



GRANTVILLE TROLLEY STATION/ALVARADO CREEK REVITALIZATION STUDY

AUGUST 2017

The City of
SAN DIEGO

SANDAG
TransNet

FOREWARD

In 2015, the City of San Diego adopted a Focused Plan Amendment to the Navajo Community Plan, putting into motion the revitalization of the Grantville neighborhood. Grantville is envisioned as a vibrant, walkable, mixed-use neighborhood that capitalizes on the area's proximity to high-quality transit at the Grantville Trolley Station. In order to fully realize this vision, it was recognized that issues involving storm events at Alvarado Creek would need to be addressed.

Engaged stakeholders and community members asked the City of San Diego to apply for a Smart Growth Incentive Program grant from the San Diego Association of Governments. In 2016 the grant was awarded and work begun on a planning-level study which included the following objectives: improving issues related to flooding, storm water, and water quality; enhancing Alvarado Creek as an amenity that includes bicycle and pedestrian trails; increasing access to the Grantville Trolley Station; and identifying possible natural and urban treatments to complement forthcoming transit-oriented development adjacent to the Creek.

The Grantville Trolley Station/Alvarado Creek Revitalization Study provides a high-level analysis of conceptual improvements to both revitalize the Creek and improve connectivity in the area around the Trolley Station. The Study will help inform future plans for implementation. While it would be ideal that the transformation of Alvarado Creek would be undertaken as a comprehensive project, it is recognized that funding and development constraints may require implementing Creek improvements in smaller segments. A comprehensive understanding of the overall vision should be kept in mind and this study provides a framework to help guide the realization of Creek improvements.



GRANTVILLE TROLLEY STATION/ALVARADO CREEK REVITALIZATION STUDY

AUGUST 2017

The City of
SAN DIEGO

Prepared by

DYETT & BHATIA
Urban and Regional Planners

with

RICK
ENGINEERING COMPANY

RECON

ACKNOWLEDGEMENTS

The Grantville Trolley Station/Alvarado Creek Revitalization Study has been funded by a San Diego Association of Governments (SANDAG) Smart Growth Incentive Program Planning Grant. This Study has benefitted from participation by community members who participated in meetings and workshops, providing valuable input to the City of San Diego.

PLANNING DEPARTMENT

Jeff Murphy, Director

Laura Black, Deputy Director

Brian Schoenfisch, Program Manager

Lisa Lind, Senior Planner

Elizabeth Dickson, Junior Planner

Michael Klein, Information Systems Analyst IV

Leo DeJesus, Principal Engineering Aide

SPECIAL THANKS

Navajo Planners Flooding Subcommittee

TABLE OF CONTENTS

1 INTRODUCTION..... 1-1

1.1 Study Purpose and Objectives1-3

1.2 Key Recommendations.....1-5

1.3 Implementation.....1-6

2 CONTEXT 2-1

2.1 Location2-2

2.2 Land Use and Policy Context.....2-5

2.3 Existing Channel Conditions and Hydraulic Capacity2-7

2.4 Biological Resources2-17

2.5 Transportation Network2-21

3 REVITALIZATION STRATEGY 3-1

3.1 Recommended Conceptual Improvements to
the Creek Corridor3-2

3.2 Potential Solutions by Topic 3-10

4 IMPLEMENTATION 4-1

4.1 Phasing 4-2

4.2 Potential Funding Opportunities 4-3

4.3 Project Permitting..... 4-5

APPENDICES

A | References

B | Design Palette

C | Feasibility Report

D | Hydrology Background Report

E | Cost Estimate

F | Summary of Community Engagement

LIST OF FIGURES

Figure 2-1: Regional Location2-3

Figure 2-2: Study Area 2-4

Figure 2-3: Planned Land Use 2-6

Figure 2-4: Channel Types..... 2-8

Figure 2-5: FEMA Floodplain 2-9

Figure 2-6: Vegetation Communities and Special Status Species 2-18

Figure 2-7: Transportation Network 2-22

Figure 3-1: Conceptual Recommendations by Reach3-3

Figure 3-2: Reach 1 Conceptual Section 3-4

Figure 3-3: Reach 2-A Conceptual Section..... 3-6

Figure 3-4: Reach 2-B Conceptual Section..... 3-6

Figure 3-5: Reach 3 Conceptual Section3-7

Figure 3-6: Reach 4 Conceptual Section..... 3-8

Figure 3-7: Flooding Solutions..... 3-11

Figure 3-8: 100-Year Floodplain3-12

Figure 3-9: Trail and Connectivity Solutions3-16

Figure 3-10: Existing and Recommended Walkshed3-17

Figure 3-11: Biological Resources Solutions 3-22

LIST OF TABLES

Table 2-1: Flow Rates during Storm Events2-7

Table 2-2: Vegetation Communities in the Study Area2-17

Table 4-1: Financing Tools and Partnership Opportunities 4-4



1. INTRODUCTION



Alvarado Creek in the Study Area



Grantville Trolley Station

The Grantville Trolley Station/Alvarado Creek Revitalization Study (“Revitalization Study” or “Study”) outlines a potential strategy for revitalizing Alvarado Creek and improving connectivity in an approximately 102-acre area around the Grantville Trolley Station (Grantville Station) in San Diego.

Based on evaluation of existing conditions, consideration of alternatives, and hydraulic modeling, the Study outlines opportunities for Alvarado Creek channel improvements to reduce the extent of flooding. It also identifies ideas for improved flood control function, potential new connections to enhance mobility within the area and increase access to Grantville Station, new open spaces and recreational areas as amenities for residents, and natural environment educative opportunities.

The Revitalization Study is organized as follows:

- **Chapter 2: Context** provides an overview of the existing conditions in the Study Area, including the land use and policy context, existing channel conditions and hydraulic capacity, biological resources, and transportation network and connections.
- **Chapter 3: Revitalization Strategy** is divided into conceptual improvements to the creek corridor by reach (sections of Alvarado Creek), and potential solutions for achieving Study objectives by topic (i.e., flooding, trails and connectivity, and biological resources).
- **Chapter 4: Implementation** provides options for implementing the improvements, including opportunities for phasing, funding, and project permitting.

The process of preparing the Revitalization Study was a collaborative effort between the City, consultant team, and community. Feedback from the community was sought throughout the planning process and integrated into the Study. In particular, the Flooding Subcommittee of the Navajo Community Planning Group, composed of property owners in the Study Area and other stakeholders, played a key role in providing background information and guidance. A combination of meetings with the Flooding Subcommittee and community workshops helped identify key concerns, goals, and input on alternatives and concepts. Materials from the community engagement events are provided in Appendix F.

1.1 STUDY PURPOSE AND OBJECTIVES

In 2015, the City of San Diego adopted a Focused Plan Amendment for the Navajo Community Plan (Community Plan), which envisions the transformation of the primarily industrial area around Grantville Station into a vibrant mixed-use community. The Community Plan seeks to promote housing and a mix of uses in a transit-oriented setting, as well as new bicycle and pedestrian trails along open spaces.

A revitalized Alvarado Creek is an essential component to the transformation of the area surrounding Grantville Station. Alvarado Creek flows through the portion of Grantville – a San Diego neighborhood located east of Mission Valley, south of Allied Gardens, and northwest of San Diego State University – that surrounds Grantville Station. The creek conveys flows from the Alvarado Creek watershed to the San Diego River during seasonal and storm events through naturalized and concrete channels and culverts. The majority of the Alvarado Creek’s segments, referred to as reaches, do not have adequate capacity to convey many of the storm events that occur.

The City of San Diego has received a Smart Growth Incentive Program grant from the San Diego Association of Governments (SANDAG) to develop concepts and assess the feasibility of transforming Alvarado Creek into an amenity that catalyzes redevelopment and improves access and connections to Grantville Station for new residents, local businesses, and the community as a whole. The specific Study objectives are to develop strategies to:

- Improve flooding, storm water, and water quality issues;
- Increase access to Grantville Station and Alvarado Creek;
- Enhance Alvarado Creek as an amenity that includes bicycle and pedestrian trails; and
- Foster transit-oriented development adjacent to Grantville Station.

The Study’s conceptual Revitalization Strategy has been developed as the preferred manner of achieving these objectives. These four objectives and specific recommendations for achieving them are discussed in further detail later in this and subsequent chapters.

PRECEDENTS

River and creek revitalization projects across California provide precedent, illustrating how waterways that were once liabilities and eyesores have been transformed into community assets.

SOUTHEASTERN SAN DIEGO CHOLLAS CREEK

Chollas Creek is a 32-mile waterway that flows through the Greater Mid-City, Encanto, Southeastern San Diego, and Barrio Logan communities, from its headwaters in La Mesa and Lemon Grove to San Diego Bay. It is mostly channelized and has high levels of cadmium, copper, lead, and other toxins, but the sections of the creek with vegetation and soft bottoms filter the water and improve the water quality downstream. The Chollas Creek Enhancement Program plans for wetland restoration and the creation of recreational opportunities throughout the creek corridor. The strategy for implementation includes a 20-year phasing schedule, as well as an approach to the reconstruction of the creek as an “arts project with artists to play a very active role or as lead designers supported by the required technical expertise” of other disciplines.¹ Two “pilot projects” for the Chollas Creek Enhancement Program have begun throughout the creek corridor. A number of restoration and development projects have been completed along Chollas Creek since the adoption of the Enhancement Program, including the removal of a concrete channel, restoration of native vegetation, and creation of a linear park system.



¹City of San Diego Chollas Creek Enhancement Program, 2002.

PRECEDENTS

SAN JOSE GUADALUPE RIVER PARK

The Guadalupe River frequently flooded downtown San Jose throughout the 1980s and 1990s; during that period, it was only capable of conveying a 10-year storm event. By modifying the channel, replacing bridges, and building a bypass box culvert, the channel capacity of Guadalupe River was improved to handle a 100-year storm event. Innovative techniques were used, such as terracing the side channels with rock gabions and riparian trees. The flood control project also improved the area with multi-use trails along the creek, as well as with open spaces. In addition, the project preserved the existing steelhead and salmon migration and spawning habitat. The project removed many adjacent properties from the 100-year floodplain, and is estimated to save \$27 million in annualized flood damages.



NORTH VALLEYHEART RIVER-WALK, LOS ANGELES RIVER, STUDIO CITY

This half-mile-long walking and biking trail is located adjacent to the north side of a channelized section of the Los Angeles River, from Studio City to Sherman Oaks. Although the channel retains its rectangular geometry, the adjacent trail—constructed of decomposed granite—and native landscaping along the trail edges, provides a welcoming environment and a well-utilized recreational corridor for community members. The trail also includes public art, artistic benches, pedestrian-scaled lighting, and educational signage.



1.2 KEY RECOMMENDATIONS

Each Study objective is discussed below, followed by a summary of the Revitalization Strategy’s key recommendations to achieve each objective. The recommendations are further explained in Chapter 3 based on the recommended conceptual improvements to the creek corridor and potential solutions by topic.



Improve Flooding, Storm Water, and Water Quality Issues

Alvarado Creek is a highly urbanized flood control channel, designed to carry water at high speeds during flooding events. However, the creek lacks the hydraulic capacity to convey 100-year storm events, or even significantly smaller events.

The Study identifies opportunities for additional hydraulic capacity and enhancements, with varied solutions depending on the reach of Alvarado Creek, to reduce flooding and enable development adjacent to the creek. These include: channel widening, raising bank height, channel realignment, Floodable Green Space within the creek corridor, and grading and fill along areas outside of the channel.



Increase Access to Grantville Station and Alvarado Creek

Alvarado Creek not only presents a barrier to pedestrians accessing Grantville Station, it is itself inaccessible to those who work in or visit the Study Area. The ability to walk through the Study Area is significantly limited, due to a lack of means to cross Alvarado Creek and a lack of streets or pedestrian paths within the Study Area.

The Study identifies opportunities to increase connectivity, including a Multi-Use Trail network with pathways on either side of the creek, linked by pedestrian/bicycle bridges. In addition, the Study identifies a network of pedestrian and bicycle access ways through the Study Area and a multi-modal Promenade.



Enhance Alvarado Creek as an Amenity that Includes Bicycle and Pedestrian Trails

Existing development is frequently oriented away from Alvarado Creek. Where the creek is visible, it is lined with chain link fencing and concrete barriers.

The Study describes ways to re-establish the neighborhood’s connection to the creek through trails along the creek corridor, making the creek a more visible and accessible community asset. A greenway/trail system has potential to enable residents and visitors to interact with natural areas in an urban environment.



Foster Transit-Oriented Development Adjacent to Grantville Station

Grantville Station is an underutilized asset in the community, especially in comparison to nearby stops in Mission Valley and San Diego State University.

The Study envisions catalyzing transit-oriented development adjacent to Grantville Station through improvements that would significantly decrease the extent of the 100-year floodplain, while leaving sites of a size adequate to construct medium- and high-density housing and other development that provides access to and overlooks the creek corridor.



Chollas Creek, in Southeastern San Diego



San Luis Obispo Creek, in Downtown San Luis Obispo

1.3 IMPLEMENTATION

Chapter 4 provides guidance and strategies with respect to implementation of the Revitalization Strategy, including information regarding cost estimates and financing. This discussion includes:

- **Phasing of Improvements.** An appropriate sequence to implement the Study concepts would be to start downstream and move upstream. Alternatively, improvements could be undertaken collectively for the entire length.
- **Financing of Improvements.** For the creek channel improvements, collective efforts by private property owners may be required. There are a range of potential financing tools and partnership opportunities, including federal, State, city, and regional funding sources and strategies.
- **Permitting.** Federal and/or state agency permits may be required for channel improvements conceptualized in this Study.



2. CONTEXT

IN THIS CHAPTER

The purpose of the Revitalization Study is to develop a strategy that achieves the Study objectives while carefully balancing several competing constraints, including existing policies and standards, property in different ownership, and sensitive biological resources in the creek corridor. This chapter summarizes these constraints and other considerations.

2.1 LOCATION

REGIONAL LOCATION

The Study Area is located in the easterly portion of the City of San Diego, within the Grantville neighborhood in the Navajo Community Plan planning area. The Study Area is close to Mission Valley, Allied Gardens, and San Diego State University. Alvarado Creek runs through the Study Area before its confluence with the San Diego River to the west, as shown in Figure 2-1.

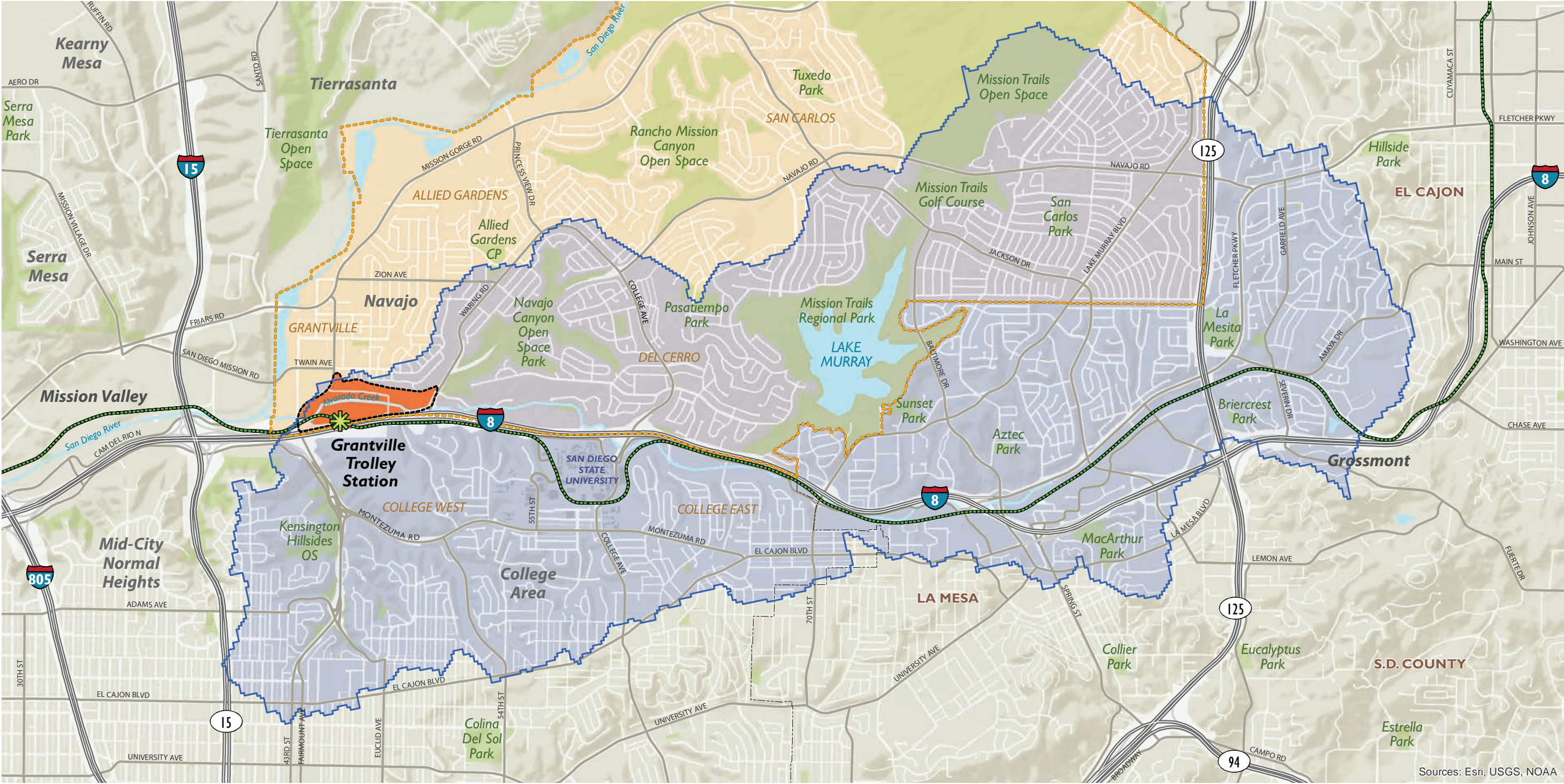
While the Study Area encompasses approximately 100 acres, it is part of the 14-square mile Alvarado Creek watershed that extends seven miles east of the Study Area to the Grossmont Area. Lake Murray is located near the center of the watershed. The watershed generally consists of developed urban land uses.

FOR FURTHER TECHNICAL BACKGROUND INFORMATION

See the following documents listed below.

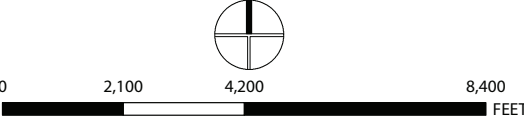
- **The Feasibility Report** analyzes alternative revitalization strategies and is included as Appendix C.
- **The Hydrology Background Report**, prepared by Rick Engineering, includes hydrology and hydraulic analysis of design options to increase the capacity of Alvarado Creek and is included as Appendix D.
- **The Biological Constraints Report**, prepared by RECON Environmental Engineering Company, analyzes the biological resources of the Study Area and is available at the City of San Diego’s Navajo Community Profile webpage: www.sandiego.gov/planning/community/profiles/navajo.
- **The Existing Conditions Report**, prepared by Dyett & Bhatia, Rick Engineering Company, and RECON Environmental, describes various existing conditions of the Study Area and is available at the City of San Diego’s Navajo Community Profile webpage: www.sandiego.gov/planning/community/profiles/navajo.

FIGURE 2-1 REGIONAL LOCATION



- Grantville Trolley Station
- Green Line
- Freeways
- Major Roads
- Lake/Pond/Water
- Study Area
- Navajo Community Plan Area
- Alvarado Creek Watershed
- San Diego City Limits
- Parks & Open Space

Data Source: City of San Diego, 2016; SANGIS/SANDAG Regional GIS Data Warehouse, 2016. (www.sangis.org) Dyett & Bhatia, 2016

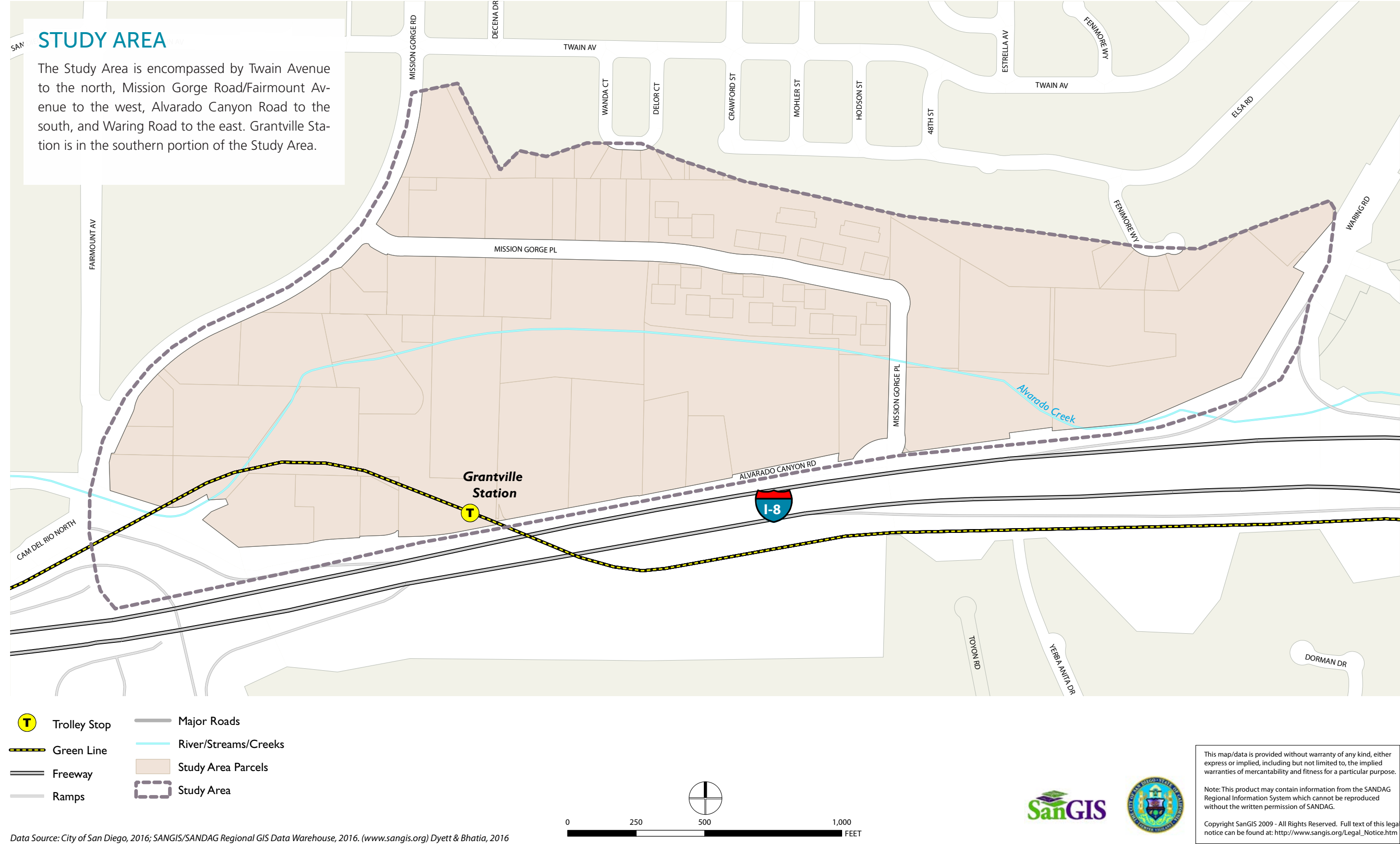


This map/data is provided without warranty of any kind, either express or implied, including but not limited to, the implied warranties of mercantability and fitness for a particular purpose.

Note: This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

Copyright SanGIS 2009 - All Rights Reserved. Full text of this legal notice can be found at: http://www.sangis.org/Legal_Notice.htm

FIGURE 2-2 STUDY AREA



2.2 LAND USE AND POLICY CONTEXT

EXISTING LAND USE AND OWNERSHIP

The Study Area is developed with primarily industrial and service commercial uses. The majority of parcels along Alvarado Creek are owned by private parties; of the approximately 48 acres of parcels that are located adjacent to the creek in the Study Area, 35 acres are privately owned.

NAVAJO COMMUNITY PLAN LAND USE VISION

The Navajo Community Plan guides future land uses in the larger area around Grantville Station, including the Study Area. The Community Plan establishes policies to support the development of Grantville as a vibrant, higher intensity, walkable, mixed-use commercial and residential neighborhood that capitalizes on Grantville Station. The Navajo Community Plan also addresses the importance of public recreational opportunities and connections to regional recreational and open space areas along Alvarado Creek, with pocket parks near Grantville Station.

The Navajo Community Plan classifies almost three-quarters of the Study Area for mixed-use development, with the highest intensity uses planned for the area surrounding Grantville Station (Figure 2-3). The Community Plan also provides for multifamily housing within a medium-high density range. Also planned for the area are Office uses, as well as Community Commercial uses, which include shopping areas with retail, service, civic, and office uses for the community at large.

There are currently approximately 240 residential

units in the Study Area. The Navajo Community Plan anticipates up to 8,280 additional housing units,² with approximately 6,260 of these³ within the Study Area. Thus, with implementation of the Community Plan, the Study Area could see an infusion of approximately 12,000 new residents, creating the imperative for a significant increase in connectivity within the Study Area to enable easy access to Grantville Station and amenities like stores and cafés, provide recreational opportunities within the creek corridor, as well as to ensure emergency access.

The Grantville Community Plan Implementation Overlay Zone (CPIOZ) includes supplemental development regulations (SDR) to help implement this vision for transit-oriented development that supports walkability, strengthens connectivity, and minimizes over-reliance on automobiles. The development regulations provide specific requirements to facilitate pedestrian and bicycle connectivity and require that new development faces Alvarado Creek. Proposals must comply with these requirements to be processed ministerially.

SAN DIEGO RIVER PARK MASTER PLAN

The San Diego River Park Master Plan, adopted by the San Diego City Council in 2013, is a policy document that communicates a common vision, principles, and recommendations to guide land use decisions within the River Corridor and River Influence Areas along the San Diego River. The River provides a water quality buffer, habitat, and recreational space, and portions of the San Diego River have historically experienced periodic flooding.

Although the Study Area is outside of the River Corridor and River Influence Area, the Master Plan speaks to the treatment of Alvarado Creek, which flows into the river just west of the Study Area, including the potential for the creek to be an amenity by replacing culverts with bridges and reducing the channelization of Alvarado Creek. It also states that “the greening” of Alvarado Creek is an important component of connecting the river valley with the canyon, which, in turn, has the potential to expand and connect habitat to the canyon, San Diego State University just east of the Study Area, and upland neighborhoods northeast of the Study Area.

The San Diego River Park Master Plan provides the following applicable recommendations with respect to the Study Area:

- Recommendation C: Improve water flow under the bridge at Mission Gorge/Fairmount Avenue for Alvarado Creek to connect to the San Diego River. Provide a pedestrian connection under or over the bridge for access to the river pathway from Alvarado Creek.
- Recommendation E: Improve open space and trail connections with Alvarado Canyon and Navajo Canyon.

It should be noted that the San Diego River Park Master Plan was completed prior to preparation and adoption of the Grantville Focused Plan Amendment; the Focused Plan Amendment envisions a much higher level of development in the Study Area than the Community Plan previously anticipated.

2013 MASTER STORM WATER SYSTEM MAINTENANCE PROGRAM

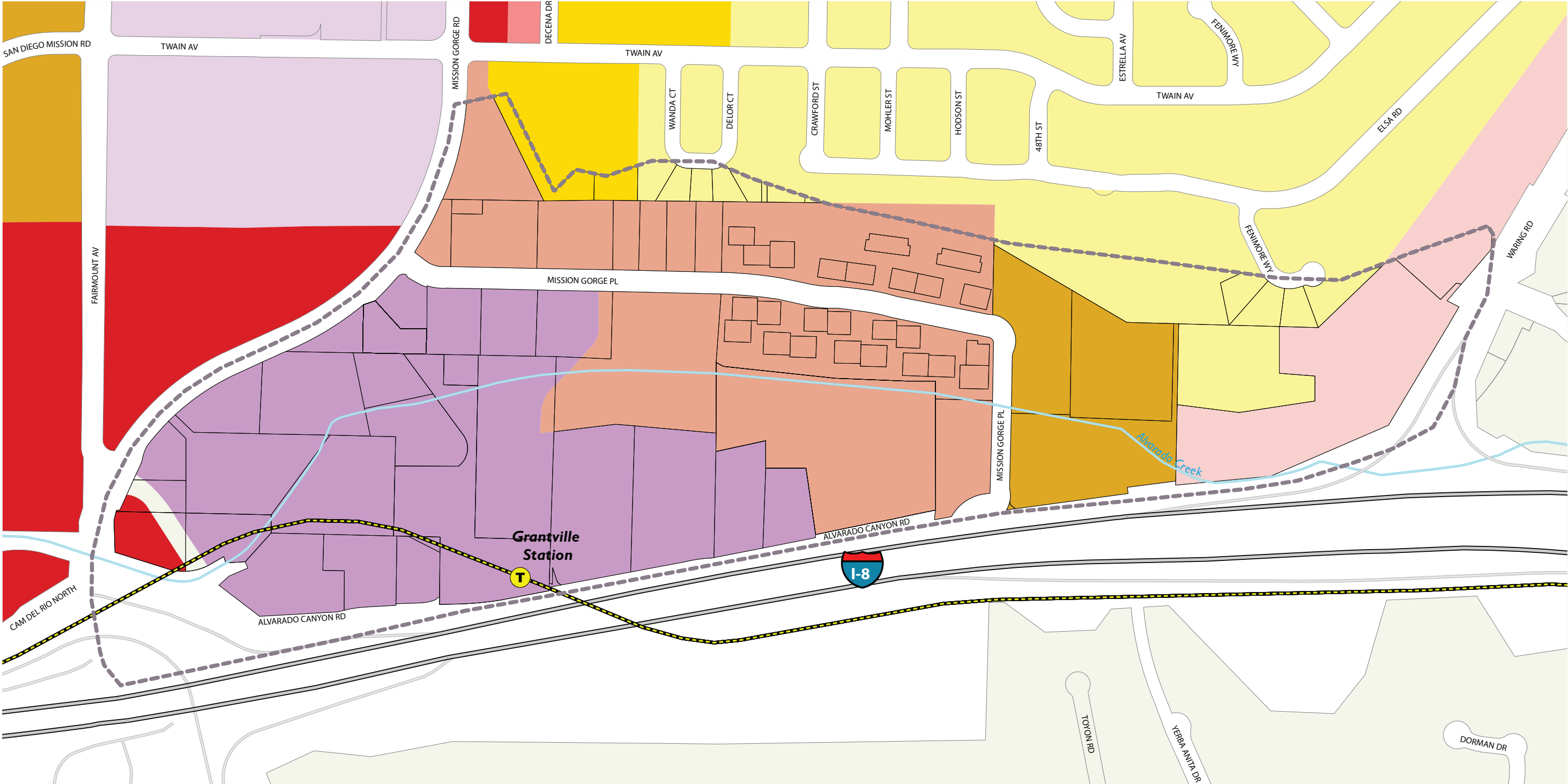
Portions of Alvarado Creek are maintained through the City's Transportation & Storm Water Department under the 2013 Master Storm Water System Maintenance Program. Of the 4,400 feet of channel within the Study Area, the City maintains approximately 1,825 feet. Alvarado Creek has been treated as a priority project in the Program, with the last maintenance of the creek completed in 2015. The creek channel provides essential infrastructure for storm water conveyance, and thus requires a high level of reliability. Where large storm events cannot be conveyed, there is the potential for flood risk, as discussed in more detail in Section 2.3.

²Grantville Focused Plan Amendment Final Environmental Impact Report, April 2015.

³Based on residential and mixed-use land use designations fully developing at the highest allowable densities, with Office, Urban Village, and Business Park designations developing with 75 percent residential uses and 25 percent commercial uses.

⁴The urban design framework for the Grantville Community Plan Implementation Zone is located in the Navajo Community Plan on page 33.

FIGURE 2-3 PLANNED LAND USE



- T** Trolley Stop
- Green Line
- Freeway
- Ramps

- Land Use Classifications**
- Residential**
- Single Family Residential
 - Multi Family Residential
 - Residential - Medium High (30-43 du/ac)

- Commercial Employment, Retail, and Services**
- Office
 - Commercial
 - Community Commercial

- Mixed Use**
- Community Village (44-109 du/ac)
 - Urban Village (44-109 du/ac)
 - Business Park - Residential (44-73 du/ac)

- River/Streams/Creeks
- Study Area

Data Source: City of San Diego, 2016; SANGIS/SANDAG Regional GIS Data Warehouse, 2016. (www.sangis.org) Dyett & Bhatia, 2016



This map/data is provided without warranty of any kind, either express or implied, including but not limited to, the implied warranties of mercantability and fitness for a particular purpose.

Note: This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

Copyright SanGIS 2009 - All Rights Reserved. Full text of this legal notice can be found at: http://www.sangis.org/Legal_Notice.htm

2.3 EXISTING CHANNEL CONDITIONS AND HYDRAULIC CAPACITY

Alvarado Creek in the Study Area is a series of open channels and box culverts. For the purposes of this Study, the creek is divided into six reaches, numbered 1 through 6 as shown in Figure 2-4.

Surface material, geometry, and alignment of the Alvarado Creek channel affect the amount of water (flow rate) that can be conveyed through it. Hydraulic calculations were performed to assess the existing channel capacity. Table 2-1 provides the estimated flow rates of Alvarado Creek through the Study Area during the 2-, 5-, 10-, 25-, 50-,

and 100-year storm events. A 2-year storm event is defined as a storm event having a 50 percent chance of occurring in any given year, and a 100-year storm event is defined as having a one percent chance of occurring in any given year. The estimated flow rate for the 2-year storm event is 1,180 cubic feet per second (cfs), and the flow rate for the 100-year storm event is 5,100 cfs.

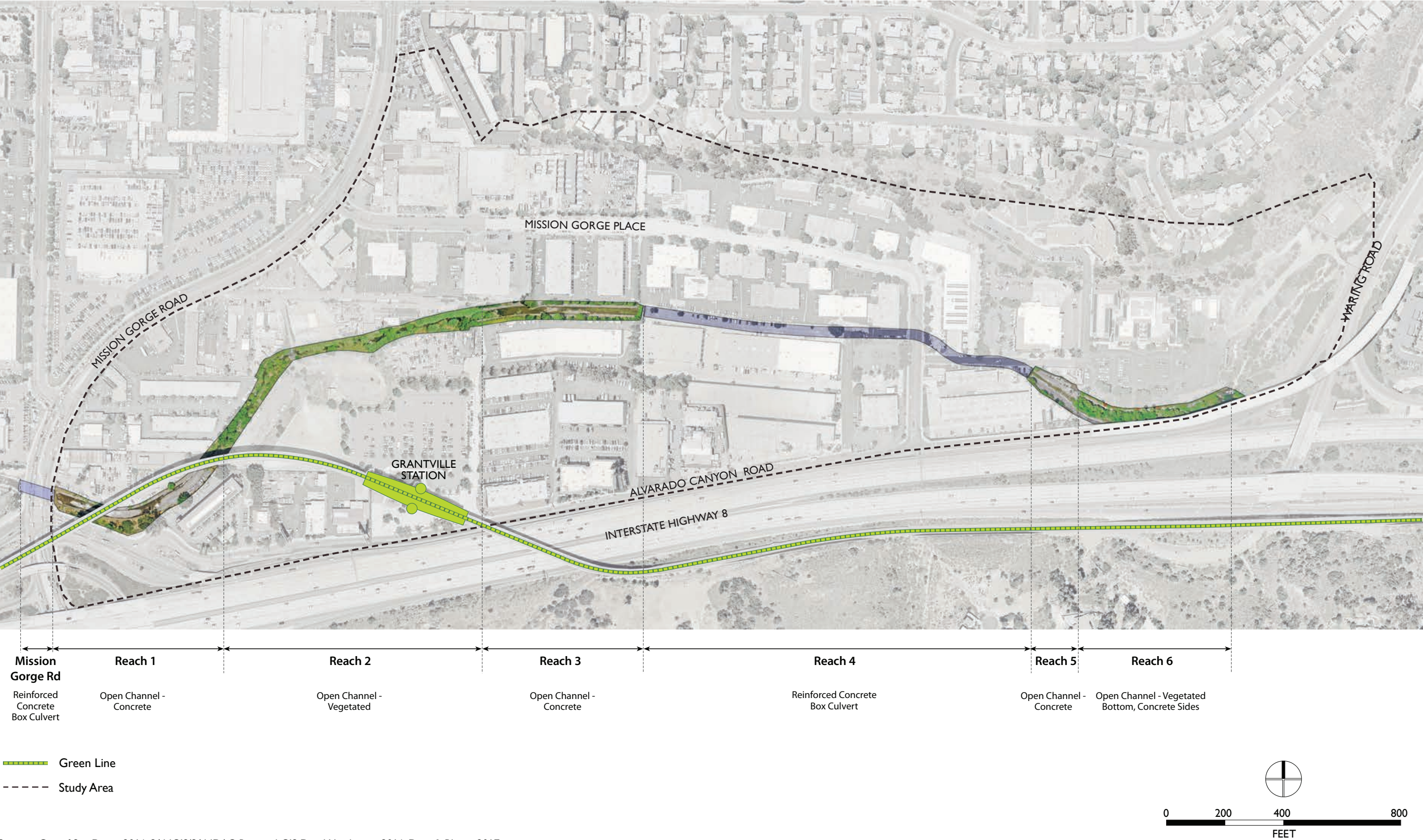
TABLE 2-1: FLOW RATES DURING STORM EVENTS

Storm Event	Flow Rate (cfs)
2-Year	1,180
5-Year	2,050
10-Year	2,700
25-Year	3,800
50-Year	4,500
100-Year	5,100

Source:
The 10-, 50-, and 100-year flow rate information for Alvarado Creek was obtained from the FEMA 2016 Flood Insurance Study for San Diego County. These flow rates were then extrapolated to estimate flow rates for the 2-, 5-, and 25-year storm events.



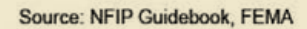
FIGURE 2-4 CHANNEL TYPES



Sources: City of San Diego, 2016; SANGIS/SANDAG Regional GIS Data Warehouse, 2016; Dyett& Bhatia, 2017

A significant portion of the Study Area is within the Federal Emergency Management Agency (FEMA) 100-year floodplain Special Flood Hazard Area (SFHA) (Figure 2-5). This is consistent with the hydraulic capacity analysis that indicates that the majority of the channel reaches lack the hydraulic capacity to convey the 100-year storm event flow, as well as the flow from much smaller storm events. The area north of Alvarado Creek along reaches 1 through 4, a limited area south of Alvarado Creek at Reach 2, and an area west of reaches 5 and 6 are shown within the 100-year floodplain. The extent of the floodplain is due, in part, to the width and configuration of the Alvarado Creek channel in the Study Area.

Floodplains are areas of land located adjacent to rivers or streams that are subject to recurring inundation or flooding. Floods are typically described in terms of their statistical frequency. For example, a 100-year floodplain describes an area within which there is a one percent probability of a flood occurring in any given year. FEMA prepares Flood Insurance Rate Maps (FIRMs), which identify 100-year and 500-year flood zones.



Legend

- Approximate Study Area Boundary
- Grantville Trolley Station
- Alvarado Creek

FEMA Special Flood Hazard Areas

- 100-YR Floodway
- 100-YR Floodplain
- 500-YR Floodplain

The map displays the Grantville Trolley Station area, showing the Alvarado Creek and its flood hazard areas. The study area boundary is indicated by a dashed line. The map includes labels for various streets and landmarks, such as San Diego Mission, Fairmount, Mission Gorge, and Interstate 8. The flood hazard areas are color-coded: light blue for 100-YR Floodway, medium blue for 100-YR Floodplain, and dark blue for 500-YR Floodplain. The Alvarado Creek is shown as a green line. The Grantville Trolley Station is marked with a red rectangle. The map also shows the Interstate 8 highway and its various lanes (e.g., Interstate 8 WB, Interstate 8 EB). Other labels include Wanda, Delor, Crawford, Mohler, Hodson, Elsa, Fendore, Howard Johnson, Private, Kona Springs, Sirocco, Zephyr, Mistral Bluff, Ostrich, and Adobe Falls. The map is oriented with North at the top.

MISSION GORGE ROAD

Alvarado Creek flows through a triple reinforced concrete box (RCB) culvert located beneath Mission Gorge Road. The triple RCB culvert is approximately 128 feet long, and each box is 11 feet wide and eight feet tall. At the east end of the culvert is a short transition structure, known as a warped wingwall structure, used for connecting rectangular channels with trapezoidal channels. Storm events greater than the 10-year storm are expected to exceed capacity of the culvert and cause flooding upstream.



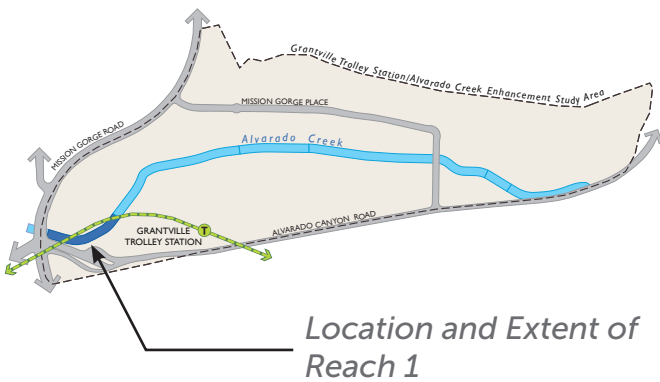
Location and Extent of Mission Gorge Road



Existing Conditions

REACH 1

Reach 1 is a trapezoidal concrete channel with a bottom width of approximately 29.5 feet and sides with an approximate 1.5 to 1 slope (horizontal to vertical). The concrete channel extends upstream about 550 feet. Reach 1 is expected to flood in the area north of Alvarado Creek in the case of a 25-, 50- and 100-year event.



Existing Conditions

REACH 2

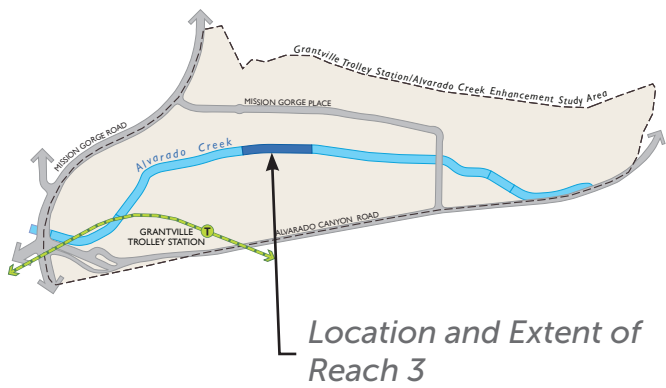
Reach 2 is the only reach within the Study Area with both vegetated channel sides and a vegetated bottom. It extends for approximately 1,100 feet, with the narrowest bottom width within the Study Area, which varies between 13 and 17 feet. Its sides have an approximate 2 to 1 slope (horizontal to vertical). Reach 2 has by far the least hydraulic capacity of the entire channel system within the Study Area. A 2-year storm event is expected to cause flooding in this area, especially if the vegetation in the reach is not maintained. Reach 3 has a concrete channel with a bottom width of approximately 29.5 feet and length of approximately 550 feet. At the upstream limits of this reach, there is a warped wing walls structure that transitions the channel into a triple RCB culvert.



Existing Conditions

REACH 3

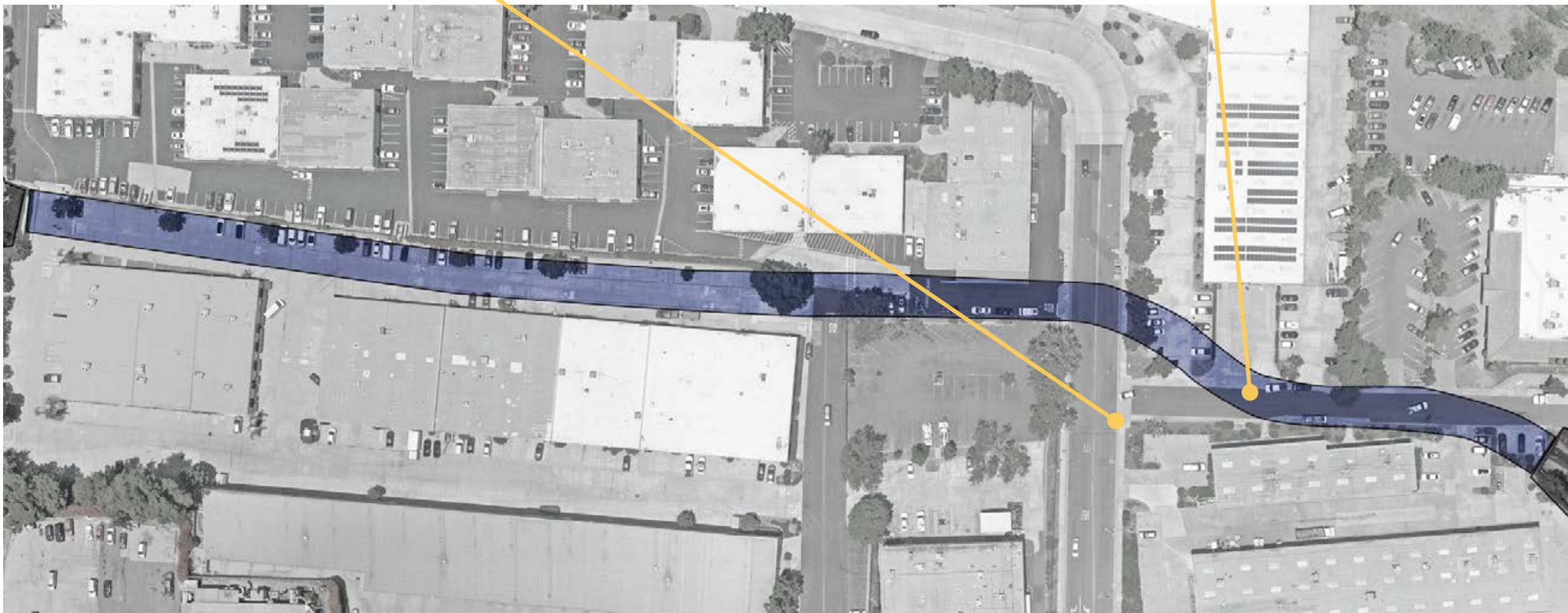
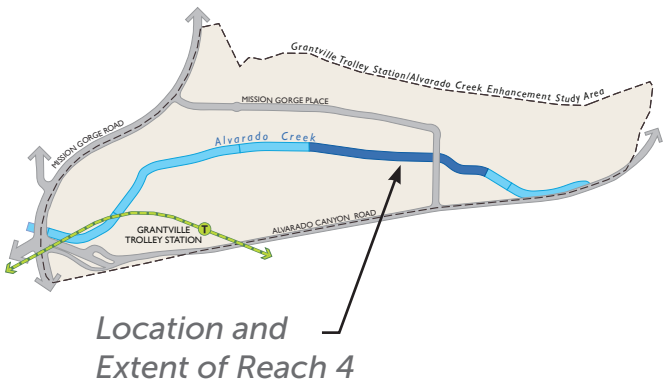
Reach 3 has a concrete channel with a bottom width of approximately 29.5 feet and length of approximately 550 feet. At the upstream limits of this reach, there is a warped wingwall structure. Under current conditions, Reach 3 is expected to flood north of the channel during 25-, 50- and 100-year storm events.



Existing Conditions

REACH 4

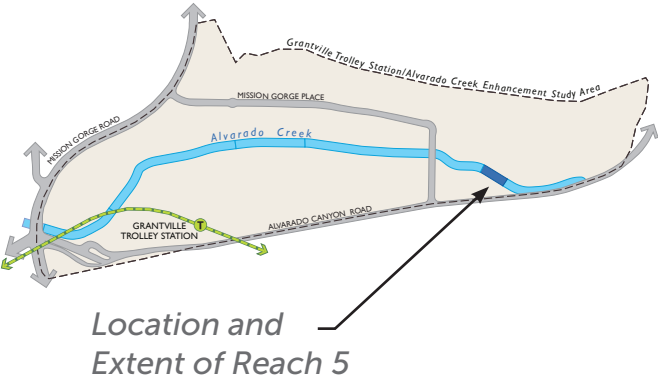
Reach 4 consists of a triple RCB culvert (each box with an 11-foot width and 8-foot height) that extends upstream approximately 1,340 feet. The downstream or westernmost 900 feet of culvert is nearly straight. The upstream or easternmost 440 feet of culvert meanders in order to be in alignment with access roads located west and east of Mission Gorge Place. The culvert in Reach 4 lacks the capacity for 50- and 100-year storm event flows, which are expected to result in flooding of a significant portion of Mission Gorge Place.



Existing Conditions

REACH 5

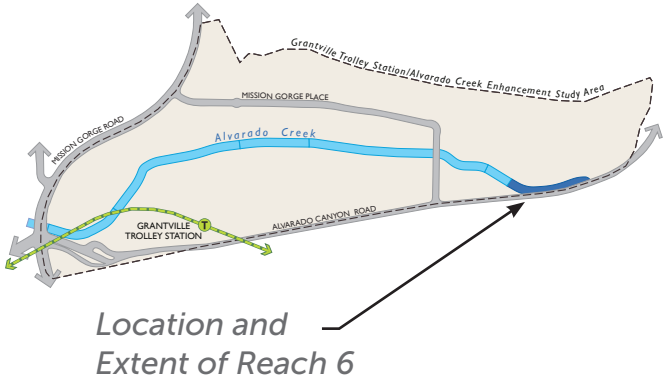
Reach 5 is a relatively short reach. The concrete channel is approximately 175 feet in length with a bottom width of 45 feet and sides with an approximate slope of 1.5 to 1 (horizontal to vertical). At the western end of the triple RCB culvert, the concrete channel is fairly steep, increasing in elevation by approximately 6 feet over a distance of 75 feet. East of the stretch, the channel slope flattens and continues for approximately 100 feet. Under current conditions, the 50- and 100-year storm event flows will cause flooding along this reach.



Existing Conditions

REACH 6

In Reach 6, the channel is approximately 44 feet wide with a vegetated bottom and concrete sides that are sloped at approximately 2 to 1 (horizontal to vertical). This channel reach extends approximately 550 feet, at which point the channel enters a culvert located beneath the Waring Road onramp to westbound I-8. Under the current conditions, 50- and 100-year storm events will result in significant flooding along both sides of Reach 6 due to the limited capacity of Reach 4.



Existing Conditions

2.4 BIOLOGICAL RESOURCES

The Study Area includes several areas with natural vegetation, biological resources, and jurisdictional waters. These are discussed below; additional information concerning biological resources and constraints within the Study Area may be found in the Existing Conditions Report and the Biological Constraints Report (See Appendix A: References).

VEGETATION COMMUNITIES

Within the Study Area, there are approximately eight acres of sensitive vegetation communities, defined as such by their rarity and ecological importance (Figure 2-6, Table 2-2). More than half of this acreage is located along the eastern and northern slopes of the Study Area, with the remaining areas located along Alvarado Creek (Reaches 1, 2, 3, 5, and 6). Most of the areas with sensitive vegetation communities are dominated by native plant species; however, the areas with non-native riparian, arundo-dominated riparian, and disturbed wetland vegetation communities are characterized

primarily by non-native or invasive species. For purposes of this Study, the sensitive vegetation communities within the Study Area are organized in two categories.

1. Higher Quality Vegetation. This includes vegetation characterized primarily by native vegetation, such as southern willow scrub and freshwater marsh communities. Both these communities are considered sensitive wetland habitat by the California Department of Fish and Wildlife (CDFW), U.S. Army Corps of Engineers (USACE), Regional Water Quality Board (RWQB), and the City of San Diego.
2. Lower Quality Vegetation. This includes vegetation communities dominated by non-native and/or invasive species, such as non-native riparian and arundo-dominated riparian communities. These communities have the potential to be regulated as a wetland.



TABLE 2-2: VEGETATION COMMUNITIES IN THE STUDY AREA

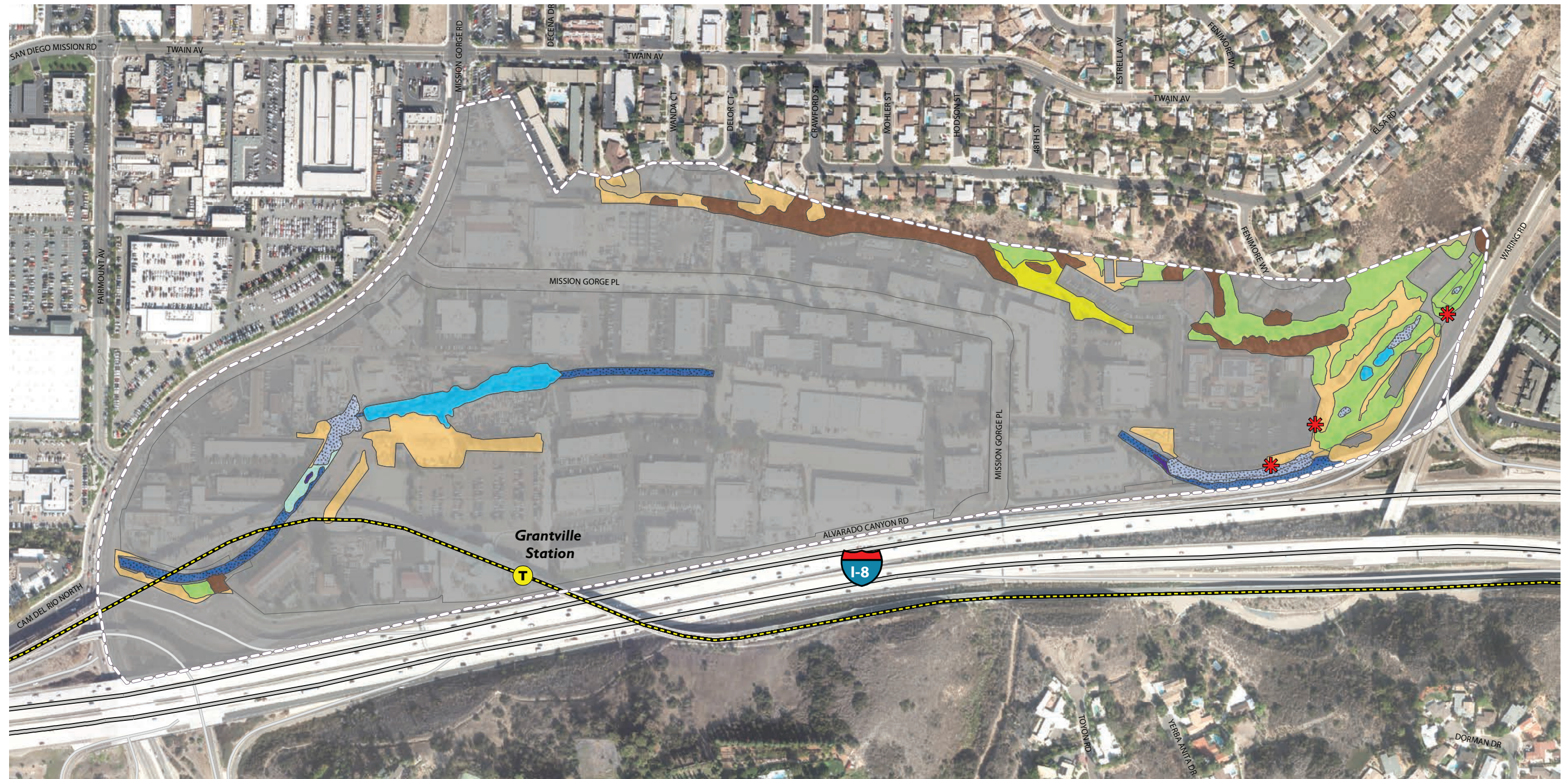
<i>Vegetation Type (Holland Code)</i>	<i>Acres</i>	<i>Agencies that Consider Vegetative Community Sensitive</i>	<i>Location in Study Area</i>
Higher Quality Vegetation			
Southern Willow Scrub (63320)	0.81	CDFW, USACE, RWQCB, San Diego	Along Alvarado Creek (Reaches 2, 6) & small tributary drainage in eastern portion
Freshwater Marsh (52400)	0.03	Typically by CDFW, USACE, RWQCB, San Diego	Along Alvarado Creek (Reaches 2, 5)
Diegan Coastal Sage Scrub (32510)	4.09	Federal and state resource agencies, considered Tier II2 by City of San Diego Biology Guidelines	Undeveloped area near Waring Road & slopes to the north
Lower Quality Vegetation			
Non-native Riparian (65000)	0.16	Typically by CDFW, may be regulated as a wetland by USACE, RWQCB, San Diego	Along Alvarado Creek (Reach 2)
Arundo-dominated Riparian (65100)	1.00	Typically by CDFW, may be regulated as a wetland by USACE, RWQCB, San Diego	Along Alvarado Creek (Reach 2) & tributary drainage in eastern portion
Disturbed Wetland (11200)	1.15	May be considered sensitive if determined to be USACE, CDFW, RWQCB, or San Diego wetland	Along Alvarado Creek (Reaches 1, 2, 3, 5, 6)
Non-native Grassland (42200)	0.59	Considered Tier IIIB3 by the City of San Diego Biology Guidelines	Slope west of Junior Achievement Finance Park
Total	7.83		





Notes:
1. Tier II is "Uncommon Upland"
2. Tier IIIB is "Common Upland"
Total acres rounded for consistency.

CDFW = California Department of Fish and Wildlife
USACE = U.S. Army Corps of Engineers
RWQCB = Regional Water Quality Control Board
San Diego = City of San Diego

Source: RECON, 2016.

FIGURE 2-6 VEGETATION COMMUNITIES AND SPECIAL STATUS SPECIES






T Trolley Stop
 Green Line
 Freeway
 Ramps
 Study Area


Vegetation Communities
Sensitive Wetland/Riparian


 Southern Willow Scrub

 Freshwater Marsh


 Non-native Riparian
 Arundo-Dominated Riparian
 Disturbed Wetland


Sensitive Upland


 Diegan Coastal Sage Scrub

 Non-native Grassland


Non-sensitive Upland

 Eucalyptus Woodland

 Non-native Woodland

 Disturbed Land
 Urban/Delevoped Land

Sensitive Species

 Singlewhorl Burrowbush
(*Ambrosia monogyra*)

This map/data is provided without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Note: This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

Copyright SanGIS 2009 - All Rights Reserved. Full text of this legal notice can be found at: http://www.sangis.org/Legal_Note.htm

Data Source: City of San Diego, 2016; SANGIS/SANDAG Regional GIS Data Warehouse, 2016. (www.sanqis.org) Dyett & Bhatia, 2016

PLANTS AND WILDLIFE

Numerous plant species, including native and non-native plant species, can be found in the natural areas along the creek and slopes in the Study Area. Although Grantville is developed, wildlife also use this area, especially the drainage west of Waring Road and in the vegetated portions of Alvarado Creek that flow to the San Diego River.

Species are considered sensitive if they are protected by state or federal agencies as threatened or endangered or are proposed for listing; designated by the City of San Diego as a narrow endemic species⁵; a covered species under the City of San Diego Multiple Species Conservation Program (MSCP);⁶ or considered endangered as a California Rare Plant Rank 1B or Rank 2 by the California Native Plant Society's *Inventory of Rare and Endangered Vascular Plants of California*⁷. One sensitive plant species has been identified in the Study Area, and three sensitive plant species have been identified as having the potential to occur in the Study Area. In addition, there are seven sensitive wildlife species that have a moderate potential to occur.

BIOLOGICAL SURVEY OF THE STUDY AREA



Image of singlewhorl burrobush (*Ambrosia monogyra*)

A biological survey of the Study Area, conducted in 2016, identified 98 plant species and several wildlife species (See Appendix A: References). One of the plant species identified within the Study Area, singlewhorl burrobush (*Ambrosia monogyra*), is identified as a California Native Plant Society California Rare Plant Rank 2B.2 species and therefore considered sensitive. Three additional sensitive plant species have the potential to occur in the Study Area: San Diego marsh-elder (*Iva hayesiana*), southwestern spiny rush (*Juncus acutus* ssp. *leopoldii*), and California adolphia (*Adolphia californica*). San Diego marsh elder and southwestern spiny rush would most likely be found in riparian vegetation (southern willow scrub, freshwater marsh, or non-native riparian) along earthen-lined portions of Alvarado Creek or the unnamed drain-

age near Waring Road. California adolphia would most likely occur within the coastal sage scrub in the undeveloped area near Waring Road, or on the nearby slopes. As Rank 1B or 2B.2 rare and endangered plant species, which occur or have a moderate potential to occur, these species require additional protections.

The animal species identified to have a moderate potential to occur in the area are: Belding's orange-throated whiptail (*Aspidoscelis hyperythra beldingi*), red-diamond rattlesnake (*Crotalus ruber*), least Bell's vireo (*Vireo bellii pusillus*), coastal California gnatcatcher (*Polioptila californica californica*), southern California rufous-crowned sparrow (*Aimophila ruficeps canescens*), western mastiff bat (*Eumops perotis californicus*), and San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). Of these, least Bell's vireo is federally and state-listed as endangered; its potential to occur is within the Study Area's southern willow scrub habitats, which is found along Alvarado Creek (Reaches 2 and 6). Coastal California gnatcatcher is federally listed as threatened and a California Department of Fish and Wildlife species of concern; its potential to occur is within the Diegan coastal sage scrub community within the undeveloped area near Waring Road, as well as the slopes to the north.



Image of California Gnatcatcher (*Polioptila californica*)



Image of Least Bell's Vireo (*Vireo bellii pusillus*)

⁵City of San Diego. 2012. Land Development Code Biology Guidelines. Amended April 23.

⁶The purpose of the Multiple Species Conservation Program is to conserve a network of 900 square miles of habitat and open space to protect biodiversity in the San Diego region, pursuant to the federal and California Endangered Species Acts and the California Natural Community Conservation Planning Act. The City of San Diego is one of several jurisdictions participating in the Multiple Species Conservation Program.

⁷California Native Plant Society. 2016. *Inventory of Rare and Endangered Plants of California* (online edition, v8-02). Sacramento, CA. Website <http://www.rareplants.cnps.org> accessed in August 2016.



JURISDICTIONAL WETLANDS AND WATERS

The creek corridor contains wetland areas that have connectivity to the San Diego River and riparian vegetation that may be under the jurisdiction of State, federal, and local agencies and jurisdictions. Given the sensitive areas within Alvarado Creek, any change to the creek corridor or function, or any encroachment into biologically sensitive areas, would be under the authority of State and federal permitting agencies. Low quality wetland areas and even channelized portions of the creek would be under the jurisdiction of these agencies due to their connectivity and function as a tributary to the San Diego River. In addition, the City of San Diego regulates wetlands. Applicable regulations may require the protection and enhancement of wetland areas; therefore, these areas are given careful consideration in the Study.

WHICH AGENCIES HAVE JURISDICTION AND WHY?

The resources agencies and bodies that potentially have jurisdiction within the Study Area are the United States Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), the California Department of Fish and Wildlife (CDFW), and the City of San Diego. Development projects, including land use projects and restoration projects in the Study Area, will be reviewed for jurisdiction by these agencies and may require permits.

- The USACE regulates the discharge of dredged or fill material into waters of the United States.
- The RWQCB is the regional agency responsible for protecting water quality in California.
- The CDFW regulates activities that would change the natural flow or the channel of any river, stream, or lake that supports fish or wildlife.
- The City of San Diego regulates wetlands within city limits.

2.5 TRANSPORTATION NETWORK

Mobility and access within the Study Area is limited. Alvarado Creek, itself, impedes movement within the Study Area and access to Grantville Station. In addition, although the Study Area is easily accessible from other areas by both automobile and transit—due to the proximity of I-8, the San Diego Trolley Green Line, and the Metropolitan Transit System (MTS) bus system service at Grantville Station—Mission Gorge Place is the only public road providing access to properties and destinations within the Study Area (Figure 2-7). This road provides the only north-south connection within the nearly one-mile-long Study Area; there are no through east-west connections. As a result, pedestrians departing Grantville Station can access only a limited portion of the area within a quarter-mile of the station in five minutes’ time.

To improve connectivity, the Navajo Community Plan requires new development along Alvarado Creek to provide a 10-foot wide multi-use pedestrian and bicycle trail directly adjacent to the Alvarado Creek. New trails and pathways within the Study Area can add to the system of trails in the

area, including the Navajo Canyon trail to the east of the Study Area, as well as the planned San Diego River Trail system to the west, which will extend 52 miles from the mountains near Julian west to the Pacific Ocean.

Although the Study Area is not currently served by any bicycle facilities, the City’s Bicycle Master Plan proposes the installation of new bicycle routes along Alvarado Canyon Road, between Mission Gorge Road/Fairmount Avenue and Mission Gorge Place, and along Mission Gorge Road. The proposed bike facilities would provide a connection from the Study Area to the San Diego River Trail.



BICYCLE FACILITY TYPOLOGY

Caltrans and the City of San Diego classify bicycle facilities based on a standard typology:



Class I Bikeway (Bike Path)

provides a paved right-of-way for exclusive use by bicyclists, pedestrians, and those using non-motorized modes of travel. They are physically separated from vehicular traffic and can be constructed in roadway right-of-way or exclusive right-of-way.



Class II Bikeway (Bike Lane)

provides a restricted right-of-way and is designated for the use of bicycles with a striped lane and signage on a street or highway. Bicycle lanes are one-way facilities on either side of the roadway and are generally five feet wide.



Class III (Bike Route)

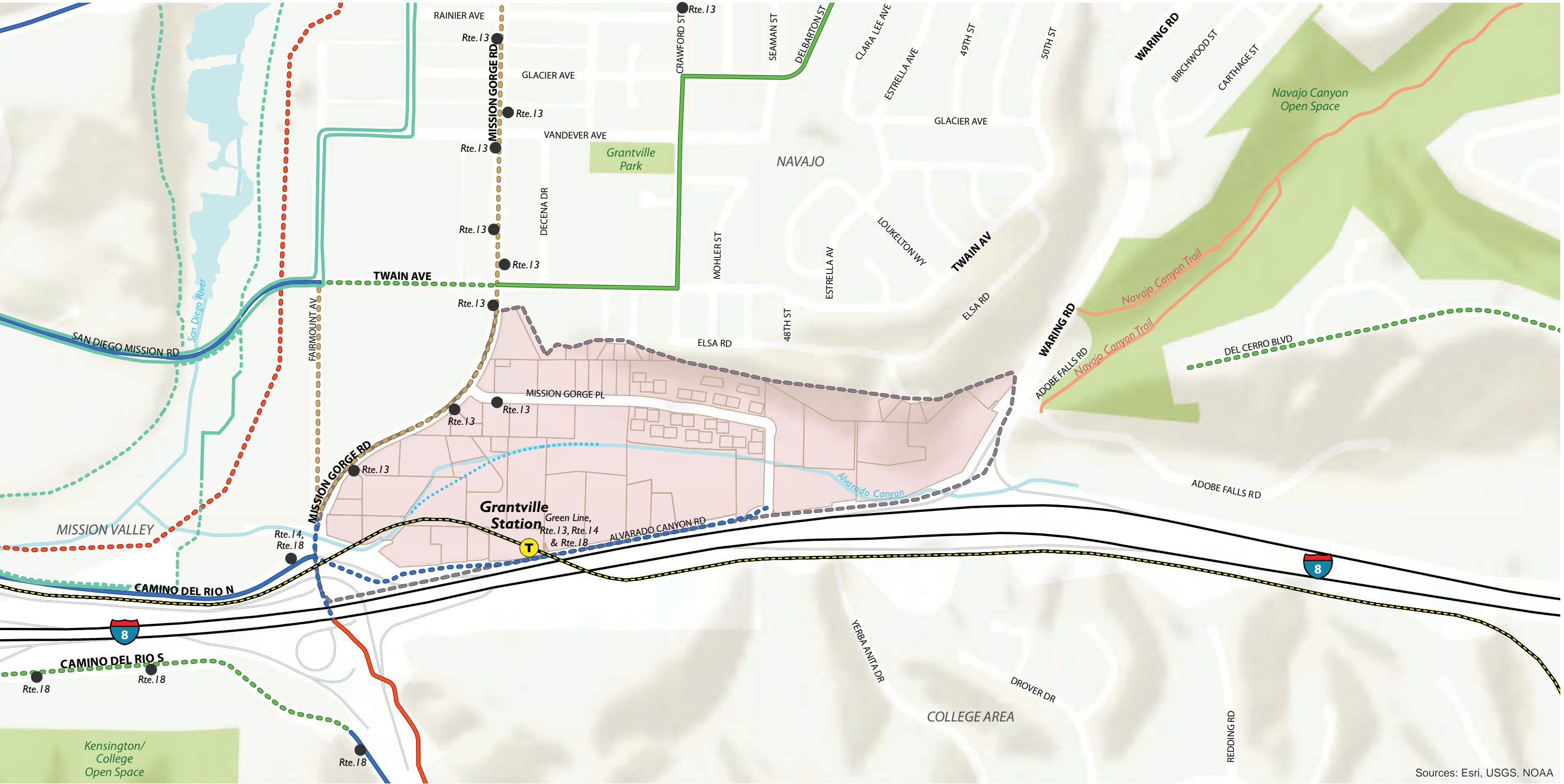
provides for a right-of-way designated by signs and/or pavement markings for shared use with motor vehicle traffic within the same travel lane.




Class IV (Separated Bikeway)


provides for a bikeway for the exclusive use of cyclists and includes a physical separation between the bikeway and motor vehicle traffic, such as grade separation, flexible posts, physical barriers, and on-street parking.


FIGURE 2-7 TRANSPORTATION NETWORK





Sources: Esri, USGS, NOAA

 Trolley Stop


 Light Rail


 Bus Stops


 Existing Stream

 Recommended Channel


Existing Network


 Class I - Bike Path


 Class II - Bike Lane


 Class III - Bike Route


Planned Network


 Class I - Bike Path


 Class II - Bike Lane


 Class III - Bike Route


 Class II or III


 Existing Trails

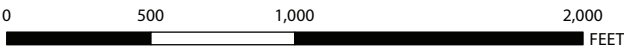
 Existing River Trails

 Planned River Trails

 Parks/Open Space

 Study Area





Data Source: City of San Diego, 2016; SANGIS/SANDAG Regional GIS Data Warehouse, 2016. (www.sangis.org) Dyett & Bhatia, 2016



This map/data is provided without warranty of any kind, either express or implied, including but not limited to, the implied warranties of mercantability and fitness for a particular purpose.

Note: This product may contain information from the SANDAG Regional Information System which cannot be reproduced without the written permission of SANDAG.

Copyright SanGIS 2009 - All Rights Reserved. Full text of this legal notice can be found at: http://www.sangis.org/Legal_Notice.htm



3. REVITALIZATION STRATEGY

IN THIS CHAPTER

This chapter describes a conceptual strategy for achieving the Study’s objectives and revitalizing the Alvarado Creek corridor. Given the broad scope of the Study’s objectives, this potential Revitalization Strategy addresses trails and connectivity improvements and protections and enhancements of biological resources, in addition to flood management. This chapter is organized in two sections:

- **Section 3.1: Recommended Conceptual Improvements to the Creek Corridor.** This section provides plan maps and cross-sections depicting a potential and conceptual strategy for revitalizing the creek corridor.
- **Section 3.2: Potential Solutions by Topic.** This section provides further detail and guidance on the recommended creek corridor improvements, and introduces improvements that, while relating to the area outside the creek corridor, are intended to further Study objectives. The section discusses these potential solutions by topic (i.e., flooding, trails and connectivity, biological resources).

These recommended conceptual improvements and potential solutions were developed through analysis of existing conditions and regulations (see Chapter 2: Context), review of other flood control and waterbody enhancement projects, preliminary hydraulic modeling, and engagement with stakeholders (see Appendix F: Summary of Community Engagement). Multiple approaches were considered to achieve the Study’s objectives. The Feasibility Study (Appendix C) and Hydrology Background Report (Appendix D) provide additional information on the development and analysis of the preferred and alternate revitalization strategies.

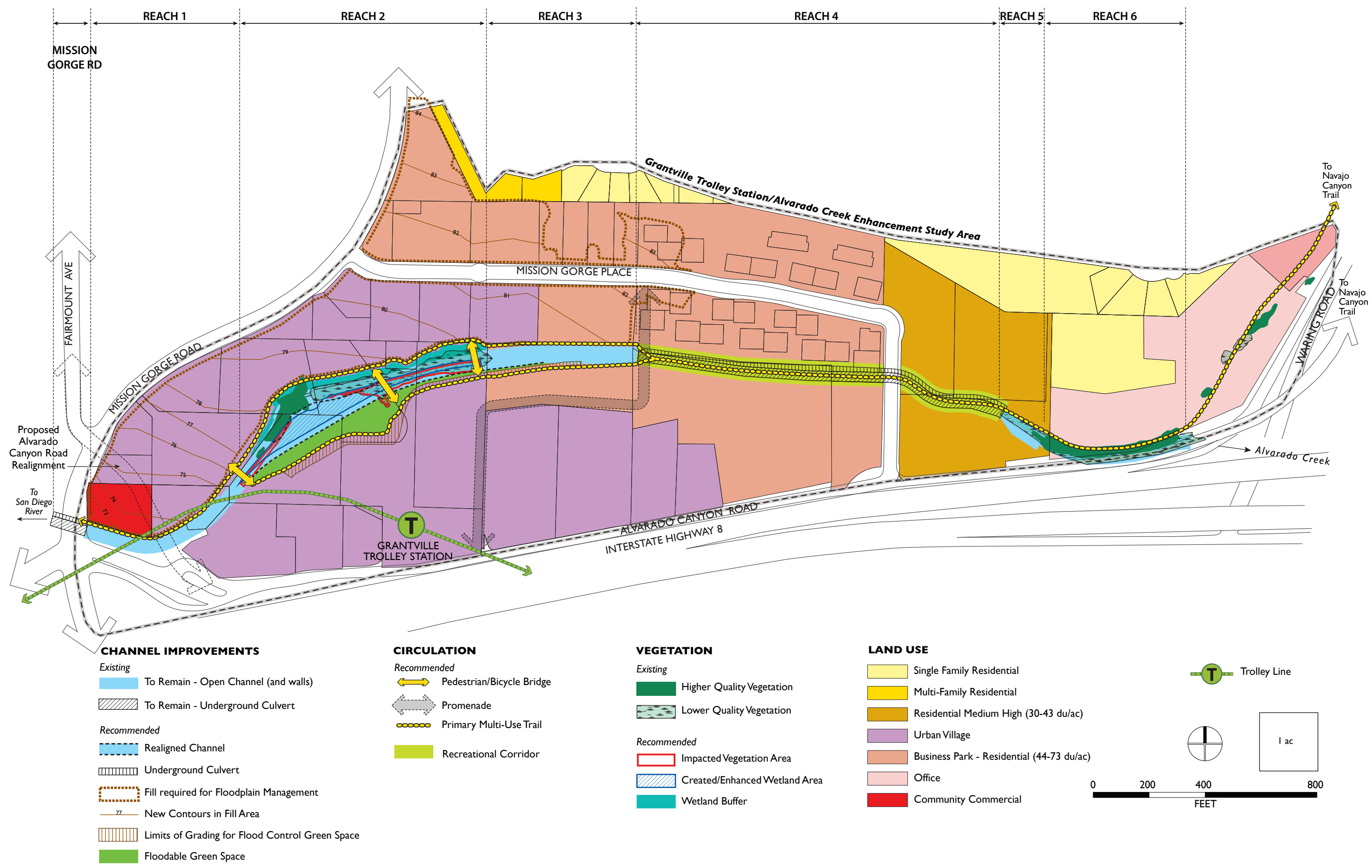
3.1 RECOMMENDED CONCEPTUAL IMPROVEMENTS TO THE CREEK CORRIDOR

A summary of recommended, conceptual improvements included in the Revitalization Strategy is visually depicted and briefly described in this section. In the following pages, opportunities for improving the hydraulic capacity of the creek corridor while increasing access to Alvarado Creek, enhancing the corridor as a community amenity, and fostering transit-oriented development are described, reach by reach.

On the adjacent page, Figure 3-1 depicts all of the recommended, conceptual improvements to the creek corridor. These improvements are further discussed in Section 3.2 (Potential Solutions by Topic) and shown in greater detail in 30 percent design drawings, provided in Appendix D.



FIGURE 3-1 CONCEPTUAL RECOMMENDATIONS BY REACH



MISSION GORGE ROAD & REACH 1

- 1 Improve the hydraulic capacity of the existing triple RCB culvert under Mission Gorge Road with the addition of a new box (15-feet-wide by eight-feet-high) adjacent and north of the existing structure.
- 2 Widen Alvarado Creek channel to connect to the recommended new box added under Mission Gorge Road.
- 3 Provide one pedestrian/bicycle bridge on the border between Reach 1 and Reach 2.
- 4 Provide a ten-foot-wide, Multi-Use Trail north of the existing channel, and south of the existing channel as topography and other constraints allow.
- 5 Grade the area north of the channel to elevate finished floor elevations of structures at least two feet above the 100-year frequency base flood elevations.

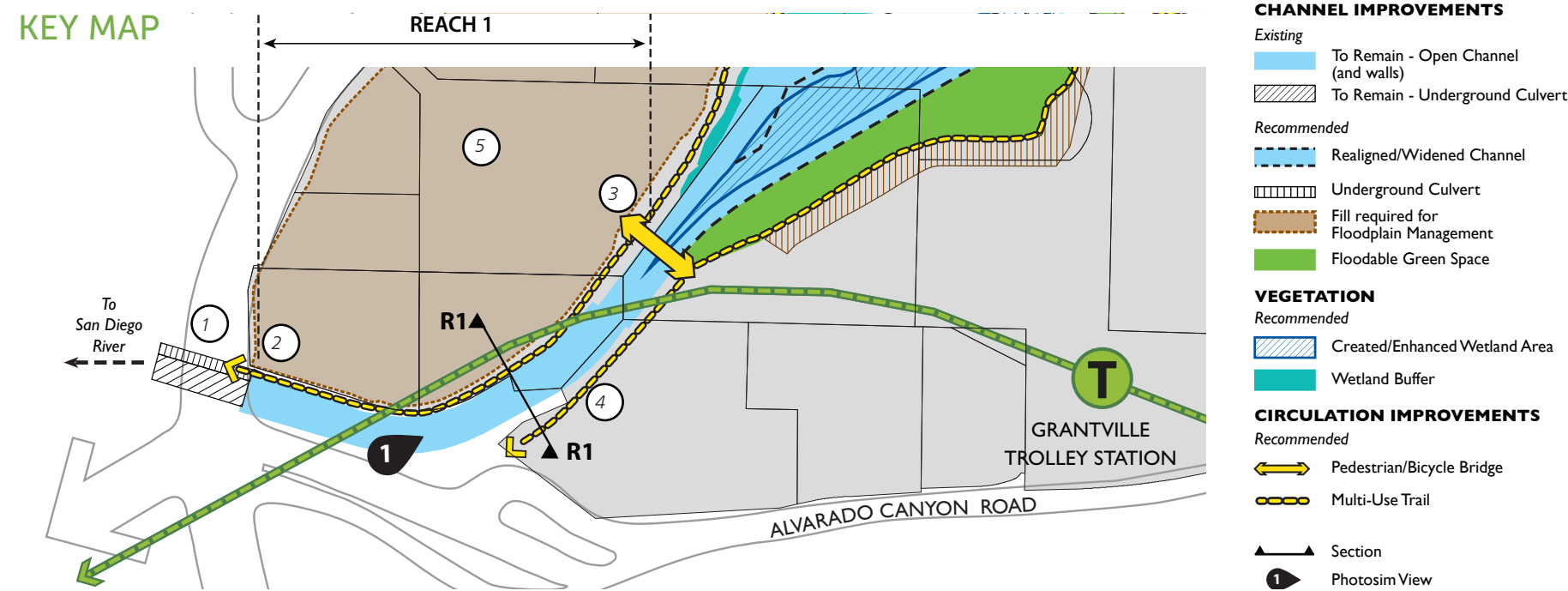
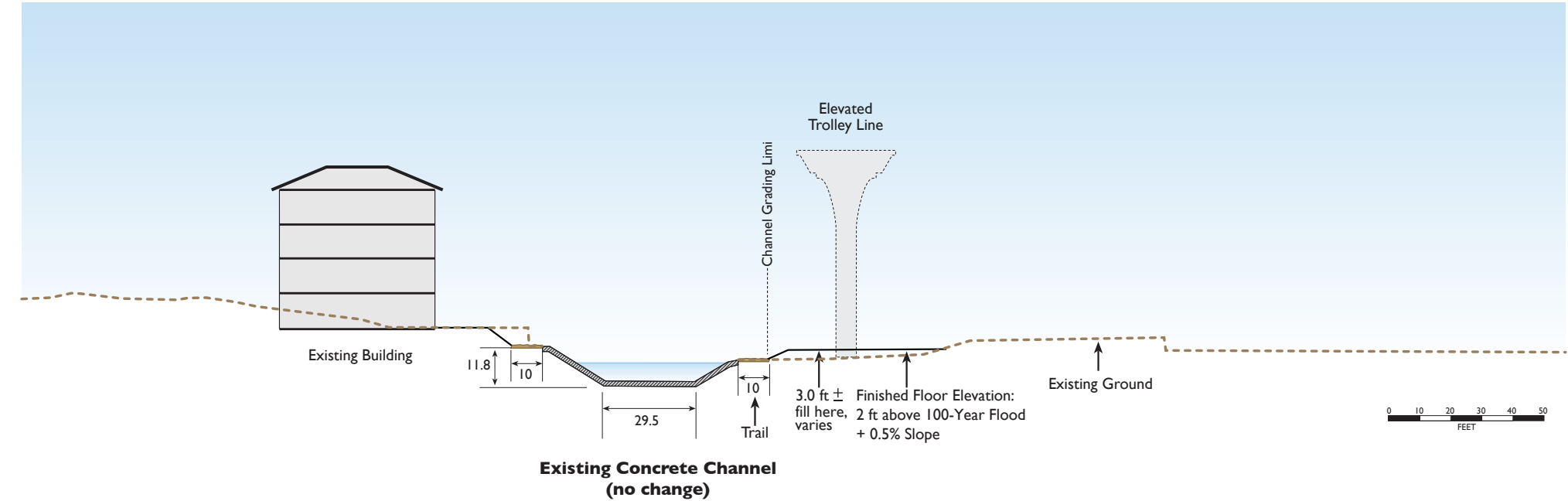
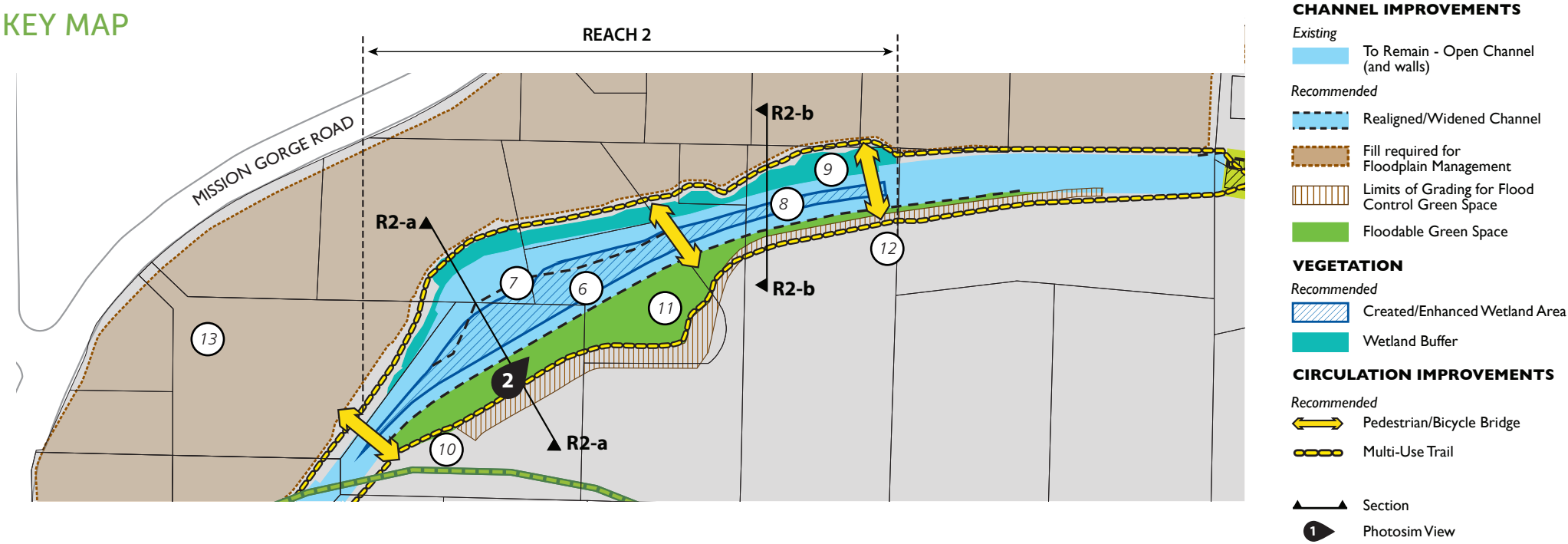


FIGURE 3-2 REACH 1 CONCEPTUAL SECTION



REACH 2

- 6 Construct a realigned channel, south of existing channel, to improve flood control. Figures 3-3 and 3-4 show a portion of the channel bottom and sides constructed of natural materials, and a portion with concrete or equivalent materials.
- 7 Grade and widen key areas of the original channel to marry the original channel with the realigned channel.
- 8 Mitigate any unavoidable, temporary losses of sensitive vegetation with new and enhanced wetlands located in the area between the existing and realigned channels, as well as within the natural portions of the channels.
- 9 Provide a 20-foot Wetland Buffer around existing and created wetlands, per San Diego Municipal Code Section 143.0141(b). A buffer area to the south of the wetlands is contained within the creek, and therefore not shown.
- 10 Provide ten-foot-wide, Multi-Use Trails along the creek corridor. In all instances, provide trails outside the Wetland Buffer. Two potential alignment options are shown (Figures 3-3 & 3-4). One is provided within the channel to increase its hydraulic capacity. The other is shown adjacent to the channel, and would not be inundated during large storm events.
- 11 Enhance hydraulic capacity with the addition of a Floodable Green Space south of the realigned channel, and a Wetland Buffer north of the existing channel.



- 12 Construct two pedestrian/bicycle bridges, to increase connections to Grantville Station and within Grantville.
- 13 Raise the bank height north of the channel and use grading to elevate finished floor elevations of structures at least two feet above the 100-year frequency base flood elevations.

See the Reach 2-A and Reach 2-B Conceptual Sections on the following page.

FIGURE 3-3 REACH 2-A CONCEPTUAL SECTION

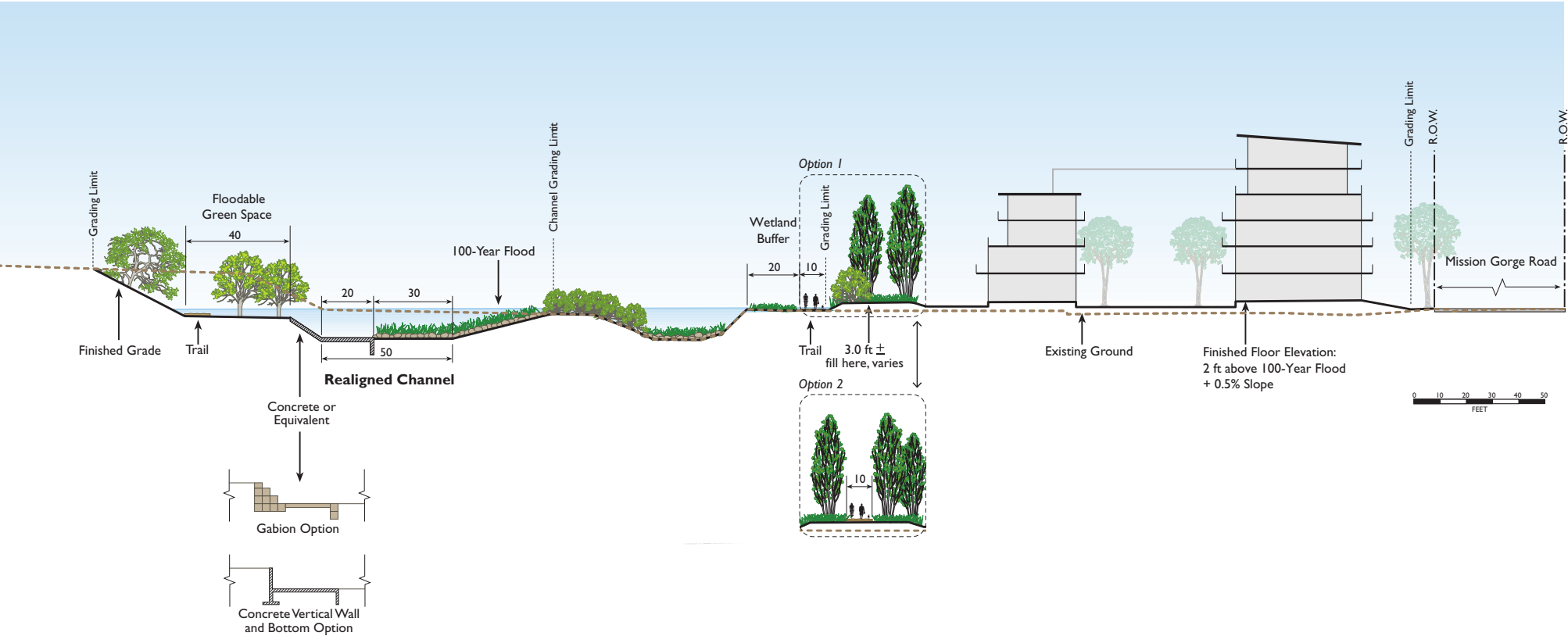
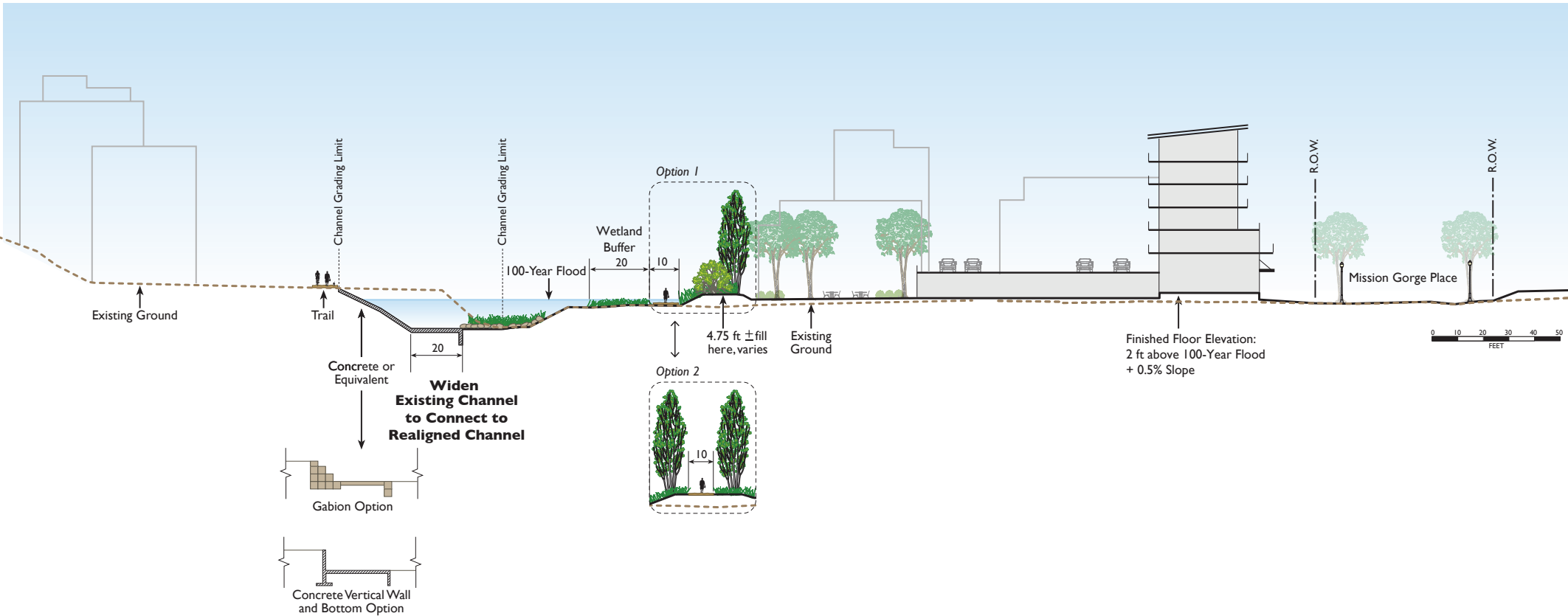


FIGURE 3-4 REACH 2-B CONCEPTUAL SECTION



REACH 3

- 14 Widen Reach 3 to connect to the widened Reach 2. This intervention would impact the southwestern portion of the reach.
- 15 Widen Reach 3 to connect to the expanded culvert under Reach 4. This intervention would impact the northeastern portion of the reach.
- 16 Provide ten-foot-wide, Multi-Use Trails along the creek corridor.
- 17 Raise the bank height north of the channel and use grading to elevate finished floor elevations of structures at least two feet above the 100-year frequency base flood elevations.

KEY MAP

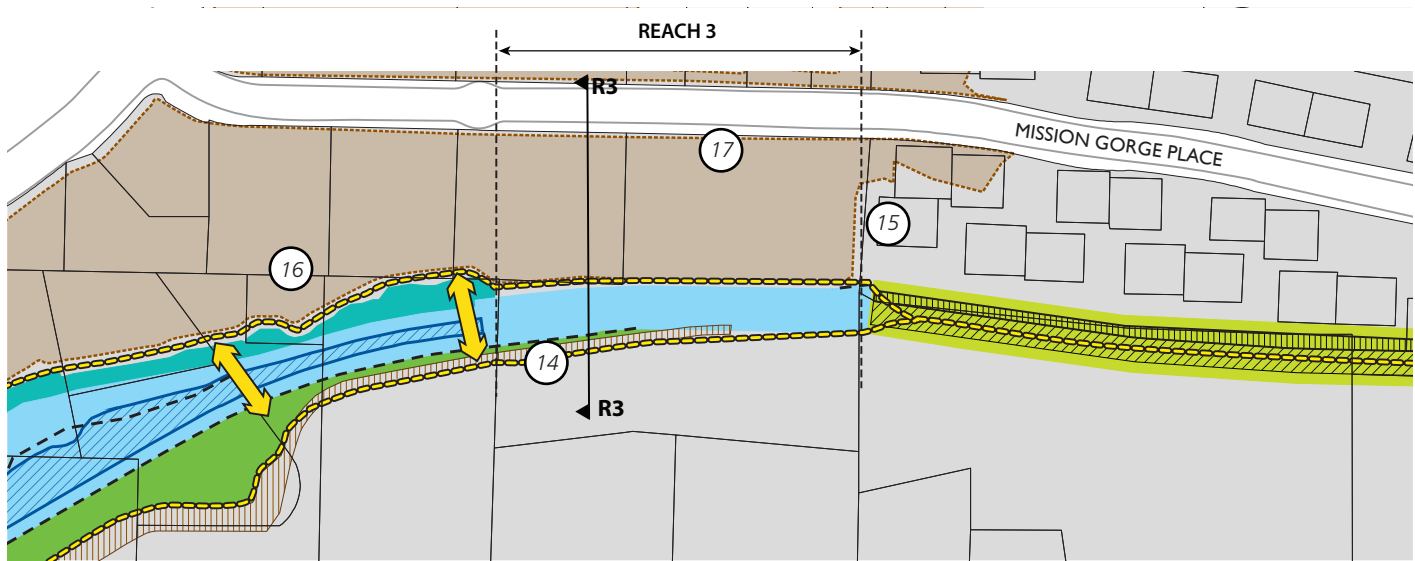
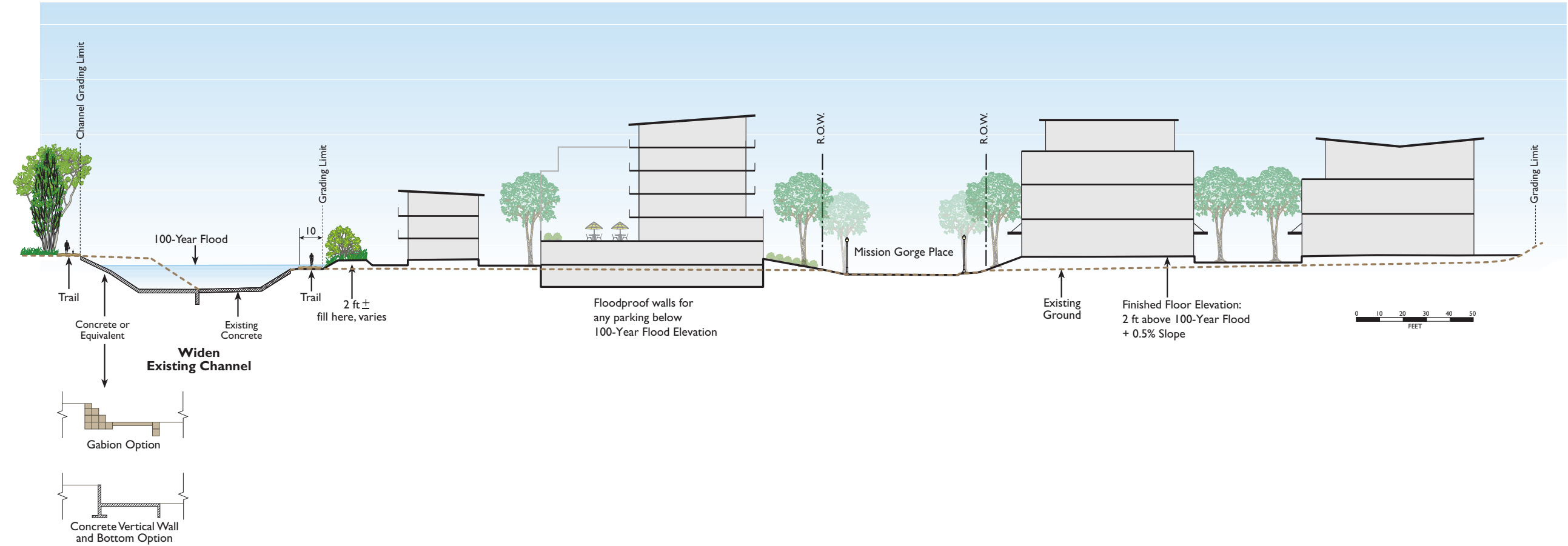


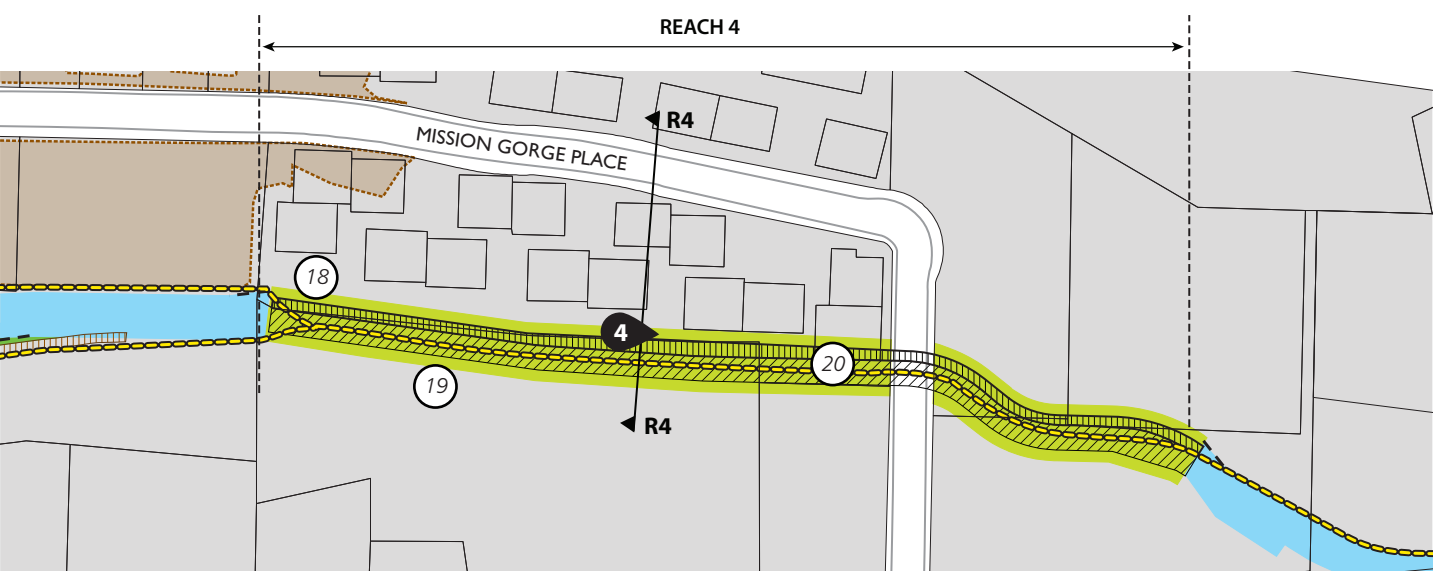
FIGURE 3-5 REACH 3 CONCEPTUAL SECTION



REACH 4

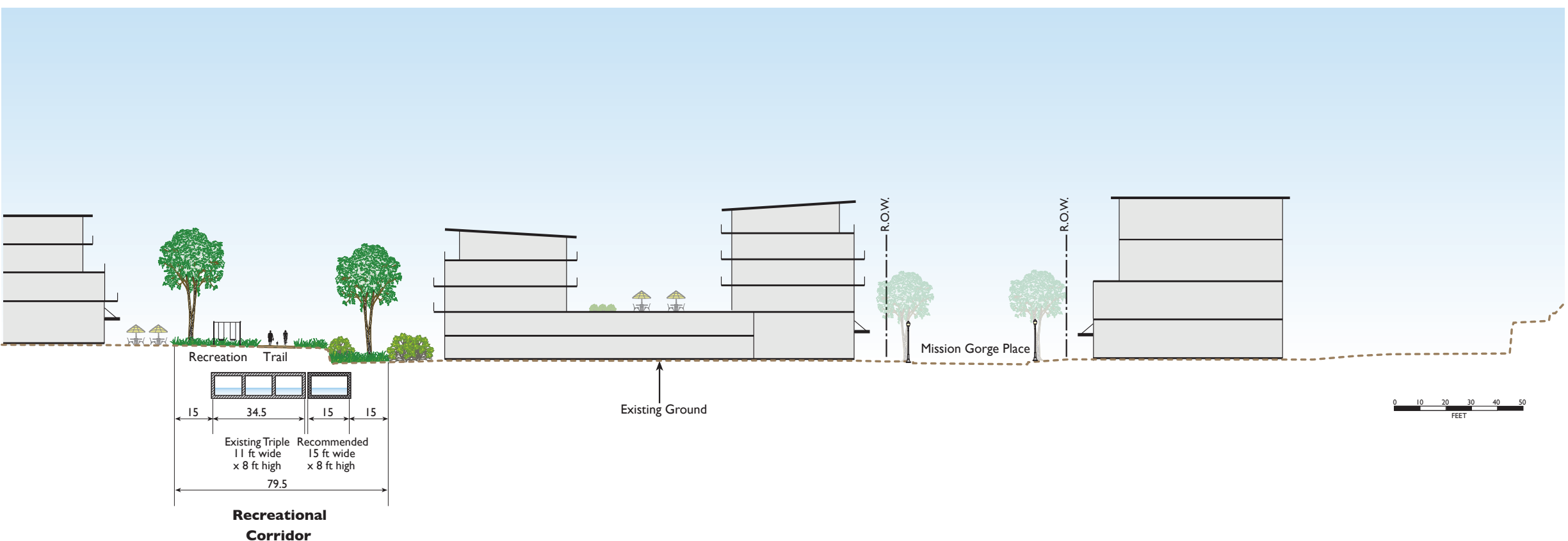
- 18 Improve the hydraulic capacity of the existing triple RCB culvert with the addition of a new box (15-foot-wide by eight-foot-high) north and parallel to the existing structure.
- 19 Provide a Recreational Corridor for passive and active recreation over the existing and recommended, new culvert. The Recreational Corridor extends 15 feet on either side of the culvert system (including the recommended, new culvert), over the area where an easement would be required to preserve access to repair and maintain the culverts.
- 20 Provide Multi-Use Trails within the Recreational Corridor.

KEY MAP



- CHANNEL IMPROVEMENTS**
- Existing
- To Remain - Open Channel (and walls)
 - To Remain - Underground Culvert
- Recommended
- Realigned/Widened Channel
 - Underground Culvert
 - Limits of Grading for Flood Control Green Space
 - Floodable Green Space
- CIRCULATION IMPROVEMENTS**
- Recommended
- Multi-Use Trail
 - Recreational Corridor
- Section
- Photosim View

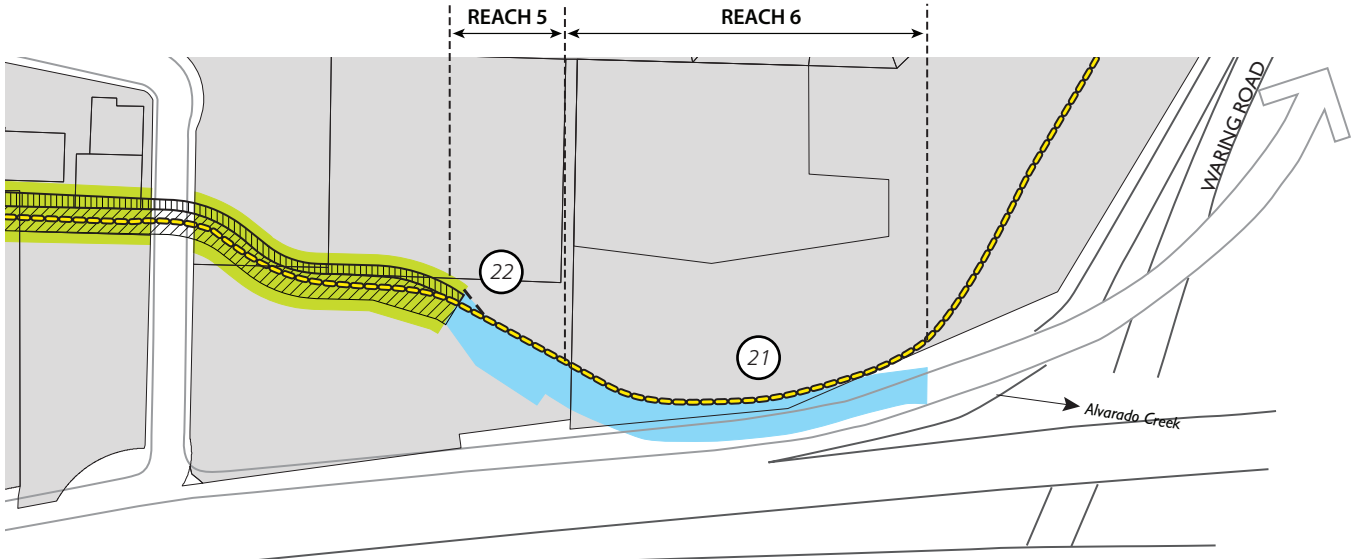
FIGURE 3-6 REACH 4 CONCEPTUAL SECTION



REACHES 5 & 6

- 21 Provide a ten-foot-wide, Multi-Use Trail, north of the channel and extending along an existing San Diego Gas & Electric easement to provide a potential future connection to the Navajo Canyon Trail, as shown in Figure 3-1.
- 22 Widen Reach 5 to connect to the recommended, new culvert under Reach 4. This intervention would impact the northwestern portion of the reach.

KEY MAP



CHANNEL IMPROVEMENTS

- Existing
- To Remain - Open Channel (and walls)
 - To Remain - Underground Culvert
- Recommended
- Realigned/Widened Channel

CIRCULATION IMPROVEMENTS

- Recommended
- Multi-Use Trail
 - Recreational Corridor

3.2 POTENTIAL SOLUTIONS BY TOPIC

Potential ways of achieving Study objectives by managing the flooding in the area, enhancing multi-modal connectivity, and protecting biological resources are discussed below, by topic. This section includes additional guidance and helpful information regarding the recommended conceptual creek corridor improvements that are mapped and briefly described in the previous section. Also explored are potential solutions that, while furthering Study objectives, relate to portions of the Study Area outside the creek corridor (e.g., secondary trail and access way system, green street at Mission Gorge Place, and signage program).

For each topic, the primary considerations used to develop the potential solutions are discussed, followed by a description of the solutions. Each is consistent with and complements existing regulations, guidelines, and policies that concern future development in the Study Area, including: the Navajo Community Plan, the San Diego River Park Master Plan, the City of San Diego Land Development Code (including Chapter 14's Environmentally Sensitive Land Regulations, Landscape Regulations, Storm Water Runoff and Drainage Regulations, and Grading Regulations), the City of San Diego's Drainage Design Manual, the City of San Diego's Storm Water Standards Manual, San Diego's Biology Guidelines in the Land Development Manual, the Americans with Disability Act (ADA) Guidelines for Accessibility, and other adopted plans and regulations relevant to the Study Area.

Where additional concrete is shown to minimize channel width, other options should first be explored, as concrete may not be the preferred solution given other competing policies.

FLOODING

As discussed in Section 3.1 (Recommended Conceptual Improvements to the Creek Corridor), a key objective of the Revitalization Strategy is to develop concepts to improve the hydraulic capacity of Alvarado Creek, so that large storm events can be conveyed within its channel. Recommended improvements are guided by the need to protect the surrounding community and property, which currently experience inundation and damage from storm events. Recommended improvements are also intended to foster development of the Study Area as a dynamic, mixed-use neighborhood with a variety of uses, including residential and commercial, as contemplated in the Navajo Community Plan.

Wherever possible, existing infrastructure has been retained and utilized. Maintaining the existing infrastructure in key locations where the existing channel can efficiently convey storm events was considered to minimize costs and impacts to private property.

This section discusses in greater detail potential solutions to manage the flooding within the Study Area, which were summarized and depicted in the prior section. The recommended solutions for managing the Study Area's flooding are guided by the following considerations:

- **Conveyance of 100-Year Storm Event.** Improve the hydraulic capacity of the Alvarado Creek channel so that it, in combination with its adjacent open spaces, can convey a 100-year storm event.

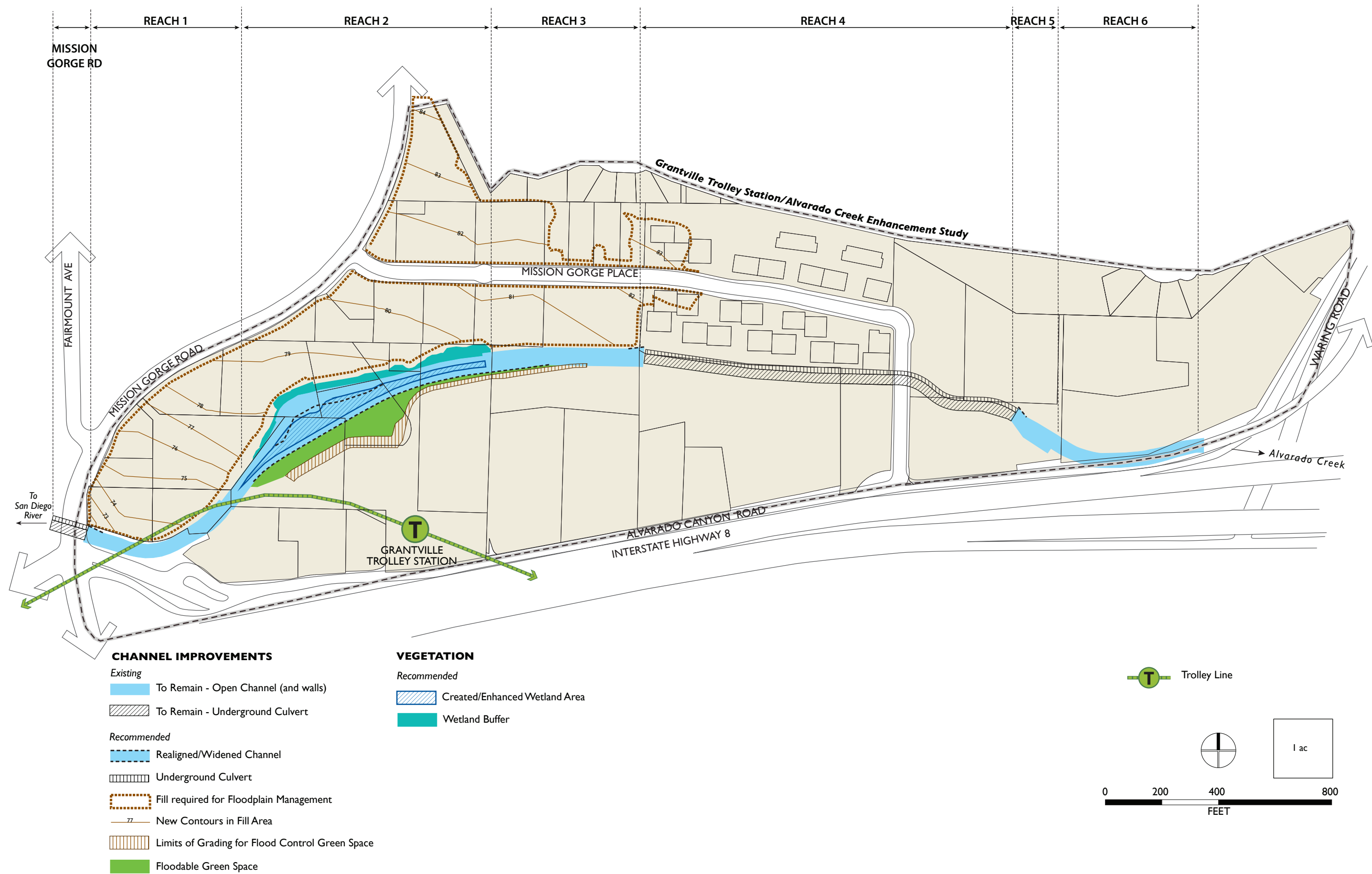
- **Integrated System of Channel, Open Spaces, and Pathway Improvements.** Integrate into the recommended channel improvements a system of open spaces and pathways that would increase channel capacity during peak-storm events and otherwise be used for recreation and open space.
- **Minimize Impacts to Adjacent Property.** Minimize the impacts of recommended flood control improvements on adjacent property, to the extent feasible, so that property owners can maintain the ability to meaningfully develop their property as transit-oriented development.
- **Maintenance Access.** Provide adequate access from public streets into the creek channel for flood control and maintenance vehicles to help with the care and function of the area.

The solutions to manage flooding throughout the Study Area are shown in Figure 3-7. To demonstrate their benefits, Figure 3-8 shows the current 100-year floodplain, and the expected 100-year floodplain if the improvements are made. As described below, there are three main conceptual solutions to manage the flooding in the Study Area: enhanced creek capacity, floodable green space, and grading.

ENHANCED CREEK CAPACITY

The conceptual improvements to the creek corridor, as discussed in Section 3.1, are recommended in order to enhance the creek's hydraulic capacity so that it can accommodate a 100-year storm event. The recommended improvements include channel widening, raising bank heights, constructing a realigned channel in Reach 2, and expanding the culverts under Mission Gorge Place and in Reach 4.

FIGURE 3-7 FLOODING SOLUTIONS



FLOODABLE GREEN SPACE

Where possible, solutions have been identified that provide multiple benefits related to flooding management and enhancing Alvarado Creek as an amenity. Specifically, the recommended conceptual improvements include a Floodable Green Space in Reach 2, along the Alvarado Creek corridor. In the case of a large storm event, this space would become inundated and some storm water would be retained in the soil after the peak flow receded. During dry seasons or low flows, it could provide opportunities for active and passive recreation for the new residents, employees, and visitors and customers to the commercial and retail areas. Ideally, this space would be designed for safe access, with uses and facilities that enhance views of the creek and not negatively affect sensitive environmental resources. For instance, the space could be designed with picnic areas, wildlife viewing areas, seating, pedestrian-only trails, boardwalks, scenic and interpretive overlooks, and educational exhibits, and the like. Landscaping could be a mixture of drought-resistant native plants and trees that are consistent with the surrounding habitat type and able to withstand occasional inundation.

Wetland creation and enhancement areas and wetland buffers are distinct from Floodable Green Space, although all these areas are expected to contribute to the function of the flood control channel.¹¹ The Recreational Corridor in Reach 4, while recommended to provide green space and recreational opportunities, is not designed to provide flood control, and thus is also distinct.¹²

REACH 2 CONCEPTUAL RENDERING

SHOWING FLOODABLE GREEN SPACE



¹¹For a discussion of these areas, see the following section on Biological Resources.

¹²For a discussion of the Floodable Green Space, see the following section on Trails and Connectivity.

GRADING

Grading is recommended to increase the ground elevation in key areas north of the channel, to ensure that finished floor elevations of structures are constructed sufficiently above the base flood elevation. Adequate fill would be needed for future building pads so that the minimum elevation of the finished, first floor elevation on any building would be at least two feet above the 100-year frequency base flood elevation (BFE). The ultimate fill depths and resulting site elevations would be determined for each site during the entitlement process so that improvement plans are in compliance with City regulations.

Although the conceptual improvements in the Study are intended to reduce the extent of the 100-year floodplain, the process to revise floodplain mapping is comprehensive. Planning during the entitlement process may include submitting a request to FEMA for a Conditional Letter of Map Revision (CLOMR), in which case the minimum first floor elevations may be based on the 100-year frequency BFEs determined in the FEMA accepted project CLOMR. Note that basing the minimum finished, first floor elevation on a CLOMR-determined BFE will require that grading be performed in strict adherence to approved construction documents, a certified topographic survey showing finished grade elevations, and a Letter of Map Revision (LOMR) accepted by FEMA. The floodplain mapping information would need to be updated with FEMA to ensure the latest available hydrologic and hydraulic engineering data is used.

It is important to note that the concepts for Alvarado Creek do not address site drainage and storm water requirements. A combination of storm drain collection and adequate fill depths will be required in the improved areas around structures so that

storm water runoff will be appropriately conveyed. Pollutant control and, if applicable, hydromodification measures will be needed as part of future redevelopment of the Study Area. These measures would need to be in compliance with the current State and local regulations in place at the time that the redevelopment occurs.

TRAILS AND CONNECTIVITY

A comprehensive system of trails, crossings, and access ways has the potential to improve multi-modal mobility in the Study Area, increasing access for the thousands of residents projected for the area. Consistent with the Navajo Community Plan, this Study focuses on solutions that are envisioned to enhance pedestrian and bicycle safety, comfort, and mobility. The recommended solutions conceive of the transformation of Alvarado Creek from an obstacle into a natural linkage, via a Multi-Use Trail system along the creek corridor with a series of pedestrian/bicycle bridges; a Promenade to enhance multi-modal connectivity; a secondary system of pathways to improve access to Grantville Station, the creek corridor, and other destinations; and a Recreational Corridor above the culverted channel in Reach 4.

The recommended solutions to improve connectivity are guided by the following considerations:

- **Multi-Modal Mobility.** Enhance multi-modal mobility, particularly walkability and bikeability, throughout the Study Area, through a system of pedestrian paths, bikeways, complete streets, and safe crossings.
- **Open Space Spine.** Establish an open space spine along Alvarado Creek to enhance mobility in the Study Area, make the corridor a more visible and accessible community asset, re-establish the community's relationship

with the creek, and create a sense of place by providing opportunities for social interaction, open views, and recreation.

- **Grantville Station Access.** Increase access to Grantville Station, particularly from the north, with publicly accessible pathways, integrated with access points from private developments.
- **Wayfinding.** Provide a consistent and comprehensive wayfinding signage program for all modes of transportation to improve access to Grantville Station and other important landmarks and transit stops.

Conceptual solutions related to trails and connectivity, as shown in Figure 3-9, consist of five main, interconnected components: the Promenade, Multi-Use Trail System, pedestrian/bicycle bridges, Recreational Corridor in Reach 4, and Secondary Trail and Access Way Network. Additionally, green infrastructure on Mission Gorge Place, and a signage program are recommended.

To demonstrate the benefits of these solutions, Figure 3-10 shows the current five and 10-minute walksheds from Grantville Station, and the expected walksheds if the solutions for improving connectivity were implemented.

REACH 1 CONCEPTUAL RENDERING
SHOWING TRAILS AND IMPROVED CONNECTIVITY



Existing Conditions

REACH 4 CONCEPTUAL RENDERING
SHOWING RECREATIONAL CORRIDOR



Existing Conditions

FIGURE 3-9 TRAIL AND CONNECTIVITY SOLUTIONS

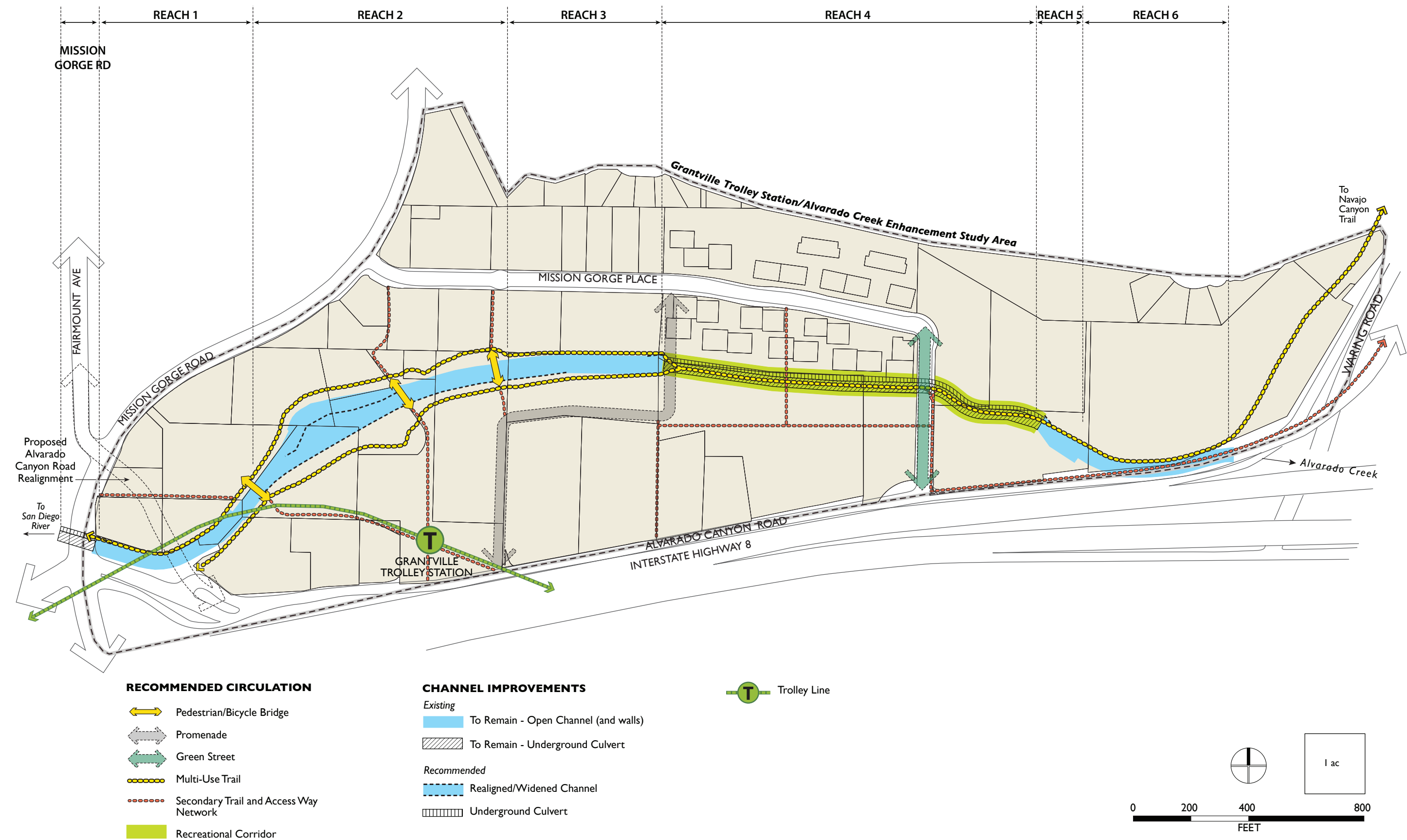
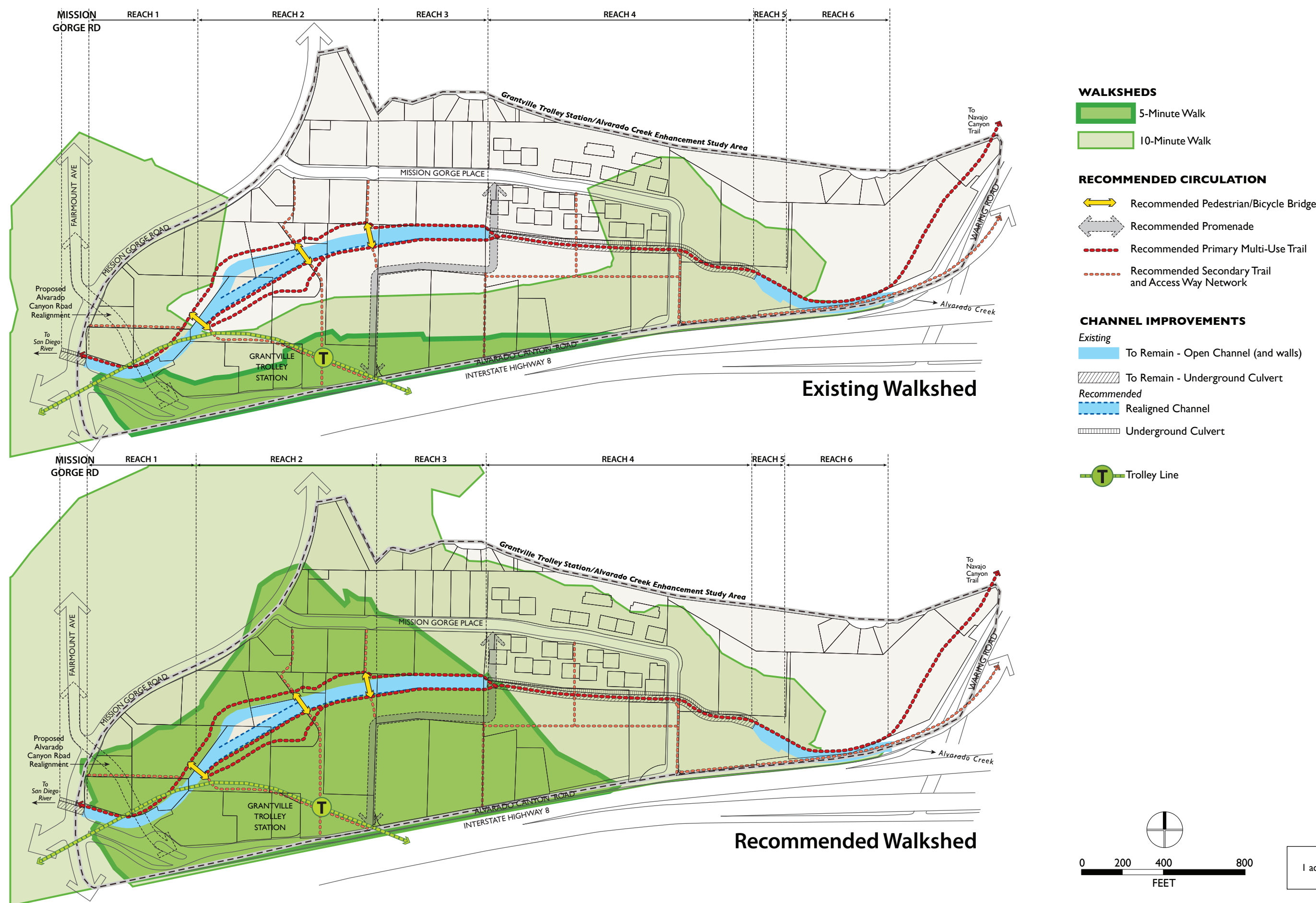


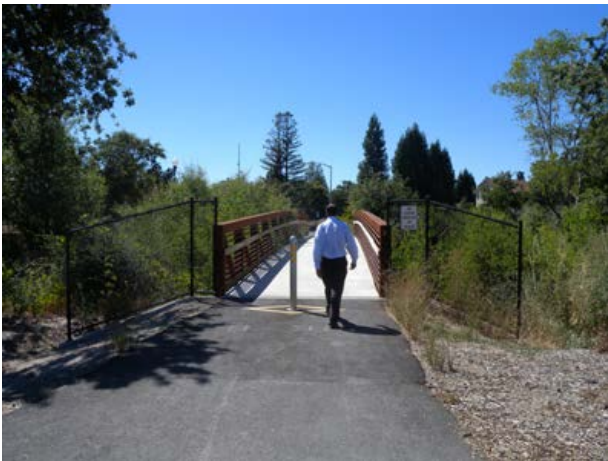
FIGURE 3-10 EXISTING AND RECOMMENDED WALKSHED



CONNECTIVITY IN THE NAJAVO COMMUNITY PLAN

The Navajo Community Plan provides the urban design framework and supplemental development regulations pertaining to connectivity within the Study Area. Some examples of policies in the Community Plan are:

- *UD-10. Provide the opportunity for a pedestrian/bicycle bridge over Alvarado Creek, which will allow any development projects adjacent to Alvarado creek a critical linkage to the Grantville Trolley Station.*
- *SDR 5. All new development shall provide a minimum of one pedestrian and bicycle access-way through the project site. Pedestrian and bicycle access-ways shall be coordinated and connected to public streets. Fencing, walls, and gates that limit access are prohibited....*
- *SDR 36. Development along Alvarado Creek shall provide a 10-foot wide multi-use pedestrian and bicycle trail directly adjacent to the Alvarado Creek.*



PROMENADE

The Promenade is shown as providing a public multi-modal, neighborhood connection aligned with existing (private) vehicular pathways, currently within a single ownership. As a condition of developing the site with higher intensity uses and in accordance with the Community Plan, the Promenade could be developed as a vehicular/pedestrian/bikeway connection, potentially remaining in private ownership, but with a public easement.

A public, multi-modal neighborhood connection between Grantville Station and Mission Gorge Place is vital given the extensive number of new housing units planned for the area surrounding the Promenade, in particular, and for the Study Area, in general. Such a connection would provide residents of these units a greater ability to connect to existing roadways and move within the Study Area, as well as access Grantville Station and Alvarado Creek. The connection would also be necessary for emergency vehicles to easily access all parts of the Study Area from the north or the south.

It is conceived that the Promenade may be realigned to establish an equivalent pedestrian-friendly interconnected street network or relocated to satisfy circulation needs based on future development. It is also contemplated that the Promenade be a complete street that is no wider than necessary to provide for emergency vehicle access per the Land Development Code “Street Design Manual” and to provide a landscaped parkway and sidewalk per Grantville CPIOZ SDR 5. It is intended for the Promenade be designed to meet the needs of all roadway users, including vulnerable populations such as young children and seniors. Pedestrian-oriented design elements may include crosswalks of a different paving material and

color than the street, bulb-outs at intersections to narrow crossing widths and provide traffic calming, crosswalks that have signals with countdown timers, and raised intersections flush with the level of the connecting public sidewalk to calm traffic and increase the likelihood that pedestrians cross at designated crossings.

MULTI-USE TRAIL

The Multi-Use Trail is shown as providing a continuous, 10-foot-wide trail for walking, jogging, and bicycling along the creek, per Grantville CPIOZ SDR 36. It is preferable for the Multi-Use Trail to be located within the Floodable Green Space or creek channel where feasible, to encourage interaction with the creek corridor and maximize the channel’s hydraulic capacity. In reach 4, where the creek is diverted into an underground culvert, it is recommended that the Multi-Use Trail be located within the recommended Recreational Corridor, to enhance the connection between reaches 3 and 4 and provide comfort for pedestrians and cyclists.

Through thoughtful design, the Multi-Use Trail system could promote Alvarado Creek as an attractive asset and natural resource. A continuous corridor along Alvarado Creek could be achieved in the Study Area for walking, bicycling, and jogging. The Multi-Use trail system could also connect to public and private sidewalks, access-ways, plazas, and parks on adjacent properties, further contributing to accessibility in the area. Further guidance to aid in the design of the Multi-Use Trail is provided in Appendix B (Design Palette).

PEDESTRIAN/BICYCLE BRIDGES

Potential locations for pedestrian/bicycle bridges are shown in Figure 3-9, per Grantville CPIOZ UD-10. These potential solutions have been selected to enhance connections to Grantville Station and other transit stops, strengthen connections to surrounding land uses, and to generally improve north-south connectivity in the Study Area. The crossing locations were also selected to minimize the bridge length to address costs; avoid higher quality, sensitive vegetation communities and wetlands; and limit interference with existing utilities and structures. It is recommended that these same factors be considered to the extent that alternate locations for pedestrian/bicycle bridges are selected.

Pedestrian/bicycle bridges should be designed to span the entire channel width so that abutments are located outside the proposed 100-year frequency storm inundation limits, if possible. If abutments must be located within the 100-year frequency storm inundation limits, hydraulic analysis that incorporates bridge features will be needed to accurately assess the effect on channel capacity (i.e., water surface elevation increase) from the bridge location. The bottom of the bridge (a.k.a. low chord) is recommended to be at least one foot above the 100-year frequency storm base flood elevation. Given their location near a flood control channel, the bridge and abutments should be designed with adequate foundation and structural strength to withstand forces from water and debris in the event that overtopping of the bridge occurs.

Additionally, pedestrian/bicycle bridges should be designed to include a minimum clearance height from the bottom of bridge to the channel finish grade of at least 20 feet in order to provide access

of all necessary maintenance equipment. If this is not possible, alternative access routes may be needed to allow all necessary maintenance equipment to access all portions of Alvarado Creek.

The width of bridges should be determined by anticipated use, but a minimum of 12-foot wide area for pedestrians and bicyclists is recommended. Other design features should follow the American Association of State Highway and Transportation Officials' (AASHTO) standards for bridge structures. For instance, 42- to 48-inch high safety rails with required spacing should be placed on both sides of the bridge.

THE SECONDARY TRAIL & ACCESS WAY NETWORK

The Secondary Trail and Access Way Network is included as an additional means of improving north-south and east-west pedestrian and bicycle connections between the Multi-Use Trail system, Grantville Station and other transit stops, existing roadways, and land uses within and outside of the Study Area. The conceptual alignment for this Network (Figure 3-9) was developed to improve access to Grantville Station and other transit stops to and from surrounding land uses, trails, and roadways; minimize impacts on residential and commercial development potential; and avoid impacting high quality, sensitive vegetation communities and wetlands. The alignment of these pathways would likely need to be reassessed as development is proposed. It is envisioned that as development occurs, a more robust network of vehicular and pedestrian and bicycle access ways would be constructed, in conformance with the Focused Plan Amendment to the Navajo Community Plan (SDR 4 & 5).

RECREATIONAL CORRIDOR

The Recreational Corridor is contemplated as extending connections through the Study Area and along the creek by providing green space and recreational opportunities over the existing and conceptual culvert system in Reach 4. It is envisioned that the Recreational Corridor will be a key element to the development of an open space spine along Alvarado Creek, which will enhance connectivity and recreational opportunities in, as well as become a defining feature for, the neighborhood.

The Recreational Corridor may include a variety of amenities and features to meet the needs of the diverse future residents of the area, including both passive and active recreational opportunities. It should be noted that while larger community parks located outside the Study Area are planned to meet the neighborhood's need for active playfields (e.g., Qualcomm Major Park and Recreation Center, as well as joint use facilities located at Grantville and Foster Elementary), there is still an opportunity to provide neighborhood-scaled and oriented recreational space close to where people would live. The Recreational Corridor may benefit from features such as a water feature, canopies, trees, planting, public art installations, sports courts, children's play facilities, plazas, and a dog park or gardens, where appropriate. It is recommended that landscaping include a mixture of drought-resistant plants and trees consistent with the surrounding habitat type, as well as native plants.



SIGNAGE IN THE NAVAJO COMMUNITY PLAN

The Navajo Community Plan provides the following supplemental development regulations relating to signage for projects within the Grantville CPIOZ:

- SDR 6. For all new projects, provide way-finding signage. The signage shall identify the pedestrian and bicycle routes to and from the Grantville Trolley Station and San Diego River. Signage shall be submitted for review. The placement of signs and other public facilities shall be done in a manner so as to provide a clear unobstructed pedestrian path and continuous parkway design. Submit the following signage for review:
 - a. Provide one vertical way-finding signage per 100 feet of street facing building façade. Examples of vertical way-finding signage include permanent banners, traditional sign posts, or plaques. Incorporate vertical way-finding signage into the building elevation as a plaque or install vertical way-finding signage in the pedestrian zone; OR
 - b. Provide one horizontal way-finding signage per 100 feet of street facing building façade. Examples of horizontal way-finding include specialized paving patterns or inset arrows. Incorporate the horizontal way-finding signage into the hardscape treatments along public street, private street, and private drive.

GREEN STREET AT MISSION GORGE PLACE

The Study includes the potential for green infrastructure elements on the north-south segment of Mission Gorge Place, which can help capture stormwater flow, increase groundwater recharge, provide shade, and create a comfortable and visually attractive connection from Alvarado Canyon Road to the creek corridor. Green infrastructure elements may include landscaped drainage swales, permeable paving, and tree box filters for on-site filtration.

WAYFINDING AND EDUCATIONAL SIGNAGE PROGRAM

Well-placed signage can help orient community members and enhance the pedestrian and cyclist experience by providing educational information regarding the value of Alvarado Creek and its surroundings as a resource. Signage in English and Spanish can serve local residents and the City’s diverse population. A design palette to aid in the design of signage is included in Appendix B.

A wayfinding signage program is included in order to enhance connectivity by providing community members clear and understandable information about where they are, what important landmarks and transit stops are nearby, how to reach them, and how long it will take to do so. Wayfinding signage should indicate the direction and relative distance of important landmarks such as Grantville Station and nearby connections and areas of interest. Wayfinding signs should be sized, designed and placed appropriately for all modes of travel. Signs should have a cohesive design and feel, and incorporate a hierarchy of sizes for ease of inter-

pretation. Signs may be supplemented by kiosks that include a map of how the trail system interacts with the larger Grantville community.

An educational signage program can engage pedestrians and cyclists, complement new open space opportunities, and provide interpretative and education information related to cultural, historic, and natural features in Grantville and the creek corridor. Educational signage includes small, informative signs that recognize the creek’s hydrology, discuss the nearby wildlife habitat, identify special natural features along the trail system, and/or highlight adjacent cultural, historical and paleontological resources. Educational signage could be integrated into overlooks along with amenities such as picnic tables, benches and/or seat walls, bicycle racks, shade trees, drinking fountains and water bottle filling stations, and elevated decks.

BIOLOGICAL RESOURCES

Alvarado Creek is a naturally-occurring stream channel that exists within an urban setting. While the creek historically existed as a meandering stream, development of the surrounding communities has substantially altered it, resulting in substantial channelization of much of its historic floodway. At present, the stream is mostly concrete, diverted into underground culverts, or dominated by exotic vegetation. Where vegetation occurs that provides value as a wetland, there is currently no buffer from the adjacent development. The Study outlines solutions that aim to protect remnant higher-quality sensitive and riparian vegetation communities and wetlands in Reach 2 by constructing a realigned channel to, in part, minimize impacts to these communities, as well as by creating a cluster of open spaces, with wetlands and protected habitats, surrounded by open space buffers.



The solutions for improving flooding conditions while also protecting and enhancing biological resources are guided by the following consideration:

- **Promote natural areas and buffers for wetland function and riparian habitat protection.** Explore ways to protect the remaining higher quality vegetation within the creek, specifically in Reach 2, and replace temporary losses to non-native and invasive vegetation with higher quality, native riparian and wetland vegetation in order to restore the habitat along the corridor.

The Study identifies potential solutions with respect to the biological resources as shown in Figure 3-11.

PROTECT AND ENHANCE SENSITIVE VEGETATION COMMUNITIES

The Study includes conceptual improvements that are intended to avoid Higher Quality Vegetation, as defined in Chapter 2 (Context), except to provide necessary flood control. Where potential impacts to these communities are unavoidable, they are intended to be restored on-site, if feasible, to achieve “no-net loss” of wetland functions and values.

Similarly, the Study includes conceptual improvements that are intended to avoid Lower Quality Vegetation, unless it is for the purposes of flood control or to replace non-native or invasive species with native, higher-quality riparian and/or wetland vegetation. Where impacts to Lower Quality Vegetation may not be avoided, restoration is planned “out-of-kind” to achieve a “no-net loss” of wetland function and values, to the extent applicable.

WETLAND BUFFERS

Wetland buffers of a sufficient size are recommended to be included around all wetlands, as appropriate to protect the functions and values of the wetlands and to provide an upland transition habitat zone, per San Diego’s Environmentally Sensitive Lands Regulations. North of the channel, a new Wetland Buffer is indicated around all wetlands, as there is currently no buffer between the existing vegetation and development. South of the channel, the buffer for wetland vegetation is contained wholly within the creek channel, and therefore not shown as an additional feature in Figure 3-11.

To protect the function and value of adjacent wetlands, it is generally recommended to avoid impervious cover, except for essential flood control, storm water outflow devices, erosion control, grade stabilization devices, utilities, and access roads. These areas can be planted with native species and upland habitat plant materials that can withstand occasional inundation; this vegetation may be landscaped with rock/boulder barriers, berms, walls, fencing, and similar features that reduce indirect impacts on the wetland are also encouraged. Unlike the Floodable Green Space, permanent structures are not appropriate, and lighting, where required, should be low intensity and directed away from the wetlands.

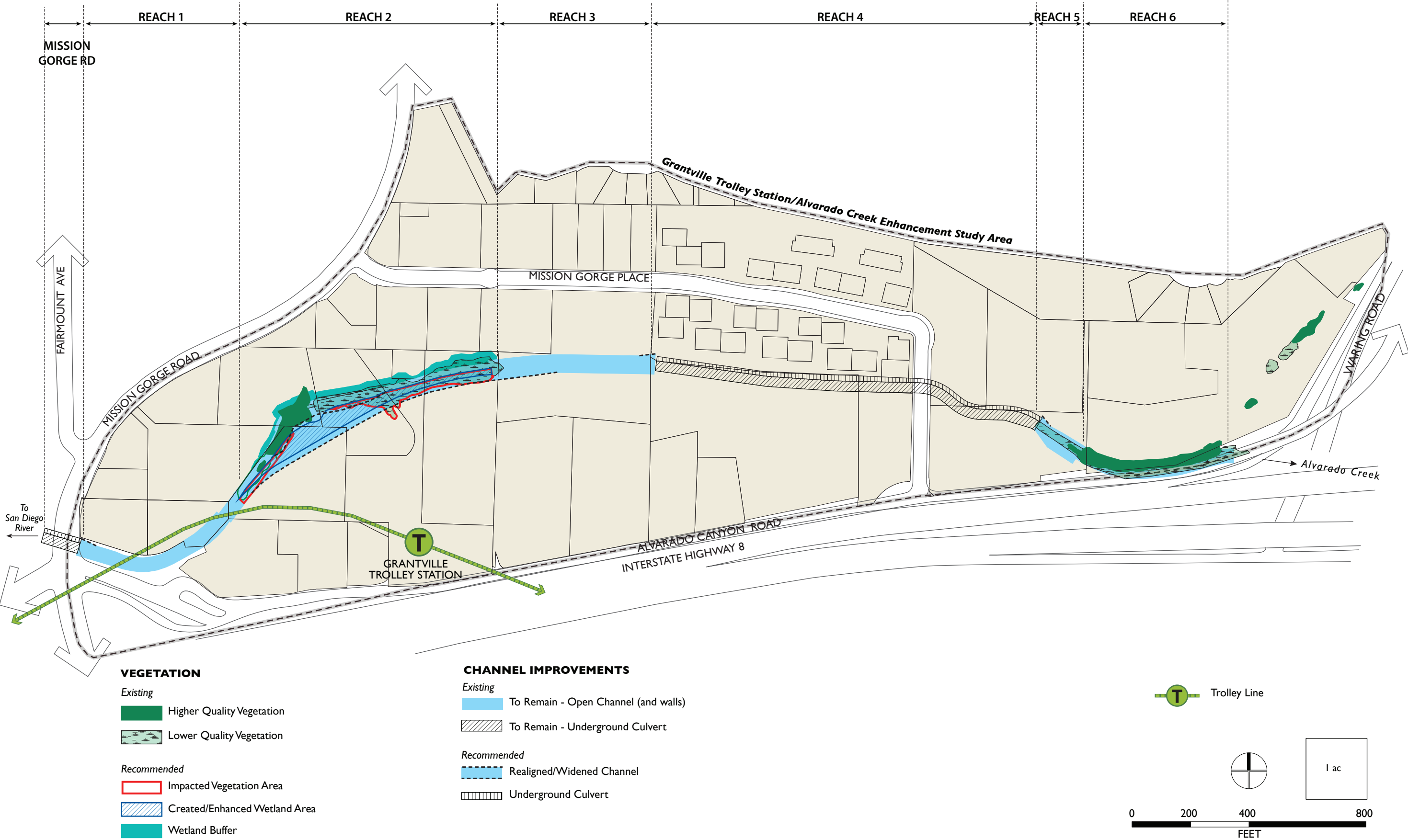
POTENTIAL IMPACTS ON BIOLOGICAL RESOURCES

For the purposes of this Study, the areas of sensitive vegetation that may be affected by the conceptual improvements in the creek corridor have been estimated. Approximately 0.02 acres of southern willow scrub, categorized as a Higher Quality Vegetation, and 0.55 acres of Lower Quality Vegetation could be potentially affected by grading and widening. The area of Lower Quality Vegetation, which is dominated by non-native or invasive vegetation, includes non-riparian (0.07 acres), arundo-dominated riparian (0.4 acres), and disturbed wetland (0.05 acres).

However, a new wetland creation area and buffers of approximately 0.8 acres could be created and enhanced and replanted with native species in the space between the existing and realigned channels, as well as within the natural portions of the channels. The Created/Enhanced Wetland Area, shown in Figure 3-11, provides such a space, on-site, to restore vegetation communities at a ratio of 2:1 for Higher Quality Vegetation and 1:1 for Lower Quality Vegetation.



FIGURE 3-11 BIOLOGICAL RESOURCES SOLUTIONS





4. IMPLEMENTATION

This chapter provides guidance and direction regarding phasing, funding and potential financing tools, and permitting.

4.1 PHASING

The Study outlines conceptual improvements that fall within four broad categories for implementation purposes, as described below. These improvements may be implemented concurrently.

- Channel improvements;
- Public realm improvements—such as the Multi-Use Trail system, pedestrian/bicycle bridges, and new open spaces—several of which are integrated with the flooding improvements;
- Promenade and Secondary Trail and Access Way Network; and
- Fill on individual properties to elevate the site levels above the 100-year frequency base flood elevation.

Additional information concerning the phasing of these categories of conceptual improvements is provided below.

CHANNEL IMPROVEMENTS

Because of their nature, channel improvements need to be undertaken in advance of, or in conjunction with proposed development. Because of permitting and construction efficiency, it may be preferable to undertake all improvements at one time. However, if the improvements are implemented as a series of independent projects, it may be more beneficial to begin downstream and move upstream. Otherwise, improvements implemented upstream may achieve limited reduction in the flooding conditions.

It should be noted that for FEMA to approve a revised map of the 100-year floodplain, all requisite channel improvements must be in place. It will be most efficient to seek FEMA approval at one time, once all improvements are in place, rather than on a piecemeal basis.

PUBLIC REALM IMPROVEMENTS

The Multi-Use Trail system, pedestrian/bicycle bridges, and new open space adjacent to the creek can designed and undertaken concurrent with adjacent channel improvements.

PROMENADE AND SECONDARY TRAIL AND ACCESS WAY SYSTEM

The Promenade, if implemented, would likely result from dedication at the time of development of individual properties.

A Secondary Trail and Access Way Network may be developed at the time individual properties are developed; extent and connectivity at any stage would depend upon the level of redevelopment completed at that stage.

DEVELOPMENT ON INDIVIDUAL PROPERTIES/ FILL

There are several properties within the Study Area that are not located within the current 100-year floodplain. Development on these sites can proceed without FEMA’s revision of the 100-year floodplain.

FEMA approval of a revised floodplain would provide immediate benefits to the properties within the Study Area, such as a lower base flood elevation. Thus, with respect to development on properties located within 100-year floodplain, it may be best to wait until channel improvements have been completed and FEMA has revised the mapping of the floodplain. It should be noted that the Study outlines several areas where fill may be needed in addition to the channel improvements.

Should any developer located within the 100-year floodplain wish to proceed with development prior to the revision of the floodplain and change of base flood elevation, they need to process improvements through FEMA. Developers may need to raise the elevation of their site above the current base flood elevation, which would be higher than after the channel has been improved, resulting in additional construction costs. Furthermore, finished grade elevations may be above those of adjacent properties, which could, in turn, require retaining walls or sloped areas that are undevelopable.

4.2 POTENTIAL FUNDING OPPORTUNITIES

COST OF CHANNEL IMPROVEMENTS

An opinion of probable cost for channel improvements—not including property acquisition and relocation costs—is provided in Appendix E. The improvements are expected to cost \$10,392,200.

The opinion of probable cost provides an order of magnitude estimate for recommended improvements within the channel grading limits (e.g., Multi-Use Trail, pedestrian/bicycle bridges, channel widening, culvert expansion, earthwork). It does not include any improvements in the fill area located north of the channel in reaches 1, 2, and 3, including grading, demolition, staging, or irrigation. It also does not include the cost of the conceptual Promenade or the Recreational Corridor.

The opinion of probable costs includes a percentage estimated Engineering fee, Construction bond fee, and contingency. Costs associated with obtaining environmental permitting, including vegetation monitoring, vary from project to project, and for the purposes of this study a lump sum cost of \$500,000 was assumed. The City of San Diego Development Services Department Unit Price List (City of San Diego, 2009) was used as the basis for unit costs. The unit costs in this reference were adjusted to 2017 dollars by assuming a 3% price annual increase over the 8-year period since the document was published.

RANGE OF FINANCING TOOLS AND PARTNERSHIP OPPORTUNITIES

Improvements on the properties themselves (such as grading, fill, stormwater remediation) would be undertaken by property owners as they redevelop their land. For the creek channel improvements, themselves, collective effort would be needed, and multiple financing tools and partnership opportunities may be sought out. Potential funding programs that may assist property owners in the implementation of the Revitalization Strategy are discussed below and in Table 4-1.

TAX CAPTURE DISTRICTS

Tax capture strategies involve special assessments on specific private properties that will be directly benefited by municipal improvements. By pledging a future stream of anticipated revenues, an issuing authority may float a bond to finance, in advance, the public improvements that will enable the stream of revenues to be realized.

In California, Community Facilities Districts often issue “Mello Roos” bonds to finance public-serving infrastructure. Properties that are benefited by the proposed infrastructure agree to assess a “special tax” on themselves to service and retire the Mello Roos debt. California requires two-thirds voter approval to pass a Mello-Roos tax, which sometimes presents a high bar to passage.

On January 1, 2015, Governor Jerry Brown signed into law SB 628, Enhanced Infrastructure Financing Districts (EIFDs) which allows for a separate government entity to be created by a city or county within a designated area to finance infrastructure projects with community-wide benefits. An EIFD may fund these facilities and development with the property tax increment of those taxing agencies (cities, counties, special districts, but not schools) that consent. EIFDs are also authorized to combine tax increment funding with other permitted funding sources. While no voter approval is required to form an EIFD, a 55 percent affirmative vote is required for the EIFDs issuance of bonds.

MAINTENANCE ASSESSMENT DISTRICT

In the City of San Diego, property owners may vote to assess themselves to pay and receive services above-and-beyond what the City normally provides, via Maintenance Assessment Districts (MAD). This above-and-beyond service level is called a “special benefit.” The purpose of a MAD is to finance special benefit services, including installation or maintenance of open space, street medians, rights-of-way, mini-parks, street lighting, security, flood control, and/or drainage. These special benefit services are provided at a level over and above the standard City general benefit level. MADs usually pay for maintenance services but can also pay for construction/installation in limited circumstances.

GRANTS

Several foundations, philanthropic organizations, and individuals have made material contributions to environmental and economic initiatives in San Diego and elsewhere in California and across the nation. Regional, State, and Federal grant opportunities may also be available for revitalization projects and potential strategies outlined in the Study.

PRIVATE LOANS

It may be possible to secure debt financing for improvements through conventional banking sources. A qualified borrower, adequate security, and an adequate means of repayment would typically be required.

TABLE 4-1: FINANCING TOOLS AND PARTNERSHIP OPPORTUNITIES			
Agency	Funding Program	Description	Timing
Federal			
U.S. Army Corps of Engineers	Continuing Authorities Program – Flood Damage Reduction Projects	Section 205 of the 1948 Flood Control Act authorizes the Corps of Engineers to study, design, and construct small flood control projects in partnership with non-Federal government agencies, such as cities, counties, special authorities, or units of state government. There are cost sharing requirements.	
US Department of Interior	Land and Water Conservation Fund Grants	The Land and Water Conservation Fund provides matching grants to States and local governments for the acquisition and development of public outdoor recreation areas and facilities.	
U.S. Fish and Wildlife Service	North American Wetlands Conservation Act (NAWCA)	The NAWCA program provides matching grants to wetlands conservation projects. There is a standard and small grants program.	Two grant cycles per year
State			
California Coastal Conservancy	Wetlands Program, through the Southern California Wetlands Recovery Project	The Wetlands Program provides funding for community-based restoration projects in coastal wetlands and watersheds in the Southern California region.	January of each year
California Coastal Conservancy	Proposition 1 Grants	Conservancy Proposition 1 grants fund multi-benefit ecosystem and watershed protection and restoration projects, including water sustainability improvements, wetland restoration and urban greening.	Three grant rounds per year
California Department of Parks and Recreation	Habitat Conservation Fund Program	The Program provides grant funding to cities, counties, and districts to provide for nature interpretation and other non-capital outlay programs which bring urban residents into park and wildlife areas, to protect fish, wildlife and native plant resources or to acquire or develop wildlife corridors and trails. There is a dollar-for-dollar match requirement.	October of each year, sunsets in 2019/2020 fiscal year
California Department of Parks and Recreation	Recreational Trails Program	The Recreational Trails Program provides funds annually for recreational trails and trails-related projects.	2018, at earliest
California State Water Resources Control Board	Storm Water Grant Program	Proposition 1. Water Code section 79747 identifies funds available for multi-benefit storm water management projects such as green infrastructure, rainwater and storm water capture projects and storm water treatment facilities. Storm Water Resource Plans, or functionally equivalent plan(s), are required to obtain grant funds for storm water and dry weather capture projects.	Spring 2018
California Wildlife Conservation Board		The Wildlife Conservation Board has a few potential funding programs, including the Land Acquisition Program and the California Riparian Habitat Conservation Program.	Varies
Regional Funds			
SANDAG	Smart Growth Incentive Program	The Program provides funding for transportation-related infrastructure improvements and planning efforts that support smart growth development.	Fall/winter 2017/2018
SANDAG	Active Transportation Grant Program	The goal of this Program is to encourage local jurisdictions to plan and build facilities that promote multiple travel choices for residents and connectivity to transit, schools, retail centers, parks, work, and other community gathering places. Funded projects include bike lanes and paths, sidewalk improvements, and bicycle parking.	Fall/winter 2017/2018

4.3 PROJECT PERMITTING

Development activity within the Alvarado Creek floodplain requires permits issued at many levels from federal, State, and local agencies.

The most beneficial approach to implementing the Revitalization Strategy is for properties along Alvarado Creek to proceed collectively. This will ensure that improvements on different properties will complement each other rather than potentially negatively impact conditions upstream or downstream.

The collective approach also provides a cost-effective strategy. It may be more feasible and efficient to obtain environmental permits if the improvements are organized as one collective project. A reduction in the design and construction costs is also anticipated, as permitting and processing costs for one project would be a fraction of the cost of permitting several projects. In addition, getting FEMA acceptance may be more streamlined, and the FEMA approval upon project completion will provide immediate benefits to the properties within the Study Area, such as lower base flood elevations. This could translate into reduced fill requirements on a parcel-by-parcel basis.

The Revitalization Strategy may proceed through a series of projects over several years' time. Depending on the approach, base flood elevations may remain unchanged, and environmental permitting may involve off-site mitigation.

A listing of permits that property owners may be required to secure is provided below, to allow for the early planning of the implementation effort.

U.S. ARMY CORPS OF ENGINEERS

Alvarado Creek is within a large mapped urban floodplain, and as a result, any alteration to it is subject to a Federal Permit under Section 404 of the Clean Water Act. The permit is under U.S. Army Corps of Engineers jurisdiction. This applies to any project that affects floodplains and wetlands or other related habitat. A variety of permits are available depending on the nature and size of the project. Smaller projects with less significant wetlands impacts could be permitted under a variety of Nationwide Permits, procedures for which vary, while larger projects would require an Individual Permit. When a permit is submitted to the U.S. Army Corps of Engineers, numerous government agencies, private individuals, and special interest groups will be informed of the proposed project, through the circulation of a Public Notice for review and comment.

CALIFORNIA DEPARTMENT OF FISH AND WILDLIFE

The California Department of Fish and Wildlife has authority over wetland resources associated with rivers, streams, and lakes. Through its Lake and Streambed Alteration Program, the Department requires notification before the initiation of any work that may do one or more of the following: substantially divert or obstruct the natural flow of any river, stream or lake; substantially change or use any material from the bed, channel or bank of any river, stream, or lake; or deposit debris, waste or other materials that could pass into any river,

stream or lake. A Lake or Streambed Alteration Agreement will be required when the Department determines that the activity may substantially adversely affect existing fish and wildlife resources.

CALIFORNIA WATER QUALITY CONTROL BOARD

Permits impacting drainage and water quality are also required to obtain a Section 401 Water Quality Certification. This permit is obtained through the California Water Quality Control Board. This certification also requires a copy of any agreement with the California Department of Fish and Game under Section 1600 Streambed Alteration Agreement of the California Endangered Species Act Consultation. Also required is a copy of the certified environmental compliance document for the project.

CEQA COMPLIANCE

Projects that require discretionary approval from a public agency, and that do not qualify for an exemption, will need to comply with the California Environmental Quality Act (CEQA).

CITY OF SAN DIEGO

The City of San Diego has its own local permitting requirements for Environmentally Sensitive Lands, which also apply. The Land Development Code provides further information.

This page intentionally left blank.