocation of bus stops in the project area (if needed). Specifically, pipeline construction activities along Quintara Street between 40th Avenue and 41st Avenue, for the proposed pipeline from the South Sunset well facility to West Sunset well facility, would require the closure of one travel lane, which could restrict access to the existing bus stop location along Quintara Street at 41st Avenue. However, a temporary relocation of bus stops during project construction would not be considered a substantial change to Muni service. In addition, during construction, a public information plan would be implemented to provide adjacent residents and businesses with regularly updated information regarding project construction activities in their area (see Section 3.4.4, Construction Schedule).

For the reasons described above, impacts related to disruptions in transit service would be less than significant, and no mitigation is required.

Bicycle Impacts

The contractor would be required to maintain bicycle lanes/lane widths to accommodate bicycle traffic during construction or seek a permit from the SFMTA to address bicycle detours and signage for any lane closures. Pipeline installation would temporarily restrict roads to single lane during construction on Martin Luther King Jr. Drive (South Windmill Replacement well facility to Golden Gate Park pipeline junction), Middle Drive West (Central Pump Station well facility to Golden Gate Park pipeline junction), and Vicente Street (South Sunset well facility to West Sunset well facility); therefore, access for bicyclists within Class III bicycle facilities along Martin Luther King Jr. Drive and Middle Drive West (Bicycle Route 34) and along Vicente Street (Bicycle Route 60) could be temporarily restricted past the active work zone for pipe installation (progressing at a rate of approximately 60 to 120 feet per day; see Section 3.4.4, Construction Schedule). The Class I (recreational path) along Martin Luther King Jr. Drive would be maintained. If deemed necessary by the SFMTA/SFDPW during the TASC review, a measure could be included in the project-specific Construction Management Plan requiring the posting of advance warning signs that state "Share the Road" for the safety of bicyclists traveling within construction areas.

In general, construction-related activities such as lane closures and construction vehicle traffic would temporarily increase the potential for motor vehicle and bicycle conflicts, but, with the measures described above, would not substantially interfere with bicycle accessibility through the project area. Therefore, given the temporary and transitory nature of the construction activities, construction-related impacts on bicycle traffic and facilities would be less than significant, and no mitigation is required.

Pedestrian Impacts

The project would be located in the Sunset District and in the western area of Golden Gate Park. Except during special events, there is generally a low (during the week) to moderate (over the weekend) level of pedestrian activity in these areas, consisting of local residents and visiting or recreational walkers or runners.

In general, project construction activities and construction traffic would temporarily increase the potential for motor vehicle and pedestrian conflicts, but would not substantially interfere with the use of pedestrian facilities through the project area for the following reasons. Project-generated traffic (truck trips and worker trips) to and from the project area is estimated at up to 64 vehicles (128 one-way trips) per day (see Impact TR-2). Worker commute trips would occur prior to the a.m. peak traffic hour, but likely during the p.m. peak traffic hour, and haul truck trips would be spread over the course of the day. It is reasonable to assume, given the geographic distribution of the proposed work sites, that project trips would be dispersed on different roads.

In addition, as described above, construction activities could temporarily and intermittently block pedestrian walkways (e.g., where a pipeline construction zone crosses a sidewalk area or a recreational path in Golden Gate Park between the well facility and the adjacent street alignment), causing an obstacle to pedestrian traffic. However, because sidewalk or pathway closures are not anticipated (outside of intermittent blockages by construction vehicles), and construction safety measures toward pedestrian and alternative modes are required by regulations in the SFMTA's *Regulations for Working in San Francisco Streets (Blue Book)*, impacts on pedestrian circulation and safety would be less than significant, and no mitigation is required.

Construction of the proposed well facilities, pipelines and Sunset Reservoir facilities would not permanently eliminate or modify alternative transportation corridors or facilities (e.g., bicycle paths or lanes, bus routes/stops, sidewalks); thus, impacts on alternative transportation modes during construction would be less than significant, and no mitigation is required.

Facility Siting, Operations, and Maintenance Impacts

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. (Less than Significant)

After construction of the well facilities, pipelines and Sunset Reservoir facilities is completed, roadways and adjacent facilities would be returned to their general preconstruction conditions. The SFPUC would also perform remote monitoring of the well facility, reservoir facilities and pipeline equipment through its SCADA system. New facilities could require an operator to perform daily visits, by truck, to check the equipment at each well facility. At the Lake Merced and West Sunset well facilities, and at the Sunset Reservoir pH adjustment facility, trucks would deliver chemicals, used for disinfection or other treatment, approximately every two to three weeks. Long-term maintenance could include the removal or repair of pumps, valves and other equipment. Occasional inspections and repairs of pipelines by small work crews would also be anticipated along all pipeline segments.

These activities would be an extension of existing maintenance practices and would not generate a substantial number of new vehicle trips. Overall, any increases in traffic generated by operation and maintenance of the well facilities would be negligible compared to existing conditions and would not result in a noticeable increase in traffic on adjacent streets. Therefore, operational impacts related to the proposed project would be less than significant, and no mitigation is required.

Parking Discussion

The CCSF does not consider parking supply as part of the permanent physical environment, and therefore does not consider changes in parking conditions to be environmental impacts as defined by CEQA. Parking conditions are not static, as parking supply and demand varies from day to day, from day to night, from month to month, etc. Hence, the availability of parking spaces (or lack thereof) is not a permanent physical condition, but changes over time as people change their modes and patterns of travel.

Parking deficits are considered to be social effects, rather than impacts on the physical environment as defined by CEQA. Under CEQA, a project's social impacts need not be treated as significant impacts on the environment. The social inconvenience of parking deficits, such as having to hunt for scarce parking spaces, is not an environmental impact, but there may be secondary physical environmental impacts, such as increased traffic congestion at intersections, air quality impacts, safety impacts, or noise impacts caused by congestion. In the experience of San Francisco transportation planners, however, the absence of a ready supply of parking spaces, combined with available alternatives to auto travel (e.g., transit service, taxis, bicycles, or travel by foot) and a relatively dense pattern of urban development, induces many drivers to seek and find alternative parking facilities, shift to other modes of travel, or change their overall travel habits. Any such resulting shifts to transit service in particular, would be in keeping with the City's "Transit First" policy. Accordingly, the following parking conditions are presented for informational purposes only.

Implementation of the proposed project would not result in any additional parking demand once completed. During construction, the proposed project would require up to approximately 15 construction workers per day for pipeline construction, 8 construction workers per day for well facility construction, and 5 construction workers per day for Sunset Reservoir facilities construction. Temporary parking demand from construction workers' vehicles would occur in proportion to the number of construction workers commuting by automobile, assumed for this analysis to be about 100 percent, or 5 to 15 parking spaces per day. If parking were not available in the project staging areas identified in Section 3.4.2, Pipeline Construction, workers could park in any existing on-street parking spaces in the project vicinity.

On-street parking capacity along the pipeline alignment, as well as off-street parking in the West Sunset Playground parking lot (approximately 37 spaces) (West Sunset well facility site) would be temporarily reduced, temporarily affecting automobile parking, and area residents may have to find alternate parking spaces in the surrounding area. Generally, loss of on-street parking on each block would occur during the one to two weeks that construction takes place on that block. Following project construction, on-street parking and off-street parking in the West Sunset Playground parking lot would be restored, with the possible exception of one parking space at the West Sunset Playground parking lot which is at the edge of the proposed concrete paving area associated with the well facility.

Cumulative Impacts

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. (Less than Significant)

The geographic scope for the analysis of cumulative traffic impacts includes the local and regional roadways and highways that would be used for well facility and pipeline construction activities and for access by construction workers and vehicles. The project's contribution to a significant cumulative impact would not be considerable because the project-related impacts are restricted to the construction period.

Section 5.1.4, Cumulative Impacts, describes the approach to the cumulative analysis used throughout this EIR; Table 5.1-6 and Figure 5.1-1 summarize cumulative projects in the vicinity of the Groundwater Supply Project. It is expected that construction of the facilities would begin in fall 2014 and be completed by spring 2016. As indicated in Figure 5.1-1, and presented in Table 5.1-6, construction of the facilities would occur within the same vicinity and timeframe as other planned and proposed projects. In addition to project-related construction impacts identified, construction activities at the well and pipeline sites would contribute incrementally to cumulative traffic increases from a number of other projects in the area that could be under construction at the same time and using the same roads to access work sites.

For example, as presented in Table 5.1-6, construction of the following cumulative projects is expected to coincide with the construction of components of the proposed project:

- *Parkmerced Project* could extend through 2030. Construction of this project could coincide with the construction of the planned Lake Merced well facility. The first phase of the Parkmerced project is expected to result in the highest level of construction activities, with Lake Merced Boulevard, Brotherhood Way, 19th Avenue, and Junipero Serra serving as the primary construction access routes.

- *San Francisco Botanical Gardens: Center for Sustainable Gardening* could begin in winter 2013 and last for about 17 months. This project is not proximate to any specific component of the proposed project, but could increase traffic temporarily on roadways used to access the three planned well facilities, and the pipeline segments extending to those well facilities, in Golden Gate Park.

- *Beach Chalet Athletic Fields Renovation Project* could begin in summer/fall 2013 and last for about 10 months. Construction of this project could coincide with the construction of the planned South Windmill Replacement well facility and Pipeline Segment 6. Martin Luther King Jr. Drive would serve as a construction access route.

- *San Francisco Westside Recycled Water Project* with a schedule to be determined, but could coincide with project construction. Construction of this project in the vicinity of the Oceanside Water Pollution Control Plant is not proximate to any specific component of the proposed project, but could increase traffic temporarily on roadways used to access the South Sunset and West Sunset well facilities and Pipeline Segments 1, 2, and 4.

- *Vista Grande Drainage Basin Improvement Project* could begin in 2015 and extend to 2017. Construction of this project could coincide with construction of the planned Lake Merced well facility.

In addition, the following projects in Table 5.1-6 are located near components of the proposed project, but the timing of their construction activities has not been established; therefore, it is not known at this time whether any or all of them would be under construction during construction of the proposed project:

- Ortega Street Traffic Calming Project
- 2800 Sloat Boulevard
- Ortega Street Bicycle Lanes

Roadways adjacent to and within the vicinity of the above-cited planned projects could experience an increase in traffic volumes and reduced roadway capacities due to combined construction activities, which could substantially worsen traffic conditions. While the effects of the detours and the additional construction-related vehicles could be accommodated within the capacity of the roadways and intersections, the increased traffic volumes, detours, and road and lane restrictions associated with the overlapping and concurrent projects could increase potential traffic hazards for vehicles, bicycles, and pedestrians on affected roadways during construction of each well facility and pipeline route. The combination of construction activities from these projects, in addition to the project construction-related impacts identified above, could also result in some temporary and intermittent travel lane or road closures adjacent to the work sites and increased construction traffic on local and regional roadways, all of which indicates the potential for a significant cumulative traffic impact to occur during construction.

However, as discussed under Impact TR-1 above, the required project-specific Construction Management Plan, as well as requirements specified in the *Regulations for Working in San Francisco Streets (Blue Book)*, would require the project to address potential transportation disruptions. In addition, the Construction Management Plan would require the SFPUC to engage in ongoing coordination with the appropriate jurisdictional agencies through the TASC, or to directly address potential cumulative transportation impacts from projects that could overlap in terms of schedule and/or location). Thus, the project's contribution to a significant cumulative traffic impact on local and regional roads would not be cumulatively considerable (less than significant), and no mitigation is required.

5.6.4 References

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5.7 Noise

This section provides an overview of the existing noise environment in the vicinity of the Groundwater Supply Project area; the regulatory framework; an analysis of potential noise impacts resulting from implementation of the project; and mitigation measures where appropriate.

5.7.1 Setting

Noise can be generally defined as unwanted sound. Sound travels in the form of waves from a source, exerting a pressure (referred to as a sound pressure or sound level) that is measured in decibels (dB). The threshold of human hearing is at about 0 dB, while the threshold of pain is in the range of 120–140 dB.

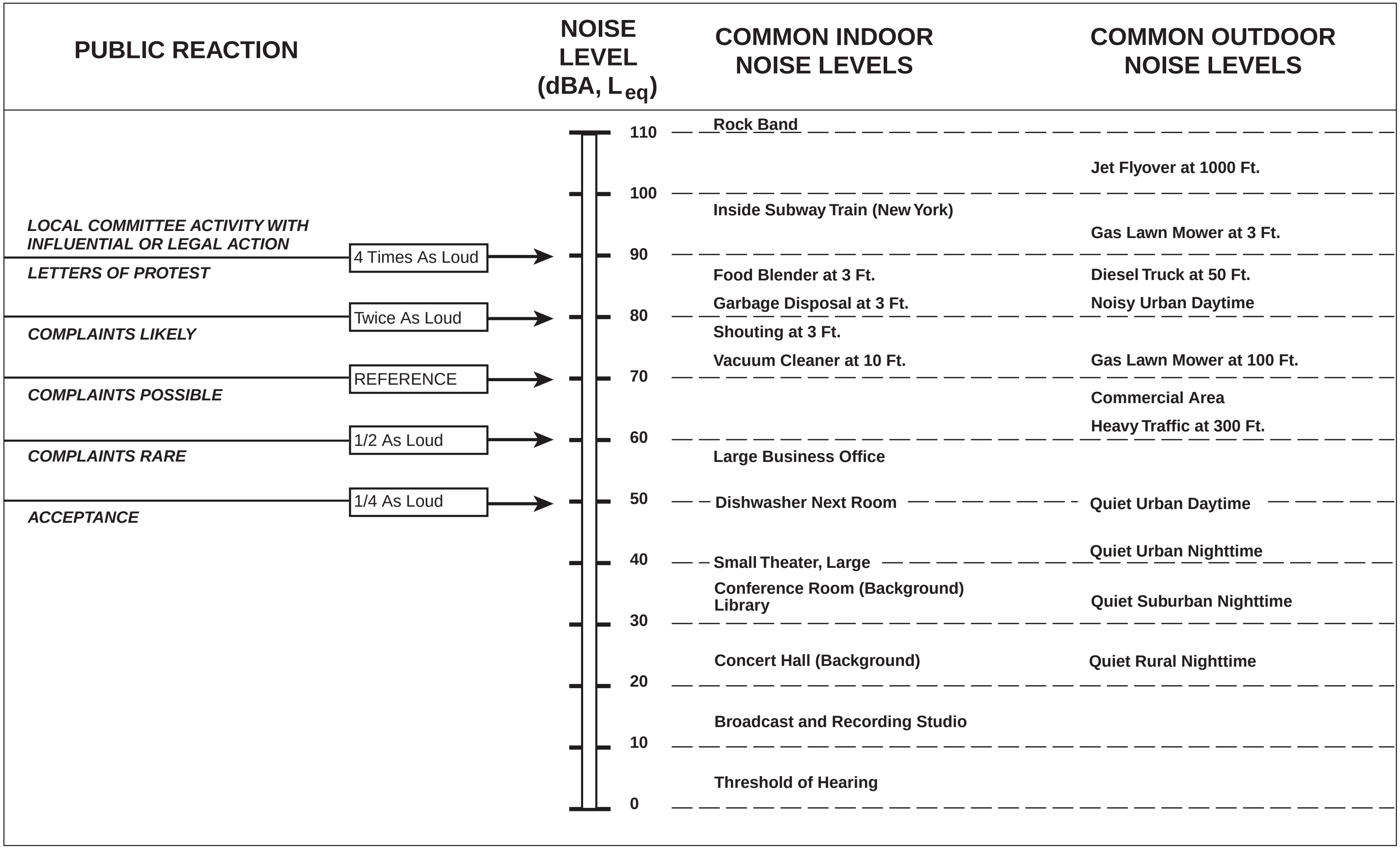
Sound pressure fluctuations can be measured in units of hertz (Hz), which correspond to the frequency of a particular sound. Typically, sound does not consist of a single frequency, but rather a broad band of frequencies varying in levels of magnitude (sound power). The sound pressure, therefore, constitutes the additive force exerted by a sound corresponding to the frequency/sound power spectrum.

The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. Therefore, to assess potential noise impacts, sound is measured with an electronic filter that de-emphasizes the frequencies below 1,000 Hz and above 5,000 Hz in a manner corresponding to the human ear's decreased sensitivity to extremely low and extremely high frequencies. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels (dBA). A-weighting follows an international standard methodology of frequency de-emphasis and is typically applied to community noise measurements. Some representative noise sources and their corresponding A-weighted noise levels are shown in **Figure 5.7-1**.

Noise Exposure and Community Noise

A noise level is a measurement of noise at a given instant in time (see Figure 5.7-1). The community noise exposures to individuals are measured over a period of time to legitimately characterize the community noise environment and evaluate the cumulative noise impacts.

Community noise is primarily the product of many distant contributing sound sources that constitute a relatively stable background level. A community noise environment varies continuously, with background noise levels gradually changing as distant noise sources such as traffic and atmospheric conditions are added and subtracted. In addition to slowly changing background noise, community noise can vary throughout the day due to short-duration, single-event noise events (e.g., aircraft flyovers, motor vehicles, sirens) that are readily identifiable to individuals. The time-varying characteristic of environmental noise is described using statistical noise descriptors, as summarized below:



SOURCE: ESA, 2007

San Francisco Groundwater Supply Project EIR

Figure 5.7-1
Effect of Noise on People

L_{eq}: The energy-equivalent sound level used to describe noise over a specified period of time, typically one hour, in terms of a single numerical value. The Leq is the constant sound level that would contain the same acoustic energy as the varying sound level during the same time period (i.e., the average noise exposure level for the given time period).

L_{dn}: 24-hour day and night A-weighted noise exposure level, which accounts for the greater sensitivity of most people to nighttime noise by weighting noise levels at night ("penalizing" nighttime noises). Noise between 10:00 p.m. and 7:00 a.m. is weighted (penalized) by adding 10 dBA to take into account the greater annoyance of nighttime noises.

CNEL: Similar to L_{dn}, the community noise equivalent level (CNEL) adds a 5-dBA "penalty" for the evening hours between 7:00 p.m. and 10:00 p.m. in addition to a 10-dBA penalty between the hours of 10:00 p.m. and 7:00 a.m.

As a general rule, in areas where the noise environment is dominated by traffic, the L_{eq} during the peak hour is generally within 1 to 2 dB of the L_{dn} at that location.

Effects of Noise on People

When a new noise is introduced into an environment, human reaction can be predicted by comparing the new noise to the existing ambient noise level. In general, the more a new noise exceeds the ambient noise level, the less acceptable the new noise will be judged by those hearing it. With regard to increases in A-weighted noise level, the following relationships occur:

- Except in carefully controlled laboratory experiments, a change of 1 dBA cannot be perceived.
- Outside the laboratory, a 3-dBA change is considered a just-perceivable difference.
- A change of at least 5 dBA is required before any noticeable change in human response is expected.
- A 10-dBA change is subjectively heard as approximately a doubling in loudness, and can cause adverse human response.

These relationships occur in part because of the logarithmic nature of sound and the decibel system. The human ear perceives sound in a non-linear fashion; hence, the dB scale was developed. Because the dB scale is based on logarithms, two noise sources do not combine in a simple additive fashion, but rather logarithmically. For example, if two identical noise sources produce noise levels of 50 dBA, the combined sound level would be 53 dBA rather than 100 dBA.

Noise Attenuation

Stationary point sources of noise, including stationary mobile sources such as idling vehicles, attenuate (lessen) at a rate between 6 dBA (for hard sites) and 7.5 dBA (for soft sites) for each doubling of distance from the reference measurement. Hard sites are those with a reflective surface between the source and the receiver, such as parking lots or smooth bodies of water. No excess ground attenuation is assumed for hard sites, and the changes in noise levels with distance (drop-off rate) is simply the geometric spreading of the noise from the source. Soft sites have an absorptive ground surface such as soft dirt, grass, or scattered bushes and trees. In addition to geometric spreading, an excess ground attenuation value of 1.5 dBA (per doubling distance) is normally assumed for soft sites. Line sources, such as traffic noise from vehicles, attenuate at a rate between 3 dBA (for hard sites) and 4.5 dBA (for soft sites) for each doubling of distance from the reference measurement (Caltrans, 1998).

Fundamentals of Vibration

As described in the Federal Transit Administration's (FTA) Transit Noise and Vibration Impact Assessment (FTA, 2006), groundborne vibration can be a concern for nearby neighbors of a transit system route or maintenance facility, causing buildings to shake and rumbling sounds to be heard. In contrast to airborne noise, groundborne vibration is not a common environmental problem. It is unusual for vibration from sources such as buses and trucks to be perceptible, even in locations close to major roads. Some common sources of groundborne vibration are trains, buses on rough roads, and construction activities such as blasting, pile-driving, and operation of heavy earthmoving equipment.

Several different methods are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. PPV is most frequently used to describe vibration impacts on buildings. Typically, groundborne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receptors for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and the sick), and vibration-sensitive equipment. The effects of groundborne vibration include movement of building floors, rattling of windows, shaking of items on shelves or hanging on walls, and rumbling sounds. In extreme cases, vibration can cause damage to buildings. Building damage is not a factor for most projects, with the occasional exception of blasting and pile-driving during construction. The FTA measure of the threshold of architectural damage for structures is 0.2 inch per second PPV (FTA, 2006).

Existing Noise Environment

The noise environment surrounding the project sites is influenced primarily by truck and automobile traffic on local streets. To quantify the existing noise environment, seven short-term (5-minute) and four long-term (72-hour) noise level measurements were taken on and around the project sites. Given the similarity in the setting of the Golden Gate Park locations (fairly isolated areas within an urban park), long-term noise level measurements were not taken at all well locations. Short-term noise level measurements were taken in the vicinity of Sunset Reservoir to represent a pipeline location that is within a residential area, but that is not in the vicinity of a well facility. All noise measurements were collected using calibrated Metrosonics dB3080 sound level meters. The locations of the noise measurements are shown on **Figure 5.7-2**. Results of the short-term noise measurements are presented in **Table 5.7-1**.

SOURCE: ESRI, 2010; ESA, 2011

San Francisco Groundwater Supply Project EIR

Figure 5.7-2
Noise Measurement Locations

TABLE 5.7-1
EXISTING NOISE ENVIRONMENTS AT PROPOSED PROJECT LOCATION

Location	Time Period	L_{eq} (dB)	Noise Sources
ST-1: Lake Merced Well Facility Site	Wednesday 11/11/10 10:09–10:14 a.m.	5-minute average noise level, L_{eq} 63	Traffic on Lake Merced Boulevard, airplanes
LT-1: Lake Merced Well Facility Site	24-hour CNEL measurements: Thursday - 67 Friday - 67 Saturday - 68	Hourly average L_{eq}: 59–64	Unattended noise measurements do not specifically identify noise sources.
ST-2: South Sunset Well Facility Site	Wednesday 11/11/10 10:52–10:57 a.m.	5-minute average noise level, L_{eq} 63	Traffic on local roadways, kids at recess
LT-2: South Sunset Well Facility Site	24-hour CNEL measurements: Thursday - 65 Friday - 64 Saturday - 65	Hourly average L_{eq}: 55–64	Unattended noise measurements do not specifically identify noise sources.
ST-3: West Sunset Well Facility Site	Wednesday 11/11/10 11:21–11:26 a.m.	5-minute average noise level, L_{eq} 55	Nearby construction noise
LT-3: West Sunset Well Facility Site	24-hour CNEL measurements: Thursday - 62 Friday - 60 Saturday - 61	Hourly average L_{eq}: 51–63	Unattended noise measurements do not specifically identify noise sources.
ST-6: Central Pump Station Well Facility Site	Wednesday 11/11/10 1:52–1:57 p.m.	5-minute average noise level, L_{eq} 60	Traffic on local roadways
ST-5: South Windmill Replacement Well Facility Site	Wednesday 11/11/10 12:14–12:19 p.m.	5-minute average noise level, L_{eq} 59	Traffic on local roadways, wind, birds, ocean
ST-4: North Lake Well Facility Site	Wednesday 11/11/10 1:10–1:15 p.m.	5-minute average noise level, L_{eq} 69	Traffic on local roadways
LT-4: North Lake Well Facility Site	24-hour CNEL measurements: Thursday - 75 Friday - 76 Saturday - 76	Hourly average L_{eq}: 66–74	Unattended noise measurements do not specifically identify noise sources.
ST-7: Sunset Reservoir (Ortega and 28th Avenue)	Wednesday 11/11/10 2:21–2:26 p.m.	5-minute average noise level, L_{eq} 57	Traffic on local roadways

NOTES:
ST = short-term (5 minutes)
LT = long-term (72 hours)

SOURCE: Data collected by ESA for this EIR.

Sensitive Receptors

People in residences, motels and hotels, schools, libraries, churches, hospitals, nursing homes, and auditoriums are generally more sensitive to noise than those at commercial and industrial establishments. Consequently, the noise standards for such sensitive land uses are more stringent than those for less sensitive uses. Sensitive receptors in the vicinity of the project include residences, schools, hospitals, and religious facilities. In general, residences and schools are among the land uses considered to be the most sensitive to noise. Active parks and playgrounds are not as sensitive to noise as residences, schools, hospitals, or convalescent care facilities, because the levels of background noise at parks with active recreational uses and school playgrounds are elevated. However, users of natural recreation areas may value an increased degree of quiet for passive recreational uses. Open space or outdoor recreation areas that are used for passive recreational activities such as hiking and picnicking are considered noise-sensitive uses if the noise environment is considered to contribute to the recreational experience (see Section 5.11, Recreation, for a discussion of impacts on recreational resources). The nearest sensitive land uses to pipeline construction would be residences adjacent to pipeline routes, which are as close as approximately 20 feet away. The nearest sensitive receptor to a well facility is a residence (the South Sunset well facility is approximately 60 feet from a residence).

5.7.2 Regulatory Framework

Federal Regulations

There are no federal standards related to noise that apply to this project.

State Regulations

There are no State standards related to noise that apply to this project.

Local Regulations

City of San Francisco Noise Ordinance

Sections 2907(a) and (b) of the San Francisco Noise Ordinance (Article 29 of the San Francisco Police Code) (CCSF, 2008) state that construction equipment shall not emit noise in excess of 80 dBA when measured at a distance of 100 feet, or at an equivalent sound level at some other convenient distance. This noise level limit is not applicable to impact tools and equipment that contain manufacturer-recommended noise-attenuating intake and exhaust mufflers approved by the Director of Public Works or the Director of Building Inspection. This noise level limit is also not applicable to pavement breakers and jackhammers provided that such equipment is fitted with manufacturer-recommended acoustically attenuating shields or shrouds that are approved by the Director of Public Works or the Director of Building Inspection.

Section 2908 states that nighttime construction noise is limited to 5 dBA above the ambient noise level at the nearest property between the hours of 8:00 p.m. of any day and 7:00 a.m. of the following day, unless a special permit has been applied for and granted by the Director of Public Works or the Director of Building Inspection.

Section 2909 stipulates operational noise level thresholds, as follows: Residential properties shall not produce noise levels more than 5 dBA above the ambient at any point outside the property plane. Commercial and industrial properties shall not produce noise levels more than 8 dBA above the local ambient at any point outside the property plane. Public properties shall not produce noise levels more than 10 dBA above the local ambient at a distance of 25 feet or more, unless the machine or device is being operated to serve or maintain the property.

5.7.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant noise effect if it were to:

- Result in exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;
- Result in exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels;
- Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project;
- Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project;
- For a project located within an airport land use plan area, or, where such a plan has not been adopted, in an area within two miles of a public airport or public use airport, expose people residing or working in the area to excessive noise levels;
- For a project located in the vicinity of a private airstrip, expose people residing or working in the project area to excessive noise levels; or
- Be substantially affected by existing noise levels.

Approach to Analysis

This section describes the impacts that have been screened out from further analysis and the reasons why; and describes the approach to impact analysis.

Due to the nature of the project, there would be no impacts related to the following criteria for the reasons stated below:

- ***For Projects Located Near Airport Land Use Area, Public Airports or Private Air Strips, Expose People to Excessive Noise Levels.*** There are no airport land use areas, airports, or private airstrips in the project vicinity. Therefore, the project would not result in the long-term exposure of people to excessive airport-related noise levels, and no further discussion of these criteria is presented.

- ***Existing Noise Level Impact on Project.*** The proposed project is a water utility project and would not be affected by existing noise levels. Because the project is not a noise-sensitive land use, the last criterion would not apply to this project, and no further discussion is presented.

Construction Noise Impacts

For construction (short-term) noise, the potential for impacts was assessed by considering: (1) the proximity of project-related noise sources to sensitive receptors; (2) typical noise levels associated with construction equipment; (3) the potential for construction noise levels to interfere with daytime and nighttime activities; (4) the duration that sensitive receptors would be affected; and (5) whether proposed activities would occur outside the construction time limits of the City's noise ordinance.

Because no nighttime construction (between the hours of 8:00 p.m. and 7:00 a.m.) would occur (see Section 3.4.4, Construction Schedule), project construction would not take place outside the construction time limits of the City's ordinance and would not interfere with nighttime activities.

To address the CEQA significance criteria regarding whether the project would result in 1) the exposure of persons to, or the generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies, or 2) a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project, a "substantial" noise increase is defined as an increase in noise to a level that causes interference with daily activities.

Temporary, construction-related noise impacts associated with the proposed project are analyzed in this EIR in a manner consistent with all development projects within San Francisco. Generally, compliance with the San Francisco Noise Ordinance, which is required by law and was established to prevent or reduce construction-related nuisance noise, and implementation of project-specific mitigation measures, would reduce construction noise effects from any well facilities or pipelines to a less-than-significant level.

Proposed construction activities would be required to comply with the San Francisco Noise Ordinance, which limits construction noise between 8:00 p.m. and 7:00 a.m. to 5 dBA above the ambient noise level at the nearest property unless a permit has been applied for and granted by the Director of Public Works or the Director of Building Inspection. The ordinance also limits noise from any individual piece of construction equipment, except impact tools approved by the Department of Public Works, to 80 dBA at 100 feet. The impact analysis compares proposed construction activities to standards to determine if they would result in the exposure of persons to or generate noise levels in excess of the standards.

Project excavation and facility construction could result in vibration that could disturb local residents and cause cosmetic damage to buildings and structures. The impact assessment for vibration assesses whether construction would result in "excessive groundborne vibration." The vibration impact analysis presented below uses standard analytical methodologies, which in this case included estimating vibration levels at sensitive receptors for a given vibration source and setback distance, comparing the estimated vibration level to recommended limits or significance thresholds, determining potentially significant impacts on nearby sensitive receptors, and providing mitigation where applicable.

For this analysis, the following criterion was used to determine the significance of construction-related vibration effects (FTA, 2006):

- The FTA threshold for building damage of 0.2 inch per second PPV

Operational Noise Impacts

Proposed operational activities would be required to comply with the San Francisco Noise Ordinance, which states that operation of machines or other devices on public properties shall not produce noise levels more than 10 dBA above the local ambient at a distance of 25 feet or more, unless the machines or devices are used for serving or maintaining the property (Police Code Section 2909[c]). As long as operational equipment is in compliance with the noise ordinance, project operations would not expose persons to or generate of noise levels in excess of standards, or result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.

Impact Summary

Table 5.7-2 summarizes the results of the noise impact analysis.

TABLE 5.7-2
SUMMARY OF IMPACTS – NOISE

Impact	Significance Determination
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.	LSM
Impact NO-2: Construction activities would not result in substantial groundborne vibration or groundborne noise levels.	LS
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.	LS
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.	LS

NOTES:
LS = Less than Significant impact, no mitigation required
LSM = Less than Significant impact with Mitigation

Impact Analysis

Construction Impacts

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 and therefore result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. (Less than Significant with Mitigation)

Proposed project construction would be required to comply with the San Francisco Noise Ordinance, which limits noise from any individual piece of construction equipment to 80 dBA at 100 feet (except for impact tools and equipment, provided that such impact tools and equipment have intake and exhaust mufflers recommended by the manufacturer and approved by the Department of Public Works). **Table 5.7-3** presents typical noise levels for the proposed project construction equipment that would result in the highest noise levels. As indicated, some construction equipment has the potential to exceed the restrictions of the Noise Ordinance for individual pieces of construction equipment, which would result in a significant noise impact.

TABLE 5.7-3
TYPICAL NOISE LEVELS FROM CONSTRUCTION ACTIVITIES AND CONSTRUCTION EQUIPMENT

Construction Equipment	Noise Level (dBA, L_{eq} at 50 feet)	Noise Level (dBA, L_{eq} at 100 feet)
Dump truck	88	82
Excavator	88	82
Generator	76	70
Backhoe	80	74
Loader	80	74
Roller	78	72
Crane	83	77
Auger Drill Rig[a]	85	79
Vibrocompactor	76	70
Forklift	80	74
Manual Compactor	82	76

[a] Exempt from the ordinance requirement of 80 dBA at 100 feet.

SOURCES: EPA, 1971; Cunniff, 1977; FHWA, 2006.

Construction activities that would be associated with the proposed project are anticipated to occur continuously for approximately 24 months with some overlap between phases. Construction activities would include site preparation, grading, placement of infrastructure, drilling and trenching. Excavation and construction activities would require the use of heavy trucks, excavating and grading equipment, material loaders, cranes, concrete breakers, and other mobile and stationary construction equipment. Construction-related noise levels within and adjacent to the project sites would fluctuate depending on the particular type, number, and duration of uses of various pieces of construction equipment. Construction activities could generate significant amounts of noise within the project sites and on roadways accessing the sites, corresponding to the particular phase of construction and the noise-generating equipment used during construction. In addition, construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of truck haul trips made and types of vehicles used.

As explained above, noise from construction activities generally attenuates at a rate of 6 to 7.5 dBA per doubling distance. Based on the project site layout and terrain, an attenuation of 6 dBA per doubling distance is assumed for the Lake Merced well facility, South Sunset well facility, and West Sunset well facility (hard sites); for the remaining sites (soft sites), an attenuation rate of 7.5 dBA per doubling distance is assumed. **Table 5.7-4** summarizes the noise level associated with the proposed project, at the nearest sensitive receptor for each project area. Table 5.7-4 also indicates the noise level with equipment controls included in Mitigation Measure M-NO-1, described at the end of this impact discussion. Construction activities and ambient noise effects are further described below for each project site.

Lake Merced Well Facility Site

The new well facility would be developed approximately 300 feet southwest of the existing pump station on Lake Merced Boulevard next to Lake Merced, and south of the Tournament Players Cup Harding Park. Construction of the Lake Merced well facility would require clearing and grubbing of the project site, which would require the removal of existing asphalt paving and excavation. The nearest sensitive receptor to construction would be approximately 300 feet away on Vidal Drive. Table 5.7-4 indicates that truck and excavator noise could be 88 dBA at 50 feet; if the noise occurred at 300 feet, this residence would experience noise levels of about 72 dBA L_{eq} during site finishing and excavation (the loudest proposed construction activities).

South Sunset Well Facility Site

The proposed well facility site is on the corner of the South Sunset Playground at 40th Avenue and Wawona Street next to a public recreational field used for softball, baseball, and soccer. Construction of the South Sunset well facility would require the removal of portions of an existing retaining wall, chain-link fencing, and concrete paving, as well as excavation into an existing slope. The nearest sensitive receptor to construction would be approximately 60 feet away. Table 5.7-4 indicates that truck and excavator noise could be 88 dBA at 50 feet; if the noise occurred at 60 feet, this sensitive receptor would experience noise levels of about 86 dBA L_{eq} during finishing and excavation (the loudest proposed construction activities).

West Sunset Well Facility Site

The proposed well facility site is at the West Sunset Playground, at the intersection of 40th Avenue and Quintara Street adjacent to a San Francisco Recreation and Park Department–managed public recreational field used for softball, baseball, and soccer. Construction of the West

TABLE 5.7-4
ESTIMATED CONSTRUCTION NOISE LEVELS (dBA) AT THE CLOSEST SENSITIVE RECEPTORS[a]

Project and Receptor Location	Maximum Noise Source	Reference Hourly L_{eq} in dBA at 50 feet[b]	Distance Between Project and Closest Residential Receptors (Lowest Stories)[c]	Distance Adjustment	L_{eq} Adjusted for Distance	With Required Compliance with Ordinance Limit of 80 dBA at 100 feet or 86 dBA at 50 feet	L_{eq} Adjusted for Ordinance Limit	Noise Reduction Measures (Mitigation Measure M-NO-1)[d]	Mitigated L_{eq} With Controls
Well Facility Construction									
Lake Merced Well Facility	Backhoe	80	300	-16	64	0	64	-5	59
	Loader	80	300	-16	64	0	64	-4	58
	Pump	78	300	-16	62	0	62	-3	59
	Various Trucks	88	300	-16	72	-2	70	-13	57
	Excavator	88	300	-16	72	-2	70	-13	57
	Crane	83	300	-16	67	0	67	-8	59
	Vibrocompactor	76	300	-16	60	0	60	-1	59
South Sunset Well Facility	Backhoe	80	60	-2	78	0	78	-5	73
	Loader	80	60	-2	78	0	78	-4	74
	Pump	78	60	-2	76	0	76	-3	73
	Various Trucks	88	60	-2	86	-2	84	-13	71
	Excavator	88	60	-2	86	-2	84	-13	71
	Crane	83	60	-2	82	0	81	-8	73
West Sunset Well Facility	Backhoe	80	85	-5	75	0	75	-5	70
	Loader	80	85	-5	75	0	75	-4	71
	Pump	78	85	-5	73	0	73	-3	70
	Various Trucks	88	85	-5	83	-2	81	-13	68
	Excavator	88	85	-5	83	-2	81	-13	68
	Crane	83	85	-5	78	0	78	-8	70
Central Pump Station Well Facility	Backhoe	80	1,350	-36	44	0	44	-5	39
	Loader	80	1,350	-36	44	0	44	-4	40
	Pump	78	1,350	-36	42	0	42	-3	39
	Various Trucks	88	1,350	-36	52	-2	50	-13	37
	Excavator	88	1,350	-36	52	-2	50	-13	37
	Crane	83	1,350	-36	47	0	47	-8	39
South Windmill Replacement Well Facility	Backhoe	80	550	-26	54	0	54	-5	49
	Loader	80	550	-26	54	0	54	-4	50
	Pump	78	550	-26	52	0	52	-3	49
	Various Trucks	88	550	-26	62	-2	60	-13	47
	Excavator	88	550	-26	62	-2	60	-13	47
	Crane	83	550	-26	57	0	57	-8	49
North Lake Well Facility	Backhoe	80	100	-8	72	0	72	-5	67
	Loader	80	100	-8	72	0	72	-4	68
	Pump	78	100	-8	70	0	70	-3	67
	Various Trucks	88	100	-8	80	-2	78	-13	65
	Excavator	88	100	-8	80	-2	78	-13	65
	Crane	83	100	-8	75	0	75	-8	67

TABLE 5.7-4 (Continued)
ESTIMATED CONSTRUCTION NOISE LEVELS (dBA) AT THE CLOSEST SENSITIVE RECEPTORS[a]

Project and Receptor Location	Maximum Noise Source	Reference Hourly L_{eq} in dBA at 50 feet[b]	Distance Between Project and Closest Residential Receptors (Lowest Stories)[c]	Distance Adjustment	L_{eq} Adjusted for Distance	With Required Compliance with Ordinance Limit of 80 dBA at 100 feet or 86 dBA at 50 feet	L_{eq} Adjusted for Ordinance Limit	Noise Reduction Measures (Mitigation Measure M-NO-1)[d]	Mitigated L_{eq} With Controls
Pipeline Construction									
Pipeline Segments 1, 2, and 4	Backhoe	80	20	8	88	0	88	-5	83
	Loader	80	20	8	88	0	88	-4	84
	Pump	78	20	8	86	0	86	-3	83
	Various Trucks	88	20	8	96	-2	94	-13	81
	Crane	83	20	8	91	0	91	-8	83
	Excavator	88	40	2	90	-2	88	-10	78
	Auger Drill Rig	85	40	2	87	0	87	-6	81
	Backhoe	80	40	2	82	0	82	-5	77
	Various Trucks	88	40	2	90	-2	88	-13	75
Pipeline Segment 3	Backhoe	80	215	-16	64	0	64	-5	59
	Loader	80	215	-16	64	0	64	-4	61
	Pump	78	215	-16	62	0	62	-3	59
	Various Trucks	88	215	-16	72	0	72	-13	59
	Crane	83	215	-16	67	0	67	-8	59
Pipeline Segment 5	Backhoe	80	400	-23	57	0	57	-5	52
	Loader	80	400	-23	57	0	57	-4	53
	Pump	78	400	-23	55	0	55	-3	52
	Various Trucks	88	400	-23	65	0	65	-13	52
	Crane	83	400	-23	60	0	60	-8	52
Pipeline Segment 6	Backhoe	80	215	-16	64	0	64	-5	59
	Loader	80	215	-16	64	0	64	-4	61
	Pump	78	215	-16	62	0	62	-3	59
	Various Trucks	88	215	-16	72	0	72	-13	59
	Crane	83	215	-16	67	0	67	-8	59
Chlorine Analyzer, pH Adjustment Facility, Chemical Injection Pipeline	Backhoe	80	155	-10	70	0	70	-5	65
	Forklift	80	155	-10	70	0	70	-4	66
	Manual Compactor	82	155	-10	72	0	72	-1	71
	Various Trucks	88	155	-10	78	-2	76	-13	63
	Crane	83	155	-10	73	0	73	-8	65
	Excavator	88	155	-10	78	-2	76	-10	66

[a] Actual noise-generating construction activities are expected to be intermittent over the entire construction duration.
[b] Reference noise levels represent noise levels for similar equipment types (without controls) at 50 feet (FTA, 2006; EPA, 1971). These estimates assume that one piece of equipment would be operated 100 percent of the time at full throttle at the closest possible distance to the receptor. Although this worst-case assumption is unlikely, it is used to offset the variable proximity of multiple pieces of equipment operating along the pipeline alignment with variable throttle speeds and durations during any given hour.
[c] Each distance represents the minimum distance between the receptor and the closest construction activity.
[d] Source control reductions represent noise level reductions achievable with quieter procedures or engine controls, as specified by the EPA (1971) [Table IV] and listed in Mitigation Measure M-NO-1.

Sunset well facility would require the removal of portions of existing asphalt paving, a retaining wall, a concrete curb, as well as excavation into an existing hillside slope. In addition, existing damaged portions of chain-link fencing adjacent to the site would be replaced (see Section 3.4.1 Groundwater Well Facilities). The nearest sensitive receptor to construction would be approximately 85 feet away on Quintara Street. Table 5.7-4 indicates that truck and excavator noise could be 88 dBA at 50 feet; if the noise occurred at 85 feet, this sensitive receptor would experience noise levels of about 83 dBA Leq during finishing and excavation (the loudest proposed construction activities). Well site finishing and excavation (clearing, grubbing, preparation) is expected to take between two and nine weeks.

Central Pump Station Well Facility Site

Construction of the Central Pump Station well facility would require clearing and grubbing of the project site as well as excavation. The nearest residence is approximately 1,350 feet south on Lincoln Way. Table 5.7-4 indicates that truck and excavator noise could be 88 dBA at 50 feet; if the noise occurred at 1,350 feet, this residence would experience noise levels of about 52 dBA L_{eq} during finishing and excavation (the loudest proposed construction activities).

South Windmill Replacement Well Facility Site

The existing South Windmill Replacement well facility site is within the western area of Golden Gate Park north of Martin Luther King Jr. Drive and east of the Murphy Windmill and Millwright's Cottage. The project would replace the existing building, replace the existing pump, and install new piping and valves. South Windmill Replacement well facility construction would require demolition of an existing irrigation well building and associated asphalt pavement, fencing, and concrete paving, as well as excavation. The nearest residence to construction is approximately 550 feet south on Lincoln Way. Table 5.7-4 indicates that truck and excavator noise could be 88 dBA at 50 feet; if the noise occurred at 550 feet, this residence would experience noise levels of about 62 dBA L_{eq} during finishing and excavation (the loudest proposed construction activities).

North Lake Well Facility Site

The existing North Lake well facility site is next to Chain of Lakes Drive within the western area of Golden Gate Park, south of Fulton Street. The project would replace the existing building, replace the pump, and install new piping and valves. North Lake well facility construction would require excavation; demolition of an irrigation well building; removal of a chain-link fence, posts, and gate; and construction of asphalt pavement and a masonry wall. The nearest sensitive receptor to construction would be approximately 100 feet north on Fulton Street, where existing daytime ambient noise levels were measured to be 69 dBA. Table 5.7-4 indicates that truck and excavator noise could be 88 dBA at 50 feet; if the noise occurred at 100 feet, this sensitive receptor would experience noise levels of about 80 dBA L_{eq} during finishing and excavation (the loudest proposed construction activities) or about 11 dBA above the existing ambient level. Well facility site finishing and excavation (clearing, grubbing, preparation) is expected to take between two and nine weeks.

There may be a period when pipeline construction (discussed in following subsections) occurs in this area simultaneously with well facility construction. Generally, pipeline construction is proposed to progress at a linear rate of 60 to 120 feet per day. Consequently, the potential combined impacts of these activities may affect a given sensitive receptor for up to three days and result in noise levels approximately 3 dBA greater than those discussed above.

Pipeline Segments South of Golden Gate Park and Sunset Reservoir Connection

The nearest sensitive receptors along Pipeline Segment 1 (West Sunset well facility to Sunset Reservoir), Pipeline Segment 2 (Golden Gate Park Pipeline Junction to West Sunset Playground), and Pipeline Segment 4 (South Sunset well facility to West Sunset well facility) would be approximately 20 feet from construction activity. Table 5.7-4 indicates that truck noise could be 88 dBA at 50 feet; if the noise occurred at 20 feet, these sensitive receptors would experience noise levels of about 96 dBA L_{eq} during finishing and excavation (the loudest proposed construction activities). However, pipeline construction activities would take place in the vicinity of each sensitive receptor for a short time period, because pipeline installation would progress at a rate of approximately 60 to 120 feet per day. At two weeks, pipeline construction would have progressed 600 to 1,200 feet farther down the pipeline, thus attenuating construction noise to between approximately 63 and 57 dBA at these sensitive receptors.

An auger drill rig and excavator would be used to drill under the MUNI light rail lines at Taraval Street and Judah Street. This activity would require excavation of a driving pit over an approximately one week period followed by a two week period where horizontal boring using an auger drill rig would occur simultaneous with excavation of the receiving pit. Backfill and repaving would occur later, over a period of approximately one week. Noise-sensitive receptors would be located approximately 40 feet from drilling at both crossings. Table 5.7-4 indicates that noise from a backhoe involved with excavation of the driving pit could be up to 80 dBA at 50 feet; if the noise were to occur at 40 feet, these sensitive receptors would experience noise levels of about 82 dBA. Truck noise could be 88 dBA at 50 feet; if this noise were to occur at 40 feet, these sensitive receptors would experience noise levels of about 88 dBA. Drill rig noise could be 85 dBA at 50 feet; if this noise were to occur at 40 feet, these sensitive receptors would experience noise levels of about 87 dBA. Excavator noise could be 88 dBA at 50 feet; if this noise were to occur at 40 feet, these sensitive receptors would experience noise levels of about 90 dBA.

Pipeline Segment 3 (Central Pump Station Well Facility to Golden Gate Park Pipeline Junction)

The nearest sensitive receptors would be approximately 215 feet to the south of construction along Lincoln Boulevard, which is generally parallel to the western portion of this pipeline segment. Table 5.7-4 indicates that truck noise could be 88 dBA at 50 feet; if the noise occurred at 215 feet, these sensitive receptors would experience noise levels of about 72 dBA L_{eq} during excavation and finishing (the loudest proposed construction activities). As noted above, pipeline construction activities would be in the vicinity of each sensitive receptor for a short time period, because pipeline installation would progress at a rate of approximately 60 to 120 feet per day.

Pipeline Segment 5 (North Lake Well Facility to Golden Gate Park Pipeline Junction)

The nearest sensitive receptors would be approximately 400 feet to the north of the northern end of construction along this pipeline segment, which extends from the service road to the well facility south to the Golden Gate Park Pipeline Junction. Table 5.7-4 indicates that truck noise could be 88 dBA at 50 feet; if the noise occurred at 400 feet, these sensitive receptors would experience noise levels of about 65 dBA L_{eq} during excavation finishing (the loudest proposed construction activities).Noise levels experienced at sensitive receptors would decrease as pipeline construction moves farther to the south along this pipeline segment, with pipeline installation progressing at a rate of approximately 60 to 120 feet per day.

Pipeline Segment 6 (South Windmill Replacement Well Facility to Golden Gate Park Pipeline Junction)

The nearest sensitive receptors would be approximately 215 feet to the south of construction along Lincoln Boulevard, which is generally parallel to the pipeline segment. Table 5.7-4 indicates that truck noise could be 88 dBA at 50 feet; if the noise occurred at 215 feet, these sensitive receptors would experience noise levels of about 72 dBA L_{eq} during excavation and finishing (the loudest proposed construction activities). As noted above, pipeline construction activities would be in the vicinity of each sensitive receptor for a short time period, because pipeline installation would progress at a rate of approximately 60 to 120 feet per day.

Sunset Reservoir

● Construction at the Sunset Reservoir would include installing a concrete pad and chlorine analyzer at the northwest corner of Sunset Reservoir. However, the majority of the Sunset Reservoir activities would occur in the vicinity of Pacheco Street and 28th Avenue where a pH adjustment facility would be located to the northeast of the existing Sunset Chlorine Station, along with chemical injection piping between the pH adjustment facility and the north and south basins of the Sunset Reservoir. Finally, a new vault would be installed behind the reservoir fenceline near 28th Avenue, along with an electrical conduit between the vault and the existing Sunset Chlorine Station. The nearest noise-sensitive receptor to this area is 155 feet to the west.

Table 5.7-4 indicates that truck and excavator noise could be 88 dBA at 50 feet; if the noise were to occur at 155 feet, this sensitive receptor would experience noise levels of about 78 dBA L_{eq} during finishing and excavation (the loudest proposed construction activities). Noise from cranes, forklifts, and compacting equipment would be 67 to 70 dBA. Construction activities at Sunset Reservoir (clearing, grubbing, and site preparation) is expected to take up to four months.

Construction Haul Truck Noise

The number of construction-related haul truck trips per day would vary depending on the type of construction technique, the volume of spoils and fill, and the pace of work. As presented in Chapter 3, Project Description, open-cut trenching and excavation would be used during pipeline installation, which would require haul trucks to export excavated spoils and import fill material along the alignment. Haul truck trips would also be generated during demolition of the existing structures at the South Windmill Replacement well and North Lake well facility sites and construction of the well facilities. This increase in truck traffic compared to existing conditions would contribute incrementally to traffic noise along these streets.

Truck noise levels depend on vehicle speed, load, terrain, and other factors. The effects of construction-related truck traffic would depend on the preexisting level of background noise at a particular sensitive receptor. In quiet noise environments such as residential neighborhoods that are protected by structural or topographic sound barriers (L_{eq} averaging 50 dBA), one truck per hour would be noticeable even though such a low volume would not measurably increase noise levels. In slightly noisier environments, such as freeway interchanges, where sensitive receptors are not protected by structural or topographic sound barriers (L_{eq} averaging 60 dBA), the threshold level is higher, and 10 trucks per hour would be required to noticeably increase noise, as calculated based on California Department of Transportation (Caltrans) methodology; in moderately noisy environments (L_{eq} averaging 70 dBA), a noise increase would be perceptible with the addition of 100 trucks per hour (Caltrans, 1998).

According to background noise levels estimated for San Francisco streets (San Francisco Department of Public Health, 2009), existing traffic noise levels along streets designated as proposed truck routes for this project range from 60 dBA (L_{dn}) to more than 70 dBA (L_{dn}). Based on the L_{dn} / L_{eq} (day) relationship in noise measurements collected in the project areas, L_{eq} noise levels along these streets are likely approximately 2 dBA less than the L_{dn} levels. With this adjustment, ambient noise levels along streets designated as proposed truck routes range between 58 and 68 dBA (L_{eq}) in the project area. Therefore, increases of up to 10 trucks per hour would be noticeable but less than significant. As discussed in Section 5.6, Transportation and Circulation, based on the estimated amount of traffic generated by each project component, concurrent construction activities would result in up to 16 haul trucks per day traveling to and from the work sites. Haul truck trips would be spread over the course of the day. The highest concentration of vehicle trips traveling to and from the well facility sites would be on the roads that provide direct access to the sites (e.g., on Quintara Street for the West Sunset well facility site and Lake Merced Boulevard for the Lake Merced well facility site). However, not all of the four well facilities and three pipelines would be located near each other. For this reason, project construction would not generate more than 10 haul trucks per hour on any one street providing access to and from a site; therefore, project haul trips would not result in a noticeable noise increase at sensitive receptors.

Impact Summary

As described above, construction-related noise associated with the South Sunset, West Sunset, and North Lake well facilities, the Sunset Reservoir facilities, and pipeline segments south of Golden Gate Park would result in a noticeable but temporary increase in ambient noise levels (a significant impact). Noise from some construction equipment could exceed limits established in the San Francisco Noise Ordinance. Although proposed construction activities would occur over a period of approximately 24 months, the construction activities that would impact noise-sensitive receptors at any one location would be temporary. Nevertheless, these noise impacts would be reduced with implementation of **Mitigation Measure M-NO-1, Administrative and Source Controls**, which requires installation of feasible engine controls, as necessary, to ensure that noise does not exceed the 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. Mitigation Measure M-NO-1 requires use of equipment with lower noise emissions and sound controls or barriers where feasible, location of stationary equipment as far as possible from sensitive receptors, and designation of a noise coordinator, and would decrease construction noise levels and minimize the significant effects. Therefore, the noise impact at these locations would be less than significant with mitigation.

Mitigation Measures

Mitigation Measure M-NO-1: Administrative and Source Controls. The SFPUC shall ensure that a noise control plan is prepared and implemented by a qualified noise consultant, defined as a board-certified Institute of Noise Control Engineering member or other qualified consultant or engineer approved by the project engineer. The SFPUC shall verify that the noise control plan contains at least the following elements:

- *Daytime:* Construction noise levels shall not exceed the 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. at all residential receptors (except where construction activities occur for two weeks or less at one location).

The noise control plan shall identify noise-sensitive receptor locations and include measures that can be employed to maintain noise levels at or below these performance standards, which could include, but not be limited to, the following:

- Implement best available noise control techniques such as mufflers, intake silencers, ducts, engine enclosures, acoustically attenuating shields or shrouds.
- Limit continuous operation of heavy equipment near sensitive receptors.
- Locate stationary noise sources (e.g., generators, fans, pumps) as far from sensitive receptors as possible and use noise controls (e.g., enclosures, barriers) as necessary.
- The name and phone number of a SFPUC designated project liaison shall be posted at project facility construction sites so that the public can contact the liaison if noise disturbance occurs. This liaison shall immediately take steps to resolve any complaints received, including modifying construction practices as necessary to address the noise complaint.

Impact NO-2: Construction activities would not result in substantial groundborne vibration or groundborne noise levels. (Less than Significant)

The project would result in a significant impact if buildings were exposed to the FTA building damage groundborne vibration threshold level of 0.2 PPV. As shown in **Table 5.7-5**, use of a front-end loader for project construction would generate vibration levels of up to 0.03 PPV at a distance of 25 feet. The nearest vibration-sensitive receptor to construction activities would be during pipeline construction south of Golden Gate Park where sensitive receptors would be as close as approximately 20 feet from heavy equipment activity, and could experience vibration levels of approximately 0.04 PPV. An auger drill rig would be used to drill under the MUNI light rail lines at Taraval Street and Judah Street. Sensitive receptors would be located approximately 40 feet from drilling at both crossings. Using caisson drilling as a conservative example, receptors at 40 feet could experience vibration levels of approximately 0.04 PPV. Because temporary vibration levels at these receptors would not exceed the potential building damage threshold of 0.2 PPV, this impact would be less than significant. Nighttime construction work is not proposed and there would be no sleep interference or annoyance vibration impacts from construction.

TABLE 5.7-5
VIBRATION VELOCITIES FOR CONSTRUCTION EQUIPMENT AND ACTIVITIES

Equipment / Activity	PPV at 25 Feet (inches/second)[a]
Front-End Loader	0.03
Loaded Trucks	0.076
Caisson Drilling[b]	0.089

[a] Buildings can be exposed to groundborne vibration levels of 0.2 PPV without experiencing structural damage.
[b] Caisson drilling is used as a worst-case vibration level over auger drilling.

SOURCE: FTA, 2006.

Facility Siting, Operations, and Maintenance Impacts

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. (Less than Significant)

Pump Operation

Pumps are the primary source of noise typically associated with the operation of water facilities. The degree of impact would differ for each part of the project, and would depend on pump sizes, proximity to sensitive receptors, and the extent of noise attenuation incorporated into the facility design. The San Francisco Noise Ordinance (Police Code Section 2909[c]) states that no person shall produce or allow to be produced by any machine or device, or any combination of same, on public property, a noise level more than 10 dBA above the local ambient at a distance of 25 feet or more, unless the machine or device is being operated to serve or maintain the property. Noise measurements were taken at a similar well facility in Livermore that has the same type of pump and noise insulation proposed for project facilities. The levels measured at the Livermore facility are used as a reference for the project’s facility operations. As shown in **Table 5.7-6** below, a housed pump could create noise levels of 59 dBA at 15 feet. If attenuated to 25 feet, a housed pump would create noise levels of 55 dBA. To exceed 10 dBA above local ambient at 25 feet, existing noise levels would have to be below 45 dBA. As shown in **Table 5.7-7** below, no project facility would result in an exceedance of the 10-dBA threshold during nighttime hours. Therefore, noise generated from project operations would not substantially increase ambient noise levels in the vicinity of the proposed project during daytime or nighttime hours, and would not result in the generation of noise levels in excess of the noise ordinance. As a result, this noise impact would be less than significant.

TABLE 5.7-6
NOISE MEASUREMENTS FROM SIMILAR PUMP FACILITY OPERATIONS

Distance	Noise Level[a] (dBA, L_{eq})
10 feet from pump	84
20 feet from pump	82
Outside 15 feet from open door	72
Outside 15 feet from closed door	59

[a] Noise levels based on 1-minute average.

SOURCE: Data collected by ESA for this EIR.

TABLE 5.7-7
AMBIENT NOISE LEVEL INCREASE FROM PUMP OPERATIONS

Location	Ambient Nighttime Noise[a]	Well Facility Noise[d]	Well Facility plus Ambient Noise	Ambient Noise Increase	Significant (exceeds 10 dBA?)
Lake Merced Well Facility Site	59 L_{eq}	55	60	1	No
South Sunset Well Facility Site	55 L_{eq}	55	58	3	No
West Sunset Well Facility Site	51 L_{eq}	55	56	5	No
Central Pump Facility Well Facility Site	51 L_{eq}[b]	55	56	5	No
South Windmill Replacement Well Facility Site	51 L_{eq}[c]	55	56	5	No
North Lake Well Facility Site	66 L_{eq}	55	66	0	No

[a] Nighttime ambient noise levels are used in this comparison because they are generally lower than daytime noise levels.
[b] Nighttime noise levels not available; therefore, measurements were used from the nearby Urban Forestry Center as a reference, which is located in close proximity to the Central Pump Station and is in a similar setting. Daytime measured L_{eq} was 60 dBA.
[c] Nighttime noise levels not available, therefore, measurements from the West Sunset well facility site (which had similar daytime noise levels) were used. Daytime noise levels at the South Windmill Replacement well facility site were measured at 59 dBA L_{eq}.
[d] Well facility noise with closed door attenuated to 25 feet.

Emergency Power Generators

Standby emergency power generators would be deployed to the West Sunset and North Lake well facilities. The San Francisco Noise Ordinance (Police Code Section 2909[c]) states that no person shall produce or allow to be produced by any machine or device, or any combination of same, on public property, a noise level more than 10 dBA above the local ambient level at a distance of 25 feet or more, unless the machine or device is being operated to serve or maintain the property. The emergency generators would create temporary noise from use during a power failure and periodically during testing to ensure their continued reliability, and could operate continuously following a catastrophic emergency until electric power service is restored to the area. Sound levels from these generators vary depending on the type of generator and the noise attenuation that has been incorporated into its design. Without any noise attenuation, the emergency generators could generate sound levels of up to 76 dBA at 50 feet from the generator (FTA, 2006). As shown in **Table 5.7-8**, emergency generator noise levels would result in an increase in ambient noise levels of over 10 dBA. Based on the permit requirements of the Bay Area Air Quality Management District (see Section 5.8, Air Quality), it is assumed that the generators would be tested for approximately 2 hours up to 25 times a year at each facility (for a total of 50 hours per generator per year, or 100 hours for both generators), and would only be used for longer periods during an emergency event. Given that the generators would serve to maintain the pump operations at the property and the operation would be of short duration during testing or an emergency, the impact resulting from this noise would be less than significant.

TABLE 5.7-8
AMBIENT NOISE LEVEL INCREASE FROM EMERGENCY GENERATOR TESTING

Location	Ambient Daytime Noise[a]	Emergency Generator Noise	Generator Plus Ambient Noise	Ambient Noise Increase	Significant
West Sunset Well Facility Site	60 L_{eq}	82	82	22	No
North Lake Well Facility Site	74 L_{eq}	82	83	9	No

[a] Daytime ambient noise levels are used in this comparison because testing is not expected to occur at night.

Cumulative Impacts

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. (Less than Significant)

The geographic scope for the analysis of potential cumulative noise and vibration impacts encompasses the project area and immediate vicinity. The geographic scope for noise effects also includes areas adjacent to construction haul routes.

Section 5.1.4, Cumulative Impacts, describes the approach to the cumulative analysis used throughout this EIR; Table 5.1-6 and Figure 5.1-1 summarize cumulative projects in the vicinity of the Groundwater Supply Project. Of the cumulative projects listed in Table 5.1-6, only the Significant Natural Resource Areas Management Plan, Vista Grande, and Parkmerced projects are located in the immediate vicinity of the proposed project (at the Lake Merced well facility site) and would have the potential to contribute to cumulative noise impacts. The Parkmerced project has been approved and the other projects are pending approval; construction of these projects could overlap with construction of the Groundwater Supply Project, potentially resulting in significant cumulative construction impacts from temporary noise increases in the adjacent areas and along construction haul routes.

Cumulative noise increases from construction of the cumulative projects together with the proposed project can be assessed by examining the cumulative noise impact at residential areas east of Lake Merced Boulevard (which is the residential area closest to the cumulative projects described above).As shown in Table 5.7-4, project construction noise would range from 64 to 72 dBA (L_{eq}) at the nearest residences on Vidal Drive, 300 feet to the east. This maximum project-related noise level (72 dBA, L_{eq}) would be caused by excavator operations on the site and haul trucks on Lake Merced Boulevard and Brotherhood Way, which would be limited to 16 trips and spread throughout the day. The Parkmerced Project would construct residential uses approximately 200 feet northeast of this receptor. The noise impact analysis for the Parkmerced Project identified a less than significant construction noise impact with the same mitigation measures identified for the proposed project. Resultant construction noise levels were not quantified in the EIR but, using the methodology contained herein, it can be assumed that unmitigated construction noise levels of 76 dBA may occur at the 200 foot distance from activity associated with the Parkmerced Project. Addition of the proposed project's 72 dBA to the Parkmerced contribution of 76 dBA results in a cumulative noise level of 77.4 dBA, an increase of 1.4 dBA. This increase would be below the threshold of human detection for normal environmental noise (Caltrans, 2009) and therefore would not be considered a cumulatively considerable contribution. Furthermore, the proposed project's daytime construction noise levels would generally be reduced through implementation of engine controls and quieter construction methods (Mitigation Measure M-NO-1: Administrative and Source Controls), which are required of all projects in San Francisco that undergo CEQA review, including those on the cumulative project list.

The cumulative projects listed in Table 5.1-6 would not cause substantial increases in operational noise levels in the vicinity of proposed well facilities. The Significant Natural Resource Areas Management Plan and Vista Grande would not include new noise generating facilities or noise-sensitive receptors; and permanent structures associated with Park Merced would be located further from the Lake Merced well facility. Furthermore, as explained above, future operation of the project would not result in substantial long-term noise increases, including operation of the Lake Merced well facility. As shown in Table 5.7-7, operation of the Lake Merced well facility would result in a 1 dBA increase which is below the threshold of human detection and therefore would not be considered a cumulatively considerable contribution. Therefore, cumulative operational impacts would be less than significant.

The proposed project would not result in a significant vibration impact from construction equipment. The potential use of the caisson drill for subsurface pipeline crossings at Taraval Street and Judah Street would be the only potential vibration –inducing equipment used for project improvements. Vibrations from the caisson drill would be less than significant and would dissipate rapidly with increased distance from any given vibration-sensitive receptor as tunneling is completed. Given that construction activities from other cumulative projects would occur well over

1,000 feet from project-related caisson drilling, there would be a less-than-significant cumulative vibration impact associated with the cumulative projects.

5.7.4 References

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5.8 Air Quality

This section addresses the air quality impacts that could result from implementation of the proposed project, including increases in criteria air pollutants. The emissions of fugitive dust and engine exhaust generated by the project would be short term in nature and associated mainly with construction of the proposed well facilities and distribution pipelines. Impacts specific to greenhouse gases and climate change are evaluated in Section 5.9, Greenhouse Gas Emissions.

5.8.1 Setting

The Bay Area Air Quality Management District (BAAQMD) is the regional agency with jurisdiction over the nine-county San Francisco Bay Area Air Basin (SFBAAB), which includes San Francisco, Alameda, Contra Costa, Marin, San Mateo, Santa Clara, and Napa Counties and portions of Sonoma and Solano Counties. The BAAQMD is responsible for attaining and maintaining air quality in the SFBAAB within federal and state air quality standards, as established by the federal Clean Air Act (CAA) and the California Clean Air Act (CCAA), respectively. Specifically, the BAAQMD has the responsibility to monitor ambient air pollutant levels throughout the SFBAAB and to develop and implement strategies to attain the applicable federal and state standards. The CAA and the CCAA require plans to be developed for areas that do not meet air quality standards, generally. The most recent air quality plan, the *2010 Clean Air Plan*, was adopted by the BAAQMD on September 15, 2010. The *2010 Clean Air Plan* updates the *Bay Area 2005 Ozone Strategy* in accordance with the requirements of the CCAA to implement all feasible measures to reduce ozone; provide a control strategy to reduce ozone, particulate matter, air toxics, and greenhouse gases in a single, integrated plan; and establish emission control measures to be adopted or implemented. The 2010 Clean Air Plan contains the following primary goals:

- Attain air quality standards;
- Reduce population exposure and protect public health in the San Francisco Bay Area; and
- Reduce greenhouse gas emissions and protect the climate.

The *2010 Clean Air Plan* represents the most current applicable air quality plan for the SFBAAB. Consistency with this plan is the basis for determining whether the proposed project would conflict with or obstruct implementation of an applicable air quality plan.

The proposed project area is located in the city of San Francisco within the SFBAAB, which comprises all of Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, and Santa Clara Counties, as well as the southern portion of Sonoma County and the southwest portion of Solano County. Ambient concentrations of air pollutants in the project area are a product of the quantity of pollutants emitted by local sources coupled with the atmosphere's ability to transport and dilute these emissions. Natural factors that affect air quality and pollutant transport and dilution include terrain, wind, atmospheric stability, and the presence of sunlight.

Meteorology

On an annual basis, temperatures in San Francisco average approximately 58 degrees Fahrenheit, with summer highs in the low 70s and winter lows in the mid-40s. August and September are the warmest months, and December and January are the coldest. December, January, and February are the wettest months, with averages of between 4.2 and 4.8 inches of rain each month; May through September are the driest months, with averages at or below 0.5 inch of rain per month (WRCC, 2013). Although the project area averages 21 inches of rainfall annually, precipitation varies markedly from year to year. Thus, the rainfall total in one month of a heavy-precipitation year may exceed that of an entire year during a drought.

Winds are an important element in characterizing the air quality setting of any project. Wind controls both the microscale dispersion of any locally generated emissions of fugitive dust and engine exhaust, as well as the regional trajectory of these emissions. Winds during warmer months are typically out of the west and northwest. Wind speeds may be locally strong in regions where air is channeled through a narrow opening such as the Golden Gate or San Bruno Gap. The sea breeze between the coast and the Central Valley commences near the surface along the coast in late morning or early afternoon. Later in the day the breeze intensifies while spreading inland. As the breeze grows stronger it flows over the lower hills farther south along the Peninsula (BAAQMD, 1998).

A primary factor in air quality is the mixing depth (i.e., the vertical dimension of air available for dilution of contaminant sources near the ground). Over the San Francisco Bay Area, the frequent occurrence of temperature inversions limits this mixing depth and consequently limits the availability of air for dilution. A temperature inversion can be described as a layer or layers of warmer air over cooler air (BAAQMD, 1998).

Criteria Pollutants and Ambient Air Quality

In accordance with the state and federal CAAs, air pollutant standards are identified for the following six criteria air pollutants: ozone, carbon monoxide (CO), particulate matter (PM), nitrogen dioxide (NO_2), sulfur dioxide (SO_2), and lead. The BAAQMD operates a regional monitoring network that measures the ambient concentrations of these six criteria air pollutants (BAAQMD, 2012a). Existing and probable future air quality in the project area can best be inferred by examining the BAAQMD's ambient air quality measurements taken at the San Francisco monitoring station over the past several years. **Table 5.8-1** presents a seven-year summary of monitoring data (2004–2010) and compares measured maximum pollutant concentrations against the most stringent applicable ambient air quality standards (both State and federal standards are described below in Section 5.8.2).

Land use projects may contribute to regional criteria air pollutants during the construction and operational phases of a project. **Table 5.8-2** identifies air quality significance thresholds followed by a discussion of each threshold. Projects that would result in criteria air pollutant emissions below these significance thresholds would not violate an air quality standard, contribute substantially to an air quality violation, or result in a cumulatively considerable net increase in criteria air pollutants within the SFBAAB.

TABLE 5.8-1
SAN FRANCISCO AMBIENT AIR QUALITY MONITORING SUMMARY (2004–2010)

Pollutant	Most Stringent Applicable Standard	Number of Days Standards were Exceeded and Maximum Concentrations Measured						
		2004	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
Ozone								
Maximum 1-hour concentration (ppm)[b]		0.090	0.058	0.053	0.060	0.082	0.072	0.079
Days 1-hour standard exceeded	>0.09 ppm[a]	0	0	0	0	0	0	0
Maximum 8-hour concentration (ppm)[a]		0.060	0.054	0.046	0.053	0.066	0.056	0.051
Days 8-hour standard exceeded	>0.07 ppm[a]	–	0	0	0	0	0	0
Days 8-hour standard exceeded	>0.075 ppm[b]	0	0	0	0	0	0	0
Carbon Monoxide (CO)								
Maximum 8-hour concentration (ppm)		2.2	2.1	2.1	1.6	2.3	2.9	1.4
Days 8-hour standards exceeded	>9 ppm[a,b]	0	0	0	0	0	0	0
Nitrogen Dioxide (NO_2)								
Maximum 1-hour concentration (ppm)		0.060	0.066	0.107	0.069	0.062	0.059	0.093
Days 1-hour standard exceeded	>0.18 ppm[a]	0	0	0	0	0	0	0
Sulfur Dioxide (SO_2)								
Maximum 24-hour concentration (ppm)		0.008	0.007	0.007	0.006	0.004	–	–
Days 24-hour standard exceeded	>0.04 ppm[a]	0	0	0	0	0	–	–
Suspended Particulates (PM_{10})								
Maximum 24-hour concentration (μg/m^3)		52	46	61	70	41	36	40
Days 24-hour standard exceeded[c]	>50 μg/m^3 [a]	1	0	3	2	0	0	0
Days 24-hour standard exceeded[c]	> 150 μg/m^3 [b]	0	0	0	0	0	0	0
Suspended Fine Particulates ($PM_{2.5}$)								
Maximum 24-hour concentration (μg/m^3)		45.8	43.6	54.3	45.2	29.4	35.6	45.3
Days 24-hour standard exceeded	>35 μg/m^3 [d]	4	6	3	5	0	1	3
Annual Average (μg/m^3)		9.9	9.5	9.7	8.9	9.8	9.7	10.5
Annual standard exceeded?	>12 μg/m^3 [a]	No	No	No	No	No	No	No

a State standard, not to be exceeded.
b Federal standard, not to be exceeded.
c Because PM_{10} is only sampled every sixth day, the actual number of days over the standard can be estimated to be six times the number shown.
d The federal standard was reduced from 65 μg/m^3 to 35 μg/m^3 in 2006. However, California Air Resources Board (CARB) data for 24-hour exceedance is based on the 2006 standard.

NOTES:
"–" indicates that data are not available; ppm = parts per million; μg/m^3 = micrograms per cubic meter.

SOURCES: CARB, 2013, 2012b.

TABLE 5.8-2
CRITERIA AIR POLLUTANT SIGNIFICANCE THRESHOLDS

Pollutant	Construction Thresholds	Operational Thresholds	
	Average Daily Emissions (lbs./day)	**Average Daily Emissions (lbs./day)**	**Annual Average Emissions (tons/year)**
Reactive Organic Gases (ROG)	54	54	10
Nitrogen Oxides (NO_x)	54	54	10
Suspended Particulates (PM_{10})	82 (exhaust)	82	15
Suspended Fine Particulates ($PM_{2.5}$)	54 (exhaust)	54	10
Fugitive Dust	Construction Dust Ordinance or other Best Management Practices	Not Applicable	

Ozone

Ozone is a secondary air pollutant produced in the atmosphere through a complex series of photochemical reactions involving reactive organic gases (ROG) and nitrogen oxides (NO_X). The main sources of NO_X and ROG, often referred to as ozone precursors, are combustion processes (including motor vehicle engines) and the evaporation of solvents, paints, and fuels. Automobiles are the single largest source of ozone precursors in the Bay Area. Ozone is considered a regional air pollutant because its precursors are transported and diffused by wind concurrently with ozone production through the photochemical reaction process, resulting in the regional dispersion of ozone. Ozone causes eye irritation, airway constriction, and shortness of breath and can aggravate existing respiratory diseases such as asthma, bronchitis, and emphysema (BAAQMD, 2011a). Table 5.8-1 shows that, according to published data, the more stringent applicable standards have not been exceeded during the past seven years.

The potential for a project to result in a cumulatively considerable net increase in criteria air pollutants, which may contribute to an existing or projected air quality violation, are based on the state and federal Clean Air Acts emissions limits for stationary sources. The federal New Source Review (NSR) program was created by the federal CAA to ensure that stationary sources of air pollution are constructed in a manner that is consistent with attainment of federal health based ambient air quality standards. Similarly, to ensure that new stationary sources do not cause or contribute to a violation of an air quality standard, BAAQMD Regulation 2, Rule 2 requires that any new source that emits criteria air pollutants above a specified emissions limit must offset those emissions. For ozone precursors ROG and NO_x, the offset emissions level is an annual average of 10 tons per year (or 54 pounds (lbs.) per day) (BAAQMD, 2009). These levels represent emissions by which new sources are not anticipated to contribute to an air quality violation or result in a considerable net increase in criteria air pollutants.

Although this regulation applies to new or modified stationary sources, land use development projects result in ROG and NO_x emissions as a result of increases in vehicle trips, architectural coating and construction activities. Therefore, the above thresholds can be applied to the construction and operational phases of land use projects and those projects that result in emissions below these thresholds, would not be considered to contribute to an existing or projected air quality violation or result in a considerable net increase in ROG and NO_x emissions. Due to the temporary nature of construction activities, only the average daily thresholds are applicable to construction phase emissions.

Carbon Monoxide

CO is an odorless, colorless gas usually formed as the result of the incomplete combustion of fuels. The single largest source of CO is motor vehicles; the highest emissions occur during low travel speeds, stop-and-go driving, cold starts, and hard acceleration. Exposure to high concentrations of CO reduces the oxygen-carrying capacity of the blood and can cause headaches, dizziness, fatigue, unconsciousness, and even death (BAAQMD, 2011a). Table 5.8-1 shows that no exceedance of CO standards were recorded at the San Francisco monitoring station between 2004 and 2011. Maximum 8-hour CO levels average less than 35 percent of the allowable 8-hour standard.

Sulfur Dioxide

SO_2 emitted into the atmosphere through natural and anthropogenic processes is changed, through a complex series of chemical reactions in the atmosphere into sulfate aerosols. These aerosols are believed to cause negative radiative forcing (i.e., a tendency to cool the earth's surface) and to result in acid deposition (e.g., acid rain) (CARB, 2012b). On June 2, 2010, the U.S. Environmental Protection Agency (U.S. EPA) established a new 1-hour SO_2 national ambient air quality standard of 0.75 part per million (ppm), effective August 23, 2010, which is based on the three-year average of the annual 99th percentile of 1-hour daily maximum concentrations. However, the existing 0.030 ppm annual and 0.14 ppm 24-hour SO_2 national standards must continue to be used until one year following the U.S. EPA's initial designation of the new 1-hour SO_2 national standard. On August 3, 2012, U.S. EPA published notice extending the deadline for designating areas with respect to the 2010 primary federal SO_2 standard for up to 1 year. U.S. EPA now has until June 3, 2013, to complete the initial designations. As shown in Table 5.8-1, the 24-hour standard was not exceeded during the five years of available monitoring data (between 2004 and 2008) over the study period.

Suspended and Inhalable Particulate Matter

Particulate matter is a class of air pollutants that consists of solid and liquid airborne particles in an extremely small size range. Particulate matter is measured in two size ranges: PM_{10} for particles less than 10 microns in diameter, and $PM_{2.5}$ for particles less than 2.5 microns in diameter. Motor vehicles generate about half of all Bay Area particulates, through tailpipe emissions as well as brake pad and tire wear. Another large source of fine particulates is wood burning in fireplaces and stoves. Fine particulates small enough to be inhaled into the deepest parts of the human lung can cause adverse health effects. Extended exposure to particulate matter can increase the risk of chronic respiratory disease. $PM_{2.5}$ poses an increased health risk because the particles contain substances that are particularly harmful to human health and can deposit deep in the lungs (BAAQMD, 2011a).

Diesel exhaust is an important concern in the Bay Area and throughout California. The California Air Resources Board (CARB) identified diesel engine particulate matter (DPM) as a toxic air contaminant (TAC), and DPM has also been identified as a human carcinogen. The exhaust from diesel engines includes hundreds of different gaseous and particulate components, many of which are toxic. Many of these toxic compounds adhere to the diesel soot particles, which are very small and can penetrate deeply into the lungs. Several medical research studies have linked near-road pollution exposure to a variety of adverse health outcomes for both children and adults, including significant allergic response and elevated production of specific antibodies (BAAQMD, 2011a).

Table 5.8-1 shows that exceedance of the state 24-hour PM_{10} standard occurs relatively infrequently in San Francisco. The state 24-hour PM_{10} standard was exceeded once in 2004, three times in 2006, and twice in 2007, but was not exceeded in 2005 or 2008 through 2010. The less stringent federal 24-hour PM_{10} standard was not exceeded during the seven-year study period.

In 2012, the U.S. EPA revised the annual standard for $PM_{2.5}$, which represents the fine fraction of particulate matter. The federal annual standard was reduced from 15 to 12 $\mu g/m^3$ and will become effective on March 16, 2013, 60 days after publication in the Federal Register. California's annual average standard went into effect in 2003. Table 5.8-1 presents the $PM_{2.5}$ data from the San Francisco monitoring station for 2004 through 2010. The federal 24-hour $PM_{2.5}$ standard was not exceeded until the standard was reduced in 2006 from 65 to 35 $\mu g/m^3$. Based on the monitoring results, the more stringent standard would have been exceeded four times in 2004, and was exceeded three times in 2006, five times in 2007, once in 2009, and three times in 2010.

The BAAQMD has not established an offset limit for $PM_{2.5}$. However, the emissions limit in the federal NSR for stationary sources in nonattainment areas is an appropriate significance threshold. For PM_{10} and $PM_{2.5}$, the emissions limit under NSR is 15 tons per year (82 lbs. per day) and 10 tons per year (54 lbs. per day), respectively. These emissions limits represent levels at which a source is not expected to have an impact on air quality (BAAQMD, 2009). Similar to ozone precursor thresholds identified above, land use development projects typically result in particulate matter emissions as a result of increases in vehicle trips, space heating and natural gas combustion, landscape maintenance, and construction activities. Therefore, the above thresholds can be applied to the construction and operational phases of a land use project. Again, because construction activities are temporary in nature, only the average daily thresholds are applicable to construction-phase emissions.

Fugitive Dust

Fugitive dust emissions are typically generated during construction phases. Studies have shown that the application of best management practices (BMPs) at construction sites significantly control fugitive dust (Western Regional Air Partnership, 2006). Individual measures have been shown to reduce fugitive dust by anywhere from 30 to 90 percent (BAAQMD, 2009). The BAAQMD has identified a number of BMPs to control fugitive dust emissions from construction activities (BAAQMD, 2011a). The City's Construction Dust Control Ordinance (Ordinance 176-08, effective July 30, 2008) requires a number of measures to control fugitive dust to ensure that construction projects do not result in visible dust. The BMPs employed in compliance with the

City's Construction Dust Control Ordinance is an effective strategy for controlling construction-related fugitive dust.

Other Criteria Air Pollutants

The standards for NO_2 and lead are being met in the SFBAAB, and pollutant trends suggest that the air basin will continue to meet these standards for the foreseeable future (CARB, 2011).

Toxic Air Contaminants

TACs are a defined set of airborne air pollutants that may pose a present or potential hazard to human health. A wide range of sources, from industrial plants to motor vehicles, emit TACs. Like $PM_{2.5}$, TACs can be emitted directly and can also be formed in the atmosphere through reactions with different pollutants. The health effects associated with TACs are quite diverse and are generally assessed locally rather than regionally. TACs can cause long-term health effects such as cancer, birth defects, neurological damage, asthma, bronchitis, or genetic damage; or short-term acute effects such as eye watering, respiratory irritation (a cough), running nose, throat pain, and headaches. DPM, a component of $PM_{2.5}$, accounts for over 80 percent of the inhalation cancer risk from TACs in the Bay Area and is one of the TACs of greatest concern. There are two categories of the most common sources of TACs: (1) stationary sources such as backup diesel generators, dry cleaners, and gasoline stations; and (2) on-road mobile sources such as cars and trucks on high-traffic-volume roadways, and off-road mobile sources such as construction equipment, ships, and trains (CARB, 2009).

In the Bay Area, there are a number of places where the exposure of sensitive populations to TACs is relatively high. The BAAQMD identifies these areas as Impacted Communities. The project area is not located within any Impacted Community boundaries. However, as described below, emissions generated by existing sources as well as by the proposed project are evaluated within a 1,000-foot zone of influence surrounding the project facility sites and pipeline routes. The zone of influence is a BAAQMD-recommended 1,000-foot radius around the project boundary used for assessing community health risks (BAAQMD, 2012c).

Permitted Stationary Sources and Roadway Sources in the Project Vicinity

Table 5.8-3 lists emissions sources within 1,000 feet of the project sites, including BAAQMD-permitted stationary sources and major roadway sources (i.e., roadways with average daily traffic volumes exceeding 10,000); these emissions sources are shown in **Figure 5.8-1**. No major non-permitted sources (e.g., train yards, distribution facilities, and high-volume fueling stations) are located within 1,000 feet of the project area.

Sensitive Receptors

Land uses such as schools, children's daycare centers, hospitals, and convalescent homes are considered to be more sensitive to poor air quality because the population groups associated with these uses have increased susceptibility to respiratory distress. People engaged in strenuous work or exercise are also more sensitive to poor air quality. Residential areas are considered more

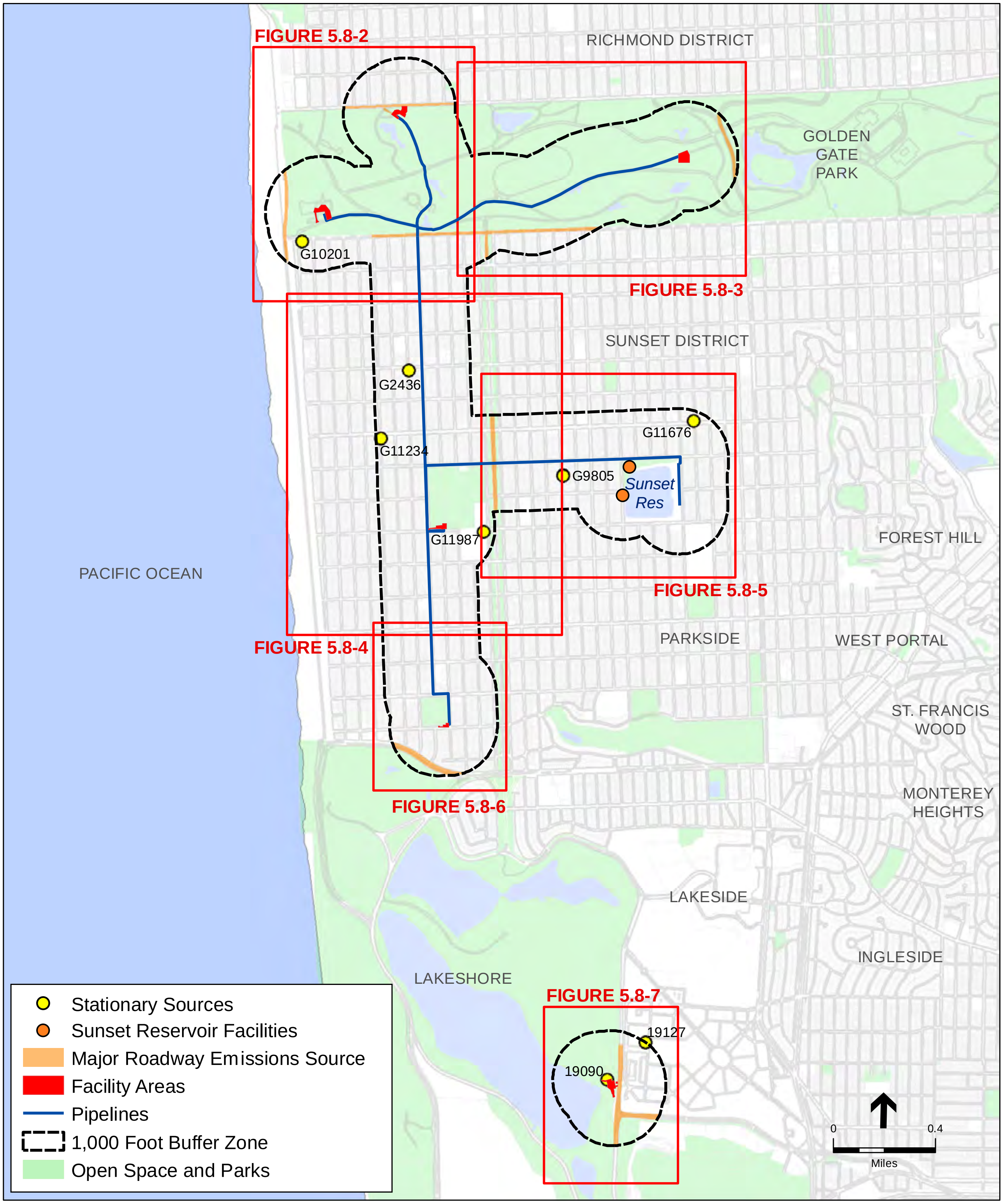
TABLE 5.8-3
PERMITTED STATIONARY SOURCES AND MAJOR ROADWAY SOURCES IN THE PROJECT VICINITY

Plant ID Number	Facility Name	Street Address	City
Permitted Stationary Sources			
G11234	76 Gas Station No. 3390	3701 Noriega Street	San Francisco
G11987	St. Ignatius College Preparatory	2001 37th Avenue	San Francisco
G10201	76 Station No. 250433	1200 La Playa Street	San Francisco
G11676	Sunset 76 Service Station No. 255468	1700 Noriega Street	San Francisco
G9805	San Francisco Fire Department Station 18	1935 32nd Avenue	San Francisco
G2436	Tosco Marketing No. 3243	3601 Lawton Street	San Francisco
19090	SFPUC (Source Type: 7 diesel generators)	991 Lake Merced Boulevard	San Francisco
19127	Parkmerced Investors LLC (Source Type: 11 diesel generators)	100 Font Boulevard	San Francisco
Roadway Sources (roads in the 1,000-foot zone of influence with average daily traffic volumes exceeding 10,000)			
Highway 1 at 700 feet			San Francisco
Fulton Street, 38th Avenue to 46th Avenue			San Francisco
Lincoln Way, 29th Avenue to 44th Avenue			San Francisco
Sloat Blvd, 39th Avenue to 44th Avenue			San Francisco
Great Highway, Fulton Street to Irving Street			San Francisco
Sunset Boulevard, Lincoln Way to Irving Street			San Francisco
Sunset Boulevard, Moraga Street to Rivera Street			San Francisco
Lake Merced Boulevard, Lake Merced Hill Street to Higuera Avenue			San Francisco
Brotherhood Way, Lake Merced Boulevard			San Francisco
Chain of Lakes Drive, Fulton Street to Lincoln Way			San Francisco
Crossover Drive (Highway 1), Fulton to Lincoln			San Francisco

SOURCES: BAAQMD, 2011a, 2011b; SFMTA, 2010.

sensitive to air quality conditions than commercial and industrial areas because people generally spend longer periods of time at their residences, resulting in greater exposure to ambient air quality conditions. Some active recreational uses are also considered sensitive due to the greater exposure to ambient air quality conditions. The proposed groundwater well facilities and pipelines would be located on the west side of San Francisco near a number of sensitive receptors that could be exposed to project emissions in the vicinity of Lake Merced, the Sunset neighborhood, and the western portion of Golden Gate Park.

The Lake Merced well facility would be located adjacent to Lake Merced and Lake Merced Boulevard in the southwestern corner of San Francisco, just north of the San Mateo County jurisdictional boundary. People engaged in active recreational activities within the project vicinity could be exposed to air pollution from the project while walking, hiking, running, biking,



SOURCE: ESRI, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.8-1
Project Location Index Map

boating, or golfing. Nearby recreational areas include a paved pedestrian path that follows the perimeter of Lake Merced; designated bikeways along Lake Merced Boulevard; the Tournament Players Cup (TPC) Harding Park; and the Villa Merced Park. All or portions of these recreational areas lie within the 1,000-foot zone of influence surrounding the Lake Merced well facility. For example, the TPC Harding Park is located approximately 200 feet northwest of the Lake Merced well facility, and the western portion of Villa Merced Park is located between 950 and 1,000 feet from the project site.

The South Sunset well facility, West Sunset well facility, Phase 1 distribution pipelines, and Sunset Reservoir facilities would be constructed in the Sunset neighborhood—a low-density residential area located on the mid-western side of San Francisco, south of Golden Gate Park and north of Lake Merced. Sensitive receptors surrounding the proposed pipeline alignment include a mix of residential and recreational uses in addition to educational, childcare, and healthcare facilities. Sensitive receptors immediately adjacent to the South Sunset well facility site consist of: residences along 40th Avenue and Wawona Street, with the nearest residences approximately 60 feet from the proposed facility; the South Sunset Playground (used for activities such as softball, baseball, and soccer) that abuts the well facility site; the Ulloa Elementary School that borders the West Sunset Playground to the west; and the St. Gabriel Elementary School, approximately 1,000 feet north of the site. Sensitive receptors in the immediate vicinity of the West Sunset well facility include: residences along Quintara Street and 41st Avenue, with the nearest residences approximately 85 feet from the facility; the West Sunset Playground (also used for activities such as softball, baseball, and soccer) that abuts the West Sunset well facility site; Sunset Elementary School and A.P. Giannini Jr. High School, each approximately 1,000 feet north of the proposed facility; St. Ignatius College Preparatory, approximately 300 feet southeast of the facility; and Sunset Mental Health Services, approximately 1,000 feet northwest of the facility. Sensitive receptors in the immediate vicinity of the Sunset Reservoir include: residents along Ortega Street, Quintara Street, 24th Avenue, and 28th Avenue, with the nearest residents located approximately 150 feet from the reservoir; San Francisco Institute of Music, approximately 200 feet west of the reservoir; Adath Israel Preschool, approximately 850 feet north of the reservoir; and Chinese Community Health Services, approximately 1,500 feet northwest of the reservoir.

The Central Pump Station well facility, North Lake well facility, South Windmill Replacement well facility, and the Phase 2 pipelines would be located in the western portion of Golden Gate Park. Recreational uses at Golden Gate Park in the vicinity of the project include outdoor activities such as walking, running, biking, fishing, archery, and equestrian riding, as well as sports associated with the playing fields and children's play areas. Active recreational areas surrounding the proposed project include the 45th Avenue Playground, Beach Chalet Soccer Fields, Polo Field, and Golden Gate Golf Course, among others. **Figures 5.8-2** through **5.8-7** show the locations of the proposed well facilities and pipelines along with sensitive receptors located within 1,000 feet of the project.

SOURCE: ESRI, 2010; CCSF, 2004; BAAQMD, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.8-2

Project Location - South Windmill Replacement Well and North Lake Well Facilities

SOURCE: ESRI, 2010; CCSF, 2004; BAAQMD, 2010

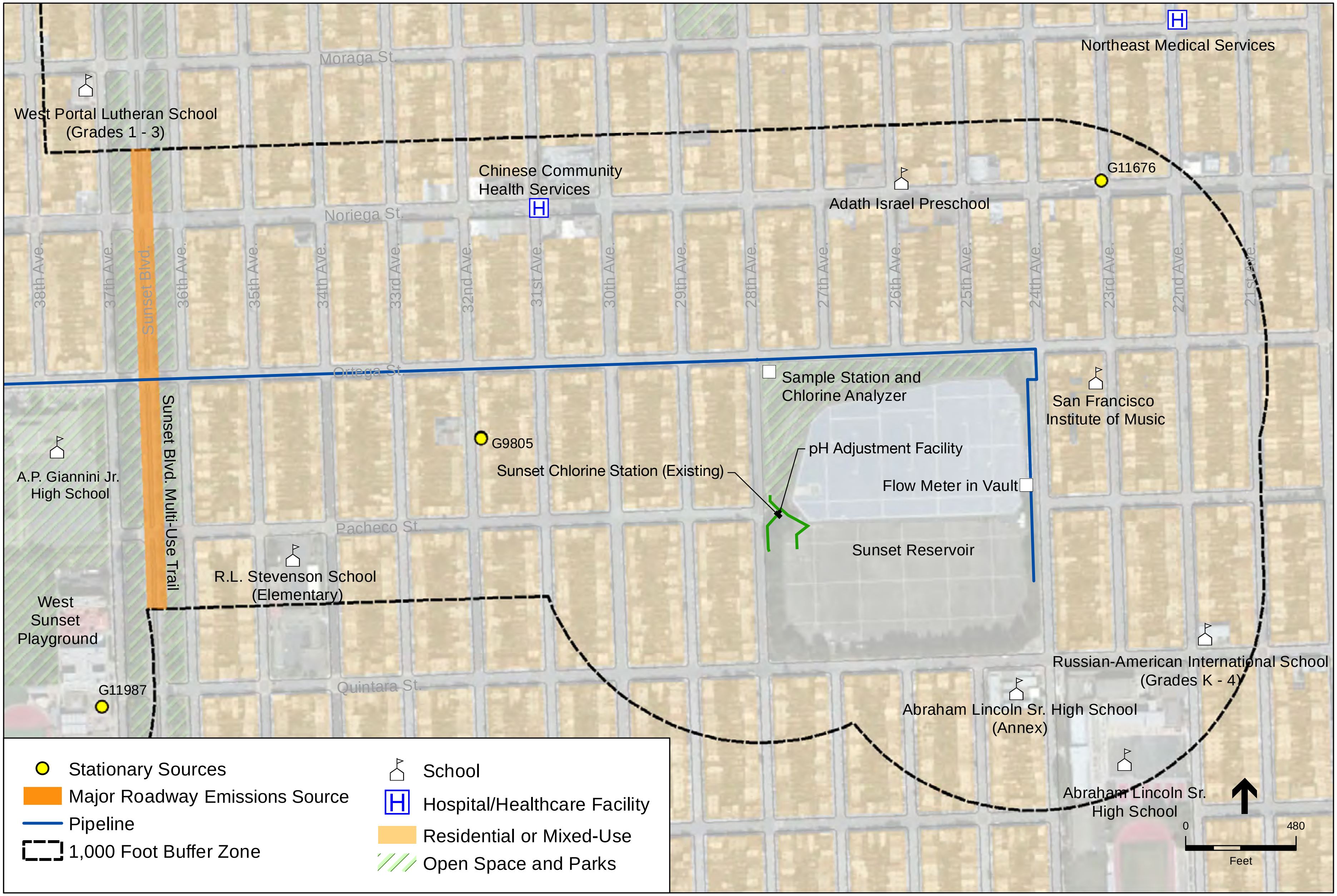
Figure 5.8-3
Project Location - Central Pump Station Well Facility

SOURCE: ESRI, 2010; CCSF, 2004; BAAQMD, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.8-4

Project Location - West Sunset Well Facility



SOURCE: ESRI, 2010; CCSF, 2004; BAAQMD, 2010

San Francisco Groundwater Supply Project EIR

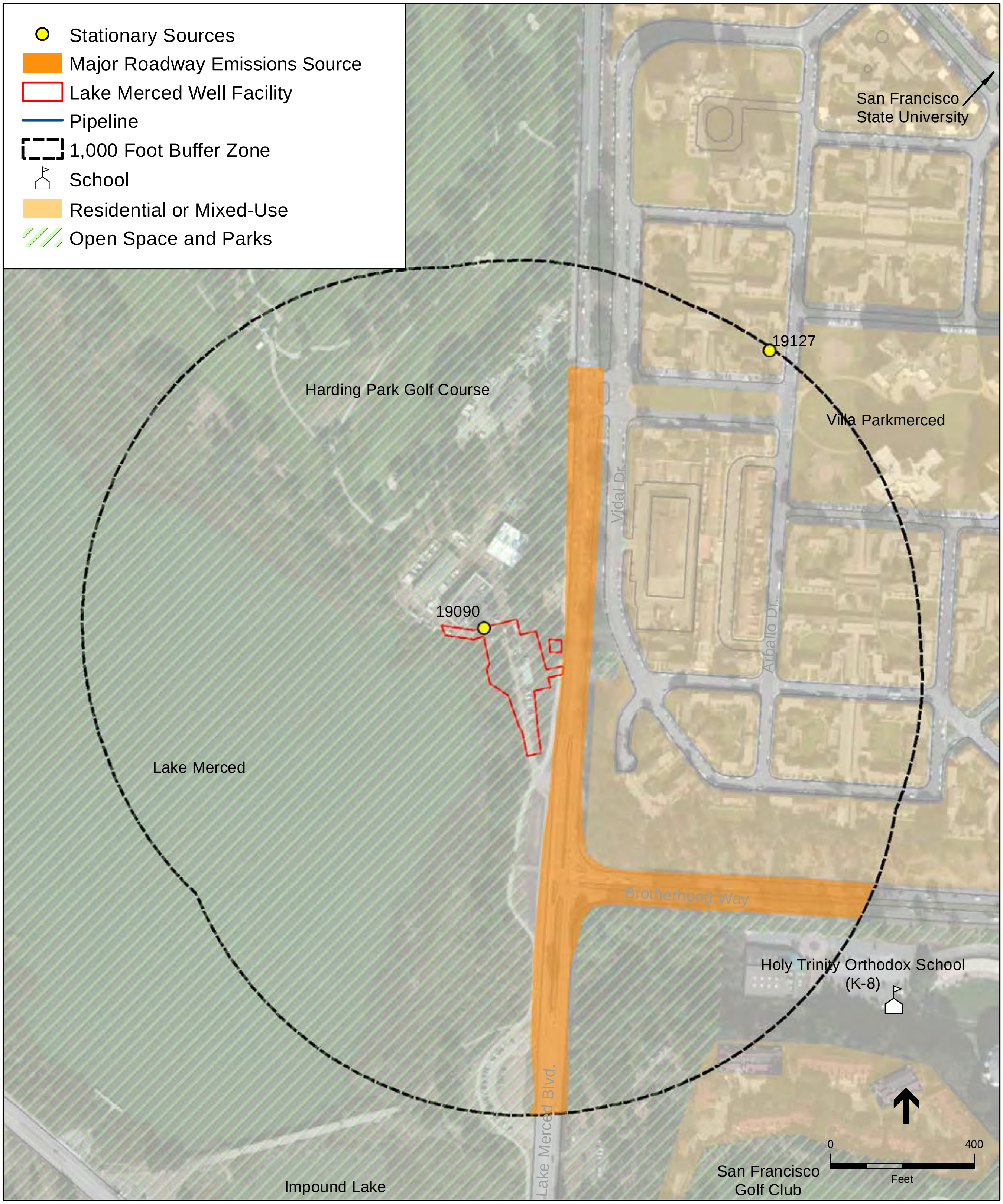
Figure 5.8-5 (Revised)
Project Location - Sunset Reservoir

SOURCE: ESRI, 2010; CCSF, 2004; BAAQMD, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.8-6

Project Location - South Sunset Well Facility



SOURCE: ESRI, 2010; CCSF, 2004; BAAQMD, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.8-7

Project Location - Lake Merced Well Facility

5.8.2 Regulatory Framework

Federal and State Regulations

The Clean Air Act Amendments of 1970 established national ambient air quality standards, and individual states retained the option to adopt more stringent standards and to include other pollution sources. California had already established its own air quality standards when federal standards were established, and because of the unique meteorological problems in California, there is considerable diversity between the state and national ambient air quality standards, as shown in **Table 5.8-4**. California ambient standards tend to be at least as protective as national ambient standards, and are often more stringent.

The ambient air quality standards are intended to protect the public health and welfare, and they specify the concentration of pollutants (with an adequate margin of safety) to which the public can be exposed without adverse health effects. They are designed to protect those segments of the public most susceptible to respiratory distress (i.e., sensitive receptors), including asthmatics, the very young, the elderly, people weak from other illness or disease, and people engaged in strenuous work or exercise. Healthy adults can tolerate occasional exposure to air pollution levels that are somewhat above the ambient air quality standards before adverse health effects are observed.

Federal Clean Air Act

The 1977 Clean Air Act (last amended in 1990; United States Code, Title 42, Section 7401 et seq.) requires that regional planning and air pollution control agencies prepare a regional air quality plan to outline the measures by which both stationary and mobile sources of pollutants will be controlled to achieve all standards within the deadlines specified in the Clean Air Act.

Table 5.8-4 summarizes the SFBAAB's current attainment status with respect to federal standards. In general, the Bay Area experiences low concentrations of most pollutants when levels are compared to the federal standards, except for ozone and particulate matter (PM_{10} and $PM_{2.5}$), for which standards are exceeded periodically. The SFBAAB's attainment status for ozone has changed several times over the past decade, first from "nonattainment" to "attainment" in 1995, then back to "unclassified nonattainment" in 1998 for the 1-hour federal ozone standard. In June 2004, the Bay Area was designated as "marginal nonattainment" for the 8-hour ozone standard. In 2008, the U.S. EPA lowered the 8-hour ozone standard from 0.08 ppm to 0.075 ppm. As the Bay Area is designated as a "marginal" nonattainment area for the federal 8-hour ozone standard, preparation of a State Implementation Plan is not required.

California Clean Air Act

In 1988, California passed the California Clean Air Act (California Health and Safety Code Section 39600 et seq.), which, like its federal counterpart, called for the designation of areas as attainment or nonattainment, but based on the state ambient air quality standards rather than the

TABLE 5.8-4
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND SFBAAB ATTAINMENT STATUS

Pollutant	Averaging Time	State Standards[a]		Federal Standards[b]	
		Concentration	Attainment Status	Concentration[c]	Attainment Status
Ozone	1 hour	0.09 ppm (180 μg/m^3)	N	N/A	–
	8 hours	0.07 ppm (137 μg/m^3)	N	0.075 ppm	N
Carbon Monoxide (CO)	1 hour	20 ppm (23 mg/m^3)	A	35 ppm (40 mg/m^3)	A
	8 hours	9 ppm (10 mg/m^3)	A	9 ppm (10 mg/m^3)	A
Nitrogen Dioxide (NO_2)	1 hour	0.18 ppm (339 μg/m^3)	A	0.10 ppm[d]	U
	Annual arithmetic mean	0.030 ppm (57 μg/m^3)	N/A	0.053 ppm (100 μg/m^3)	A
Sulfur Dioxide (SO_2)[e]	1 hour	0.25 ppm (655 μg/m^3)	A	0.075 ppm (196 μg/m^3)	A
	24 hours	0.04 ppm (105 μg/m^3)	A	0.14 ppm (365 μg/m^3)	A
	Annual arithmetic mean	N/A	–	0.03 ppm (80 μg/m^3)	A
Particulate Matter (PM_{10})	24 hours	50 μg/m^3	N	150 μg/m^3	U
	Annual arithmetic mean	20 μg/m^3	N	N/A	–
Fine Particulate Matter ($PM_{2.5}$)	24 hours	N/A	–	35 μg/m^3 [f]	N
	Annual arithmetic mean	12 μg/m^3	N	12 μg/m^3 [g]	U
Sulfates	24 hours	25 μg/m^3	A	N/A	–
Lead[h]	30-day average	1.5 μg/m^3	–	N/A	A
	Calendar quarter	N/A	–	1.5 μg/m^3	A
	Rolling 3-month average	N/A	–	0.15 μg/m^3	[h]
Hydrogen Sulfide	1 hour	0.03 ppm (0.15 μg/m^3)	U	N/A	–
Vinyl Chloride[i]	24 hours	0.01 ppm (26 μg/m^3)	–	N/A	–

a State ambient air quality standards (California). The State standards for ozone, carbon monoxide (except Lake Tahoe), SO_2 (1-hour and 24-hour), NO_2, and suspended particulate matter (PM_{10}) are values that are not to be exceeded. All other State standards shown are values not to be equaled or exceeded. If the standard is for a 1-hour, 8-hour, or 24-hour average (i.e., all standards except for lead and the PM_{10} annual standard), then some measurements may be excluded. In particular, measurements are excluded that the CARB determines would occur less than once per year on average.

b National ambient air quality standards. National standards shown are the "primary standards" designed to protect public health. National standards, other than for ozone and particulates, and those based on annual averages or annual arithmetic means, are not to be exceeded more than once a year. The 1-hour ozone standard is attained if, during the most recent three-year period, the average number of days per year with maximum hourly concentrations above the standard is equal to or less than one. The 8-hour ozone standard is attained when the three-year average of the fourth highest daily concentration is 0.075 ppm (775 parts per billion) or less. The 24-hour PM_{10} standard is attained when the three-year average of the 99th percentile of monitored concentrations is less than 150 μg/m^3. The 24-hour $PM_{2.5}$ standard is attained when the three-year average of the 98th percentile is less than 35 μg/m^3.

c National air quality standards are set by the U.S. EPA at levels determined to be protective of public health with an adequate margin of safety.

d To attain this standard, the three-year average of the 98th percentile of the daily maximum 1-hour average at each monitoring station within an area must not exceed 0.100 ppm.

TABLE 5.8-4 (Continued)
STATE AND FEDERAL AMBIENT AIR QUALITY STANDARDS AND SFBAAB ATTAINMENT STATUS

[e] On June 2, 2010, the U.S. EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the three-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The existing 0.030 ppm annual and 0.14 ppm 24-hour SO_2 national standards must continue to be used, however, until one year following the U.S. EPA's initial designation of the new 1-hour SO_2 national standard. The U.S. EPA expects to designate areas by June 2012.
[f] The U.S. EPA designated the SFBAAB as nonattainment of the $PM_{2.5}$ standard on October 8, 2009. The effective date of the designation is December 14, 2009, and the BAAQMD has three years to develop a plan—called a State Implementation Plan—that demonstrates the SFBAAB will achieve the revised standard by December 14, 2014. The State Implementation Plan for the new $PM_{2.5}$ standard must be submitted to the U.S. EPA by December 14, 2012.
[g] On December 14, 2012, U.S. EPA lowered the federal primary $PM_{2.5}$ annual standard from 15.0 micrograms per cubic meter to 12.0 micrograms per cubic meter. The new annual standard will become effective March 16, 2013, 60 days after publication in the Federal Register (CARB, 2012c).
[h] National lead standard, rolling three-month average: final rule signed October 15, 2008.
[i] The CARB has identified lead and vinyl chloride as "toxic air contaminants" with no threshold level of exposure below which no adverse health effects would occur.

NOTES:
"–" = not indicated or no information available
A = attainment
N = nonattainment
U = unclassified
N/A = not applicable or no applicable standard
ppm = parts per million
$\mu g/m^3$ = micrograms per cubic meter
mg/m^3 = milligrams per cubic meter.

SOURCE: BAAQMD, 2012b.

federal standards. Table 5.8-4 summarizes the attainment status of the SFBAAB with respect to State standards. As shown in Table 5.8-4, the Bay Area experiences low concentrations of most pollutants when levels are compared to State standards, except for ozone, PM_{10}, and $PM_{2.5}$, for which standards are exceeded periodically. The California Clean Air Act requires that air districts in which state air quality standards are exceeded must prepare a plan, to be updated every three years, documenting reasonable progress towards attainment. In the Bay Area, this planning process is incorporated into the *Clean Air Plan* (CAP). The BAAQMD adopted the CAP in 2010 (see discussion below under the heading Bay Area Air Quality Management District).

California Air Resources Board

The CARB is the State agency responsible for regulating air quality. Its responsibilities include establishing state ambient air quality standards, emissions standards, and regulations for mobile emissions sources (e.g., autos, trucks), in addition to overseeing the efforts of countywide and multi-county air pollution control districts, which have primary responsibility over stationary sources. The emissions standards most relevant to the proposed project are those related to on- and off-road heavy-duty diesel engines. The CARB also regulates vehicle fuels with the intent of reducing emissions; it has set emission reduction performance requirements for gasoline (California reformulated gasoline), and limited the sulfur and aromatic content of diesel fuel to make it burn cleaner. The CARB also sets the standards used to pass or fail vehicles in smog-check and heavy-duty truck inspection programs.

In 2005, the CARB approved the Airborne Toxic Control Measure (ATCM) to Limit Diesel-Fueled Commercial Motor Vehicle Idling in an effort to reduce emissions of toxic and criteria pollutants by limiting the idling of new heavy-duty diesel vehicles. This ATCM altered five sections of Title 13 of the California Code of Regulations; the relevant changes with respect to the proposed project are contained in Section 2485. Pertinent requirements of the measure include:

(c) The driver of any vehicle subject to this section:

(1) shall not idle the vehicle's primary diesel engine for greater than five minutes at any location, except as noted below; and

(2) shall not operate a diesel-fueled auxiliary power system to power a heater, air conditioner, or any ancillary equipment on that vehicle during sleeping or resting in a sleeper berth for greater than five minutes at any location when within 100 feet of a restricted area, except as noted below.

"Restricted area" means any real property zoned for individual or multifamily housing that has one or more such units. There are 12 exceptions to this requirement (e.g., emergency situations, military activities, adverse weather conditions, etc.), including when a vehicle's power takeoff is being used to run pumps, blowers, or other equipment; when a vehicle is stuck in traffic, stopped at a light, or under direction of a police officer; when a vehicle is queuing beyond 100 feet from any restricted area; and when an engine is being tested, serviced, or repaired.

Local Regulations

Bay Area Air Quality Management District

The BAAQMD is the regional agency responsible for air quality regulation within the SFBAAB, regulating air quality through planning and review activities. The BAAQMD has permit authority over most types of stationary emission sources and can require stationary sources to obtain permits, impose emission limits, set fuel or material specifications, or establish operational limits to reduce air emissions. The BAAQMD regulates new or expanding stationary sources of toxic air contaminants.

In September 2010, the BAAQMD adopted the *Bay Area 2010 Clean Air Plan* (2010 CAP), which updates the *Bay Area 2005 Ozone Strategy* and complies with state air quality planning requirements as codified in the California Health and Safety Code (BAAQMD, 2010). While steady progress in reducing ozone levels in the SFBAAB has been achieved, the region is designated as nonattainment for both the 1- and 8-hour State ozone standards. In addition, emissions of ozone precursors in the SFBAAB contribute to air quality problems in neighboring air basins. Under these circumstances, State law requires the CAP to include all feasible measures to reduce emissions of ozone precursors and to reduce the transport of ozone precursors to neighboring air basins. The 2010 CAP addressed four categories of pollutants: ozone and ozone precursors (ROG and NO_X); particulate matter (primarily $PM_{2.5}$); air toxics; and greenhouse gases. The 2010 CAP contains 55 control strategies, including:

- 18 stationary-source measures

- 10 mobile-source measures
- 17 transportation control measures
- 6 land use and local impact measures
- 4 energy and climate measures

In response to Senate Bill 636, the BAAQMD completed the *Particulate Matter Implementation Schedule* in November 2005. The implementation schedule evaluates the applicability of the 103 particulate matter (PM) control measures on the CARB's list and discusses how the BAAQMD implements applicable measures. The BAAQMD implements a number of regulations and programs to reduce PM emissions, such as controlling dust from earthmoving and construction/ demolition operations, limiting emissions from various combustion sources such as cement kilns and furnaces, and reducing PM emissions from composting and chipping activities. In addition to limiting stationary sources, the BAAQMD implements a variety of mobile-source incentive programs to encourage fleet operators and the public to purchase low-emission vehicles, repower old polluting heavy-duty diesel engines, and install after-market control devices to reduce particulates and NO_X emissions.

City and County of San Francisco

The San Francisco Board of Supervisors approved a series of amendments to the San Francisco Building and Health Codes called the Construction Dust Control Ordinance (Ordinance No. 176-08, effective July 30, 2008). These amendments are intended to reduce the quantity of dust generated during site preparation, demolition, and construction work in order to protect the health of the general public and onsite workers, minimize public nuisance complaints, and avoid orders to stop work by the Department of Building Inspection.

For projects over one-half acre in size, applicants must submit a map to the Director of Health showing the location of the project and clearly identifying all surrounding sensitive receptors, especially within 1,000 feet of the project. For projects within 1,000 feet of sensitive receptors, the applicant is required to submit a site-specific dust control plan to the Director of Health for approval. Site-specific dust control plans prepared pursuant to this ordinance are required to contain site specific measures, that may include the following or equivalent measures:

- Wet down areas around soil improvement operations, visibly dry disturbed soil surface areas, and visibly dry disturbed unpaved driveways at least three times per shift per day.
- Provide an analysis of wind direction and install upwind and downwind particulate dust monitors.
- Record particulate monitoring results.
- Hire an independent third party to conduct inspections and keep a record of those inspections.
- Establish shutdown conditions based on dust crossing the property boundary, or in the event that dust is contained within the property boundary but not controlled after a specified number of minutes.

- Establish a hotline for surrounding community members to call and report visible dust problems so that the project applicant can promptly fix those problem; post signs around the site with the hotline number; and make sure that the number is given to adjacent residents, schools and businesses.

- Limit the area subject to excavation, grading, and other demolition or construction activities at any one time.

- Minimize the amount of excavated material or waste materials stored at the site.

- Install dust curtains, plastic tarps, or windbreaks, or plant tree windbreaks on the property line on windward and down-windward sides of construction areas, as necessary.

- Pave, apply water three times daily, or apply nontoxic soil stabilizers on all unpaved access roads, parking areas, and staging areas at the construction site. Reclaimed water must be used if required by Article 21, Section 1100 et seq. of the San Francisco Public Works Code. If not required, reclaimed water should be used whenever possible.

- Load haul trucks carrying excavated material and other non-excavated material so that the material does not extend above the walls or back of the truck bed. Tightly cover with tarpaulins (or other effective covers) all trucks hauling soil, sand, and other loose materials before the trucks leave the loading area. Wet prior to covering if needed.

- Enforce a 15-mile-per-hour speed limit for vehicles entering and exiting construction areas.

- Sweep affected streets with water sweepers at the end of the day if visible soil material is carried onto adjacent paved roads. Reclaimed water must be used if required by Article 21, Section 1100 et seq. of the San Francisco Public Works Code. If not required, reclaimed water should be used whenever possible.

- Install and utilize wheel washers to clean all trucks and equipment leaving the construction site. If wheel washers cannot be installed, tires or tracks and spoil trucks shall be brushed off before they re-enter city streets to minimize the deposition of dust-causing materials.

- Terminate construction activities when winds exceed 25 miles per hour.

- Hydroseed inactive construction areas, including previously graded areas that have been inactive for at least 10 calendar days, or apply nontoxic soil stabilizers.

- Sweep surrounding streets during demolition, excavation, and construction at least once per day to reduce particulate emissions.

The Construction Dust Control Ordinance requires that the project sponsor designate an individual to monitor compliance with dust control requirements. The ordinance is included in the SFPUC's contract specifications, and all contractors working on SFPUC projects are required to comply with it.

In 2007, the San Francisco Board of Supervisors adopted the Clean Construction Law (Ordinance No. 70-07) to require City and County of San Francisco (CCSF) contractors to adopt clean construction practices, which included implementation of biodiesel fuel and emissions controls for all large CCSF-financed construction projects beginning in 2009. The ordinance applies to “major” projects (i.e., projects that would take at least 20 days of cumulative work to complete). In addition, for these major projects, the emissions requirements apply to “high use” vehicles or diesel equipment that would be used for 20 or more hours during any portion of the project. Contractors performing major public works projects in San Francisco are required to comply with the following:

- Use biodiesel fuel in off-road vehicles and equipment used on the job. The fuel must be a blend of at least a 20 percent biodiesel (B20), but can be as high as 100 percent (B100); and
- Use construction equipment (25 horsepower or more) with engines that either:
  - Meet U.S. EPA Tier 2 standards for off-road engines; or
  - Use the most “effective verified diesel emission control strategy,” also known as “best available control technology.”

Compliance with the Clean Construction Law is required for all CCSF-financed construction projects, and thus applies to the proposed project. For this analysis, all equipment used for the project was assumed to operate in compliance with this ordinance, and all off-road equipment is assumed to operate using B20 with U.S. EPA Tier 2 engines.

5.8.3 Impacts and Mitigation Measures

Significance Criteria

This analysis uses the thresholds and methodologies from the BAAQMD *CEQA Air Quality Guidelines* (BAAQMD, 2011a) to evaluate the potential impacts of construction and operation of the proposed project. Although the BAAQMD’s adoption of significance thresholds, the subject of recent judicial actions, has been set aside by the court, the San Francisco Planning Department has determined that Appendix D of the BAAQMD *CEQA Air Quality Guidelines,* in combination with BAAQMD’s *Revised Draft Options and Justification Report* (BAAQMD, 2009), provide substantial evidence to support the BAAQMD recommended thresholds and, therefore, has determined they are appropriate for use in this analysis.

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect on air quality if it were to:

- Conflict with or obstruct implementation of the applicable air quality plan;
- Violate any air quality standard or contribute substantially to an existing or projected air quality violation;
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal, state, or regional ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);

- Expose sensitive receptors to substantial pollutant concentrations; or
- Create objectionable odors affecting a substantial number of people.

Because of the nature of the proposed project, it would have no impacts related to the following criterion; therefore, this EIR does not discuss associated impacts for the reasons described below:

- ***Conflict with or Obstruct Implementation of the Applicable Air Quality Plan***. The most recently adopted air quality plan for the SFBAAB is the BAAQMD's 2010 CAP, which is a comprehensive plan aimed at improving Bay Area air quality and protecting public health. As indicated above in Section 5.8.2, the 2010 CAP contains 55 control measures in the following categories: stationary-source measures, mobile-source measures, transportation control measures, land use and local impact measures, and energy and climate measures. The temporary air quality impacts associated with project construction would not hinder the long-term air quality planning goals of the 2010 CAP due to the project's short-term nature and relatively low levels of construction emissions. In addition, use of U.S EPA Tier 2 construction equipment and B20 biodiesel fuel in accordance with the Clean Construction Law (Ordinance No. 70-07) would control emissions during project construction activities and would be consistent with the control measures and strategies identified in the 2010 CAP.

  Except for emissions associated with testing the diesel-powered emergency generators and the infrequent use of the generators during power outages, proposed project operations would not result in increased air pollutant emissions. Operation of the proposed portable diesel-powered emergency generators at the West Sunset well facility and North Lake well facility would generate $PM_{2.5}$ and TAC emissions that would be well below the significance thresholds (see Impacts AQ-4 and AQ-5). Given the limited emissions associated with project operations (i.e., well below significance thresholds), the proposed project's operational emissions would be consistent with the 2010 CAP (the most recently adopted regional air quality plan). Thus, the project would not conflict with or obstruct implementation of the applicable air quality plan, and no impacts would occur. Therefore, this issue is not addressed further in this EIR.

Approach to Analysis

This air quality impact analysis is based on the *Air Quality Technical Report* prepared for the proposed project by Environmental Science Associates (ESA, 2012). The impact analysis considers short-term construction and long-term operational impacts associated with the project. As noted above, the Construction Dust Control Ordinance requires that the project sponsor designate an individual to monitor compliance with dust control requirements. Compliance with the ordinance is assumed by this analysis.

During project construction, direct emissions of criteria air pollutants and precursor emissions would be generated by construction equipment, trucks, worker vehicles, and ground-disturbing activities. In addition, diesel-operated equipment, vehicles, and generators would result in emissions of DPM—a known TAC. The construction equipment inventory and use assumptions that were applied to estimate construction emissions were developed based on the assumed weekly construction schedule for the project combined with equipment number and duration of use information provided by the SFPUC. Site preparation and foundation work for each well facility are expected to require a front-end loader, excavator, and roller compactor. Construction of aboveground project components, such as well facilities and pumps, would be performed using a forklift, telescopic crane, and pump-setting rig. An arc welder would also be necessary for facility construction. Construction equipment required for each pipeline route would typically include two backhoe loaders, a bobcat/skip loader, an arc welder, and a generator. A compactor would also be necessary for infill compaction. In addition, an excavator and additional auger/boring equipment would be required for tunneling under the two MUNI light rail line crossings. Diesel generators might also be needed during well facility and pipeline construction.

Truck trips would be required associated with construction of the pipelines, construction activities at Sunset Reservoir, and construction of the well facilities to haul spoils and fill material, to deliver other materials (e.g., concrete, asphalt, shoring, etc.), and to remove debris (such as broken pavement and pipe delivery boxes from pipeline construction, and material from demolition of existing structures at the North Lake well and South Windmill Replacement well facility locations). In addition, pipeline delivery trips would be required for pipeline construction. Spoils and fill material truck trip estimates were based on the size of the construction areas for each well facility and pipeline segment. An average of two 30-mile round-trips per day was assumed for the hauling of other materials (non-spoils/fill) and the removal of other debris, which, consistent with equipment use calculations, was assessed over the average well facility construction period (60 weeks), and for the construction duration of the longest pipeline segment (16 weeks). For pipeline delivery, it was estimated that each truck would deliver 16 20-foot pipes (total of 320 feet) to the pipeline alignment/staging areas. According to the project schedule, there may be periods when construction activities at all six well facilities would overlap. During those overlap periods, there would be an average of 24 construction workers traveling to and from the six work sites, which would result in an average of approximately 25 round-trip miles per day per worker in light duty (i.e., pickup) trucks. Furthermore, construction of pipeline segments would require a workforce of up to 60 workers, depending on the construction phasing and planned activities per site, and construction activities at Sunset Reservoir would require up to five workers.

Emissions of ROG, NO_X, PM_{10}, and $PM_{2.5}$ associated with construction activities were estimated assuming that Tier 2 (or equivalent) off-road equipment would be fueled with a blend of at least 20 percent biodiesel (B20), in compliance with the requirements of the San Francisco Clean Construction Law. NO_X and PM emissions were adjusted by +2 percent and -12 percent, respectively, to reflect the use of B20 biodiesel (NBB, 2012). ROG, NO_X, PM_{10}, and $PM_{2.5}$ construction emission rates are also based on the CARB's load factors from the Offroad Emissions Inventory Update Access Database (CARB, 2010). The Offroad Emissions Inventory Update Access Database does not include emission factors for stationary equipment, such as emergency generators. Therefore, operational emissions related to emergency generator testing were estimated using emission rates derived from the CARB's Offroad2007 model. Construction emissions that would be generated by on-road vehicles (i.e., hauling trucks and worker vehicles) were estimated using emissions rates derived from the CARB's Emfac2007 model.

Operation of the proposed groundwater facilities is not expected to result in a substantial change from existing conditions with respect to emissions of criteria pollutants, precursors, or TACs; under normal operations, the project would utilize hydroelectric power provided by the Hetch Hetchy system. Operation of the proposed well facilities would generate criteria pollutants and precursors associated with reliability-based testing of the two proposed portable 500-horsepower diesel-fueled backup generators, one of which would be located at the North Lake well facility and the other at the West Sunset well facility. Backup generator emissions would also occur during planned and unplanned outages. Based on BAAQMD permit requirements, it is assumed that 2-hour tests would be performed 25 times a year for each of the two generators, for a total of 50 hours per generator per year, or 100 hours for both generators. Emissions rates for the emergency generator testing were derived using Offroad2007. PM_{10} and $PM_{2.5}$ emissions are based on PM emissions factors from Offroad2007, with PM_{10} and $PM_{2.5}$ fractions applied to the PM emissions factors (SCAQMD, 2006). Vehicle emissions related to daily well facility inspections by an operator would be negligible, and are not expected to result in an increase in criteria pollutant and precursor emissions. All other assumptions used to estimate project-related mass emissions are included in Appendix AIR-2 of the *Air Quality Technical Report* (ESA, 2012).

Construction and operational emissions are evaluated in accordance with the *CEQA Air Quality Guidelines* (BAAQMD, 2011a) to determine whether short-term construction-related air pollutant emissions require further analysis as to whether the project may exceed the criteria air pollutant significance thresholds shown in Table 5.8-2, above. If a proposed project meets the screening criteria, then construction of the proposed project would result in less-than-significant criteria air pollutant impacts. A project that exceeds the screening criteria may require a detailed air quality assessment to determine whether criteria air pollutant emissions would exceed significance thresholds.

The BAAQMD CEQA Guidelines recommended evaluation of risks and hazards associated with TAC emissions from an individual project undergoing environmental review pursuant to CEQA. Consistent with the recommendations and methodology of these guidelines and additional guidance documents from the BAAQMD (*Recommended Methods for Screening and Modeling Local Risks and Hazards*; BAAQMD, 2012d), human health risks and hazards associated with project construction and operations were calculated for the sensitive receptors within a 1,000-foot zone of influence, including educational, healthcare, childcare, and active recreational facilities, as well as residences (assumed to include children). Figures 5.8-1 through 5.8-7 illustrate the sensitive receptor locations within this zone.

Impact Summary

Table 5.8-5 summarizes the project's air quality impacts and significance determinations.

TABLE 5.8-5
SUMMARY OF IMPACTS – AIR QUALITY

Impacts	Significance Determinations
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.	LS
Impact AQ-2: Project construction would not result in substantial exposure of sensitive receptors to pollutant concentrations.	LS
Impact AQ-3: Project construction activities would not result in the creation of objectionable odors that affect a substantial number of people.	LS
Impact AQ-4: Project operations would generate emissions of criteria pollutants and precursors, but would not violate air quality standards or contribute substantially to an existing air quality violation.	LS
Impact AQ-5: Project operations would expose sensitive receptors to pollutant concentrations, but concentrations would not be substantial.	LS
Impact AQ-6: Project operations could create objectionable odors, but the odors would not affect a substantial number of people.	LS
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.	LS

NOTES:
LS = Less than Significant impact, no mitigation required.

Impact Analysis

Construction Impacts

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. (Less than Significant)

Equipment and Vehicle Exhaust

The proposed site preparation activities, including demolition, site improvements and earthwork, excavation, grading, and other construction activities such as pouring of concrete, would generate ozone precursor emissions (i.e., ROG and NO_X) and other criteria pollutants from equipment exhaust, construction-related vehicular activity, and construction worker automobile trips. Emission levels for these activities would vary depending on the number and type of equipment, duration of use, operation schedules, and the number of construction workers. Emissions of ROG and NO_X from these sources would incrementally add to the regional atmospheric loading of ozone precursors during project development. Emissions were estimated for Phase 1 and for Phase 1 and Phase 2 combined using the methods described above, and are depicted below in **Tables 5.8-6** and **5.8-7**.

TABLE 5.8-6
AVERAGE DAILY CONSTRUCTION-RELATED POLLUTANT EMISSIONS – PHASE 1
(pounds/day)[a]

Emission Source	ROG	NOx	Exhaust PM_{10}[b]	Exhaust $PM_{2.5}$[b]
Pipeline Construction and Installation of Facilities at Sunset Reservoir	1.43	16.09	0.69	0.61
Well Facility Installation	1.58	16.67	0.59	0.54
Total	**3.01**	**32.76**	**1.27**	**1.15**
Significance Thresholds	54	54	82	54
Significant Impact?	No	No	No	No

[a] Emissions were modeled using Tier 2 emissions factors and biodiesel B20 emission reduction rates, and assume the equipment inventory described in the project description.
[b] Significance thresholds for PM_{10} and $PM_{2.5}$ apply to exhaust emissions only and not to fugitive dust. Fugitive construction dust impacts would be regulated by the construction dust ordinance.

NOTES:
ROG = reactive organic gases; NOx = nitrogen oxides; PM_{10} and $PM_{2.5}$= particulate matter.

SOURCE: ESA, 2012.

TABLE 5.8-7
AVERAGE DAILY CONSTRUCTION-RELATED POLLUTANT EMISSIONS – PHASES 1 AND 2
(pounds/day)[a]

Emission Source	ROG	NOx	Exhaust PM10[b]	Exhaust PM2.5[b]
Pipeline Construction and Installation of Facilities at Sunset Reservoir	1.48	17.31	0.74	0.67
Well Facility Installation	1.85	**19.81**	0.70	0.64
Total	**3.33**	**37.12**	**1.44**	**1.31**
Significance Thresholds	54	54	82	54
Significant Impact?	No	No	No	No

[a] Emissions were modeled using Tier 2 emissions factors and biodiesel B20 emission reduction rates, and assume the equipment inventory described in the project description.
[b] Significance thresholds for PM_{10} and $PM_{2.5}$ apply to exhaust emissions only and not to fugitive dust. Fugitive construction dust impacts would be regulated by the construction dust ordinance.

NOTES:
ROG = reactive organic gases; NOx = nitrogen oxides; PM_{10} and $PM_{2.5}$= particulate matter.

SOURCE: ESA, 2012.

It should be noted that vehicle idling would be minimized either by shutting equipment off when not in use or by limiting the maximum idling time to five minutes, as required by the ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling contained in Title 13, Section 2485 of the California Code of Regulations. Additional assumptions and information related to the project's criteria pollutant and precursor emissions estimates are included in the *Air Quality Technical Report*, Appendix AIR-2 (ESA, 2012).

As shown in Tables 5.8-6 and 5.8-7, total average daily emissions would not exceed applicable average daily significance thresholds for construction activities. Therefore, it is assumed that equipment and vehicle exhaust emissions associated with construction of the project would not result in a violation of an air quality standard or contribute substantially to an existing or projected air quality violation. As a result, the air quality impact would be less than significant.

Construction Dust

Compliance with the San Francisco Construction Dust Control Ordinance (Ordinance No. 176-08) requires the project sponsor to prepare and implement a dust control plan, and to designate an individual to monitor compliance with dust control requirements. This ordinance is included in the SFPUC's contract specifications for work in San Francisco, and all contractors working on SFPUC projects in San Francisco are required to comply with it. Dust suppression activities may include watering all active construction areas sufficiently to prevent dust from becoming airborne; increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water must be used if required by Article 21, Section 1100 et seq. of the San Francisco Public Works Code. If not required, reclaimed water should be used whenever possible. Contractors would be required to provide as much water as necessary to control dust (without creating run-off in any area of land clearing, and/or earth movement). During excavation and dirt-moving activities, contractors would be required to wet sweep or vacuum the streets, sidewalks, paths, and intersections where work is in progress at the end of the workday. Inactive stockpiles (where no disturbance occurs for more than seven days) greater than 10 cubic yards or 500 square feet of excavated materials, backfill material, import material, gravel, sand, road base, and soil would be covered with a 10 millimeter (0.01 inch) polyethylene plastic (or equivalent) tarp, braced down, or use other equivalent soil stabilization techniques. The Building Code and Health Code regulations and procedures set forth in the Dust Control Ordinance would ensure that construction-related fugitive dust impacts associated with the proposed project would be less than significant.

Impact AQ-2: Project construction would not result in substantial exposure of sensitive receptors to pollutant concentrations. (Less than Significant)

As described under the Impact AQ-1 discussion, site preparation activities and other construction work would result in the generation of exhaust emissions that contain air pollutants, including particulate matter (PM_{10} and $PM_{2.5}$) emissions, the majority of which would be DPM—a known TAC. As shown in Tables 5.8-6 and 5.8-7 above, emissions of PM_{10} and $PM_{2.5}$ in equipment exhaust would not exceed the significance criteria for regional emissions. However, exposure of sensitive receptors to TAC emissions could result in an elevated health risk. Under California guidelines, DPM is used as a surrogate measure of carcinogen exposure for the mix of chemicals that make up diesel exhaust as a whole (OEHHA, 2003). There is currently no acute non-cancer toxicity value available for DPM. Thus, speciated components of diesel total organic gases with acute toxicity values were included in the acute non-cancer hazard analysis using U.S. EPA

SPECIATE Profile No. 3161DPM exhaust emissions for off-road heavy equipment and for on-road haul/delivery trucks operating within the project area during construction. The speciated emissions were calculated using currently accepted calculation protocols and are described in detail in Appendix AIR-3 of the *Air Quality Technical Report* (ESA, 2012).

A construction health risk assessment was conducted to evaluate carcinogenic and non-carcinogenic health impacts on existing sensitive receptors (ESA, 2012). First, discrete receptor points were placed at the locations of surrounding receptors, including the adult and child residents, daycare facilities, schools (including playgrounds), active recreational facilities, and hospitals, identified in Figures 5.8-1 through 5.8-7. Uniform Cartesian receptor grids were then placed over the residential and active recreational areas closest to proposed construction activities. The Cartesian receptor grids were spaced 10 meters apart.

To evaluate cancer health impacts, the maximum incremental cancer risk from exposure to TACs was calculated following the guidelines established by the California Environmental Protection Agency – Office of Environmental Health Hazard Assessment (OEHHA), as described in the *Air Quality Technical Report* (ESA, 2012). A conservative assumption was employed—that the maximally exposed individual (MEI) in the vicinity of the project sites would be exposed to the annual average TAC concentration throughout the construction period; however, during the actual construction process, the location of equipment would vary within the project area, and TAC concentrations around the sites would change. The receptor grids, in combination with the discrete receptors described above, allowed for an examination of TAC concentrations throughout the construction vicinity.

Construction-related emissions of DPM (using PM_{10} exhaust as a surrogate) were calculated using the Offroad2007 and Emfac2007 models, as described in Section 5.8.3, above. This assumption is also conservative (since DPM represents a portion of total particulate emissions from exhaust) but is consistent with regulatory guidance. Health risks were estimated based on the maximum daily exhaust emissions of DPM across all project components. The maximum daily exhaust emissions include emissions from off-road equipment and on-road trucks associated with construction activities at the well facility sites and pipeline alignments. Construction activities are expected to last from fall 2014 to fall 2016 (approximately two years) across both phases. It was conservatively assumed that the maximum emissions would be uniform over the duration of construction. In reality, emissions would vary by day and phase and would progress across the pipeline alignments.

Modeled average annual dispersion factors were multiplied by the maximum daily emission rate for all construction activities (converted to grams per second) to estimate annual average concentrations. For simplicity, the model was set up to assume a constant emission rate during the entire year for each phase (average daily emissions of 1.3 pounds/day of PM_{10} for Phase 1 and Phase 2). For acute non-cancer hazard analyses, the 1-hour maximum dispersion factor estimates were multiplied by the maximum emission rates. Emissions data for Phases 1 and 2 were used since they represent the maximum construction emissions.

Dispersion modeling was conducted using the Industrial Source Complex Short Term (ISCST3) dispersion modeling program. The specific dispersion modeling parameters used in ISCST3 are described in the *Air Quality Technical Report* (ESA, 2012).

Non-cancer health risk is based on hazard indices established by the OEHHA for acute (short-term) and chronic (long-term) exposures. Each hazard index is the ratio of the predicted incremental exposure concentration to the Reference Exposure Levels (RELs) that could cause adverse chronic health effects. The Chronic REL is the inhalation exposure concentration below which no adverse chronic health effects would be anticipated following exposure. The OEHHA has established a DPM Chronic REL of 5.0 $\mu g/m^3$. This REL represents the level below which exposure to DPM would not result in adverse health effects. The OEHHA has established Acute RELs for identified speciated components of total organic gases (OEHHA, 2008). This REL represents the level below which exposure to these TACs would not result in adverse health effects. Relevant total organic gas components along with their weight percentage and RELs are included in Appendix AIR-3 of the *Air Quality Technical Report* (ESA, 2012).

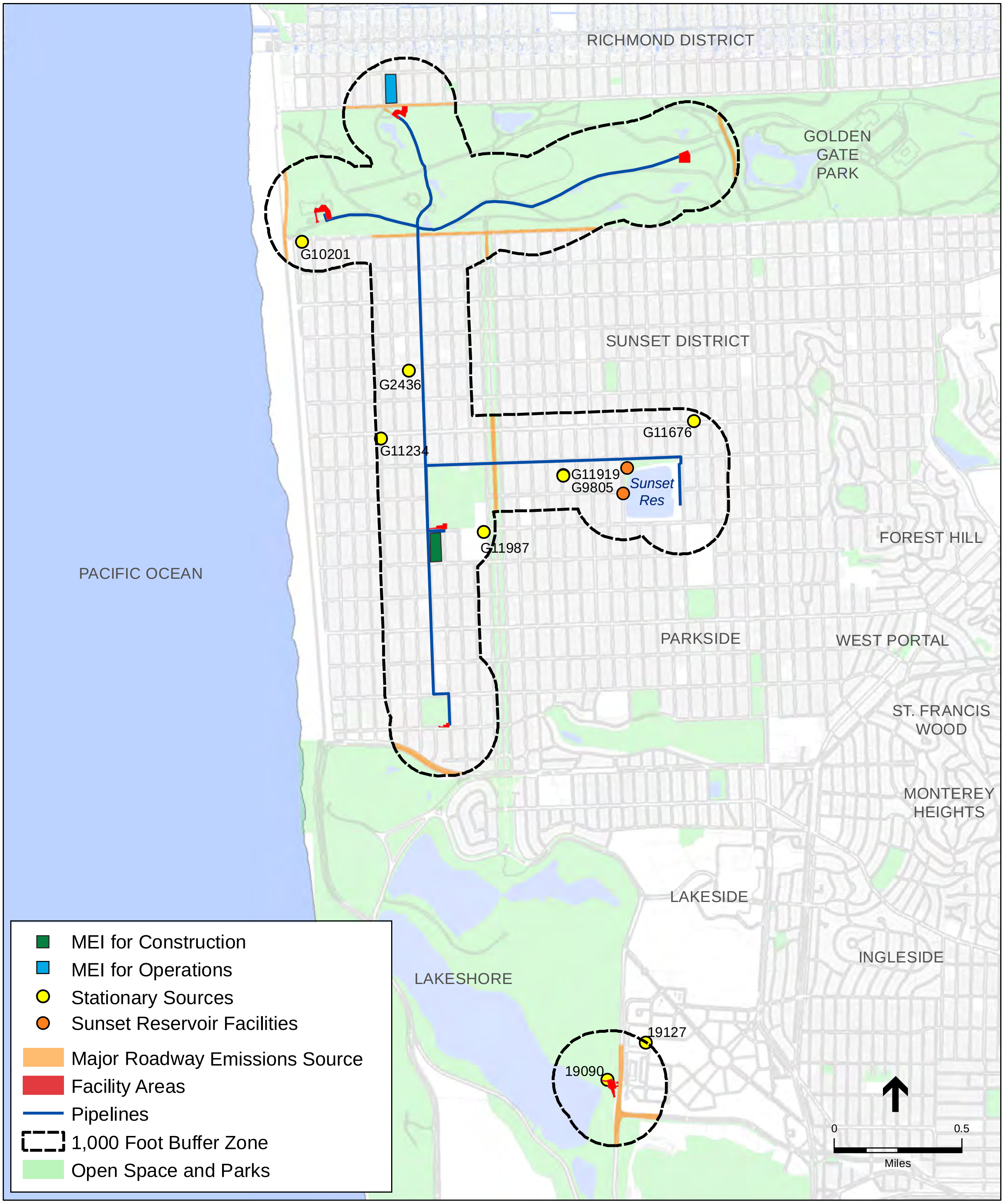
Table 5.8-8 presents the health risk assessment results for the construction period. Based on the assessment methods described above, the MEI (child resident receptor) would be exposed to an incremental cancer risk of 4.40 in 1 million, which is below the project-level significance threshold of 10 in 1 million. The approximate location of the MEI during the construction phase (directly south of the West Sunset well facility) is shown in **Figure 5.8-8**. Results of the analysis also indicate that the maximum annual average $PM_{2.5}$ concentration would be up to 0.023 $\mu g/m^3$ near the construction areas, which is below the project-level significance threshold of 0.3 $\mu g/m^3$. Furthermore, as shown in the table, TAC exposure from the project's construction emissions would result in a maximum chronic hazard index of 0.01 and a maximum acute hazard index of 0.0157, which are well below the project-level significance thresholds of 1.0; therefore, project-related construction activities would not expose existing sensitive receptors to substantial pollutant concentrations. As a result, these air quality impacts would be less than significant.

TABLE 5.8-8
CONSTRUCTION-PERIOD HEALTH RISK ASSESSMENT RESULTS

Receptor	Cancer Risk[a]	$PM_{2.5}$[b]	Chronic HI[c]	Acute HI[c]
Child Receptor (Resident)	4.40	0.023	0.01	0.0157
Adult Receptor (Resident)	0.39	0.023	0.01	0.0157
Child Receptor (School)	0.59	0.020	0.004	0.0146
Child Receptor (Daycare)	0.52	0.004	0.001	0.0067
Thresholds of Significance	**10.0**	**0.3**	**1.0**	**1.0**
Exceeds Threshold?	*No*	*No*	*No*	*No*

[a] Chances in 1 million.
[b] Micrograms per cubic meter ($\mu g/m^3$).
[c] Hazard indices (HI) are dimensionless.

SOURCE: ESA, 2012.



SOURCE: ESRI, 2010

San Francisco Groundwater Supply Project EIR

Figure 5.8-8
MEI Locations

Impact AQ-3: Project construction activities would not result in the creation of objectionable odors that affect a substantial number of people. (Less than Significant)

Project construction would not involve activities that could cause water to stagnate, creating a potential odor. Combustion emissions from the use of diesel fuel in construction equipment, as well as tar or asphalt for repaving roadways after pipeline installation, could temporarily generate localized objectionable odors. Construction equipment used during pipeline and well facility construction would generate diesel exhaust emissions and could result in objectionable odors for nearby residents as well as for recreational users in the immediate project vicinity, such as bicyclists and runners. Project construction would increase vehicle and truck traffic within the South Sunset neighborhood and Golden Gate Park, which would also generate odors associated with diesel emissions. However, truck deliveries and hauling to and from the project area would be limited to weekdays; therefore, odors from construction truck traffic would not affect recreational activities on weekends, when recreational use is generally the highest. In addition, the proposed project would be subject to Title 13 of the California Code of Regulations, Section 2485, which limits the idling of diesel-fueled commercial motor vehicles and associated odors.

Although temporary odors could be perceivable by residents and recreationists in the immediate vicinity of the construction areas, the odors would be temporary and would not affect a substantial number of people. For these reasons, the project's construction impacts related to objectionable odors would be less than significant.

Operational Impacts

Impact AQ-4: Project operations would generate emissions of criteria pollutants and precursors, but would not violate air quality standards or contribute substantially to an existing air quality violation. (Less than Significant)

During normal operations, the Hetch Hetchy system would provide hydroelectric power to the well facilities. However, during planned and unplanned electrical outages, operation of the proposed well facilities would generate criteria pollutants and precursors associated with two portable diesel-fueled emergency generators at the West Sunset well facility and North Lake well facility. It is assumed that 2-hour tests would be conducted 25 times a year for each emergency generator at the West Sunset and North Lake well facilities, for a total of 50 hours per generator per year, or 100 hours for both generators. **Table 5.8-9** provides the long-term maximum day and annual generator testing-related pollutant emissions that would be associated with the proposed project.

As shown in the table, the incremental increase in long-term operational emissions would be less than the significance thresholds; therefore, it is assumed that pollutant emissions associated with project operations would not result in a violation of an air quality standard or contribute substantially to an existing or projected air quality violation. As a result, the air quality impact would be less than significant.

TABLE 5.8-9
MAXIMUM DAY AND ANNUAL GENERATOR TESTING-RELATED POLLUTANT EMISSIONS[a]

Emergency Generator Testing	ROG	NO_X	PM_{10}	$PM_{2.5}$
Pounds/Day	<1	6	<1	<1
Tons/Year	<1	<1	<1	<1
Operational Threshold of Significance [pounds per day (tons per year)]	54 (10)	54 (10)	82 (10)	54 (15)
Significant Impact?	No	No	No	No

a Emissions were modeled using Offroad2007. Additional assumptions and information are included in Appendix AIR-2 of the *Air Quality Technical Report*.

SOURCE: ESA, 2012.

Except for the emissions associated with periodic testing and maintenance of the two portable emergency generators and the infrequent use of the generators during power outages, project operations would result in a negligible increase in criteria pollutant emissions related to a maximum of two additional vehicle trips per day. It should also be noted that the Hetch Hetchy hydroelectric power system would be the primary source of electricity for operation of the new facilities; therefore, the project would utilize electricity generated by a clean, renewable resource. Maintenance of the proposed pipelines and facilities would not generate a significant number of new vehicle trips. Therefore, increases in air pollutant emissions associated with project operations would primarily be limited to emissions from the emergency generators, as presented in Table 5.8-9. As a result, the overall operational impact would be less than significant.

Impact AQ-5: Project operations would expose sensitive receptors to pollutant concentrations, but concentrations would not be substantial. (Less than Significant)

The additional daily vehicle trips during operation of the project would result in a negligible increase in health risk for local receptors. The BAAQMD recommends conducting a health risk assessment for roadways that accommodate more than 10,000 daily vehicle trips. The proposed project would not cause any roadways to exceed this threshold and would not make a measurable contribution to traffic levels on any roadways. Accordingly, no quantification of health risk from vehicle traffic is required.

As noted above, it was assumed that 2-hour tests would be conducted for each portable generator 25 times a year for the emergency generators at the West Sunset well facility and the North Lake well facility. A health risk assessment was conducted to evaluate carcinogenic and non-carcinogenic health impacts on existing sensitive receptors associated with testing of the emergency generators (ESA, 2012). Emergency generators were modeled as point sources with a stack height of 1.8 meters and a stack exhaust temperature of 679.6 kelvin. These values represent typical parameters for diesel generators of this size (500 horsepower). All other model settings (i.e., meteorological data, terrain, receptor characterization, and risk assessment parameters) were set the same as for the construction health risk assessment. Modeled average annual dispersion factors were multiplied by the maximum daily emission rate for each test run (converted to grams per second) to estimate annual average concentrations. For the acute non-cancer hazard analysis, the 1-hour maximum dispersion factor estimates were multiplied by the maximum emission rates. **Table 5.8-10** presents the results.

TABLE 5.8-10
OPERATIONAL-PERIOD HEALTH RISK ASSESSMENT RESULTS

Year	Cancer Risk[a]	$PM_{2.5}$ (μg/m³)	Chronic HI[b]	Acute HI[b]
West Sunset Well Facility				
Child Receptor (Resident)	7.88	0.001	0.0003	0.0303
Adult Receptor (Resident)	0.69	0.001	0.0003	0.0303
Child Receptor (School)	1.11	0.001	0.0002	0.0263
Child Receptor (Daycare)	0.46	0.0001	0.00002	0.0014
North Lake Well Facility				
Child Receptor (Resident)	8.19	0.001	0.0003	0.0338
Adult Receptor (Resident)	0.72	0.001	0.0003	0.0338
Child Receptor (School)	N/A	N/A	N/A	N/A
Child Receptor (Daycare)	N/A	N/A	N/A	N/A
Thresholds of Significance	**10.0**	**0.3**	**1.0**	**1.0**
Exceeds Threshold?	*No*	*No*	*No*	*No*

[a] Chances in 1 million.
[b] Hazard indices (HI) are dimensionless.

NOTES:
N/A = Not Applicable; there are no schools or daycare centers within 1,000 feet of the North Lake well facility.
μg/m³ = micrograms per cubic meter.

SOURCE: ESA, 2012

Based on the assessment described above, it was determined that the MEI child resident receptor (located directly north of the North Lake well facility) would be exposed to an incremental cancer risk of 8.19 in 1 million, which is below the significance threshold of 10 in 1 million. No schools or daycare centers were identified within 1,000 feet of the North Lake well facility. The maximum incremental cancer risk at the student receptors near the West Sunset well facility (estimated using the child daily breathing rate and cancer risk adjustment factor of 3) would be 1.11 in 1 million. The maximum incremental cancer risk at the daycare receptors would be 0.46 in 1 million. The risk was estimated based on predicted concentrations at discrete daycare receptors.

Thus, incremental cancer risks from the project would be below the excess cancer risk significance threshold, and the impact would be less than significant. It should be noted that incremental cancer risks were estimated assuming a 70-year exposure period to the annual average DPM concentrations for all sensitive receptors. Detailed modeling results are shown in Appendix AIR-3 of the *Air Quality Technical Report* (ESA, 2012).

Chronic and acute hazard indices were estimated using the same methodology as described above. As shown in Table 5.8-10, TAC exposure from the project's operational emissions would result in a maximum chronic hazard index of 0.0003, which is well below the significance threshold of 1.0; therefore, chronic non-cancer health impacts at existing receptors would be less than significant. Results of the analysis also indicate that the maximum annual average $PM_{2.5}$ concentration would be 0.001 $\mu g/m^3$, which is below the significance threshold of 0.3 $\mu g/m^3$. Therefore, $PM_{2.5}$ concentrations from operations-related DPM emissions would be less than significant. TAC exposure from the project's operational emissions would result in an acute hazard index of 0.0338, which is well below the significance threshold of 1.0; therefore, acute non-cancer health impacts at existing receptors would be less than significant.

Impact AQ-6: Project operations could create objectionable odors, but the odors would not affect a substantial number of people. (Less than Significant)

Normal operation of the proposed well facilities would not create odors, because these facilities would run on electrical power (no direct emissions). However, operation of the portable emergency generators would require the combustion of diesel fuel, which could generate localized objectionable odors. Emergency use and periodic 2-hour tests of the emergency generators would generate diesel exhaust emissions and could result in objectionable odors for nearby residents as well as for recreational users in the immediate vicinity, such as bicyclists and runners. Although temporary odors could be perceivable by residents and recreational users in the immediate vicinity of the emergency generators, these odors would be temporary and would not affect a substantial number of people. For these reasons, the project's operational impacts related to objectionable odors would be less than significant.

Cumulative

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. (Less than Significant)

Construction-Related Criteria Pollutant and Precursor Emissions

The geographic scope for cumulative impacts related to criteria pollutant and precursor emissions generated during construction of the proposed project is the SFBAAB. As presented in Table 5.8-1 above, ambient air quality standards for PM_{10} and $PM_{2.5}$ have recently been exceeded in the SFBAAB. Therefore, there is an existing cumulative air quality impact in the SFBAAB.

Section 5.1.4, Cumulative Impacts, describes the approach to the cumulative analysis used throughout this EIR; Table 5.1-6 and Figure 5.1-1 summarize cumulative projects in the vicinity of the Groundwater Supply Project.

Although the project would include installation of new groundwater well facilities, facilities at Sunset Reservoir, and pipelines, total average daily emissions from construction would not exceed applicable average daily significance thresholds for construction activities. The BAAQMD thresholds represent the levels above which a project's individual emissions of criteria pollutants and precursors would result in a cumulatively considerable contribution to the SFBAAB's existing significant cumulative impact with respect to air quality violations. If average daily or annual emissions exceed these thresholds, the project would result in a cumulatively considerable (i.e., significant) impact. As indicated in Impact AQ-1 above, construction-related criteria pollutant and precursor exhaust emissions associated with the project would not exceed the significance thresholds. With regard to fugitive dust, the San Francisco Building Code and Health Code regulations and procedures identified in the Dust Control Ordinance would ensure that construction-related fugitive dust impacts associated with the proposed project would be less than significant. Therefore, the project's short-term contribution to cumulative air quality impacts related to criteria pollutants and precursor emissions during construction would not be cumulatively considerable, and the cumulative impact would be less than significant.

Construction-Related Health Risks

To address cumulative impacts on local air quality conditions due to TAC emissions during project construction, the BAAQMD recommends assessing impacts within 1,000 feet of the proposed project, taking into account both project-specific and cumulative sources (i.e., the proposed project plus existing and foreseeable future projects). The following are the cumulative thresholds of significance for evaluating impacts at the project's MEI: 100 excess cancer cases in a million; a hazard index of 1 for chronic and acute non-cancer risk; and 0.8 $\mu g/m^3$ of $PM_{2.5}$ (annual average) from all local sources.

Table 5.8-3 lists BAAQMD-permitted stationary emissions sources as well as major roadway sources (roadways with average daily traffic volumes exceeding 10,000) within 1,000 feet of project facility sites. Figures 5.8-1 through 5.8-7 show the locations of all stationary sources and major roadways in relation to the well facility sites. No major non-permitted sources (e.g., rail yards, distribution facilities, and high-volume fueling stations) are located within 1,000 feet of well facility sites.

The BAAQMD coordinated with the Environmental Planning section (EP) of the San Francisco Planning Department to develop detailed information on existing stationary sources and associated health risk levels for inclusion in the analysis, as shown in **Table 5.8-11**. The San Francisco Department of Public Health provided contour maps showing concentrations for DPM, ROG, and $PM_{2.5}$ from all sources within the project's 1,000-foot zone of influence. In addition, EP assessed the cumulative projects within 1,000 feet of the project's MEIs and determined that none warranted inclusion in the cumulative analysis. Most cases consist of either interior renovation or minor construction or demolition (one- to two-story homes and commercial businesses). These construction

TABLE 5.8-11
CONSTRUCTION-PHASE CUMULATIVE HEALTH RISKS

Plant ID Number	Source	Cancer Risk[a]	$PM_{2.5}$ ($\mu g/m^3$)	Chronic HI[b]
Stationary Sources				
G11234	76 Gas Station No. 3390	16	N/A	0.0197
G11987	St. Ignatius College Preparatory[c]	N/A	N/A	N/A
G10201	76 Station No. 250433	14	N/A	0.0137
G11676	Sunset 76 Service Station No. 255468	30.9	N/A	0.0382
G9805	San Francisco Fire Department Station 18[c]	N/A	N/A	N/A
G2436	Tosco Marketing No. 3243	21.7	N/A	0.0268
19090	SFPUC (4 emergency generators)[d]	0.49	0.0005	0.0001
19127	Parkmerced Investors LLC (Source Type: 11 diesel generators)	1.59	N/A	0.0006
Roadways				
	Cumulative emissions within the 1,000-foot zone of influence[e]	0.63	0.02	0.004
	Project Construction	4.40	0.023	0.01
	Total [f]	5.03	0.043	0.014
	Cumulative Thresholds	100	0.8	10
	Exceeds Thresholds?	No	No	No

[a] Chances per one million population exposed.
[b] Hazard index (HI) is dimensionless.
[c] The BAAQMD does not provide risks and hazards data for these sources, since the risk associated with non-retail gas stations is considered insignificant.
[d] The BAAQMD does not provide risk data for this source. Concentrations and risks were estimated based on the 50-hour permit limit on emergency generators and distance to the nearest receptor (400 feet).
[e] Risks and hazards were conservatively computed based on the maximum DPM concentration within the 1,000-foot zone of influence, with the assumption that the MEI would be a residential child receptor exposed for the 70-year duration.
[f] Cumulative risks for the MEI are estimated based on project-level risks in conjunction with risks from other sources within 1,000 feet of the MEI. G11987 is the only stationary source within 1,000 feet of the MEI. Data for this source were not available, since the BAAQMD considers the risk associated with non-retail gas stations to be insignificant. Sunset Boulevard, a major roadway carrying more than 10,000 vehicles per day, is located approximately 1,000 feet from the MEI.

NOTES:
$\mu g/g^3$ = micrograms per cubic meter.
HI = hazard index.
N/A = Data not available from BAAQMD. BAAQMD does not report $PM_{2.5}$ data for gas stations because these are considered insignificant. Additionally, Plants G11987 and G9805 are non-retail gas stations.

SOURCE: ESA, 2012

projects would require only minor amounts of diesel equipment, if at all, and are not expected to contribute substantially to cumulative health risks. Data used for the cumulative analysis are included in Appendix AIR-3 of the *Air Quality Technical Report* (ESA, 2012).

One project, the SFPUC Westside Recycled Water Project, located in the vicinity of the project area, could contribute to cumulative risks and hazards. The SFPUC is proposing the Westside Recycled Water Project to develop a new recycled water supply for nonpotable irrigation uses at Golden Gate Park, Lincoln Park Golf Course, and the Presidio Golf Course. The availability of recycled water in Golden Gate Park would enable the SFPUC to convert two existing well facilities in the park from irrigation use to municipal supply. Pipelines would be extended from the proposed wastewater treatment facility to Golden Gate Park. Although portions of the Westside Recycled Water Project would be within the project's 1,000-foot zone of influence, short-term construction emissions associated with the recycled water project would be similar to those of the Proposed Project, resulting in cumulative risks and hazards that would likely be below the significance thresholds.

Table 5.8-11 shows the contribution of non-project sources within 1,000 feet of the project's zone of influence. The only non-project source of TACs within 1,000 feet of the construction-phase MEI is traffic on Sunset Boulevard, a major roadway carrying more than 10,000 vehicles per day. There is no health risk data available for the stationary source (G11987) within 1,000 feet of the MEI. The cumulative lifetime excess cancer risk (0.63 in one million) and the cumulative $PM_{2.5}$ concentrations (0.02 μg/m^3) from the proposed project and existing nearby sources would not exceed the cumulative significance criteria. Addition of the cancer risk and $PM_{2.5}$ concentration from project construction to the background values would not lead to exceedance of the cumulative significance criteria. Therefore, no cumulative construction-related health risk impact would result.

Operational Criteria Pollutant and Precursor Emissions

The geographic scope for cumulative impacts related to criteria pollutant and precursor emissions generated during operation of the proposed project is the SFBAAB. As presented in Table 5.8-1 above, ambient air quality standards for PM_{10} and $PM_{2.5}$ have recently been exceeded in the SFBAAB. Therefore, there is an existing cumulative air quality impact in the SFBAAB. The thresholds of significance for operational criteria pollutants and precursor emissions represent the levels above which a project's individual emissions of criteria pollutants and precursors would result in a cumulatively considerable contribution to the SFBAAB's existing air quality violations. If average daily or annual emissions were to exceed these thresholds, the project would result in a cumulatively considerable (i.e., significant) impact. As discussed in Impact AQ-4 and indicated in Table 5.8-9 above, operational criteria pollutant and precursor emissions associated with the proposed project would not exceed the significance thresholds. Therefore, the project's contribution to cumulative air quality impacts related to emissions of ozone precursors, PM_{10}, and $PM_{2.5}$ would not be cumulatively considerable (less than significant).

Operational Health Risks

The project would result in an increase in emissions of TACs and particulate matter during operation of the portable diesel-powered emergency generators. The effects of these emissions at the closest sensitive receptors are described under Impact AQ-5, above. Cumulative increases in TAC emissions could occur from operation of the proposed diesel-powered generator in combination with other emissions from sources located within 1,000 feet of the project and the closest sensitive receptors.

Table 5.8-12 shows the cumulative cancer risk, $PM_{2.5}$ concentrations, and chronic hazard indices for all sources within the project's 1,000-foot zone of influence. The BAAQMD and San Francisco Department of Public Health provided detailed information on existing stationary sources and health risk levels for inclusion in the analysis, as shown in the following table. The San Francisco Department of Public Health provided contour maps showing concentrations for DPM, ROG, and $PM_{2.5}$ from all sources within the 1,000-foot zone of influence.

TABLE 5.8-12
CUMULATIVE HEALTH RISKS – OPERATIONAL

Plant ID Number	Source	Cancer Risk[a]	$PM_{2.5}$ ($\mu g/m^3$)	Chronic HI[b]
Stationary Sources				
G11234	76 Gas Station No. 3390	16	N/A	0.0197
G11987	St. Ignatius College Preparatory[c]	N/A	N/A	N/A
G10201	76 Station No. 250433	14	N/A	0.0137
G11676	Sunset 76 Service Station No. 255468	30.9	N/A	0.0382
G9805	San Francisco Fire Department Station 18[c]	N/A	N/A	N/A
G2436	Tosco Marketing No. 3243	21.7	N/A	0.0268
19090	SFPUC (4 emergency generators)[d]	0.49	0.0005	0.0001
19127	Parkmerced Investors LLC (Source Type: 11 diesel generators)	1.59	N/A	0.0006
Roadways				
	Cumulative within the 1,000-foot zone of influence[e]	1.19	0.06	0.012
	Project Operation	8.19	0.001	0.0003
	Total[f]	*9.38*	*0.061*	*0.0123*
	Cumulative Thresholds	100	0.8	10
	Exceeds Thresholds?	No	No	No

a Chances in 1 million.
b Hazard index (HI) is dimensionless.
c The BAAQMD does not provide risks and hazards data for these sources, since the risk associated with non-retail gas stations is considered insignificant.
d BAAQMD does not provide risk data for this source. Concentrations and risks were estimated based on the 50-hour permit limit on emergency generators and distance to the nearest receptor (400 feet).
e Risks and hazards were conservatively computed based on the maximum DPM concentration within the 1,000-foot zone of influence, with the assumption that the MEI would be a residential child receptor exposed for the 70-year duration.
f There are no stationary sources within 1,000 feet of the MEI. Fulton Street, a major roadway source carrying more than 10,000 vehicles per day, is located approximately 100 feet from the MEI.

NOTES:

$\mu g/m^3$ = micrograms per cubic meter.
HI = hazard index.
N/A = Data not available from BAAQMD. BAAQMD does not report $PM_{2.5}$ data for gas stations. Additionally, Plants G11987 and G9805 are non-retail gas stations.

SOURCE: ESA, 2012.

Table 5.8-12 shows the contribution of non-project sources within 1,000 feet of the project's zone of influence. The only non-project source of TACs within 1,000 feet of the operations-phase MEI is traffic on Fulton Street, a major roadway carrying more than 10,000 vehicles per day. There are no stationary sources of TACs within 1,000 feet of the MEI. The cumulative lifetime excess cancer risk (1.19 in one million) and the cumulative $PM_{2.5}$ concentrations (0.06 μg/m^3) from the proposed project and existing nearby sources would not exceed the cumulative significance criteria. Addition of the cancer risk and $PM_{2.5}$ concentration from project operations to the background values would not lead to exceedance of the cumulative significance criteria. Therefore, no cumulative operations-related health risk impact would result.

5.8.4 References

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5.9 Greenhouse Gas Emissions

This section provides a description of global climate change, greenhouse gas (GHG) emissions, the existing regulatory framework governing GHG emissions, and an analysis of the impacts related to GHGs associated with development of the proposed project. The proposed project's GHG emissions are evaluated based on compliance with plans and policies adopted for the purpose of reducing GHG emissions, namely the City's aggressive local GHG reduction plan, *Strategies to Address Greenhouse Gas Emissions* (CCSF, 2010).

5.9.1 Environmental Setting

Greenhouse Gases and Global Climate Change

Gases that trap heat in the atmosphere are referred to as GHGs because they capture heat radiated from the earth, similar to a greenhouse does. The accumulation of GHGs has been implicated as a driving force for global climate change. Definitions of climate change vary between and across regulatory authorities and the scientific community, but in general can be described as the changing of the earth's climate caused by natural fluctuations and anthropogenic activities (i.e., activities relating to, or resulting from, the influence of human beings) that alter the composition of the global atmosphere. The primary GHGs are carbon dioxide (CO2), black carbon, methane (CH4), and nitrous oxide (N2O), ozone (O3), and water vapor.

Individual projects contribute to the cumulative effects of climate change by emitting GHGs during demolition, construction, and operational phases. Although the presence of the primary GHGs in the atmosphere is naturally occurring, CO2, CH4, and N2O are largely emitted from human activities, accelerating the rate at which these compounds accumulate in the earth's atmosphere. Emissions of CO2 are largely byproducts of fossil fuel combustion, whereas CH4 is a component of natural gas and also a byproduct of off-gassing associated with agricultural practices and landfills. Black carbon has recently emerged as a major contributor to global climate change, possibly second only to CO2. Black carbon is produced naturally and by human activities as a result of the incomplete combustion of fossil fuels, biofuels, and biomass (Center for Climate and Energy Solutions, 2010). N2O is a byproduct of various industrial processes and has a number of uses, including use as an anesthetic and as an aerosol propellant. Other GHGs, with much greater heat-absorption potential than CO2, include hydrofluorocarbons (HFCs), perfluorocarbons, and sulfur hexafluoride, and are generated in certain industrial processes. CO2 is the "reference gas" for GHG emissions, meaning that emissions of GHGs are typically reported in "carbon dioxide equivalent" (CO2E) measures.1

There is international scientific consensus that human-caused increases in GHGs have contributed, and will continue to contribute, to global warming, although there is uncertainty concerning the magnitude and rate of the warming. Measurements show that averaged over the globe, the Earth's surface has

[1] Because of the differential heat absorption potential of various GHGs, GHG emissions are frequently measured in terms of "carbon dioxide-equivalent" (CO2E) to account for each gas's heat absorption or global warming potential.

warmed by about 0.8 degrees centigrade (°C) (1.44°F) (with an uncertainty of about ±0.2ºC) since 1850. Many impacts resulting from climate change, including increased fires, floods, severe storms and heat waves, are occurring already and will only become more frequent and more costly (California Climate Change Center, 2012). Secondary effects of climate change are likely to include a global rise in sea level, impacts to agriculture, water resources, the state's electricity system, and native freshwater fish ecosystems, an increase in the vulnerability of levees in the Sacramento-San Joaquin Delta, changes in disease vectors, and changes in habitat and biodiversity (California Climate Change Center, 2012).

The California Air Resources Board (CARB) estimated that in 2009 California produced about 457 million metric tons of CO2E (MMTCO2E) (CARB, 2011).2, The CARB inventory for California shows that transportation is the source of approximately 38 percent of the State's GHG emissions, followed by electricity generation (both in-state generation and imported electricity) at approximately 23 percent and industrial sources at approximately 18 percent. Commercial and residential fuel use (primarily for heating) accounted for approximately nine percent of CO2E emissions (CARB, 2011). In the Bay Area, fossil fuel consumption in the transportation (on-road motor vehicles, off-highway mobile sources, and aircraft) and industrial/commercial sectors are the two largest sources of GHG emissions, each accounting for approximately 36 percent of the Bay Area's 95.8 MMTCO2E emitted in 2007. Electricity generation accounts for approximately 16 percent of the Bay Area's GHG emissions, followed by residential fuel usage (e.g., home water heaters, furnaces, etc.) at seven percent, and agriculture at one percent. Oil refining currently accounts for more than 40 percent of the industrial/commercial-sector GHG emissions, or approximately 15 percent of the total Bay Area GHG emissions (BAAQMD, 2010a).

5.9.2 Regulatory Setting

Federal

U.S. Supreme Court Ruling on Greenhouse Gases

The U.S. Environmental Protection Agency (USEPA) is the federal agency responsible for implementing the Clean Air Act (CAA). The U.S. Supreme Court ruled on April 2, 2007 that CO2 is an air pollutant as defined under the CAA, and that the USEPA has the authority to regulate emissions of GHGs (USEPA, 2009a). At this time, there are no federal regulations or policies regarding GHG emissions directly applicable to the proposed project. (See discussion of Assembly Bill [AB] 1493, below, for information on the USEPA's grant of a waiver of federal CAA preemption to California.)

Energy and Independence Security Act of 2007 and Corporate Average Fuel Economy Standards

The Energy and Independence Security Act of 2007 (EISA) amended the Energy Policy and Conservation Act (EPCA) to further reduce fuel consumption and expand the production of renewable fuels. The EISA's most significant amendment includes a statutory mandate for the

[2] One metric ton (MT) is 1,000 kilograms or 2,204.6 pounds or 1.1 short tons. One short ton or U.S. ton is 2,000 pounds. The abbreviation for "million metric tonnes" is MMT; thus, million metric tons of CO_2-equivalent (MMTCO2E).

National Highway Traffic Safety Administration (NHTSA) to set passenger car corporate average fuel economy (CAFE) standards for each model year (MY) vehicle at the maximum feasible level. This statutory mandate also eliminates the old default CAFE standard of 27.5 miles per gallon (mpg). The EISA requires that CAFE standards for MY 2011to 2020 be set sufficiently high to achieve the goal of an industry-wide passenger car and light-duty truck average CAFE standard of 35 mpg. Various rule makings over the last few years have established CAFE standards for MY 2011 and MY 2012 to 2016 vehicles (USEPA, 2009b). On August 28, 2012 the NHTSA and USEPA issued a joint final rule for CAFE and GHG emissions standards for MY 2017 to 2025 vehicles. The rule includes two phases of fuel economy standards. The first phase establishes final passenger car and light truck standards for model years 2017 to 2021, which the USEPA projects will require in model year 2021, on average, a combined fleet-wide fuel economy of 40.3 to 41.0 mpg. The rule also presents a second phase of non-final passenger car and light truck standards for MY 2022 to 2025 vehicles, which the USEPA projects would require in model year 2025, on average, a combined fleet-wide fuel economy of 48.7 to 49.7 mpg. USEPA's GHG standards, which are harmonized with NHTSA's fuel economy standards, are projected to require 163 grams/mile of CO_2in model year 2025 (NHTSA, 2012).

U.S. Environmental Protection Agency Actions

In response to the issue of climate change, USEPA has taken actions to regulate, monitor, and potentially reduce GHG emissions.

Proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the Clean Air Act

On April 23, 2009, the USEPA published its proposed Endangerment and Cause or Contribute Findings for Greenhouse Gases under the CAA (Endangerment Finding) in the Federal Register. The Endangerment Finding is based on Section 202(a) of the CAA, which states that the USEPA Administrator should regulate and develop standards for "emission[s] of air pollution from any class or classes of new motor vehicles or new motor vehicle engines, which in [its] judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare." The proposed rule addresses Section 202(a) in two distinct findings. The first addresses whether or not the concentrations of the six key GHGs (i.e., CO2, CH4, N2O, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride) in the atmosphere threaten the public health and welfare of current and future generations. The second addresses whether or not the combined emissions of GHGs from new motor vehicles and motor vehicle engines contribute to atmospheric concentrations of GHGs and thus increase the threat of climate change.

The USEPA Administrator proposed the finding that atmospheric concentrations of GHGs endanger the public health and welfare within the meaning of Section 202(a) of the CAA. The evidence supporting this finding consists of human activity resulting in "high atmospheric levels" of GHG emissions, which are very likely responsible for increases in average temperatures and other climatic changes. Furthermore, the observed and projected results of climate change (e.g., higher likelihood of heat waves, wildfires, droughts, sea level rise, and higher intensity storms) are a threat to public health and welfare. Accordingly, GHGs were found to endanger the public health and welfare of current and future generations.

The Administrator also proposed the finding that GHG emissions from new motor vehicles and motor vehicle engines are contributing to air pollution, which is endangering public health and welfare. The proposed finding states that in 2006, motor vehicles were the second largest contributor to domestic GHG emissions (24 percent of the total), behind electricity generation. Furthermore, in 2005, the United States was responsible for 18 percent of global GHG emissions (U.S. Federal Register, 2009a). Thus, GHG emissions from motor vehicles and motor vehicle engines were found to contribute to air pollution that endangers public health and welfare.

On December 7, 2009, USEPA finalized its decision that GHG emissions from motor vehicles constitute an "endangerment" under the CAA. This finding allows for the establishment of GHG emissions standards for new motor vehicles.

State

The CARB is the state agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA), adopted in 1988. The passage of the California Global Warming Solutions Act of 2006, or Assembly Bill 32 (AB 32), gave the CARB broad responsibility for promulgating regulations designed to achieve the general goals of reducing GHG emissions from sources and activities under its jurisdiction. (For a discussion of AB 32, see "Assembly Bill 32 and the California Climate Change Scoping Plan," below)

Various statewide and local initiatives have been introduced to reduce the state's contribution to GHG emissions. However, because every nation emits GHGs and thus makes an incremental cumulative contribution to global climate change, cooperation on a global scale will be required to reduce the rate of GHG emissions to a level that can effectively slow or stop the human-caused increase in global average temperatures and associated changes in climatic conditions.

Assembly Bill 1493

In 2002, then-Governor Gray Davis signed AB 1493 (also known as the Pavley Standards named for the bill's author, State Senator Fran Pavley). The Pavley standards required the CARB to develop and adopt, by January 1, 2005, regulations that achieve the maximum feasible reduction of GHGs emitted by passenger vehicles and light-duty trucks and other vehicles determined by CARB to be vehicles whose primary use is noncommercial personal transportation in the state.

To meet the requirements of AB 1493, the CARB approved amendments to the California Code of Regulations (CCR) in 2004, adding GHG emissions standards to California's existing standards for motor vehicle emissions. Amendments to CCR Title 13, Sections 1900 and 1961 (13 CCR 1900, 1961), and adoption of Section 1961.1 (13 CCR 1961.1), require automobile manufacturers to meet fleet-average GHG emissions limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes (i.e., any medium-duty vehicle with a gross vehicle weight (GVW) rating of less than 10,000 pounds and designed primarily for the transportation of persons), beginning with MY 2009 vehicles. The standards adopted by CARB phase in for 2009 through 2016 model year vehicles. When fully phased in, the near term (2009 to 2012) standards are projected to result in about a 22 percent reduction in GHG emissions as compared to the 2002 fleet, and the mid-term (2013 to 2016) standards are projected to result in about a 30 percent reduction in GHG emissions (CARB, 2004).

Because the Pavley standards would impose stricter vehicle standards than those under the federal CAA, California was required to apply to the USEPA for a waiver from the federal CAA requirements. This waiver, granted in 2009, allows California to impose stricter vehicle standards (U.S. Federal Register, 2009b). In September 2009, the CARB adopted amendments to the Pavley standards that reduce GHG emissions from new passenger vehicles MY 2009 through 2016 (CARB, 2010a). These amendments are part of California's commitment toward a nationwide program to reduce new passenger vehicle GHG emissions.

Executive Order S-3-05

In 2005, in recognition of California's vulnerability to the effects of climate change, then-Governor Schwarzenegger established Executive Order S-3-05, which sets forth a series of target dates by which statewide emissions of GHGs would be progressively reduced, as follows: by 2010, reduce GHG emissions to 2000 levels (approximately 457 MMTCO2E); by 2020, reduce GHG emissions to 1990 levels (an estimated 427 MMTCO2E); and by 2050, reduce GHG emissions to 80 percent below 1990 levels (approximately 85 MMTCO2E).

Assembly Bill 32 and the California Climate Change Scoping Plan

In 2006, the California legislature passed AB 32 (California Health and Safety Code Division 25.5, Sections 38500, et seq.), also known as the California Global Warming Solutions Act. AB 32 requires CARB to design and implement emission limits, regulations, and other measures, such that feasible and cost-effective statewide GHG emissions are reduced to 1990 levels by 2020.

Pursuant to AB 32, CARB adopted a Scoping Plan in December 2008, outlining measures to meet the 2020 GHG reduction limits. In order to meet these goals, California must reduce its GHG emissions by 30 percent below projected 2020 business-as-usual emissions levels, or about 15 percent from 2008 levels (CARB, 2010b). The Scoping Plan estimates a reduction of 174 MMTCO2E from the transportation, energy, agriculture, forestry, and high global warming potential sectors (see **Table 5.9-1**) (CARB, 2010b).

CARB has identified an implementation timeline for the GHG reduction strategies in the Scoping Plan (CARB, 2006). Some measures may require new legislation to implement, some will require subsidies, some have already been developed, and some will require additional effort to evaluate and quantify. Additionally, some emissions reductions strategies may require their own environmental review under CEQA or the National Environmental Policy Act (NEPA).

The AB 32 Scoping Plan also anticipates that local government actions will result in reduced GHG emissions. CARB has identified a GHG reduction target of 15 percent from 2008 levels for local governments themselves and noted that successful implementation of the plan relies on local governments' land use planning and urban growth decisions because local governments have the primary authority to plan, zone, approve, and permit land development to accommodate population

TABLE 5.9-1
GHG REDUCTIONS FROM THE AB 32 SCOPING PLAN SECTORS

GHG Reduction Measures by Sector	GHG Reductions ($MMTCO_2E$)
Transportation Sector	62.3
Electricity and Natural Gas	49.7
Industry	1.4
Landfill Methane Control Measure (Discrete Early Action)	1
Forestry	5
High Global Warming Potential GHGs	20.2
Additional Reductions Needed to Achieve the GHG Cap	34.4
Total Reductions Counted Towards 2020 Target	174
Other Recommended Measures	
Government Operations	1-2
Agriculture - Methane Capture at Large Dairies	1
Additional GHG Reduction Measures:	
Water	4.8
Green Buildings	26
High Recycling/ Zero Waste - Commercial Recycling - Composting - Anaerobic Digestion - Extended Producer Responsibility - Environmentally Preferable Purchasing	9
Total Reductions from Other Measures	**41.8-42.8**

NOTES:
$MMTCO_2E$ = million metric tons of CO_2E (carbon dioxide equivalent)

SOURCE: CARB, 2008; CARB, 2010b

growth and the changing needs of their jurisdictions (CARB, 2008). The Scoping Plan also relies on the requirements of Senate Bill (SB) 375 of 2008 (discussed below) to align local land use and transportation planning for achieving GHG reductions.

Executive Order S-1-07

Executive Order S-1-07, signed by then-Governor Schwarzenegger in 2007, proclaimed that the transportation sector is the main source of GHG emissions in California, at over 40 percent of statewide emissions. The order established a goal of reducing the carbon intensity of transportation fuels sold in California by a minimum of 10 percent by 2020. It also directed CARB to determine whether this Low Carbon Fuel Standard could be adopted as a discrete, early-action measure after meeting the mandates in AB 32. CARB adopted the Low Carbon Fuel Standard on April 23, 2009.

Senate Bill 1078 and 107 and Executive Order S-14-08 and S-21-09

California established aggressive renewable energy standards under SB 1078 (Chapter 516, Statutes of 2002) and SB 107 (Chapter 464, Statutes of 2006), which require retail sellers of electricity, including investor-owned utilities and community choice aggregators,3 to provide at least 20 percent of their electricity supply from renewable sources by 2010. Executive Order S-14-08 of November 2008 expanded the State's Renewable Portfolio Standard to 33 percent of electricity from renewable sources by 2020. In September 2009, then-Governor Schwarzenegger continued California's commitment to the Renewable Portfolio Standard by signing Executive Order S-21-09, which directed CARB under its AB 32 authority to enact regulations to help California meet the Renewable Portfolio Standard goal of 33 percent renewable energy by 2020 (CEC, 2012).

Senate Bill 1368

SB 1368 (September 2006) is a companion bill of AB 32 that required the California Public Utilities Commission to establish a GHG emission performance standard for baseload generation from investor-owned utilities. The California Energy Commission was required to establish a similar standard for local publicly owned utilities. These regulations (20 CCR 2900), established in 2007, prohibit utilities from entering into long-term contracts with any baseload power plant that would emit more than the equivalent GHG performance of a typical combined-cycle natural-gas-fired plant. The legislation ensures that all new contracts for electricity provided to California, including imported electricity, must be generated from plants that meet the standards set by the Public Utilities Commission and the California Energy Commission.

Senate Bill 97

SB 97, signed in August 2007, acknowledges that climate change is a prominent environmental issue requiring analysis under CEQA. SB 97 required the Office of Planning and Research (OPR) to amend the state CEQA Guidelines to address the feasible mitigation of GHG emissions or the effects of GHGs. In response, OPR amended the CEQA Guidelines to provide guidance for analyzing GHG emissions. Among other changes to the CEQA Guidelines, the amendments add a new section to the CEQA Checklist (CEQA Guidelines Appendix G) to address questions regarding a project's potential to emit GHGs. The amendments were reviewed by the Office of Administrative Law, and became effective March 18, 2010. Accordingly, OPR's State CEQA Guideline, as amended to address GHGs, has been incorporated into the analysis in this EIR.

Senate Bill 375

In addition to policy directly guided by AB 32, the California legislature passed SB 375 in September 2008 to require regional coordination in land use and transportation planning and funding to help meet the AB 32 GHG reduction goals. SB 375 aligns regional transportation planning efforts, regional GHG emissions reduction targets, and land use and housing allocations. SB 375 requires regional transportation plans developed by each of the State's 18 Metropolitan Planning Organizations (MPOs) to incorporate a "sustainable communities strategy (SCS)" in each regional transportation plan that will achieve GHG emission reduction targets set by CARB. SB 375 also includes provisions for streamlined CEQA review for some infill projects such as transit-oriented development. The Bay

[3] The City and County of San Francisco community choice aggregation program, "CleanPowerSF," was registered in May 2010 and is administered by the San Francisco Public Utilities Commission.

Area's Metropolitan Transportation Commission's 2013 Regional Transportation Plan, Plan Bay Area, will be the region's first plan subject to SB 375.

CARB, in consultation with MPOs, will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035. These reduction targets will be updated every eight years, but can be updated every four years if advancements in emissions technologies affect the reduction strategies to achieve the targets. CARB is also charged with reviewing each MPO's SCS or "alternative planning strategy" for consistency with its assigned targets. If MPOs do not meet the GHG emissions reduction targets, transportation projects would not be eligible for funding programmed after January 1, 2012.

SB 375 also extends the minimum time period for the Regional Housing Needs Allocation (RHNA) cycle from five years to eight years for local governments located within an MPO that meets certain requirements. City and county land use policies (including general plans) are not required to be consistent with the regional transportation plan (and associated SCS or alternative planning strategy). However, SB 375 added new CEQA provisions that would incentivize qualified projects that are consistent with the approved strategy, categorized as "transit priority projects."

Regional/Local

Bay Area Air Quality Management District Climate Protection Program

The Bay Area Air Quality Management District (BAAQMD) is the primary agency responsible for air quality regulation in the nine-county San Francisco Bay Area Air Basin (SFBAAB). BAAQMD established a climate protection program to reduce pollutants that contribute to global climate change and affect air quality in the SFBAAB (BAAQMD, 2012a). The climate protection program includes measures that promote energy efficiency, reduce vehicle miles traveled, and develop alternative sources of energy, all of which assist in reducing GHGs and other air pollutants that affect the health of residents. BAAQMD also seeks to support current climate protection programs in the region and to stimulate additional efforts through public education and outreach, technical assistance to local governments and other interested parties, and promotion of collaborative efforts among stakeholders. The BAAQMD recommends that local agencies adopt a Greenhouse Gas Reduction Strategy consistent with AB 32 goals and that subsequent projects determine the significance of their GHG emissions based on the degree to which that project complies with a Greenhouse Gas Reduction Strategy (BAAQMD, 2012b). This recommendation is consistent with the approach to analyzing GHG emissions outlined in OPR's CEQA Guidelines, as amended by SB 97.

City and County of San Francisco Greenhouse Gas Reduction Strategy

At a local level, San Francisco has developed a number of plans and programs to reduce the City's contribution to global climate change. San Francisco's GHG reduction goals, as outlined in the 2008 Greenhouse Gas Reduction ordinance are as follows: by 2008, determine the City's GHG emissions for the year 1990, the baseline level with reference to which target reductions are set; by 2017, reduce GHG emissions by 25 percent below 1990 levels; by 2025, reduce GHG emissions by 40 percent below 1990 levels; and finally by 2050, reduce GHG emissions by 80 percent below 1990 levels.

San Francisco's Greenhouse Gas Reduction Strategy documents the City's actions to pursue cleaner energy, energy conservation, alternative transportation and solid waste policies. As identified in San Francisco's Greenhouse Gas Reduction Strategy, the City has implemented a number of mandatory requirements and incentives that have measurably reduced GHG emissions including, but not limited to, increasing the energy efficiency of new and existing buildings, installation of solar panels on building roofs, implementation of a green building strategy, adoption of a zero waste strategy, a construction and demolition debris recovery ordinance, a solar energy generation subsidy, incorporation of alternative fuel vehicles in the City's transportation fleet (including buses), and a mandatory recycling and composting ordinance. The strategy also identifies 42 specific regulations for new development that would reduce a project's GHG emissions.

The Greenhouse Gas Reduction Strategy concludes that San Francisco's policies and programs have resulted in a reduction in GHG emissions below 1990 levels, exceeding statewide AB 32 GHG reduction goals. As reported, San Francisco's communitywide 1990 GHG emissions were approximately 6.15 $MMTCO_2E$. A recent third-party verification of the City's 2010 communitywide and municipal emissions inventory has confirmed that San Francisco has reduced its GHG emissions to 5.26 $MMTCO_2E$, representing a 14.5 percent reduction in GHG emissions below 1990 levels (ICF, 2012a)(ICF, 2012b).

The following plans, policies, and regulations demonstrate San Francisco's continued commitment to environmental protection.

City and County of San Francisco Plans, Policies, and Programs

Transit First Policy

In 1973, the City instituted the Transit First Policy, which added Article 8A, Section 8A.115 to the City Charter with the goal of reducing San Francisco's reliance on freeways and meeting transportation needs by emphasizing mass transportation. The Transit First Policy gives priority to public transit investments; adopts street capacity and parking policies to discourage increased automobile traffic; and encourages the use of transit, bicycling, and walking instead of single-occupant vehicles.

San Francisco Sustainability Plan

In July 1997, the Board of Supervisors endorsed the *Sustainability Plan for the City and County of San Francisco*, which establishes sustainable development as a fundamental goal of municipal public policy.

Electricity Resource Plan (Revised December 2002)

The City adopted the *Electricity Resource Plan* to help address growing environmental health concerns in San Francisco's southeast community, the site of two power plants. The plan presents a framework for ensuring a reliable, affordable, and renewable source of energy for the future of San Francisco.

Climate Action Plan for San Francisco

In February 2002, the San Francisco Board of Supervisors passed the Greenhouse Gas Emissions Reduction Resolution (Number 158-02) that set a goal for the City to reduce GHG emissions to 20 percent below 1990 levels by the year 2012. In September 2004, the San Francisco Department of the Environment and San Francisco Public Utilities Commission published the *Climate Action Plan for San Francisco: Local Actions to Reduce Greenhouse Gas Emissions* (San Francisco Department of the Environment and San Francisco Public Utilities Commission, 2004). This *Climate Action Plan* provides the context of climate change in San Francisco and examines strategies to meet the 20 percent GHG emissions reduction target. Although the Board of Supervisors has not formally committed the City to perform the actions addressed in the plan, and many of the actions require further development and commitment of resources, the plan serves as a blueprint for GHG emissions reductions, and several actions have been implemented or are now in progress.

San Francisco Municipal Transportation Agency's Zero Emissions 2020 Plan

The Zero Emissions 2020 Plan focuses on the purchase of cleaner emission transit buses, including hybrid diesel-electric buses. Under this plan, hybrid buses will replace the oldest diesel buses, some dating back to 1988. The hybrid buses emit 95 percent less particulate matter (soot) than the diesel buses, produce 40 percent less nitrogen oxides, and reduce GHGs by 30 percent.

Zero Waste

In 2004, the City committed to a goal of diverting 75 percent of its waste from landfills by 2010, with the ultimate goal of zero waste by 2020. In 2010 San Francisco successfully diverted 75 percent of discarded material (San Francisco Department of the Environment, 2012).

GoSolarSF

On July 1, 2008, the San Francisco Public Utilities Commission launched its "GoSolarSF" program to San Francisco's businesses and residents, offering incentives in the form of a rebate program that could pay for approximately half the cost of installation of a solar power system and more to those qualifying as low-income residents.

The San Francisco Planning Department and the San Francisco Department of Building Inspection have also developed a streamlining process for solar photovoltaic permits and priority permitting mechanisms for projects pursuing Gold certification under the Leadership in Energy and Environmental Design (LEED®) Green Building Rating System.

Local Ordinances

San Francisco Planning Code

The San Francisco Planning Code reflects the latest smart growth policies and includes electric vehicle refueling stations in City parking garages, bicycle storage facilities for commercial and office buildings, and zoning that is supportive of high-density mixed-use infill development. The City's area plans, including the *Rincon Hill Area Plan, Market and Octavia Area Plan*, *Eastern Neighborhoods Rezoning and Area Plans*, *Glen Park and Balboa Park Area Plans, and Transit Center District Plan* provide transit-oriented development policies that allow for neighborhood-oriented retail services and limit off street parking to accessory parking spaces. At the same time, there is a communitywide focus on ensuring that San Francisco's neighborhoods are "livable," as reflected in the *San Francisco Better Streets Plan*, which provides streetscape policies throughout the City; the Transit Effectiveness Project, which aims to improve transit service; and the *San Francisco Bicycle Plan*. All of these plans and projects are intended to promote alternative transportation options for residents and visitors.

Construction and Demolition Debris Recovery Ordinance

In 2006, the City adopted Ordinance No. 27-06, requiring all construction and demolition debris to be transported to a registered facility that can divert a minimum of 65 percent of the material from landfills. This ordinance applies to all construction, demolition, and remodeling projects within the City.

Greenhouse Gas Reduction Ordinance

In May 2008, the City adopted Ordinance No. 81-08 amending the San Francisco Environment Code to establish GHG emissions targets and departmental action plans, to authorize the San Francisco Department of the Environment to coordinate efforts to meet these targets, and to make environmental findings. The ordinance establishes the following GHG emissions reduction limits for San Francisco and the target dates by which to achieve them:

- Determine 1990 Citywide GHG emissions by 2008, the baseline level with reference to which target reductions are set.
- Reduce GHG emissions by 25 percent below 1990 levels by 2017.
- Reduce GHG emissions by 40 percent below 1990 levels by 2025.
- Reduce GHG emissions by 80 percent below 1990 levels by 2050.

The ordinance also specifies requirements for City departments to prepare climate action plans that assess GHG emissions associated with their activities and with the activities they regulate, report the results of those assessments to the San Francisco Department of the Environment, and prepare recommendations to reduce emissions. In particular, the San Francisco Planning Department is required to: (1) update and amend the City's applicable *General Plan* elements to include the emissions reduction limits set forth in this ordinance and policies to achieve those targets; (2) consider a project's impact on the City's GHG emissions reduction limits specified in this ordinance as part of its review under CEQA; and (3) work with other City departments to enhance the Transit First Policy to encourage a shift to sustainable modes of transportation, thereby reducing emissions and helping to achieve the targets set forth by the ordinance.

City and County of San Francisco's Green Building Ordinance

On August 4, 2008, San Francisco's Green Building Ordinance (Ordinance No. 180-08) became law for newly constructed residential and commercial buildings and renovations to existing buildings. The ordinance specifically requires newly constructed commercial buildings over 5,000 square feet, residential buildings over 75 feet in height, and renovations on buildings over 25,000 square feet to be subject to an unprecedented level of required LEED® Green Building Rating System™

requirements, the most stringent green building requirements in the nation at the time. In addition, green building standards are required for all newly constructed buildings, regardless of size or occupancy, as well as renovations to building areas greater than 25,000 square feet undergoing major structural, mechanical, or electrical upgrades. Cumulative benefits of this ordinance include reducing CO_2 emissions by 60,000 tons, saving 220,000 megawatt-hours of power, saving 100 million gallons of drinking water, reducing waste and stormwater by 90 million gallons, reducing construction and demolition waste by 700 million pounds, increasing the valuations of recycled materials by $200 million, reducing 540,000 automobile trips, and increasing generation of green power by 37,000 megawatt-hours.[4]

City and County of San Francisco Commuter Benefits Ordinance

The City adopted Ordinance No. 199-08, effective January 19, 2009, that allows commuters to deduct a specified amount per month, pre-tax, for transit and vanpool expenses. These commuter benefits must be offered by any employer with 20 employees or more that operates within the City. To qualify for these benefits, employees must work at least 10 hours per week averaged over a calendar month. Although not required by the ordinance, employers can offer the commuter benefits to employees who work fewer than 10 hours per week averaged over a month.

City and County of San Francisco Mandatory Recycling and Composting Ordinance

The City adopted Ordinance No. 100-09, effective October 21, 2009, that requires all businesses and residences to compost food scraps and biodegradable products. Businesses and residents are provided with green, blue, and black bins to sort their food and other biodegradable waste, recycling, and trash, respectively. Businesses and residences that do not comply with the ordinance are subject to fines, depending on the level and duration of noncompliance.

The above are just some of the programs that San Francisco implements to reduce communitywide GHG emissions. As discussed above, the Greenhouse Gas Reduction Strategy provides a comprehensive assessment of City policies, programs, and regulations that reduce GHG emissions.

5.9.3 Impacts and Mitigation Measures

Significance Criteria

The thresholds for determining the significance of impacts in this analysis are consistent with the environmental checklist in Appendix G of the State CEQA Guidelines, as amended by SB 97, which has been adopted by the San Francisco Planning Department. For the purposes of this EIR, the Groundwater Supply Project would have a significant effect on greenhouse gas emissions if the project would:

- Generate GHG emissions, either directly or indirectly, that may have a significant impact on the environment; or

[4] These findings are contained within the final Green Building Ordinance, signed by the Mayor on August 4, 2008.

- Conflict with an applicable plan, policy, or regulation of an agency adopted for the purpose of reducing the emissions of GHGs.

Approach to Analysis

In compliance with SB 97, OPR amended the CEQA Guidelines to address the feasible mitigation of GHG emissions or the effects of GHGs. Among other changes to the CEQA Guidelines, the amendments added a new section to the CEQA Checklist (CEQA Guidelines Appendix G) to address questions regarding the project's potential to emit GHGs. The potential for a project to result in significant GHG emissions which contribute to the cumulative effects global climate change is based on the CEQA Guidelines and CEQA Checklist, as amended by SB 97, and is determined by an assessment of the project's compliance with local and state plans, policies and regulations adopted for the purpose of reducing the cumulative effects of climate change. GHG emissions are analyzed in the context of their contribution to the cumulative effects of climate change because a single land use project could not generate enough GHG emissions to noticeably change the global average temperature. CEQA Guidelines Sections 15064.4 and 15183.5 address the analysis and determination of significant impacts from a proposed project's GHG emissions. CEQA Guidelines Section 15183.5 allows for public agencies to analyze and mitigate GHG emissions as part of a larger plan for the reduction of greenhouse gases and describes the required contents of such a plan. As discussed above, San Francisco has prepared its own Greenhouse Gas Reduction Strategy, demonstrating that San Francisco's policies and programs have collectively reduced communitywide GHG emissions to below 1990 levels, meeting GHG reduction goals outlined in AB 32. The City is also well on its way to meeting the long-term GHG reduction goal of reducing emissions 80 percent below 1990 levels by 2050. Chapter 1 of the City's *Strategies to Address Greenhouse Gas Emission (*the Greenhouse Gas Reduction Strategy) describes how the strategy meets the requirements of CEQA Guidelines Section 15183.5. The BAAQMD has reviewed San Francisco's Greenhouse Gas Reduction Strategy, concluding that "Aggressive GHG reduction targets and comprehensive strategies like San Francisco's help the Bay Area move toward reaching the State's AB 32 goals, and also serve as a model from which other communities can learn (BAAQMD, 2010b)."

With respect to CEQA Guidelines Section 15064.4(b), the factors to be considered in making a significance determination include: 1) the extent to which GHG emissions would increase or decrease as a result of the proposed project; 2) whether or not a proposed project exceeds a threshold that the lead agency determines applies to the project; and finally 3) demonstrating compliance with plans and regulations adopted for the purpose of reducing or mitigating GHG emissions.

The GHG analysis provided below includes a qualitative assessment of GHG emissions that would result from a proposed project, including emissions from an increase in vehicle trips, natural gas combustion, and/or electricity use among other things. Consistent with the CEQA Guidelines and BAAQMD recommendations for analyzing GHG emissions, the significance standard applied to GHG emissions generated during project construction and operational phases is based on whether the project complies with a plan for the reduction of GHG emissions. The City's Greenhouse Gas Reduction Strategy is the City's overarching plan documenting the policies, programs and regulations that the City implements towards reducing municipal and communitywide GHG emissions. In particular, San Francisco implements 42 specific regulations that reduce GHG emissions which are applied to projects within the City. Projects that comply with the Greenhouse Gas Reduction Strategy would not result in a substantial increase in GHGs, since the City has shown that overall communitywide GHGs have decreased and that the City has met AB 32 GHG reduction targets. Individual project compliance with the City's Greenhouse Gas Reduction Strategy is demonstrated by completion of the Compliance Checklist for Greenhouse Gas Analysis (San Francisco Planning Department, 2013).

In summary, the two applicable greenhouse gas reduction plans, the AB 32 Scoping Plan and the City's Greenhouse Gas Reduction Strategy, are intended to reduce GHG emissions below current levels. Given that the City's local greenhouse gas reduction targets are more aggressive than the State's 2020 GHG reduction targets and consistent with the long-term 2050 reduction targets, the City's Greenhouse Gas Reduction Strategy is consistent with the goals of AB 32. Therefore, proposed projects that are consistent with the City's Greenhouse Gas Reduction Strategy would be consistent with the goals of AB 32, would not conflict with either plan, and would therefore not exceed San Francisco's applicable GHG threshold of significance. Furthermore, a locally compliant project would not result in a substantial increase in GHGs.

The following analysis of the proposed project's impact on climate change focuses on the project's contribution to cumulatively significant GHG emissions. Given the analysis is in a cumulative context, this section does not include an individual project-specific impact statement.

Impact Analysis

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. (Less than Significant)

The most common GHGs resulting from human activity associated with land use decisions are CO2, black carbon, CH4, and N2O (Governor's Office of Planning and Research, 2008). Individual projects contribute to the cumulative effects of climate change by directly or indirectly emitting GHGs during construction and operational phases. Direct operational emissions include GHG emissions from new vehicle trips and area sources (natural gas combustion). Indirect emissions include emissions from electricity providers; energy required to pump, treat, and convey water; and emissions associated with waste removal, disposal, and landfill operations.

The proposed project would result in an increase in GHG emissions primarily during the construction phase, which would include construction of up to 6 well facilities (including demolition of two existing facilities) and associated underground distribution pipelines. As indicated in Chapter 3, Project Description, upon completion, the proposed project would include groundwater pumping operations that would result in the addition of up to 4 million gallons per day (mgd) of groundwater to the municipal water system. The GHG emissions under normal operations would not be substantial, given that the well facilities would primarily operate using automated systems that would allow remote supervision by San Francisco Public Utilities Commission (SFPUC) staff, and minimal vehicle trips would be required. Furthermore, under normal project operations, hydroelectric power from the Hetch Hetchy Regional Water System would be used to pump, treat, and convey the water from the groundwater well facilities. However, the project would require use of two portable diesel back-up generators during electrical outages associated with catastrophic emergencies and reliability-based testing purposes for up to 50 hours per generator per year. Project operations would not result in an increase in discarded landfill materials, since it would not generate organic material that would require disposal; nor would it generate a substantial increase in wastewater requiring treatment.[5] Therefore, the proposed project would not appreciably contribute to annual long-term increases in GHGs as a result of operations associate with energy use, water use, wastewater treatment, or solid waste disposal.

As discussed above and consistent with the state CEQA Guidelines and BAAQMD recommendations for analyzing GHG emissions under CEQA, projects that are consistent with San Francisco's *Strategies to Address Greenhouse Gas Emissions* would result in a less-than-significant GHG impact. Based on an assessment of the proposed project's compliance with San Francisco's *Strategies to Address Greenhouse Gas Emissions*, the proposed project would be required to comply with several ordinances that reduce greenhouse gas emissions (see **Table 5.9-2**).

In addition to complying with the City's regulations, the 2008 Green Building Ordinance requires that all City Departments prepare an annual department-specific climate action plan. These climate action plans require City Departments to report their GHG emissions, reduction efforts, and related environmental activities (SFPUC, 2012b).

The SFPUC's principal climate action plan goals are to: a) reduce CO2 emissions ten percent below its 1990 levels by the close of 2012; and b) maintain a GHG-free electric system by 2030. These goals are accomplished through a number of policies, projects and programs that aim to reduce SFPUC's municipal GHG emissions, increase resource reuse, conservation and delivery efficiencies, and improve climate change mitigations and adaptions. According to the SFPUC's most recent April 2012 summary report, the SFPUC's carbon footprint has maintained a relatively flat trend in comparison to past years. Electricity and natural gas usage comprise 46% of CO2 emissions and the other 56% comes from fleet vehicle consumption of liquid fuels (SFPUC, 2012b).

The SFPUC supports a number of programs that empower its employees to be aware of carbon-producing activities and to allow them to help minimize and reduce them. To that end, the SFPUC encourages participation in the City's Zero Waste and Commuter Benefits programs. The SFPUC is also a member of the Mayor's Interdepartmental Climate Team and provides services to other City Departments in order to achieve their GHG emissions-reduction goals through the implementation of energy efficiency, water conservation, and renewable energy projects within their facilities (SFPUC, 2012b).

[5] Some "overboard" water from South Sunset and West Sunset well facilities could go to the combined sewer. However the sewer connection at both facilities is a backup to the percolation / groundwater recharge design features.

TABLE 5.9-2
CITY GREENHOUSE GAS REGULATIONS APPLICABLE TO THE PROPOSED PROJECT

Regulation	Requirement	Project Compliance	Discussion
Transportation Sector			
Commuter Benefits Ordinance (San Francisco Environment Code, Section 421)	All City employees are offered commuter benefits for transit and vanpool expenses. The City Hall bike room provides secure bicycle parking, showers and lockers for bicycle commuters. City employees are also eligible for telecommuting and alternative work schedules.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	All City employees, including SFPUC staff, are provided commuter benefits in accordance with Environment Code Section 421.
Emergency Ride Home Program	All City employees are automatically eligible for the emergency ride home program.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	All City employees, including SFPUC staff, are automatically enrolled in the emergency ride home program.
Healthy Air and Clean Transportation Ordinance (San Francisco Environment Code, Chapter 4)	Requires all new purchases or leases of passenger vehicles and light-duty trucks to be the cleanest and most efficient vehicles available on the market. There are also requirements for medium and heavy-duty vehicles and for phasing out highly polluting vehicles (diesel MUNI buses).	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Operations and maintenance activities would be performed by SFPUC staff located at existing SFPUC facilities, so existing SFPUC fleet vehicles may be utilized. However, if any new SFPUC fleet vehicles are required for project operations and maintenance activities, new purchases would be consistent with these vehicle efficiency requirements.
Biodiesel for Municipal Fleets (Executive Directive 06-02)	Requires all diesel using City Departments to begin using biodiesel (B20). Sets goals for all diesel equipment to be run on biodiesel by 2007 and goals for increasing biodiesel blends to B100.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Consistent with this requirement, SFPUC diesel vehicles used during construction and operation of the project would use biodiesel fuel.
Clean Construction Ordinance (San Francisco Administrative Code, Section 6.25)	Effective March 2009, all contracts for large (20+ day) City projects are required to: • Fuel diesel vehicles with B20 biodiesel, and • Use construction equipment that meet USEPA Tier 2 standards or best available control technologies for equipment over 25 hp.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	All contracts issued for construction of the project would incorporate these biodiesel and best available control technology requirements into the contract specifications. SFPUC adheres to these requirements for vehicles and equipment that fall under this category; therefore, all operations and maintenance activities would also comply with this ordinance.
Resource Efficiency and Green Building Ordinance (Environment Code, Chapter 7)	All new construction must achieve at a minimum the LEED® Gold standard. City leaseholds are subject to all of the requirements of the Commercial Water Conservation Ordinance of Chapter 13A of the San Francisco Building Code, including provisions requiring the replacement of non-compliant water closets and urinals on or before January 1, 2017. All water closets (toilets) with a rated flush volume exceeding 1.6 gallons per flush and all urinals with a rated flush volume exceeding 1.0 gallon per flush must be replaced with high-efficiency	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	LEED for New Construction was designed primarily for new commercial office buildings, and applies to buildings greater than 5,000 square feet. The proposed well facility buildings would be substantially less than 5.000 square feet. Therefore, the project would not be required to be LEED certified. However, the required minimum energy efficiency requirements would be met, as the project's well facilities would be constructed in compliance with California's Energy Efficiency Standards specified in the California Code of Regulations, Title 24, Part 6.

TABLE 5.9-2 (Continued)
CITY GREENHOUSE GAS REGULATIONS APPLICABLE TO THE PROPOSED PROJECT

Regulation	Requirement	Project Compliance	Discussion
Transportation Sector (cont.)			
Resource Efficiency and Green Building Ordinance (Environment Code, Chapter 7) (cont.)	water closets that use no more than 1.28 gallons per flush and high efficiency urinals that use no more than 0.5 gallon per flush, respectively 2. Showerheads must use no more than 1.5 gal/ min. In addition, all showerheads in the facility having a maximum flow rate exceeding 2.5 gallons per minute must be replaced with showerheads that use no more than 1.5 gal/ min. 3. All faucets and faucet aerators in the facility with a maximum flow rate exceeding 2.2 gallons per minute are replaced with fixtures having a maximum flow rate not to exceed 0.5 gallon per minute per appropriate site conditions.		Furthermore, many resource efficiency elements would be implemented as part of the project, such as green roof construction at the Lake Merced, South Sunset, and West Sunset well facilities; construction of permeable vegetated swales for stormwater runoff at the Lake Merced well facility site; collection and discharge of overboard water to percolation piping and recharge basins; installation of a grass-pavement system at the Central Pump Station well facility, South Windmill Replacement well facility, and North Lake well facility to support occasional vehicular use; and, use of premium efficiency motors for well and booster pumps. The project would not include toilets or showerheads.
Energy Efficiency Sector			
Green Building requirements for City Buildings: Energy Efficient Lighting Retrofit Requirements**.** (San Francisco Environment Code, Chapter 7)	These requirements (or those in the CCR Title 24, Part 6, or subsequent State standards, whichever are more stringent) shall apply in all cases except those in which a City department is not responsible for maintenance of light fixtures or exit signs. **Exit Signs;** At the time of installation or replacement of broken or non-functional exit signs, all exit signs shall be replaced with light-emitting diode (L.E.D.)-type signs. Edge-lit compact fluorescent signs may be used as replacements for existing edge-lit incandescent exit signs. **Fluorescent Fixtures - Mercury Content.** The mercury content of each 4-foot or 8-foot fluorescent lamp ("tube" or "bulb") installed in a luminaire shall not exceed 5 mg for each 4-foot fluorescent lamp, or 10 mg for each 8-foot fluorescent lamp. **Fluorescent Fixtures - Energy Efficiency.** The lamp and ballast system in each luminaire that utilizes one or more 4-foot or 8-foot linear fluorescent lamps to provide illumination in a City-Owned Facility must meet the specified requirements. **Exterior Light Fixtures.** At the time of installation or replacement of broken or non-functional exterior light fixtures, a photocell or automatic timer shall be installed to prevent lights from operating during daylight hours.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Construction of the well facilities would require installation of indoor lighting, exit signs, and outdoor lighting. All existing facilities would be demolished and replaced with the new well facilities, so all light fixtures would be new (i.e., not retrofitted). All fluorescent lighting fixtures will have high efficiency advanced electronic ballasts. Furthermore, all outdoor lighting would be the LED-type. For security purposes, outdoor lighting would be manually operated as needed by SFPUC staff. Exit signs are not required for rooms with occupancy levels less than 50.

TABLE 5.9-2 (Continued)
CITY GREENHOUSE GAS REGULATIONS APPLICABLE TO THE PROPOSED PROJECT

Regulation	Requirement	Project Compliance	Discussion
Energy Efficiency Sector (cont.)			
Green Building requirements for City Buildings: Energy Performance (San Francisco Environment Code, Chapter 7)	Using an Alternative Calculation Method (ACM) approved by the California Energy Commission, the LEED Project Administrator shall calculate the project's energy use, and compare it to the standard or "budget" building to achieve LEED credit EA1 by either: (A) A 15 percent compliance margin over Title 24, Part 6, 2008 California Energy Standards; or, (B) Document compliance with Title 24, Part 6, 2008 California Energy Standards, including submittal of all standard documentation, and additionally demonstrate that the project achieves a 15 percent or greater compliance margin over the ASHRAE 90.1 2007 energy cost baseline using the published LEED 2009 rules.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	As noted above, LEED for New Construction was designed primarily for new commercial office buildings, and applies to buildings greater than 5,000 square feet. The proposed well facility buildings would be substantially less than 5.000 square feet. Therefore, the project would not be required to be LEED certified. However, the required minimum energy efficiency requirements would be met, as the project's well facilities would be constructed in compliance with California's Energy Efficiency Standards specified in the California Code of Regulations, Title 24, Part 6.
Green Building requirements for City Buildings: Renewable Energy (San Francisco Environment Code, Chapter 7)	The LEED Project Administrator shall confer with SFPUC on renewable energy opportunities for municipal construction projects. The LEED Project Administrator shall submit documentation verifying that either: (A) At least 1 percent of the building's energy costs are offset by on-site renewable energy generation, achieving LEED credit A 2, including any combination of: photovoltaic, solar thermal, wind, biofuel-based electrical systems, geothermal heating, geothermal electric, wave, tidal, or low impact hydroelectric systems, or as specified in Section 25741 of the California Public Resources Code; or, (B) In addition to meeting LEED prerequisite EA 1 Energy performance requirement, achieve an additional 10 percent compliance margin over Title 24, Part 6, 2008 California Energy Standards, for a total compliance margin of at least 25 percent.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	As noted, the project would not be LEED certified. However, all facilities would utilize renewable energy in the form of hydroelectric power from the Hetch Hetchy Regional Water System for project operations under normal conditions. Two portable diesel generators would be used only during outages caused by catastrophic emergencies, and during testing (up to 50 hours per year).

TABLE 5.9-2 (Continued)
CITY GREENHOUSE GAS REGULATIONS APPLICABLE TO THE PROPOSED PROJECT

Regulation	Requirement	Project Compliance	Discussion
Energy Efficiency Sector (cont.)			
Green Building requirements for City Buildings: Commissioning (San Francisco Environment Code, Chapter 7)	The LEED Project Administrator shall submit documentation verifying that the facility has been or will meet the criteria necessary to achieve LEED credit EA 3.0 (Enhanced Commissioning), in addition to LEED prerequisite EAp1 (Fundamental Commissioning of Building Energy Systems.)	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	As noted above, the project would not be LEED certified. However, the required minimum energy efficiency requirements would be met, as the project's well facilities would be constructed in compliance with California's Energy Efficiency Standards specified in the California Code of Regulations, Title 24, Part 6.
Waste Reduction Sector			
Resource Efficiency and Green Building Ordinance (San Francisco Environment Code, Chapter 7)	The ordinance requires all demolition (& new construction) projects to prepare a Construction and Demolition Debris Management Plan designed to recycle construction and demolition materials to the maximum extent feasible, with a goal of 75% diversion. The ordinance specifies requires for all city buildings to provide adequate recycling space.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Construction of the project would require excavation and grading as well as demolition and/or modification of existing facilities. Spoils generated during construction of the project that are not reused on-site would be taken to a registered disposal facility (approximately 2,920 cubic yards), and demolition debris would be recycled as appropriate. All material removed from the project sites, including concrete, metal, and green waste, would be recycled to the maximum extent feasible, with a goal of 75% diversion or disposed of at an appropriate landfill in compliance with applicable federal, State, and local regulations. In addition, a Construction and Demolition Debris Management Plan would be prepared.
Resource Conservation Ordinance (San Francisco Environnent Code, Chapter 5)	This ordinance establishes a goal for each City department to (i) maximize purchases of recycled products and (ii) divert from disposal as much solid waste as possible so that the City can meet the state-mandated 50% division requirement. Each City department shall prepare a Waste Assessment. The ordinance also requires the Department of the Environment to prepare a Resource Conservation Plan that facilitates waste reduction and recycling. The ordinance requires janitorial contracts to consolidate recyclable materials for pick up. Lastly, the ordinance specifies purchasing requirements for paper products.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	All City departments, including SFPUC, meet these resource conservation requirements. SFPUC includes the ordinance requirements in their construction contract specifications
Green Building Requirements for City Buildings: Recycling (San Francisco Environment Code, Chapter 7)	All City departments are required to recycle used fluorescent and other mercury containing lamps, batteries, and universal waste as defined by California Code of Regulations Section 66261.9	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The project would require demolition of existing facilities at the South Windmill Replacement and North Lake well facilities, and construction of new well facilities. If present at existing structures to be demolished or during operation of

TABLE 5.9-2 (Continued)
CITY GREENHOUSE GAS REGULATIONS APPLICABLE TO THE PROPOSED PROJECT

Regulation	Requirement	Project Compliance	Discussion
Waste Reduction Sector (cont.)			
Green Building Requirements for City Buildings: Recycling (San Francisco Environment Code, Chapter 7) (cont.)			new facilities, all mercury-containing lamps, batteries, and universal waste would be recycled.[a] If present, mercury-containing lamps replaced under project operations would also be recycled, as required.
Mandatory Recycling and Composting Ordinance (San Francisco Environment Code, Chapter 19)	The mandatory recycling and composting ordinance requires all persons in San Francisco to separate their refuse into recyclables, compostables and trash, and place each type of refuse in a separate container designated for disposal of that type of refuse.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	All City Departments, including the SFPUC, meet these recycling and composting requirements. Waste generated at well facilities would be minimal because these facilities would not include permanent on-site staff. However, any waste generated would be separated for disposal elsewhere, as there would be no waste disposal service at the well facilities.
Green Building requirements for City Buildings: Low Emitting Materials (San Francisco Environment Code, Chapter 7)	The LEED Project Administrator shall submit documentation verifying that the project is using low-emitting materials, subject to onsite verification, achieving LEED credits EQ 4.1. EQ 4.2. EQ 4.3. and EQ 4.4 wherever applicable: (A) Adhesives, sealants and sealant primers shall achieve LEED credit EQ 4.1. including compliance with South Coast Air Quality Management District (SCAQMD) Rule 1168. (B) Interior paints and coatings applied on-site shall achieve LEED credit EQ 4.2. including: (i) Architectural paints and coatings shall meet the VOC content limits of Green Seal Standard GS-11. (ii) Anti-corrosive and anti-rust paints applied to interior ferrous metal substrates shall not exceed the VOC content limit of Green Seal Standard GC-03 of 250 g/L. (iii) Clear wood finishes, floor coatings, stains, primers, and shellacs applied to interior elements shall not exceed SCAQMD Rule 1113 VOC content limits. (C) Flooring systems shall achieve LEED credit EQ 4.3 Option 1. including: (i) Interior carpet shall meet the testing and product requirements of the Carpet and Rug Institute Green Label Plus program.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	The project would include LEED compliant adhesives, sealants, paints, etc. as required. The well facilities would include reinforced concrete flooring. Chemical rooms would have a corrosion resistant coating applied to their concrete floor; this coating would be low VOC.

TABLE 5.9-2 (Continued)
CITY GREENHOUSE GAS REGULATIONS APPLICABLE TO THE PROPOSED PROJECT

Regulation	Requirement	Project Compliance	Discussion
Waste Reduction Sector (cont.)			
Green Building requirements for City Buildings: Low Emitting Materials (San Francisco Environment Code, Chapter 7) (cont.)	(ii) Interior carpet cushioning shall meet the requirements of the carpet and Rug Institute Green Label Program. (iii) Hard surface flooring, including linoleum, laminate flooring, wood flooring, ceramic flooring, rubber flooring, and wall base shall be certified as compliant with the FloorScore standard, provided, however, that 100 percent reused or 100 percent post-consumer recycled hard surface flooring may be exempted from this LEED credit EQ 4.3 requirement. Projects exercising this exemption for hard surface flooring shall otherwise be eligible (or LEED credit EQ 4.3. (D) Interior composite wood and agrifiber products shall achieve LEED credit EQ 4.4 by containing no added urea formaldehyde resins. Interior and exterior hardwood plywood, particleboard, and medium density fiberboard composite wood products shall additionally meet California Air Resources Board Air Toxics Control Measure for Composite Wood (17 CCR 93120 et seq.), by or before the dates specified in those sections. (E) Project sponsors are encouraged to achieve LEED Pilot Credit 2: Persistent Bioaccumulative Toxic Chemicals Source Reduction: Dioxins and Halogenated Organic Compounds. This standard is consistent with Environment Code Chapter 5: Non-PVC Plastics.		
Environmentally Preferable Purchasing Ordinance (Formerly Precautionary Purchasing Ordinance)	Requires City Departments to purchase products on the Approved Green Products List, maintained by the Department of the Environment. The items in the Approved Green Products List has been tested by San Francisco City Depts. and meet standards that are more rigorous than ecolabels in protecting our health and environment.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Some products that would be needed for the project fall under the Approved Green Products List product categories, including (but not limited to): building materials, fuel, landscaping products, lighting, and paint and lacquer thinner. These products would be utilized during the project construction phase; therefore, construction specifications would include the requirement to use products from the Approved Green Products List when feasible. Any applicable products from the Approved Green Products List needed for

**TABLE 5.9-2 (Continued)
CITY GREENHOUSE GAS REGULATIONS APPLICABLE TO THE PROPOSED PROJECT**

Regulation	Requirement	Project Compliance	Discussion
Waste Reduction Sector (cont.)			
Environmentally Preferable Purchasing Ordinance (Formerly Precautionary Purchasing Ordinance) (cont.)			conducting operations and maintenance activities (such as office chemicals and landscaping products) would be utilized by SFPUC staff when feasible.
Tropical Hardwood and Virgin Redwood Ban (Environment Code, Chapter 8)	The ordinance prohibits City departments from procuring, or engaging in contracts that would use the ordinance-listed tropical hardwoods and virgin redwood.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	All contracts associated with construction of the project would prohibit the utilization of the ordinance-listed tropical hardwoods and virgin redwood.
Regulation of Diesel Backup Generators (San Francisco Health Code, Article 30)	Requires: All diesel generators to be registered with the Department of Public Health All new diesel generators must be equipped with the best available air emissions control technology.	☒ Project Complies ☐ Not Applicable ☐ Project Does Not Comply	Portable diesel generators would provide backup power to enable operation of the West Sunset well facility and the North Lake well facility during an emergency. For reliability-based testing purposes only, these generators would be tested for up to 50 hours per year and would be registered with the Department of Public Health. Purchase of new backup generators is not part of the project.

NOTES:
[a] Mercury-containing universal waste: Also know as mercury-containing equipment, or a device or part of a device (including thermostats, but excluding batteries and lamps) that contains elemental mercury integral to its function (USEPA, 2012).

The SFPUC offers climate action programs that are available to residents and businesses of San Francisco. Highlights from fiscal year 2010-2011 include: the launch of a Laundry-to-Landscape Pilot Graywater Program and publishing of a comprehensive Graywater Design Manual for Outdoor Irrigation as a free resource to the public; the continuation of the availability of 60-gallon rain barrels and large-volume cisterns available for purchase at steep discounts through the Department's rainwater harvesting program; and the publishing of San Francisco's 2011 Updated Electricity Resource Plan (ERP), which was endorsed by the Board of Supervisors in August of 2011 (SFPUC, 2012b).

Renewable Energy Actions include development of renewable solar, wind, and biomass projects; conducting pilot projects for emerging technologies; and supporting and developing green power projects (estimated reduction of 500,000 metric tons (550,000 U.S. tons) of CO_2e per year). Accomplishments noted in Chapter VI include progress in the development of solar power and biodiesel; closure of the Hunters Point Power Plant in 2006 (the Potrero Power Plant closed in 2011); installation of more than 1,600 photovoltaic systems (capacity of 8.5 megawatts); installation of solar panels at the Sunset Reservoir to generate 5 megawatts of electricity; the use and development of biofuels, including the SFGreasecycle program in which the City picks up used cooking oil and grease from local establishments and converts the oil into biodiesel; and biodiesel use by City fleets.

The City and County of San Francisco examined various renewable technologies for the SFPUC's new headquarters building in the City of San Francisco. The new headquarters at 525 Golden Gate includes the following renewable energy features: hybrid solar array and wind turbine installation, maximizing of daylight harvesting and minimizing of artificial lighting, automatic lighting and work-station equipment shutoff after-hours (SFPUC, 2012a) (San Francisco Department of the Environment, 2012).

In addition to the regulations listed above, the proposed project includes the design features that would further reduce the project's GHG emissions, as discussed in Table 5.9-2, including the provision of energy efficiency requirements, indoor and outdoor water conservation measures, waste reduction and recycling measures, and low VOC building materials. Therefore, as detailed above and in the project's GHG Compliance Checklist, the proposed project was determined to be consistent with San Francisco's *Strategies to Address Greenhouse Gas Emissions*.

Depending on a proposed project's size, use, and location, a variety of controls are in place to ensure that a proposed project would not impair the State's ability to meet statewide GHG reduction targets outlined in AB 32, or impact the City's ability to meet San Francisco's local GHG reduction targets. Given that: (1) San Francisco has implemented regulations to reduce GHG emissions specific to new construction and renovations of private developments and municipal projects; (2) San Francisco's sustainable policies have resulted in the measured reduction of annual GHG emissions; (3) San Francisco has met and exceeds AB 32 GHG reduction goals for the year 2020 and is on track towards meeting long-term GHG reduction goals; (4) current and probable future state and local GHG reduction measures will continue to reduce a project's contribution to climate change; and (5) San Francisco's *Strategies to Address Greenhouse Gas Emissions* meet the CEQA and BAAQMD requirements for a Greenhouse Gas Reduction Strategy, projects that are consistent with San Francisco's regulations would not contribute significantly to global climate change. The proposed project would be required to comply with the requirements listed above, in order to be consistent with San Francisco's *Strategies to Address Greenhouse Gas Emissions*. As such, the proposed project would result in a less than significant impact with respect to GHG emissions. No mitigation measures are necessary.

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5.10 Wind and Shadow

This section analyzes potential wind and shadow impacts that could occur during construction and operation of the proposed Groundwater Supply Project and assesses the potential for project implementation to adversely affect existing wind and shadow patterns.

5.10.1 Setting

The proposed project facilities would be located entirely within San Francisco. San Francisco encompasses approximately 46.7 square miles. The city is generally densely populated and urbanized, except for publicly owned open spaces that make up approximately 20 percent of the total land area.

The project area would be located on the western side of San Francisco, in the Outer Parkside and the Outer Sunset neighborhoods. As shown in Figure 3-1, the project area is generally situated between 19th Avenue (Highway 1) to the east, the Great Highway to the west, Fulton Street to the north, and Lake Merced to the south. The project area overlies the North Westside Groundwater Basin and includes four city parks: Golden Gate Park, Lake Merced, West Sunset Playground, and South Sunset Playground, as well as public open space at Sunset Reservoir. These park areas are described in Section 5.11, Recreation. This urban area is between 0.25 and 1.5 miles from the Pacific Ocean and is characterized by a mix of residential, commercial, public open space, and recreational uses. Because the project area is predominantly developed, existing wind and shadow patterns can be affected by existing and new buildings and structures.

5.10.2 Regulatory Framework

No federal or State regulations govern wind or shadow that apply to the Groundwater Supply Project. The City and County of San Francisco (CCSF) has regulations that govern wind and shadow effects within San Francisco's boundaries. The subsections below present an overview of CCSF wind and shadow regulations.

Wind

The San Francisco Planning Code establishes wind comfort and wind hazard criteria for evaluating new development in four areas of the city: the C-3 Downtown Commercial Districts (Section 148); the Van Ness Avenue Special Use District (Section 243[c][9]); the Folsom–Main Residential/Commercial Special Use District (Section 249.1); and the Downtown Residential District (Section 825).[1] Because the Groundwater Supply Project area is not in any of these areas, the Planning Code wind comfort and wind hazard criteria do not apply to the proposed project.

[1] The cited San Francisco Planning Code sections provide that any new building or addition located in these areas of the city that would cause wind speeds to exceed the hazard level of 26-mph-equivalent (as defined in the Planning Code) for more than 1 hour of any year must be modified to meet this criterion. (The 26-mph standard accounts for short-term—3-minute averaged—wind observations at 36 mph as equivalent to the frequency of an hourly averaged wind speed of 26 mph. Winds over 34 mph make it difficult for a person to maintain balance, and gusts can blow a person over.) For CEQA purposes, the San Francisco Planning Department generally refers to the wind hazard criterion to determine the significance of wind effects related to new development in the city.

Shadow

San Francisco General Plan

The Recreation and Open Space Element of the *San Francisco General Plan* (CCSF, 1996) includes the following policy related to potential solar access or shading impacts:

> ***Policy 2.3*:** Solar access to public open space should be protected.

The policy promotes solar access and avoidance of shading to maintain the usability of public open space. It states that the requirements of Planning Code Section 295 apply to the review of projects that could shade San Francisco Recreation and Park Department (SFRPD) property. Policy 2.3 further states that:

> A number of other open spaces designated in this Element or elsewhere in the General Plan are under the jurisdiction of other public agencies, or are privately owned and therefore not protected by the Planning Code amendments. These spaces should be given other forms of protection to assure they are not shaded during the hours of their most intensive use. Any new shading should be remedied to the extent feasible by expanding opportunities for public assembly and recreation in indoor and outdoor settings.

San Francisco Planning Code

Planning Code Section 295,[2] adopted in 1984 pursuant to voter approval of Proposition K (also known as the Sunlight Ordinance), prohibits the issuance of building permits for structures over 40 feet in height that would cast shade or shadow on property under the jurisdiction of, or designated to be acquired by, the Recreation and Park Commission from one hour after sunrise to

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[2] Planning Code Section 295 provides that: "The City Planning Commission shall conduct a hearing and shall disapprove the issuance of any building permit governed by the provisions of this Section if it finds that the proposed project will have any adverse impact on the use of the property under the jurisdiction of, or designated for acquisition by, the Recreation and Park Commission because of the shading or shadowing that it will cause, unless it is determined that the impact would be insignificant. The City Planning Commission shall not make the determination required by the provisions of this Subsection until the general manager of the Recreation and Park Department in consultation with the Recreation and Park Commission has had an opportunity to review and comment to the City Planning Commission upon the proposed project." As required by Planning Code Section 295, the Recreation and Park Commission and the Planning Commission adopted criteria in 1987 and 1989 for the review of shade, solar access, and shadow effects. According to those criteria, shadow is measured by multiplying the area of the shadow by the amount of time the shadow is present on the park, in units called "square-foot-hours." Determining the shadow impact caused by a project begins with a calculation of the number of square-foot-hours the project casts shadow on a protected property over the course of a year during each day, an hour after sunrise to an hour before sunset, summed over the course of a year, ignoring shadow from any surrounding structures and from clouds, fog, and solar eclipses. This is called the "Annual Available Sunlight" (AAS) for that park. The shadow impact of the project is defined as the shadow in square-foot-hours cast by the project divided by the AAS, expressed as a percentage. Further, in addition to quantitative criteria, the adopted criteria set forth qualitative criteria for the evaluation of shadow. Those criteria for assessing new shadow would be based on existing shadow profiles; important times of day; important seasons in the year; the location, size, and duration of new shadows; and the public good served by buildings casting new shadow. Also, the adopted criteria state that small parks, less than two acres in area, with existing shadow loads of 20 percent or larger, should not be subjected to additional shadow by new development. Larger parks (two acres or more), with shadow loads between 20 percent and 40 percent, would have an additional new shadow budget of 0.1 percent. Larger parks with existing shadow loads of less than 20 percent would have an additional new shadow budget of 1.0 percent. The adopted criteria also include absolute cumulative limits for increase in percent shading for 14 parks in the downtown San Francisco area. Planning Code Section 295, *Presentation for Planning Commission Hearing on October 23, 2003* (San Francisco Planning Department) provides an overview of current procedures for Planning Department review of applications that are subject to Section 295; it includes a review of the Planning Code requirements and of the implementation document adopted jointly by the Recreation and Park and the Planning Commissions, and a description of the technical methodology for analysis of shadow impacts on protected properties.

one hour before sunset at any time of year unless the Planning Commission determines that the shade or shadow would have an insignificant adverse impact on the use of such property.

The proposed well facility sites are located in San Francisco. As described in Chapter 3, Project Description, the well facility sites would be constructed adjacent to or within areas under the jurisdiction of the SFRPD, all of which would be managed by the SFPUC during project operation. However, because all proposed groundwater facilities would be less than 40 feet in height, the project would not be subject to review under Planning Code Section 295.

5.10.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect related to wind and shadow if it were to:

- Alter wind in a manner that substantially affects public areas; or
- Create new shadow in a manner that substantially affects outdoor recreation facilities or other public areas.

Approach to Analysis

Because of the nature of the proposed project, it would have no impacts related to the impact criteria listed above, for the following reasons:

- ***Alter Wind in a Manner that Substantially Affects Public Areas.*** The proposed project involves construction of four new groundwater well facilities, conversion of two existing well facilities in Golden Gate Park to municipal use, and installation of groundwater pipelines. All proposed pipelines would be installed below ground and would not alter wind patterns in the project area. Although the proposed project includes construction of new well facilities that would be between 13 and 20 feet in height, these facilities would not substantially alter wind patterns in public areas for various reasons. The Lake Merced well facility would be located in an area along the access road to the existing Lake Merced Pump Station. This access road is currently restricted from public use, and such restrictions would continue under the proposed project; therefore, the facility would not alter wind in a manner that would substantially affect public areas. The South Sunset well facility would be located within a landscaped berm area along the southern side of the South Sunset Playground. The wall along 40th Avenue would be approximately 5 feet above the sidewalk grade. The southern wall facing Wawona Street and the northern wall would slope up to the roofline, which would be approximately 14 feet above the playground field. Since this facility would be relatively small in size (approximately 14 feet tall) and an existing pathway between the fields and the building would be maintained, the South Sunset well facility would not substantially alter wind patterns in a manner that would adversely affect public use at the South Sunset Playground. The South Windmill Replacement well facility and the North Lake well facility would replace existing well facilities and would be of similar height and scale as the existing facilities. Therefore, these facilities would not introduce new structures that would alter wind patterns to the degree that they would adversely affect public areas. The proposed West Sunset well facility would be within the parking lot of the West Sunset Playground, where existing trees between the proposed West Sunset well facility and the sports fields serve as a windbreak, and public use of the fields on the other side of the trees would not be affected by the new facility. The Central Pump Station well facility would also be located in an area of Golden Gate Park that is within a forested area adjacent to an area used for park operations and maintenance activities, and this well facility site is not within a highly used public area; therefore, this facility would not substantially alter wind patterns in public areas. For these reasons, the project would not alter wind patterns in a manner that would substantially affect public areas.

- ***Create New Shadow in a Manner that Substantially Affects Outdoor Recreation Facilities or Other Public Areas.*** The project does not propose any features that would substantially affect shadow patterns. As described above, the proposed project would construct new groundwater well facilities between 13 and 20 feet in height. Although the new facilities would be high enough to result in new shadows, these facilities would not substantially affect outdoor recreational facilities or other public areas because of their siting relative to surrounding uses, site inaccessibility, and use by the SFRPD. For instance, the South Sunset well facility would be approximately 14 feet high and would be within a landscaped berm area just south of the South Sunset Playground. The West Sunset well facility would rise approximately 17 feet aboveground and would be located adjacent to a parking lot. Due to the size, height, and placement of these buildings, neither would shade actively used public areas. In addition, the South Windmill Replacement well facility and the North Lake well facility would replace existing well facilities with new structures that are similar in size and scale, and would be located in areas that are not often used by the public. Therefore, neither of these facilities would substantially alter current shading patterns. The Central Pump Station well facility would not be high enough to cast new shadows, and would be adjacent to an area designated for park operation and maintenance activities that is not often used by the public. The Lake Merced well facility would rise approximately 20 feet aboveground and would be within an area that is restricted from public use and access; thus, this facility would not substantially alter current shading patterns for nearby recreationists. For these reasons, the project would not create new shadow that would substantially affect outdoor recreational facilities or other public areas.

Impact Analysis

As described above, implementation of the proposed project would not result in impacts related to wind and shadow. Therefore, there are no impacts under this topic.

Cumulative Impacts

Implementation of the proposed project would not result in any cumulative impacts related to wind and shadow because the project would not result in any project-specific impacts related to this topic.

5.10.4 References

City and County of San Francisco (CCSF), *San Francisco General Plan*, *Recreation and Open Space Element*, 1996.

5.11 Recreation

This section evaluates potential impacts on recreational resources that could result from implementation of the proposed project and identifies mitigation measures to reduce or avoid impacts, as appropriate. For the purpose of this assessment, recreational resources are generally defined as the natural and built features that people use for recreation (e.g., fields, trails, and playgrounds), including facilities associated with the recreational resource that enable recreation, such as parking facilities and restrooms. The analysis addresses publicly accessible recreational resources within approximately 1/3 mile of the project area, including local roadways used for bicycling and designated recreational trails. This section also describes regulations pertinent to the proposed project.

5.11.1 Setting

The San Francisco Recreation and Parks Department (SFRPD) manages the majority of the open space and recreational resources in the project area that could be affected by the proposed project. The SFRPD manages more than 230 parks, playgrounds, and open spaces throughout San Francisco that are available to the public for recreation. The City and County of San Francisco (CCSF) also contains several Golden Gate National Recreation Area (GGNRA) sites, which are designated by the U.S. Department of the Interior and administered by the National Park Service (NPS). It also contains the Presidio of San Francisco, whose non-coastal areas (80 percent of the park) are administered by the Presidio Trust. The San Francisco Department of Public Works (SFDPW) maintains and manages several of the paved recreational trails in the project vicinity. Privately owned recreational resources in the project vicinity include the Olympic Club and San Francisco Golf Club.

Table 5.11-1 summarizes the recreational facilities, trails, and bicycle routes within approximately 1/3 mile of the project area.

Recreational Facilities

Lake Merced

Lake Merced is a 368-acre freshwater lake within a larger 614-acre CCSF property in southwest San Francisco (see **Figure 5.11-1**). The SFPUC maintains Lake Merced as a non-potable emergency water supply for the City to be used for firefighting or sanitation purposes if no other water sources are available. While the SFPUC manages the water aspects of Lake Merced, the SFRPD manages the lake's recreational areas pursuant to a 1950 resolution giving the SFRPD management of the surface of the Lake Merced tract for recreational purposes. The lake is surrounded by three golf clubs (the private Olympic Club and San Francisco Golf Club, and the public Tournament Players Cup (TPC) Harding Park (formerly Harding Park Golf Course), the San Francisco Police Department shooting range, the Pacific Rod and Gun Club, residential areas, a multi-use path (discussed below under Recreational Trails), Lowell High School, San Francisco State University, Fort Funston, and the Pacific Ocean (see Figure 5.11.1). Fort Funston is managed by the GGNRA.

TABLE 5.11-1
RECREATIONAL RESOURCES IN THE PROJECT AREA

Resource	Location	Activities / Facilities	Jurisdiction
Recreational Facilities			
Lake Merced and surrounding area	Southwest San Francisco between Lake Merced Boulevard and Skyline Boulevard	Boating, fishing, bird and nature watching, picnicking, trail activities, bicycling	Managed for recreation by SFRPD under terms of 1950 SFPUC and SFRPD resolutions
TPC Harding Park	Harding Road, which connects to Skyline Boulevard on the west side of Lake Merced	18-hole golf course, 9-hole golf course, putting green, pro shop, restaurant, banquet and event facilities	SFRPD
San Francisco Golf Club	Highway 1 / Junipero Serra Boulevard and Thomas More Way	18-hole golf course, clubhouse, restaurant	Privately Owned
Olympic Club at Lakeside	Skyline Boulevard, south of Lake Merced	Two 18-hole and a 9-hole golf course, clubhouse, tennis center	Privately Owned
Pacific Rod & Gun Club	Southwest San Francisco at 520 John Muir Drive	12-field trap and skeet shooting range	Privately managed (via lease from SFPUC)
San Francisco Zoo	Great Highway between Skyline and Sloat Boulevards	Animal exhibits, food cafes, restrooms, children's petting zoo and play area	San Francisco Recreation and Park Commission and Zoological Society (via lease from SFRPD)
Ocean Beach	Great Highway between Point Lobos Avenue and Sloat Boulevard	Swimming, surfing, restrooms, parking facilities	National Park Service
Pine Lake Park	South of Wawona Street between 26th Avenue and 33rd Avenue, adjacent to the west side of Stern Grove Park	Walking and running trails, turf areas, benches, picnic areas, dog runs	SFRPD
South Sunset Playground	40th Avenue and Vicente Street	Picnic tables, baseball and soccer fields, basketball and tennis courts, playground with sand and plastic play structures	SFRPD
West Sunset Playground	41st Avenue and Quintara Street	Picnic tables, baseball fields, soccer fields, basketball and tennis courts, playground with sand and plastic play structures	SFRPD
Golden Gate Park	West San Francisco; bounded on the west by the Great Highway (along Ocean Beach), on the north by Fulton Street, on the east by Stanyan Street, and on the south by Lincoln Way	Horse stables and equestrian center, boathouse and anglers lodge, handball and racquetball courts, baseball diamonds, lawn bowling greens and clubhouse, archery field, tennis courts and clubhouse, dog training area, soccer fields, golf course and clubhouse, polo green, horseshoe pits, three children's playgrounds, carrousel	SFRPD
	Murphy Windmill and Millwright's Cottage. Lincoln Way at the southwest corner of Golden Gate Park	Lawns and interpretive materials open to the public; windmill and cottage are displays and not open to the public	SFRPD
Recreational Trails			
Juan Bautista de Anza Historical Trail	Extends north along Highway 1 from Lake Merced to Park Presidio to Lake Street to Arguello Street through the Presidio; Historic Trail Corridor extends north from Lake Merced and parallels 19th Avenue between 23rd Avenue and 31st Avenue	Designated streets and highways with recreational placards	Caltrans, San Francisco Department of Public Works

TABLE 5.11-1 (Continued)
RECREATIONAL RESOURCES IN THE PROJECT AREA

Resource	Location	Activities / Facilities	Jurisdiction
Recreational Trails (cont.)			
Lake Merced Multi-use Path	Extends four miles around the perimeter of Lake Merced with main access points at Sunset Boulevard, John Muir Drive, Skyline Boulevard, and Lake Merced Boulevard	Paved walking, running, bicycle trail; access to network of informal trails around Lake Merced	SFRPD
Sunset Boulevard	Extends north two miles along Sunset Boulevard between Lake Merced Boulevard and Lincoln Way	Paved (eastern) and unpaved (western) walking, running, bicycle trail	SFDPW
Great Highway Multi-use Path	Extends three miles north along the Great Highway between Sloat Boulevard and Balboa Street	Paved walking, running, bicycle trail	SFDPW
Golden Gate Park Oak Woodlands Trail	Network of trails surrounding the San Francisco Conservancy of Flowers on the northeastern side of Golden Gate Park between Fulton Street, John F. Kennedy Drive, and Stanyan Street	Unpaved walking, running, mountain biking trail	SFRPD
Bicycle Routes			
The Embarcadero to Ocean Beach via Golden Gate Park (Route 30)	Extends east-to-west from the Embarcadero and Howard Street to Mission Street, then travels to Fell Street via Steiner, Waller, Pierce, and Scott Streets; follows Fell Street to the Panhandle Park multi-use pathway to Golden Gate Park; within Golden Gate Park, follows Kezar Drive and John F. Kennedy Drive to the Great Highway	Designated Class II bicycle facility on Howard, 11th, Mission, Otis, McCoppin, Market, Fell, Steiner, Waller, Pierce, and Scott Streets and Duboce Avenue; designated Class I bicycle facility to the Panhandle Park multi-use pathway; designated Class II/III bicycle facilities within Golden Gate Park, Kezar Drive, John F. Kennedy Drive, and the Great Highway	SFMTA
Middle Drive West and Martin Luther King Jr. Drive (Route 34)	Extends east to west through Golden Gate Park from Middle Drive West at Transverse Drive, to Martin Luther King Jr. Drive, to Lincoln Way ending at the Great Highway	Designated Class II and Class III bicycle facility	SFMTA
Illinois Street to the Great Highway (Route 60)	Extends east to west from Illinois Street and Cesar Chavez Street to Portola Drive; zigzags from Dewey Boulevard to Taraval Street, Ulloa Street, and finally to Vicente Street to the Great Highway	Designated Class II bicycle facility along Dewey Drive, Taraval Street, and Ulloa Street; designated Class III bicycle facility along Illinois Street, Portola Drive, and Vicente Street	SFMTA
Seacliff to Daly City BART (Route 75)	Extends north to south from Lake Street to 23rd Avenue to Fulton Street to Transverse Drive, to Martin Luther King Jr. Drive, to 20th Avenue; then travels south on 20th Avenue through Stern Grove	Designated Class II bicycle facilities along Lake Street, 23rd Avenue, Fulton Street, Transverse Drive, Martin Luther King Jr. Drive, and 20th Avenue; designated Class I bicycle facilities on path through Golden Gate Park and path through Stern Grove	SFMTA/SFRPD

TABLE 5.11-1 (Continued)
RECREATIONAL RESOURCES IN THE PROJECT AREA

Resource	Location	Activities / Facilities	Jurisdiction
Bicycle Routes (cont.)			
Legion of Honor to San Mateo County (Route 85)	Extends north to south from the Legion of Honor along 34th Avenue through Golden Gate Park to Lake Merced; provides access to Lake Merced Boulevard and the adjacent multi-use pathway around Lake Merced (Route 885) and south to San Mateo County	Designated Class III bicycleway along Legion of Honor Drive at El Camino del Mar and on Lake Merced Boulevard south to San Mateo County; designated Class II bicycleways on 34th to 36th, Martin Luther King Jr. Drive, Sunset Boulevard to Irving Street, and south on 34th Avenue, Clearfield Drive, Lake Merced Boulevard; designated Class I bicycleway on the Polo Field bicycle track to Martin Luther King Jr. Drive	SFMTA/SFRPD
Winston Drive/Lake Merced Boulevard (Route 86)	Extends east to west from Ocean Avenue to Cerritos Avenue to Mercedes Way to Winston Drive, ending at Lake Merced Boulevard	Designated Class II bicycle facilities along Winston Drive; designated Class III bicycle facilities along Ocean Avenue, Cerritos Avenue, and Mercedes Way	SFMTA
Transverse Drive to Middle Drive West via Overlook Drive (Route 134)	A multi-use east-to-west pathway along Overlook Drive connecting Transverse Drive (Route 75) to Middle Drive West (Route 34)	Designated Class III bicycle facility along Overlook Drive	SFMTA
43rd Avenue and Chain of Lakes Drive West Connector (Route 730)	A north-to-south connector route within Golden Gate Park between Cabrillo Street along 43rd Avenue (Route 20), to Martin Luther King Jr. Drive and Middle Drive West (Route 830) via a multi-use path along Chain of Lakes Drive West	Designed Class I bicycle facility along a multi-use path adjacent to Chain of Lakes Drive West; designated Class III facilities along 43rd Avenue	SFRPD/SFMTA
Martin Luther King Jr. Drive and Middle Drive West Pathway Connector (Route 830)	An east-to-west connector route within Golden Gate Park between Route 30 (John F. Kennedy Drive) across from Lloyd Lake, running south of Hellman Hollow, the Polo Field, Middle Lake, and Bercut Equitation Field, ending near the intersection of Lincoln Way and the Great Highway	Class I bicycle facility offering bicyclists in Golden Gate Park an off-street alternative to Route 34 (Middle Drive West/Martin Luther King Jr. Drive) and Route 30 (John F. Kennedy Drive)	SFRPD/SFMTA
Lake Merced Boulevard/ John Muir Drive/ Skyline Boulevard Connector (Route 885)	Circles Lake Merced; consists of parts of Routes 85, 86, 91, and 95; in clockwise direction, Route 885 follows Lake Merced Boulevard, John Muir Drive, and Skyline Boulevard back to Lake Merced Boulevard; in counterclockwise direction, route runs along Middlefield Drive, Gellert Drive, Clearfield Drive, Ocean Avenue, and the pathway just west of Sunset Boulevard back to Lake Merced Boulevard	On-street loop route that provides a guide for bicyclists who wish to circle Lake Merced; designated Class I and Class III bicycle facilities	SFMTA/SFRPD

SOURCE: ESA, 2012

San Francisco Groundwater Supply Project EIR

Figure 5.11-1
Recreational Opportunities

North and South Lakes are used year round by 6 permitted rowing and Dragon Boat clubs, which primarily consist of student athlete groups. It is estimated that there are approximately 250 on-water users per day (Kinsey, 2012). Lake Merced hosts several special events annually, including races and walks around the perimeter of the lake and boating races.

Information on Lake Merced recreation facilities was collected during a site visit conducted on June 20, 2012. The main entrance to the lake is along Skyline Boulevard between the junction of the Great Highway and John Muir Drive. The entrance area houses restrooms, a boathouse, shoreline access points, four floating docks, three stationary docks, a par course, boat launch ramp, and picnic tables with post barbecue grills. The boathouse, which formerly housed a concessionaire that provided rental rowboats and canoes and also housed rowing clubs, has recently been improved. However, a concessionaire has not been identified and the boathouse is currently closed. Shoreline access points are located adjacent to the picnicking area on the North Lake in areas that have a moderate slope and are relatively free of vegetation. Two floating docks are located in front of the boathouse on South Lake and one is located along the boat launch ramp on the North Lake. These docks are primarily used for boaters to access the lake. Two stationary docks are located on the North Lake, to the west of the boat launch ramp. These docks are mainly used for fishing access as a majority of the lake's shoreline is inaccessible due to dense vegetation. The lake's par course begins on the west side of the entrance area and continues along the multi-use path to the Sunset Circle entrance area.

The John Muir Drive lake entrance is adjacent to the southwest end of South Lake. This area contains parking, picnic benches, shoreline access, a porta-potty, and a stationary dock for fishing. It also provides pedestrian and bicycle access across the berm between South Lake and Impound Lake to Lake Merced Boulevard.

The Lake Merced Boulevard lake entrance is adjacent to the southeast end of South Lake, directly across from the John Muir Drive lake entrance. The area contains parking, picnic benches, access across the berm between South Lake and Impound Lake to John Muir Drive, and access to an informal trail network that was once a nature walk.

The Sunset Circle lake entrance is adjacent to Lake Merced and Sunset Boulevards. The area contains parking, restrooms, access to a network of informal trails along the multi-use path to the east and west, a par course connecting to the main entrance along the multi-use path to the west, a stationary dock for fishing to the west, and access to the TPC Harding Park Clubhouse via a pedestrian bridge to the south. The pedestrian bridge is also used for fishing.

Tournament Players Cup Harding Park

TPC Harding Park is a municipal golf club owned by the CCSF. The 18-hole course covers 163 acres in the southwest corner of San Francisco, west of San Francisco State University and surrounded by Lake Merced on the other three sides. It is part of the PGA Tour's TPC network of courses, following an agreement between the tour and the city in November 2010. The TPC Harding Park complex also contains a nine-hole course known as the Fleming Golf Course, putting green, club house, banquet facilities, and a restaurant (SFRPD, 2010a). The entrance is at Harding Road, which connects to Skyline Boulevard on the east.

San Francisco Golf Club

The San Francisco Golf Club is a privately owned 18-hole golf course located south of Brotherhood Way and between Lake Merced Boulevard and Junipero Serra Boulevard. Access to the course is available via Highway 1/ Junipero Serra Boulevard and Thomas More Way. The golf course facilities include approximately 130 acres of fairways and greens, a clubhouse, and a restaurant.

Olympic Club Lakeside

The Olympic Club is a privately owned sports club with locations in downtown San Francisco and south of Lake Merced. Access to the Olympic Club's Lakeside facilities is via Skyline Boulevard. The facility includes two 18-hole golf courses, a 9-hole golf course, a clubhouse, and a tennis center.

San Francisco Zoo

The San Francisco Zoo occupies 125 acres along the Great Highway between Skyline and Sloat Boulevards. The CCSF and the San Francisco Zoological Society operate the zoo in partnership. The Recreation and Park Commission governs the zoo, and a 60-member Board of Directors governs the Zoological Society (SF Zoo, 2010a). The San Francisco Zoo is an accredited member of the Association of Zoos and Aquariums, a nonprofit organization for the advancement of zoos and aquariums in the areas of conservation, education, science, and recreation. The zoo houses more than 250 animal species and receives more than 980,000 visitors annually. The zoo is open year-round from 10 a.m. to 5 p.m. (SF Zoo, 2010b).

Golden Gate National Recreation Area

GGNRA, established by Congress in 1972, is the largest national park unit in an urban area in the United States. The GGNRA lands are located in Marin, San Francisco, and San Mateo Counties. Upwards of 20 million people per year visit this recreation area, which includes Alcatraz Island, Muir Woods, Crissy Field, the Presidio, Marin Headlands, Stinson Beach, Fort Mason, and Ocean Beach, described in detail in the subsection below (NPS, 2010a). The GGNRA operates under NPS policies and guidelines, in accordance with the *General Management Plan* published in 1980 (NPS, 2010b).

Ocean Beach

Ocean Beach stretches about 3.5 miles along San Francisco's Pacific Ocean shore, from the Cliff House to Fort Funston. There is open access to Ocean Beach along the Great Highway, with three parking lots adjacent and south of the Sloat Boulevard and Great Highway intersection. The parking lots are located approximately 660 feet and 0.5 mile northwest of the Oceanside Water Pollution Control Plant (WPCP). There are restroom facilities in the parking lot at the intersection of Sloat Boulevard and Great Highway and a boat access at stairwell 15. Ocean Beach is open year-round with no entrance fees (GGNPC, 2010).

Rolph Nicol Playground

Rolph Nicol Playground is located at Eucalyptus Drive and 24th Avenue, south of Sloat Boulevard in the Sunset District of San Francisco. This park has a children's playground area and open grass space and is surrounded by eucalyptus trees. SFRPD owns and maintains the park (Parkscan, 2011).

Stern Grove Park

Stern Grove Park occupies 36 acres at the northwest corner of 19th Avenue and Sloat Boulevard. The park is a continuous valley, dropping 100 feet in elevation from the city street above. Stern Grove includes a playground, tennis courts, horseshoe pits, and a croquet green. In addition to accommodating informal sports opportunities, Stern Grove has an open-air concert venue and clubhouse available for receptions, large picnic events, and summer concerts. The Sigmund Stern Grove Association, which is governed by the San Francisco Recreation and Park Commission, organizes a summer concert series in Stern Grove. Stern Grove is accessible by bicycle and foot at the main entrance on Sloat Boulevard. The Recreation and Parks Department estimates that 175,000 patrons attend the Stern Grove summer concert series each year (SFRPD, 2011). The park is open year-round, and access is free of charge.

Pine Lake Park

Pine Lake Park, a 28-acre park situated south of Wawona Street between 26th Avenue and 33rd Avenue, is adjacent to the west side of Stern Grove Park. The park is located in the same valley as Stern Grove. The western edge of Pine Lake Park contains one of four natural lakes in the city of San Francisco; therefore, Pine Lake is listed in San Francisco's Natural Area Program, which aims to restore and enhance remnant natural areas. Pine Lake Park provides walking and running trails and turf areas. The park is open year-round, and access is free of charge (SFRPD, 2011).

South Sunset Playground

South Sunset Playground is a four-acre park located at 40th Avenue and Vicente Street. South Sunset Playground includes picnic tables, baseball and soccer fields, basketball and tennis courts, and a playground with sand and plastic play structures (Parkscan, 2010a). Parking is available along the residential streets surrounding South Sunset, and access is available along the north, south and east sides of the park.

West Sunset Playground

The West Sunset Playground is a 5.5-acre park located at 41st Avenue and Quintara Street. West Sunset Playground includes picnic tables, baseball fields, soccer fields, basketball and tennis courts, and a playground with sand and plastic play structures (Parkscan, 2010b). Parking is available at a parking lot located at 41st Avenue and Quintara Street and along residential streets surrounding West Sunset. Access is available along all sides of the park, including an entrance at the Ortega Branch Library. The park is adjacent to two schools (Sunset Elementary School and AP Giannini Middle School), which account for the majority of park use (FOWSP, 2010).

Golden Gate Park

Golden Gate Park is a 1,017-acre park bounded on the west by the Great Highway (along Ocean Beach), on the north by Fulton Street, on the east by Stanyan Street, and on the south by Lincoln Way. The main body of Golden Gate Park is about 3.5 miles long and 0.5 mile wide. Extending eastward about 0.75 mile from the main body of the park is the block-wide strip known as the Panhandle, which is bounded on the west by Stanyan Street, on the north by Fell Street, on the east by Baker Street, and on the south by Oak Street. Golden Gate Park comprises 680 acres of forest; 130 acres of meadows, fields, and open areas; 33 acres of lakes; and 15 miles of drives (SFRPD, 1998). The park has a variety of outdoor attractions, including two stadiums, 13 lakes and ponds, a Japanese tea garden, an arboretum and botanical gardens, a conservatory of flowers, a horticultural library, and a number of gardens, walkways, and groves. Golden Gate Park also provides a wide range of recreational facilities, including horse stables[1] and an equestrian center, a boathouse and anglers lodge, handball and racquetball courts, baseball diamonds, lawn bowling greens and clubhouse, archery field, tennis courts and clubhouse, dog training area, soccer fields, golf course and clubhouse, polo green, horseshoe pits, three children's playgrounds, and a carrousel. The park also houses the de Young Museum, the California Academy of Sciences and Aquarium, the Conservatory of Flowers, the Japanese Tea Garden, the Beach Chalet Restaurant, multiple concession stands, a senior adult center, and the park's administrative offices (SFGate, 2010). There are more than 20 vehicle access roads into Golden Gate Park, with Fell Street to John F. Kennedy Drive and 9th Avenue off of Lincoln Way serving as primary entrances. Golden Gate Park is open year-round and attracts an estimated 11 to 15 million visitors annually (SFRPD, 1998).

The following Golden Gate Park recreational facilities are located in close proximity to the project area:

- **Murphy Windmill and Millwright's Cottage.** The Murphy Windmill is located on Lincoln Way at the southwest corner of Golden Gate Park. The windmill was the largest in the world when it was built in 1908 and was able to pump 40,000 gallons of water per day to irrigate Golden Gate Park (Western Neighborhoods Project, 2010). The Millwright's Cottage is situated adjacent to the Murphy Windmill. Built in 1903 as windmill caretaker's residence. The windmill, cottage, and grounds have been renovated; however, the windmill and cottage are not open to the public.

- **Beach Chalet Athletic Fields.** The Beach Chalet Athletic Fields are located at the west end of Golden Gate Park between John F. Kennedy Drive and the Great Highway. The fields were built in 1936 and currently include four grass turf athletic fields surrounded by an 8-foot-tall metal chain link fence, an approximately 25,320-square-foot, 50-space asphalt parking lot (including one disabled-accessible space), a restroom building, and a cargo container being used as a maintenance shed (SFRPD, 2012).

- **Beach Chalet.** The Beach Chalet is located at the western end of Golden Gate Park, overlooking the Pacific. Built in 1925, the Spanish Revival building originally housed a

1 The horse stables have been closed in Golden Gate Park since 2001.

restaurant and bathing facilities for Ocean Beach swimmers. The building was restored in 1996 and now houses the Golden Gate Park visitor center, the Beach Chalet restaurant, and the Park Chalet restaurant (SFRPD, 2012).

- **Queen Wilhelmina Tulip Garden.** The Queen Wilhelmina Tulip Garden is located at the far west end of Golden Gate Park between John F. Kennedy Drive and Fulton Street, immediately adjacent to the Dutch Windmill. The garden features a blanket of tulips in bloom during February and March and was dedicated in 1962 in honor of the queen of the Netherlands (SFRPD, 2012).

- **Dutch Windmill.** The windmill is located at the far west end of Golden Gate Park between John F. Kennedy Drive and Fulton Street, immediately adjacent to the Queen Wilhelmina Tulip Garden. The windmill was originally built in 1903 in order to pump fresh water from below ground to irrigate the park. The windmill was restored in 1981 and is now a purely decorative icon (SFRPD, 2012).

- **45th Avenue Playground.** The 45th Avenue playground is located in Golden Gate Park bordering Lincoln Way and 45th Avenue. The playground is ocean themed and contains a boat and traditional playground equipment in sand (SFRPD, 2012).

- **Golden Gate Park Golf Course.** The Golden Gate Park Golf Course is located at 47th Avenue and John F. Kennedy Drive. The 9-hole par 3 course was built in 1951 and features a restaurant. The course is open every day (SFRPD, 2012).

- **Golden Gate Park Archery Range.** The Golden Gate Park Archery Range is located along 47th Avenue adjacent to Fulton Street. The flat field features a row of stuffed bales set against a row of trees in the background. The use of the field is free (SFRPD, 2012).

- **Bercut Equitation Field.** The Bercut Equitation Field is located within Golden Gate Park along Chain of Lakes Drive East and John F. Kennedy Drive. The facility is a fenced-in ring where equestrians may ride their horses (SFRPD, 2012).

- **Bison Paddock.** The Bison Paddock is located within Golden Gate Park along John F. Kennedy Drive, immediately south of Spreckels Lake. The paddock houses a herd of American Bison and was established in 1899 (SFRPD, 2012).

- **Hellman Hollow.** Hellman Hollow (formerly Speedway Meadow) is located along John F. Kennedy Drive and was once a speedway in the late 1800s, where carriage races took place. The stretch of grass, along with the adjacent Lindley and Marx Meadows, are now the location for large scale events in the summer and fall months (SFRPD, 2012).

Recreational Trails

Juan Bautista de Anza National Historic Trail

The Juan Bautista de Anza National Historic Trail is a 1,210-mile historic route from Nogales, Arizona to San Francisco, California commemorating the route of the 1775–1776 Spanish Expedition.

The NPS operates and maintains signage for the trail and promotes public access to areas related to the Anza expedition to provide educational opportunities and preserve this significant part of Southwestern history. In San Francisco, the expedition members founded and established the Mission and Presidio of San Francisco. The Historic Trail travels up Highway 1 (19th Avenue) to Golden Gate Park. The trail then continues north to Mountain Lake Park, the Presidio of San Francisco, and Fort Point. The Historic Trail Corridor also extends north from Lake Merced and parallels 19th Avenue between 23rd Avenue and 31st Avenue (NPS, 2010c).

Lake Merced Multi-Use Path

Lake Merced multi-use path is a paved trail that extends approximately four miles along the perimeter of Lake Merced. Main access to the trail is from four parking areas: 1) at the end of Sunset Boulevard; 2) along Lake Merced Boulevard near the southern tip of the lake; 3) along John Muir Drive near the southern tip of the lake; and 4) along Skyline Boulevard at the main entrance to Lake Merced. Further, numerous informal trails branch off of the multi-use path and access the lake's shoreline. These informal trails are located near the Lake Merced Boulevard parking area and near Middlefield Drive and Lake Merced Boulevard.

Sunset Boulevard

Sunset Boulevard runs north to south from Lincoln Way to Lake Merced Boulevard, connecting Golden Gate Park to Lake Merced. The boulevard is 20 city blocks long and is lined by 2.5 miles of paved and unpaved walking paths and hundreds of trees and shrubs. The SFDPW Bureau of Forestry provides maintenance for Sunset Boulevard. SFDPW crews remove dead trees and prune trees of dead or damaged limbs. In addition, the SFDPW is seeking funding to begin a Sunset Boulevard reforestation plan to ensure that this area remains a signature green belt in the city (SFDPW, 2011).

Great Highway Multi-Use Path

The Great Highway multi-use path is a paved trail located east of the Great Highway. The trail extends approximately three miles north to south from Balboa Street to Sloat Boulevard. The multi-use path is separated from the vehicular roadway, but it crosses public roadways between each city block. SFDPW maintains the path.

Golden Gate Park Recreational Trails

Oak Woodland Trails

Golden Gate Park Oak Woodland Trails are located at the eastern end of the park between Fulton Street, John F. Kennedy Drive, and Stanyan Street. The trails are paved and unpaved, multi-use paths that are separated from the vehicular roadways. The SFDPW maintains the trails.

Trails on the Western End of Golden Gate Park

Several informal recreational trails are located in the vicinity of the South Windmill Replacement well facility site. A trail to the west of the soccer fields runs north-south, connecting the Beach Chalet

Restaurant with the Murphy Windmill. Other trails connect Martin Luther King Jr. Drive and John F. Kennedy Drive.

Bicycle Routes

Local and regional roadways in San Francisco are popular routes for both bicycle commuters and recreationists, as well as for more general bicycle travel. These routes exist within a larger regional network of popular bicycling routes in the surrounding areas, including, but not limited to, abundant popular routes south of San Francisco in the Peninsula foothills and north of San Francisco in Marin County. The CCSF Municipal Transportation Agency classifies bicycle routes in the project area as Class I, II, or III facilities.[2] Class I bicycle facilities are designated bicycle paths separated from roads with exclusive right-of-way for use by bicyclists or pedestrians. Class II bicycle facilities are bicycle lanes striped within the paved areas of roadways and for the preferential use by bicycles. Class III bicycle facilities are signed bicycle routes that allow cyclists to share streets with vehicles; Class III facilities may consist of a variety of features, including streets with wide curb lanes (travel lane width closest to the curb is at least 14 feet wide), sharrows,[3] traffic-calming measures, or simply streets signed as bicycle routes. Further, it should be noted that bicycles are permitted to use all city streets, regardless of whether or not a bicycle route is present, and are subject to all the duties applicable to a driver of a motor vehicle (SFMTA, 2010).

A Class I designated multi-use pathway runs along Chain of Lakes Drive West, and Class III bicycle routes run along Martin Luther King Jr. Drive, Middle Drive West, Overlook Drive, and Vicente Street.

The Embarcadero to Ocean Beach via Golden Gate Park (Route 30). Route 30 begins as a Class II bicycle facility at Embarcadero and Howard Street and continues on to Golden Gate Park via the Panhandle Park multi-use pathway (Class I bicycleway). Within Golden Gate Park, the route follows Kezar Drive and John F. Kennedy Drive to the Great Highway via Class II and III bicycle facilities (SFMTA, 2009).

Golden Gate Park to Market Street (Route 32). Route 32 is located on Page Street between Golden Gate Park and Market Street. Within Golden Gate Park, Route 32 connects with Route 365 (Kezar Drive multi-use pathway) and with Route 30 (John F. Kennedy Drive) via multi-use pathways (SFMTA, 2009).

Middle Drive West and Martin Luther King Jr. Drive (Route 34). Route 34 begins on Middle Drive West at Transverse Drive and travels along Middle Drive West to Martin Luther King Jr. Drive and Lincoln Way, ending at the Great Highway (SFMTA, 2009).

Illinois Street to the Great Highway (Route 60). Route 60 begins at Illinois Street and Cesar Chavez Streets and travels westbound towards Laguna Honda Boulevard and Dewey Boulevard. From

[2] The State of California defines bicycle facilities in the California Streets and Highway Code, Section 890.4.
[3] Shared roadway bicycle pavement markings within traffic lane.

Dewey Boulevard, Route 60 follows Taraval Street, Forest Side Avenue, Ulloa Street, and 15th Avenue to connect to Vicente Street and west to Ocean Beach (SFMTA, 2009).

Legion of Honor to San Mateo County (Route 85). Route 85 begins as a Class III bicycleway along Legion of Honor Drive at El Camino del Mar and travels south through Golden Gate Park. Outside Golden Gate Park, Route 85 continues on Sunset Boulevard to Irving Street and then south on 34th Avenue. The route then travels south on 34th Avenue to Clearfield Drive. From the intersection of Clearfield Drive and Ocean Avenue, the southbound route is Ocean Avenue, the off-street pathway just west of Sunset Boulevard, and Lake Merced Boulevard (SFMTA, 2009). The northbound route is Middlefield Drive, Gellert Drive, and Clearfield Drive. The pathway west of Sunset Boulevard provides access to either Lake Merced Boulevard or the adjacent multi-use pathway around Lake Merced (Route 885).

Winston Drive/Lake Merced Boulevard (Route 86). Route 86 travels west from Route 84 at Ocean Avenue via Cerritos Avenue, Mercedes Way, Winston Drive, and Lake Merced Boulevard to its junction with Route 91 (Skyline Boulevard). At Lake Merced Boulevard, bicyclists can connect with Route 85 south to San Mateo County and north to both the Sunset and Richmond districts (SFMTA, 2009).

Skyline Boulevard and John Muir Drive (Route 91). Route 91 begins at Route 50 at Sloat Boulevard and connects to Route 85 (Lake Merced Boulevard) via Skyline Boulevard and John Muir Drive on the west side of Lake Merced. It also provides a connection with Route 95 (Skyline Boulevard/the Great Highway). As an alternative to this on-street route, bicyclists can use the paved pathway along Lake Merced (SFMTA, 2009).

Transverse Drive to Middle Drive West via Overlook Drive (Route 134). Route 134 connects Route 75 (Transverse Drive) to Route 34 (Middle Drive West) via a multi-use pathway along Overlook Drive (SFMTA, 2009).

3rd Avenue and Hugo Street via Kezar Drive (Route 365). Route 365 connects Route 32 and Route 65 via the Kezar Drive multi-use pathway within Golden Gate Park and 3rd Avenue and Hugo Street outside of the park (SFMTA, 2009).

Cabrillo Street to Martin Luther King Jr. Drive via 43rd Avenue (Route 730). Route 730 connects Route 20 (Cabrillo Street) to Route 830 (Martin Luther King Jr. Drive and Middle Drive West Pathway Connector) via 43rd Avenue and the multi-use pathway along Chain of Lakes Drive West. In the northbound direction, the route briefly jogs onto Chain of Lakes Drive East to avoid the one-way section of Chain of Lakes Drive West that is open to motor vehicles (SFMTA, 2009).

John F. Kennedy Drive to Lincoln Way and Great Highway (Route 830). Route 830 begins at Route 30 (John F. Kennedy Drive) across from Lloyd Lake and runs south of Hellman Hollow, the Polo Field, Middle Lake, and Bercut Equitation Field, ending near the intersection of Lincoln Way and the Great Highway. Route 830 offers bicyclists in Golden Gate Park an off-street alternative to Route 34 (Middle Drive West/Martin Luther King Jr. Drive) and Route 30 (John F. Kennedy Drive) (SFMTA, 2009).

Lake Merced (Route 885). Route 885 is an on-street loop route that provides a guide for bicyclists who wish to circle Lake Merced. Route 885 consists of parts of Routes 85, 86, 91, and 95. In the clockwise direction, Route 885 follows Lake Merced Boulevard, John Muir Drive, and Skyline Boulevard back to Lake Merced Boulevard. In the counter-clockwise direction, Route 885 deviates from the lake at the north end and is routed via the streets that are used for both northbound and southbound Route 85: Middlefield Drive, Gellert Drive, Clearfield Drive, Ocean Avenue, and the path just west of Sunset Boulevard back to Lake Merced Boulevard (SFMTA, 2009).

5.11.2 Regulatory Framework

Federal Regulations

No federal regulations govern recreational resources that are applicable to the proposed project.

State Regulations

As discussed in Section 5.16, Hydrology and Water Quality, the Regional Water Quality Control Board has developed regulatory standards and objectives for water quality aimed at supporting the beneficial uses of Lake Merced that are identified in the Basin Plan, including body-contact recreation (e.g., swimming, wading, which does not occur at Lake Merced) and non-contact recreation (e.g., picnicking and rowing).[4]

As discussed under Chapter 4, Plans and Policies, the *Western Shoreline Area Plan*, an area plan within the *General Plan*, is the CCSF plan for the Local Coastal Zone established by the California Coastal Act of 1976. The *Western Shoreline Area Plan* includes objectives and policies pertaining to open space in the area covered by the plan, and includes the western portion of Golden Gate Park and Lake Merced, the locations of the South Windmill Replacement and North Lake, and Lake Merced well facilities, respectively.

Local Regulations

No local regulations specifically govern recreational resources that are applicable to the recreation impact analysis under CEQA. However, information on plans and policies relevant to the recreation resources within and near the project area are described in Chapter 4, Plans and Policies and summarized briefly below. Those portions of the project located within the coastal zone will require issuance of a coastal development permit pursuant to San Francisco Planning Code sections 330 et seq.

San Francisco General Plan

The *San Francisco General Plan* provides general policies and objectives to guide land use decisions.

[4] Fishing is considered body contact recreation, and is the only form of body contact recreation allowed at Lake Merced.

Recreation and Open Space Element

The Recreation and Open Space Element of the *San Francisco General Plan* is composed of several sections, each addressing a certain aspect of CCSF's recreation and open space system. The plan sections are (1) The Regional Open Space System, (2) The Citywide Open Space System, (3) The Shoreline, (4) The Neighborhoods, and (5) Downtown.

Western Shoreline Area Plan

The Western Shoreline Area Plan, which is part of the *San Francisco General Plan,* is CCSF plan for the Local Coastal Zone established by the California Coastal Commission. Policies related to the western end of Golden Gate Park include strengthening the visual and physical connection between the park and Ocean Beach; emphasizing the naturalistic landscape qualities of the western end of the park for visitor use; and continuing to implement a long-term reforestation program in the western portion of the park. Policies related to the Lake Merced area include preserving recreational facilities, passive activities, playgrounds and vistas of the Lake Merced area; maintaining a recreational pathway around the lake for multiple use; and only allowing activities that will not adversely affect the lake's water quality as a standby reservoir for emergency use.

Golden Gate Park Master Plan

The *Golden Gate Park Master Plan* (Park Master Plan) was adopted by the Recreation and Park Commission in October of 1998 (SFRPD, 1998). The Park Master Plan is a comprehensive planning document that includes general objectives and policies for the park, management strategies, and specific objectives and policies relating to park landscape, circulation, recreation facilities, visitor facilities, buildings and monuments, utilities and infrastructure, park maintenance and operations, and special area plans. The Park Master Plan is intended to provide a framework and guidelines to ensure responsible stewardship of the park. The overarching goal of the plan is to manage the current and future park and recreation demands while preserving the historic significance of the park.

5.11.3 Impacts and Mitigation Measures

Significance Criteria

For the purposes of this EIR, the Groundwater Supply Project would have a significant effect on recreational resources if it were to:

- 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;
- Include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment; or
- Physically degrade existing recreational resources.

Overall Approach to Analysis

This section describes the impacts that have been screened out from further analysis and the reasons why; and describes the overall approach to impact analysis.

Because of the nature of the proposed project, it would have no impacts related to the following criteria; therefore, this report does not discuss impacts related to these topics for the reasons described below:

- ***Include Recreational Facilities or Require the Construction or Expansion of Recreational Facilities.*** The project does not propose construction or expansion of recreational facilities, nor would it result in the need for new or expanded recreational facilities because it would not increase the number of residents or recreationists in the project area. Thus, the significance criterion related to the construction or expansion of recreational facilities is not applicable to the project.

This analysis assesses recreation and public space impacts associated with the implementation of the proposed project. For the purpose of this assessment, recreational resources are generally defined as the natural and built features that people use for recreation (e.g., fields, trails, and playgrounds), including facilities associated with the recreational resource that enable recreation, such as parking facilities and restrooms. Local planning documents and maps were reviewed and site visits conducted to identify the recreational resources in the project area that, because of their proximity, could be directly or indirectly affected by the proposed project. The approach to analysis of impacts related to construction and operation of project facilities are described below under the heading Facility Construction, Siting, Operations, and Maintenance. For impacts related to groundwater pumping, the specific approach to analysis is described under the heading Groundwater Pumping Operations.

Impact Summary

Table 5.11-2 lists the proposed project's recreation impacts and significance determinations.

TABLE 5.11-2
SUMMARY OF IMPACTS – RECREATION

Impact	Significance Determination
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.	LS
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.	LS
Impact RE-3: The proposed project would physically degrade existing recreational resources.	LSM
Impact C-RE: The project's contribution to cumulative impacts on recreational resources and uses would be cumulatively considerable.	LSM

NOTES:
LS = Less than Significant impact, no mitigation required
LSM = Less than Significant impact with Mitigation

Impact Analysis

Facility Construction, Siting, Operations, and Maintenance Impacts

Approach to Analysis: Facility Construction, Siting, Operations, and Maintenance Impacts

To determine the potential for construction activities and project siting to cause short-term physical effects on recreation facilities or resources, the proposed project areas were compared with the locations of identified recreational resources. Construction-related activities that could adversely affect the recreational experience are discussed in other sections and include impacts on scenic resources or the visual character of an area (Section 5.3, Aesthetics); impact on bicycle routes or impeded access to recreational resources (Section 5.6, Transportation and Circulation); construction-related noise (Section 5.7, Noise); or construction-related dust and exhaust emissions (Section 5.8, Air Quality). Where applicable, the significance of impacts on existing recreational resources is also evaluated in the context of the availability of similar, nearby recreational resources to the public. Short-term physical degradation or temporary loss of use of a recreational facility (e.g., a bicycle path or a park area) would not typically result in a finding of a significant recreational impact if the use is restored after completion of construction. A significant recreational impact would more likely result from the permanent loss of a recreational opportunity caused by the physical degradation of a recreational facility or resource without similar alternative recreational facilities or resources located nearby.

Similar to the approach to analysis for construction-related impacts, the proposed project areas and maintenance activities were compared with the locations of identified recreational resources to determine long-term effects on recreational resources associated with facility siting and maintenance.

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. (Less than Significant)

As described in Section 5.11.1, Setting, the proposed well facilities are located within and immediately adjacent to parks and other recreation resources. In addition, proposed pipeline routes would be located in the vicinity of urban trails and parks, and would cross Golden Gate Park. The proposed Lake Merced, South Sunset, and West Sunset well facilities and Sunset Reservoir are adjacent to recreation facilities and resources; however, project construction would not result in removal or deterioration of recreational resources and use of the adjacent recreation areas would continue during the 15- to 18-month construction period at each well facility. The Central Pump Station, South Windmill Replacement, and North Lake well facilities and Sunset Reservoir are in areas open to the public, but do not include recreation facilities.

Access within western Golden Gate Park would be slightly altered during project construction through the temporary restrictions and closures of roads and bicycle lanes. Pipeline installation would temporarily restrict roads to a single lane with alternating traffic flow during construction on Martin Luther King Jr. Drive (South Windmill Replacement well facility to Golden Gate Park pipeline junction), Middle Drive West (Central Pump Station well facility to Golden Gate Park pipeline junction), and Vicente Street (South Sunset well facility to West Sunset well facility); therefore, the Class III bicycle facilities along Martin Luther King Jr. Drive and Middle Drive West (Bicycle Route 34) and along Vicente Street (Bicycle Route 60) could be temporarily restricted and features that are part of the facilities (e.g., pavement markers or traffic calming measures) could be temporarily removed while pipeline is being installed at a rate of approximately 120 feet per day (see Section 5.6 Transportation and Circulation). Bicycle access along Bicycle Route 34 could be detoured to neighboring Bicycle Route 830 and Bicycle Route 30, and bicyclists using Bicycle Route 60 could be detoured around construction activity to Ulloa Street. In addition, full-width closure of Chain of Lakes Drive from Martin Luther King Jr. Drive to the Equitation Field (for about 10 weekdays) and from the Equitation Field to John F. Kennedy Drive (for about 10 weekdays) would be required during periods of pipeline construction (weekdays from 7:00 a.m. to 5:00 p.m.) (see Section 5.6 Transportation and Circulation). This temporary closure would divert traffic to Martin Luther King Jr. Drive, Bernice Rodgers Way, 47th Avenue, and 36th Avenue, and would be coordinated in order to maintain vehicle access to the Equitation Field. Vehicle access to the Equitation Field would be temporarily closed (for about one or two days) when construction activities occur directly across from access points. However, construction would occur on weekdays only and any open trenches would be covered during non-work hours. Thus, construction activities would not conflict with the higher recreation use that typically occurs on weekend days. Construction is proposed to progress at a rate of 60 to 120 feet per day and work areas would be restored to their general preconstruction conditions after pipeline construction is completed in each segment (see Section 3.4.2, Pipeline Construction). Therefore, physical deterioration of recreational resources and facilities would not occur.

It is possible that some recreationists that currently use the recreation areas near project construction areas would not want to use these areas during construction activities due to temporary increases in noise and reduced air quality associated with use of construction equipment (see Sections 5.7, Noise and 5.8, Air Quality). Other recreationists may avoid work areas due to the appearance of construction areas and impeded access to some park areas (see Sections 5.3, Aesthetics and 5.6, Transportation and Circulation). Some recreationists may instead use other similar local or regional recreation facilities located in the project vicinity resulting in occasional increases in use of other recreation facilities. Construction near the Equitation Field would only restrict vehicle access for one or two days and Bicycle Routes 34 and 60 would be detoured to adjacent bicycle facilities and roadways during the same time period. However, there are a number of additional bicycle routes and recreation resources that would be available throughout Golden Gate Park and western San Francisco and the temporary increased use of other local or regional recreation resources that may be attributable to construction of the proposed project would not likely be enough to result in substantial physical deterioration of recreational resources, or otherwise result in physical degradation of existing recreational resources, and the potential impact on these other recreational resources would therefore be less than significant.

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. (Less than Significant)

Proposed well facilities would not be located on active play fields at South Sunset or West Sunset Playgrounds, or in high visitor use areas of Golden Gate Park. The proposed project facility at the South Sunset includes a room devoted exclusively to SFRPD recreation storage for use in connection with the existing uses. At the West Sunset site, an area devoted to soils storage for use on the adjacent fields is proposed for use by the SFRPD (see Section 3.4.1, Groundwater Well Facilities). Siting a well facility in the undeveloped forested area at the Central Pump Station well facility site would not substantially reduce Golden Gate Park recreation use areas, as this site is not highly used for recreation, and is adjacent to an existing, active pump station and wood waste storage area. The site would include an approximately 798 square foot building with a resin-paved driveway and parking for worker site visits and maintenance. Therefore, the existing variety of recreational opportunities within the parks would remain available during project operations and not be affected by the project.

The Golden Gate Park project would provide a backup irrigation supply and ornamental lake supply for Golden Gate Park, which would contribute to the upkeep of existing recreational areas in the park. Excavated areas at well facilities would be planted with new ground cover and plants (see Section 5.3, Aesthetics). As described under Impact RE-1, the surface of corridors proposed for pipeline alignments would be returned to their general pre-project conditions with the restoration of asphalt concrete pavement, concrete paving and curbs, parking space lines, and where applicable, unpaved service roads and trails. Therefore, existing use of roads as designated bicycle routes and general bicycle use would not be affected during project operations. Thus, project siting and operation would not result in the greater use of recreational facilities elsewhere in the park or outside of the park due to loss of recreational use areas within the park. For these reasons, there would be a less-than-significant impact relative to a potential increase in 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, and therefore no mitigation is required.

Groundwater Pumping Operations Impacts

Approach to Analysis: Groundwater Pumping Operations Impacts

Impacts on recreation would be significant if groundwater pumping were to result in physical deterioration of recreational facilities or resources at Lake Merced, which is hydraulically connected to the underlying groundwater basin. As described in Section 5.1.5, Overview of Groundwater Modeling Approach, groundwater level changes were modeled to simulate a 47-year period under estimated hydrologic conditions without the project, which are referred to throughout this EIR as the "modeled existing conditions," as well as groundwater level changes with the project, which are referred to as "conditions with the project" (Phase 1 and Phase 2) and "cumulative conditions." As also discussed in Section 5.1.5, the groundwater modeling for the larger basin was supplemented by specific lake level modeling for Lake Merced for the same operational period. As described in Section 5.16, Hydrology and Water Quality, the proposed project would not result in substantial effects to other water bodies that serve as recreational resources. Thus, this section focuses on the potential for operation of the project to result in physical deterioration of Lake Merced recreational facilities or resources.

To determine the potential for impacts on recreation at Lake Merced to occur, the fluctuation of lake elevation contour lines, estimated over the 47-year modeling period, was incorporated into a geographic information system (GIS), along with lake topography, bathymetry, and slope. A GIS-based analysis was then conducted to estimate lake depth and surface area for: 1) modeled existing conditions and project conditions in model year 33, which is modeled as a high precipitation year; and 2) modeled existing conditions and project conditions in model year 44, which is modeled as the end of an extended drought period (the "design drought" discussed in Section 5.1.5). The effect of other model years would be within the range of impacts discussed for the high precipitation and drought conditions considered in the analysis. The GIS-based analysis estimated lake depth and surface area for model years 33 and 44 to determine whether the lake itself, which is a recreational resource, would be physically degraded or whether nearby recreational resources and facilities, such as docks and picnic areas, would be physically degraded as a result of project operations. The GIS-based analysis estimated shoreline locations for model years 33 and 44 to determine whether shoreline recreational facilities and resources, such as docks, would be physically degraded as a result of project operations.

As discussed under "Limitations of the Westside Basin Groundwater Model" in Section 5.1.5, Overview of Groundwater Modeling Approach, under future pumping conditions, hydrologic parameters, such as temperature and rainfall, would not occur exactly as modeled, and the response to pumping would depend on actual hydrological conditions taking place at that time. In addition, at water levels of 5 feet City Datum or above, all of the individual lakes comprising Lake Merced are hydraulically connected. At water levels lower than 5 feet City Datum, the hydrologic actions of the individual lakes would differ once the lakes act more independently, in which case lake levels tend to decrease progressively from north to south; i.e., North and East lakes would have higher levels than South Lake, and South Lake would be higher than Impound Lake (Kennedy/Jenks, 2012a). The GIS-based analysis cannot determine this level of detail because sufficient information does not exist about the comparative rate of decline between the lakes. Hence, the GIS-based analysis applies one constant rate of decline across all of the lakes. Thus, the modeled lake levels should only be considered as representative of *relative* changes in lake levels in response to groundwater pumping.

Pine Lake, which is discussed in Section 5.16, Hydrology and Water Quality, is not addressed in this section since project operations would have no effect on recreation resources at Pine Lake. No facilities would be built at Pine Lake and as discussed in greater detail in Section 5.16, Hydrology and Water Quality, existing lake level augmentation would continue to occur, if necessary, to maintain the existing lake level during project operations (groundwater pumping). Therefore, no impacts to recreation resources at Pine Lake would occur.

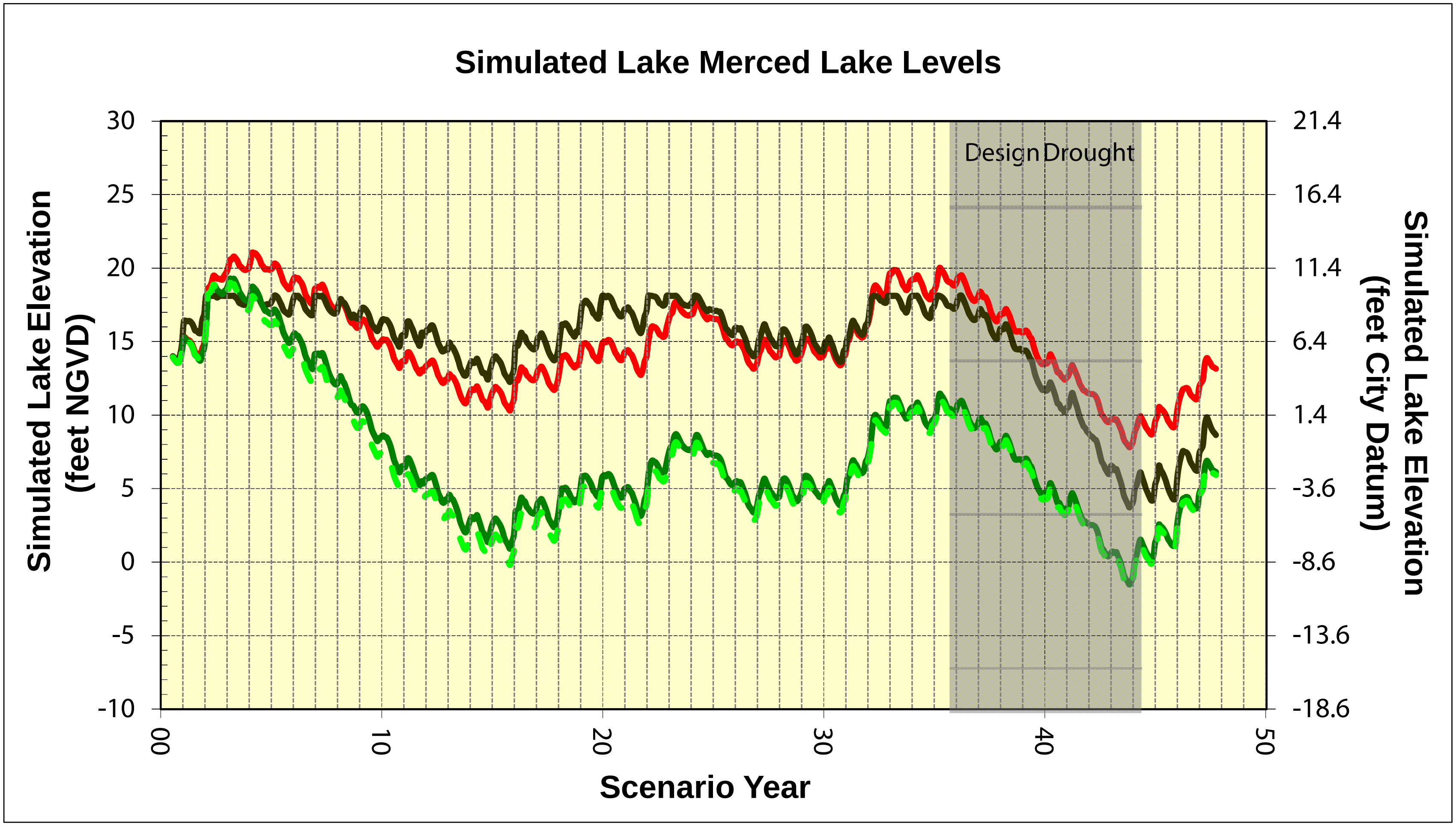
Impact RE-3: The proposed project would physically degrade existing recreational resources. (Less than Significant with Mitigation)

Figure 5.11-2 shows the estimated Lake Merced water levels over the 47-year simulation period under modeled existing conditions. The modeled existing conditions respond directly to the assumed hydrologic sequence (based upon past hydrologic conditions) and existing groundwater practices described in Section 5.1.5, Overview of Groundwater Modeling Approach. Levels are predicted to increase during years 1 to 4 of project operation, which in the model are years of above-average precipitation, followed by a predicted decline in lake levels in years 4 through 16, which are a modeled dry period, to a predicted low of 1.5 feet City Datum. From years 16 to 36, lake levels are predicted to fluctuate with hydrologic conditions but show an overall increasing trend to over 11 feet City Datum. The model also depicts the hypothetical design drought in years 36 to 44, during which lake levels are predicted to decline sharply to -0.8 feet City Datum, then recover to about 5 feet City Datum.

Figure 5.11-2 also shows the estimated Lake Merced water levels over the 47-year simulation period under modeled project conditions. During Phase 1, the Groundwater Supply Project would pump a total of 3 million gallons per day (mgd) from the North Westside Groundwater Basin. For Phase 2, the South Windmill Replacement and North Lake irrigation wells would be converted to use for domestic drinking water supply, and the total quantity of groundwater pumping under the Groundwater Supply Project would be increased from 3 mgd to 4 mgd. The total groundwater pumping from the Lake Merced well (completed in the Primary Production Aquifer) would be 0.43 mgd during both phases. Basin-wide, there would be 0.142 mgd less groundwater pumping when Phase 2 is implemented because the municipal pumping in Golden Gate Park under the proposed project would be less than the current irrigation pumping, as discussed in the Project Description and Section 5.1.5, Overview of Groundwater Modeling Approach. Because the changes in pumping would be minor, the response of groundwater levels during each phase is predicted to be similar, and the phases are therefore discussed together in this impact analysis.

As shown in Figure 5.11-2, for the first two years of the simulation, the estimated Lake Merced water levels are similar to the modeled existing conditions, but then decline rapidly to approximately -8.6 feet City Datum by year 16 as a result of lowered groundwater levels in the Shallow Aquifer. While the lake levels would continue to respond to hydrologic conditions for the remainder of the simulation period (similar to the modeled existing conditions), the modeled lake levels with operation of the project are predicted to be approximately 10 feet lower than what is predicted under the modeled existing conditions, as shown on **Figure 5.11-3**.

The lowest modeled lake level with operation of the project, predicted to occur near the end of the design drought, is approximately -10-feet City Datum, which would be below the bottom of Impound Lake at -6 feet City Datum and near the bottom of East Lake at -11 feet City Datum. Similarly, during the dry years 4 through 16, the modeled lake level is predicted to approach -8 to -9 feet City Datum.



Note: Zero elevation NGVD is equivalent to mean sea level. City Datum = NGVD - 8.62 feet.

Lake Levels:

Modeled Existing Conditions

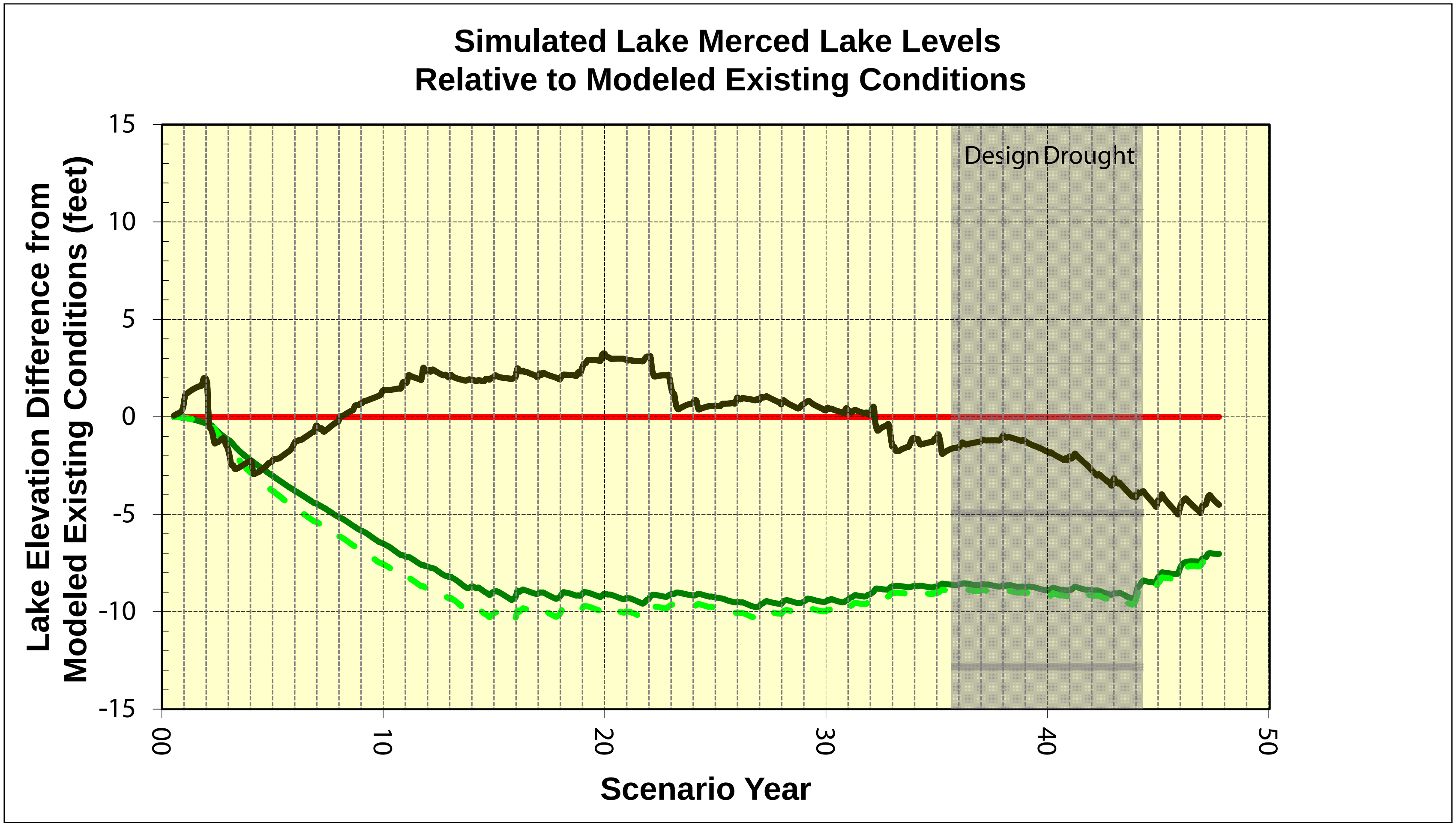
SFGW, Phase I

SFGW, Phase 2

Cumulative

SOURCE: Kennedy/Jenks Consultants, 2012 d

Figure 5.11-2
Simulated Lake Merced Lake Levels



Lake Levels:
- Modeled Existing Conditions
- SFGW, Phase I
- SFGW, Phase 2
- Cumulative

SOURCE: Kennedy/Jenks Consultants, 2012d

Figure 5.11-3
Simulated Lake Merced Lake Levels
Relative to Modeled Existing Conditions

The lake itself is a recreational resource used for boating/paddling and fishing, including fishing from floating and stationary docks. In addition, the lake is a scenic resource as seen from surrounding picnic areas and trails (see Section 5.3, Aesthetics for a discussion of scenic resources impacts associated with groundwater pumping). Reduced water levels would reduce the lake acreage available for boating and fishing and detract from the scenic quality of the lake. Should water levels be reduced substantially, stationary docks would not provide access to the lowered water surface, and Impound Lake and East Lake, which are smaller/shallower lakes than North Lake and South Lake, could dry up altogether. In addition, as discussed in Section 5.11.2, Regulatory Framework, the Basin Plan identifies the designated water quality-related beneficial uses of Lake Merced as body contact recreation (i.e., swimming, wading, and fishing) and noncontact recreation (e.g., rowing), and any reduction in water quality that could result from lowered lake levels could also affect the recreation-related beneficial uses that are identified by the Basin Plan. However, while the Basin Plan designates body contact recreation as a beneficial use, swimming and wading is not currently allowed (see Impact HY-9 in Section 5.16, Hydrology and Water Quality, for a discussion of potential adverse effects on water quality that could affect the beneficial uses of Lake Merced). In addition, the Western Shoreline Plan calls for preserving the recreational uses at Lake Merced.

As shown in **Table 5.11-3**, during high precipitation periods (e.g., Year 33 of the 47-year hydrologic sequence), overall lake levels and lake acreages are predicted to be much less under project conditions than under modeled existing conditions. However, the available surface areas of North and South Lakes are not predicted to decrease substantially with operation of the project and floating and stationary docks would not be disconnected from the lake water surface at the surface acreages shown in Table 5.11-3 for a high precipitation period. The estimated water depth of approximately 18 to 20 feet under project conditions (compared to approximately 26 to 28 feet estimated under modeled existing conditions) would remain sufficient for boating uses. However, groundwater pumping during a high precipitation periods (e.g., Year 33 of the 47-year hydrologic sequence), is predicted to result in a substantial reduction in the overall size of Impound Lake, a recreation resource, and the shallow southern end of this lake would be entirely dewatered as a result. Under such conditions, the proposed project would result in a substantial degradation of this recreational resource, as compared to modeled existing conditions. However, **Mitigation Measure M-HY-9, Lake Level Management for Lake Merced** (see Section 5.16, Hydrology and Water Quality) requires the SFPUC to implement lake level management procedures to maintain Lake Merced at water levels similar to conditions that are predicted to occur without the project. These corrective actions include the additions of supplemental water and/or alteration of pumping patterns, as necessary. Therefore, with implementation of Mitigation Measure M-HY-9, Lake Merced, as a recreational resource, would be maintained lake levels similar to that which would be expected without project-related pumping. No additional recreation-specific mitigation is required.

As discussed in Section 5.16, Hydrology and Water Quality, Impact HY-9, the lowest modeled lake levels, which is predicted to occur at the end of the design drought, is approximately -10 feet City Datum under the project, which would be below the bottom of Impound Lake at -6 feet City Datum and near the bottom of East Lake at -11 feet City Datum. As shown on Table 5.11-3, lake levels, lake acreages, and water depth are predicted to be substantially less under project conditions, than under

TABLE 5.11-3
ESTIMATED LAKE MERCED CONDITIONS

	High Precipitation Year			Design Drought Year		
	Modeled Existing Conditions (Year 33)	Project Conditions (Year 33)	Difference from Modeled Existing Conditions (Year 33)	Modeled Existing Conditions (Year 44)	Project Conditions (Year 44)	Difference from Modeled Existing Conditions (Year 44)
South Lake						
Acreage (acres)	200.4	165.1	-35.3	158.2	124.2	-34
Length (miles)	1.24	1.20	-0.04	1.19	1.12	-0.07
Width (miles)	.41	.34	-0.07	.33	0.27	-0.06
Water Level (feet City Datum)	11	3	-8	-1	-10	-9
Water Depth (feet)	28	20	-8	16	7	-9
North Lake						
Acreage (acres)	65.3	53.5	-11.8	51.9	29.7	-22.2
Length (miles)	.44	.43	-0.01	.41	.35	-0.06
Width (miles)	.28	.23	-0.05	.21	.18	-0.03
Water Level (feet City Datum)	11	3	-8	-1	-10	-9
Water Depth (feet)	26	18	-8	14	5	-9
East Lake						
Acreage (acres)	31.7	21.9	-9.8	20	2.4	-17.6
Water Level (feet City Datum)	11	3	-8	-1	-10	-9
Water Depth (feet)	22	14	-8	10	1	-9
Impound Lake						
Acreage (acres)	21.8	11.4	-10.4	9.2	None	-9.2
Water Level (feet City Datum)	11	3	-8	-1	None	-5
Water Depth (feet)	17	9	-8	5	None	-5

SOURCE: Kennedy/Jenks, 2012b; ESA

modeled existing conditions, during an extended drought. Based on the lake level GIS-analysis, floating and stationary docks would be disconnected from the lake water surface at the lake levels shown in Table 5.11-3 for model year 44. Docks would not be disconnected from the lake water surface under modeled existing conditions. Also, the water depths of North and South Lakes with the project are predicted to be fairly shallow during an extended drought of the magnitude included in model years 36 to 44, with a maximum depth of approximately 5 and 7 feet, respectively. While the overall lake length and maximum depth of these two lakes would be sufficient for continued use by rowing clubs during an extended drought under modeled existing conditions, there may be periods during operation of the project in drought conditions when there is not a sufficient lake depth to support the approximately 250 existing daily on-water users (Kinsey, 2012). Further, the water's edge could be more than 150 feet farther from the existing shoreline, in which case stationary docks would not be in contact with the water's edge and floating docks would have to be moved to provide water access. In addition, under the proposed project, East Lake would nearly dry up and Impound Lake would dry up altogether during an extended drought of the magnitude included in model years 36 to 44. Water levels would be reduced in East Lake and Impound Lake under modeled existing conditions, but to a much lesser extent than under the project. Following an extended drought, lake level conditions and associated effects on recreation resources would improve as water levels increase due to increased precipitation.

While the Lake Merced water levels, surface area, and depth are predicted to be reduced naturally during modeled existing conditions where an extended drought is assumed, the proposed project pumping wouldexacerbate such effects. Accordingly, recreation resources would likely be degraded substantially, as described above, and therefore, operation of the proposed project would result in a significant impact on Lake Merced as a recreational resource. However, Mitigation Measure M-HY-9, Lake Level Management for Lake Merced (see Section 5.16, Hydrology and Water Quality) requires the SFPUC to implement lake level management procedures to maintain Lake Merced at water levels similar to conditions that are predicted occur without the project. Therefore, with implementation of Mitigation Measure M-HY-9, Lake Merced would be maintained as a recreational resource at conditions similar to that which would be expected without project-related pumping. These corrective actions include the additions of supplemental water and/or alteration of pumping patterns, as necessary. As a result, no additional recreation-specific mitigation is required.

It is possible that some recreationists that currently use Lake Merced would not want to use these areas during project operation, due to reduced water levels and the resulting appearance of the lake. Some recreationists may instead use other similar local or regional recreation facilities located in the project vicinity thereby potentially resulting in occasional increases in use of other recreation facilities. However, there are a number of other trails and recreation resources that would be available throughout western San Francisco and other lakes available for boating use in the Bay Area such that the increased use of other local or regional recreation resources that may be attributable to operation of the proposed project would not likely be enough to result in substantial physical deterioration of these other recreational resources, or otherwise result in physical degradation of these other existing recreational resources.

Mitigation Measures

> **Mitigation Measure M-HY-9: Lake Level Management for Lake Merced.** (see Section 5.16, Hydrology and Water Quality, for description)

Cumulative Impacts

Impact C-RE: The project's contribution to cumulative impacts on recreational resources and uses would be cumulatively considerable. (Less than Significant with Mitigation)

The geographic scope for the analysis of potential cumulative, construction-related and operations-related impacts on recreational resources encompasses the proposed construction and staging areas, proposed well facility sites, and the proposed groundwater pipeline, as well as recreational facilities, trails, and bicycle routes in their immediate vicinities. The analysis of potential operational impacts on recreational resources also addresses the overall Lake Merced area. Section 5.1.4, Cumulative Impacts, describes the approach to the cumulative analysis used throughout this EIR; Table 5.1-6 and

Figure 5.1-1 summarize the reasonably foreseeable cumulative projects in the vicinity of the Groundwater Supply Project.

Facility Construction, Siting, Operations, and Maintenance Cumulative Impacts

The SFPUC estimates that the proposed project would be constructed over a 26-month period (anticipated to be between fall of 2014 and late summer of 2016).During this period, the project would result in impacts on established recreational resources in the immediate project area by impeding access to 2 bicycle routes and temporarily restricting access to the Golden Gate Park Equitation Field during one or two days. It is assumed for purposes of this EIR analysis that construction of many of the other projects listed in Table 5.1-6 would have similar access impacts. Cumulative projects that could either coincide in time with the Groundwater Supply Project or extend the time period that construction activities occur in the same area as the project include: the Beach Chalet Athletic Fields Renovation Project, the San Francisco Westside Recycled Water Project, and the 3711 19th Avenue (Parkmerced) Project.

The combination of construction activities from these multiple projects could contribute incrementally to cumulative impacts on bicycle routes where there would be closures of travel lanes and roadways adjacent to the worksites. As described under Impact RE-1, some recreationists may instead use other similar regional recreation facilities located in the project vicinity resulting in occasional increases in use of other recreational facilities. However, given the general availability of recreational facilities in San Francisco and the region, any temporarily increased use of local or regional recreation facilities that may be attributable to the simultaneous construction of several projects in the area of the proposed project would not likely be enough to result in substantial physical deterioration of recreational resources, or otherwise result in physical degradation of existing recreational resources, and the potential cumulative impact would therefore be less than significant. The proposed project and planned or proposed cumulative projects do not include substantial increases in housing (with the exception of the Parkmerced project and San Francisco State Master Plan), or other aspects that would result in substantial increases in potential recreationists utilizing recreation resources in the project vicinity. Given the wide variety and quantity of nearby public open space and recreational opportunities, the anticipated on-site population for the Parkmerced project would not increase the use of these public facilities such that substantial physical deterioration of existing facilities would occur or be accelerated. Further, the Parkmerced project would provide 68 acres of open space in a network of publically accessible neighborhood parks, athletic fields, public plazas, greenways and an organic farm (San Francisco Planning Department, 2010). The Beach Chalet Athletic Fields Renovation Project would improve access to and maintenance of existing recreational resources, rather than degrade any (San Francisco Planning Department 2012). Finally, although the proposed project would temporarily restrict: 1) vehicle access to the Golden Gate Park Equitation Field during construction, and 2) bicycle access along bicycle routes that would be closed during construction, vehicle access to the Equitation Field would only be closed for one or two days and closed bicycle routes would be detoured to adjacent bicycle facilities and roadways. The proposed project would not affect access to or use of all other existing recreational resources, and the project would provide a backup irrigation water supply for Golden Gate Park. Therefore, the potential cumulative impact associated with an increase in 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 associated with other substantial degradation of existing recreational resources, would be less than significant.

Groundwater Pumping Operations Cumulative Impacts

Specific additional proposed and existing projects that would affect lake levels were considered in this Lake Merced operational cumulative analysis. As described in greater detail in Section 5.1.5, Overview of Groundwater Modeling Approach, these include the SFPUC's proposed Regional Groundwater Storage and Recovery Project and Daly City's proposed Vista Grande Drainage Basin Improvement Project. The former would affect Lake Merced water surface elevations most directly through groundwater pumping and non-pumping periods, and the latter through direct hydrologic input of stormwater and baseflow from the Vista Grande Canal to the lake. With operation of the identified cumulative projects, the estimated Lake Merced water levels are expected to be higher than under the modeled existing conditions for much of the 47-year simulation period, largely as a result of the Vista Grande Drainage Basin Improvement Project and the Regional Groundwater Storage and Recovery Project (see Figures 5.11-2 and 5.11-3) (Kennedy/Jenks, 2012a).

However, with operation of the identified cumulative projects, estimated lake levels would only be below the modeled existing conditions for years 2 through 8 of the simulation period and after year 32 during the modeled drought conditions, as shown on Figures 5.11-2 and 5.11-3. Under cumulative conditions, the available surface area of North and South Lakes would not decrease substantially as compared to modeled existing conditions and the water depth under cumulative conditions would likely be sufficient to support existing boating uses in all years. Further, based on the GIS analysis of shoreline changes, floating and stationary docks would not be disconnected from the lake water surface. However, under cumulative conditions, Impound Lake water levels are predicted to be substantially reduced during an extended drought, as compared to modeled existing conditions. While the depth and size of Impound Lake are predicted to be reduced naturally under modeled existing conditions during an extended drought, the combination of the groundwater pumping associated with the proposed project and the Regional Groundwater Storage and Recovery Project, along with other ongoing groundwater pumping activities, is predicted to exacerbate the effects described above during the years of an extended drought. Therefore, cumulative impacts on Lake Merced, as a recreational resource, would be significant. However, similar to the project-specific impact, the project's contribution to this impact would be reduced to a less-than-cumulatively considerable (less-than-significant) level with implementation of Mitigation Measure M-HY-9, Lake Level Management for Lake Merced, which requires the SFPUC to implement lake level management procedures to maintain Lake Merced at water levels similar to conditions that are predicted to occur without the project. Therefore, Lake Merced would be maintained at conditions similar to those that would be expected without project-related pumping. Therefore, the Groundwater Supply Project's contribution to significant cumulative impacts on recreational resources at Lake Merced would not be cumulatively considerable.

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