3.5 Geology, Soils, and Seismicity

This section provides an assessment of potential impacts related to geology, soils, and seismicity that could result from implementation of the proposed project, including from both the Complete Streets improvements and the Incentive District. Potential geologic, soil, and seismicity hazards addressed in this section include impacts associated with earthquake faults, ground-shaking, liquefaction, landslides, soil erosion, unstable geologic units, expansive soils, and soils adequately supporting wastewater disposal systems.

3.5.1 Environmental Setting

Topography

The proposed project extends approximately 3.5 miles from the northern terminus of Coast Highway at Harbor Drive to Eaton Street near the city's southern boundary. Generally, the project area is relatively flat and, given its proximity to the Pacific Ocean, has low elevations. While the topography of the project area varies from parcel to parcel, overall, the project area gradually slopes to the south and the west. The topography ranges from a high elevation of approximately 70 feet above mean sea level (amsl) in the northern portion of the project area, and slopes gradually to the south, to a low elevation of approximately 10 feet amsl near the Loma Alta Marsh in the central portion of the project area, before having a slight increase back to approximately 40 feet amsl in the southern portion of the project area. Slopes range from 0 to 9 percent in the project area (NRCS 2016).

Regional and Site Geology

San Diego County can be divided into three distinct geomorphic regions—the Coastal Plain, the Peninsular Ranges, and the Salton Trough (the desert). Each region is characterized by different climatic, topographic, biological, and geologic settings (San Diego County 2011a). The City of Oceanside is located within the Coastal Plain region, which is underlain by layers of marine and non-marine sedimentary rock units from the last 140 million years. The project area is underlain by late to middle Pleistocene-aged (approximately 80,000 to 200,000 years old) marine and continental deposits (ESA 2017).

Soils

Complete Streets Improvements

As shown in **Figure 3.5-1**, soils in the northern portion of the Complete Streets improvements consist of Marina loamy coarse sand, tidal flats, terrace escarpments, and Huerhuero loam (NRCS 2016). Marina loamy coarse soils are somewhat excessively drained with slow to rapid runoff permeability, and tidal flats are very poorly drained (USDA 2016). Huerhuero soils are part of the Antioch soil series, which is found on nearly level to strongly sloping alluvial fans and terraces. Antioch soils are moderately well to somewhat poorly drained, with slow to medium runoff and very slow permeability (USDA 1997).

The central portion of the Complete Streets improvements consists of Tujunga sandy loam, which makes up a majority of the project area. The Tujunga series consists of very deep, somewhat excessively drained soils formed in alluvium from granitic sources (USDA 2015). Tujunga soils are on alluvial fans and floodplains, including urban areas.

A small area of the southern portion of the Complete Streets improvements consists of Carlsbad-Urban land complex. Carlsbad-Urban land complex soils come from the parent material of Ferruginous sandstone, and are moderately well drained (NRCS 2016).

Incentive District

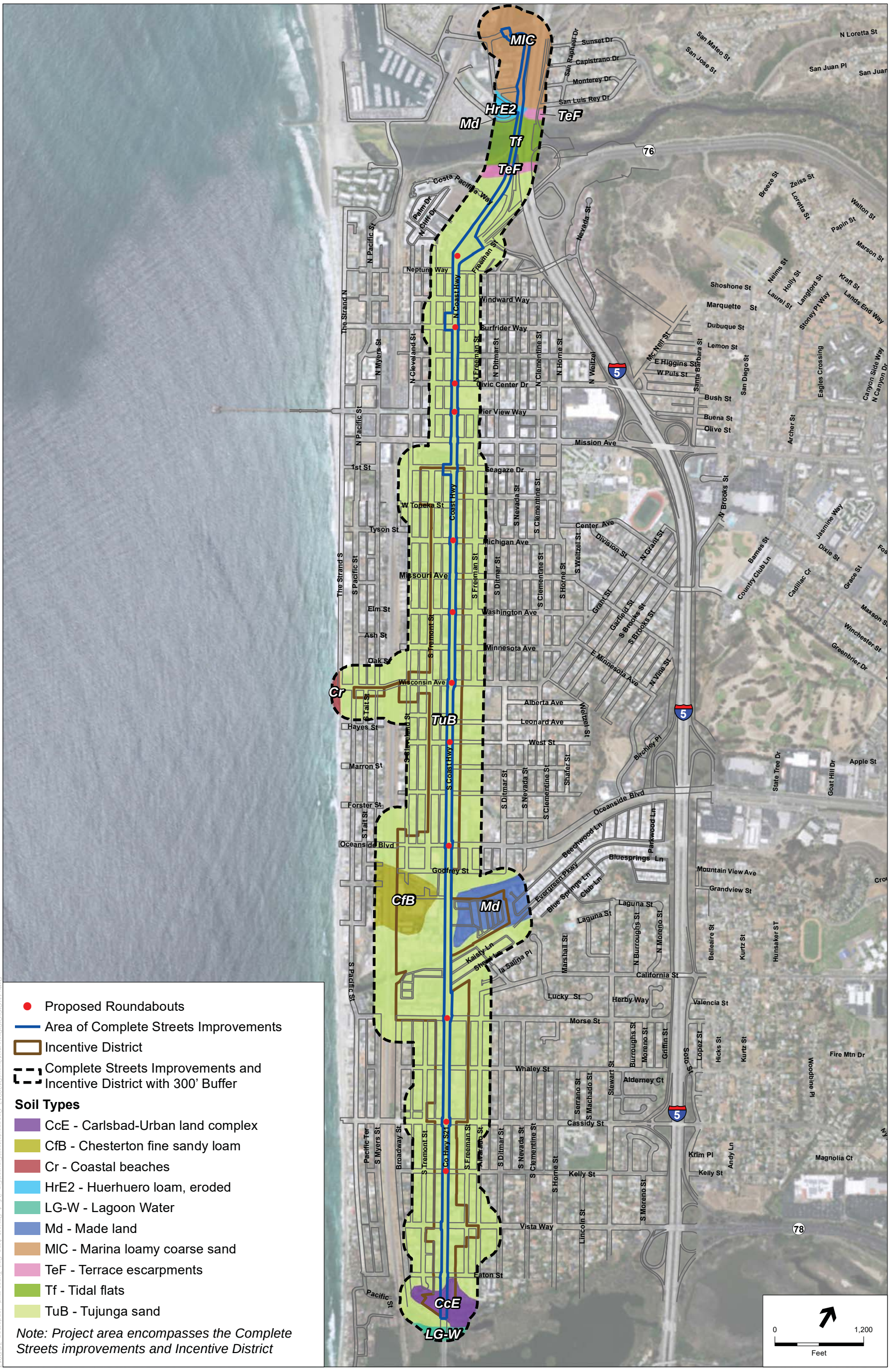
Most of the Incentive District is mapped as Tujunga sandy loam, but also includes Chesterton fine sandy loam, made land (fill), and Carlsbad-Urban land complex. As detailed above, Tujunga series consists of very deep, somewhat excessively drained soils formed in alluvium from granitic sources. Chesterton soils are moderately well-drained and are very slowly-permeable soils found on uplifted marine sediments and old terraces (USDA 1993). Made land are areas created by the man-made activities such as cut and fill operations, disposal of waste material, and other urban activities. Carlsbad-Urban land complex soils come from the parent material of Ferruginous sandstone, and are moderately well drained.

Faults and Seismicity

Regional Faults

San Diego County is a region of known seismic activity (as is almost all of Southern California). The eastern portion of the county contains several sizable active faults, as does the ocean floor just 5 miles offshore. All of San Diego County is located within Seismic Zone 4, which is the highest Seismic Zone and, like most of Southern California, is subject to ground shaking (see Section 1629.4.1 of the California Building Code [CBC]).

There are no known active or potentially active faults within the city of Oceanside or its sphere of influence (City of Oceanside 2002). The Rose Canyon fault is located approximately 5 miles offshore of the project area. In addition to the Rose Canyon fault, the four major active fault zones in proximity to the city includes the Elsinore fault zone, located approximately 25 miles from the coast; San Jacinto fault zone, located approximately 48 miles from the coast; the Agua Caliente fault zone, located 33 miles from the coast; and the San Andreas fault zone, located approximately 77 miles from the coast (City of Oceanside 2002).



- Proposed Roundabouts
- Area of Complete Streets Improvements
- Incentive District
- Complete Streets Improvements and Incentive District with 300' Buffer

Soil Types

- CcE - Carlsbad-Urban land complex
- CfB - Chesterton fine sandy loam
- Cr - Coastal beaches
- HrE2 - Huerhuero loam, eroded
- LG-W - Lagoon Water
- Md - Made land
- MIC - Marina loamy coarse sand
- TeF - Terrace escarpments
- Tf - Tidal flats
- TuB - Tujunga sand

Note: Project area encompasses the Complete Streets improvements and Incentive District

SOURCE: City of Oceanside 2016; SanGIS 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 3.5-1

Project Area Soil Types

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Seismically Induced Hazards

Landslides

Susceptibility of slopes to landslides and other forms of slope failure depends on several factors, including, but not limited to, steep slopes, conditions of rock and soil materials, presence of water, formational contacts, geologic shear zones, and seismic activity (City of Oceanside 2002). The project area varies in its topography, but is relatively flat with gradual sloping to the west and south. According to the City of Oceanside's General Plan, areas susceptible to landslides are located inland, starting approximately two miles from the coast. The project area is located in the vicinity of the coast, in an area designated as not susceptible to landslides (City of Oceanside 2002).

Liquefaction, Lateral Spreading, and Subsidence

Liquefaction is a condition that can occur in certain types of saturated soils due to shaking during an earthquake, where soils lose their cohesive strength, causing them to be unable to bear the weight of overlying soils and structures (City of Oceanside 2002). Lateral spreading is the movement of loose soils during an earthquake over low-angle slopes into open areas. Subsidence typically occurs in association with the extraction of groundwater in excess of recharge from a confined aquifer, resulting in compaction of soil pores once occupied by water. Local subsidence can also occur during an earthquake when water is driven out of saturated soils, causing the soils to become more compact (City of Oceanside 2002). Geologic units composed of sand and gravel are less prone to subsidence than clayey or organic soils because the granular structure is better able to support the overlying weight of soil.

As shown in **Figure 3.5-2**, there are several areas within the city of Oceanside, including within the project area, that contain soils subject to liquefaction, lateral spreading, and subsidence hazards. However, the United States Geological Service (USGS) has not recorded historical or current subsidence within the city of Oceanside or the surrounding cities (USGS 2016).

Erosion

Erosion is a normal and inevitable geologic process in which earth materials are loosened, worn away, decomposed, or dissolved, and are removed from one place and transported to another location. Precipitation, running water, waves, and wind can increase the process of erosion. The city of Oceanside is currently experiencing erosion-related problems, specifically related to soft rocks of the La Jolla Group and rapid weathering of granite rocks (City of Oceanside 2002).

Expansive Soils

Certain types of clay soils expand when they are saturated and shrink when dried. These are called expansive soils, and can pose a threat to the integrity of improvements that are built on them without proper engineering. Areas with potential to have expansive soils within the County occur predominately in the coastal plains, but can also be found in valleys and on slopes in the foothills and mountains (County of San Diego 2007). The expansion and contraction of the soil varies with the soil moisture content, and can be aggravated by the way a property is maintained or irrigated. The San Diego County Guidelines for Determining Significance, Geologic Hazards,

lists clay soils found in San Diego County. The list includes Huerhuero soils, which are found within a small area of the northern portion of the project area within the Complete Streets improvements (Figure 3.5-1). The majority of the soils within the project area are primarily sand based, with little expansion properties.

3.5.2 Regulatory Framework

Federal

Earthquake Hazards Reduction Act

The U.S. Congress passed the Earthquake Hazards Reduction Act in 1977, which created the National Earthquake Hazards Reduction Program (NEHRP). The purposed of the NEHRP is to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." The principle behind NEHRP is that earthquake-related losses can be reduced through improved design and construction methods and practices, land use controls and redevelopment, prediction techniques and early-warning systems, coordinated emergency preparedness plans, and public education and involvement programs. There are four federal agencies that can contribute to earthquake mitigation efforts; they have been designated as NEHRP agencies and are as follows: the Federal Emergency Management Agency (FEMA), the National Institute of Standards and Technology (NIST), the National Science Foundation (NSF), and the USGS.

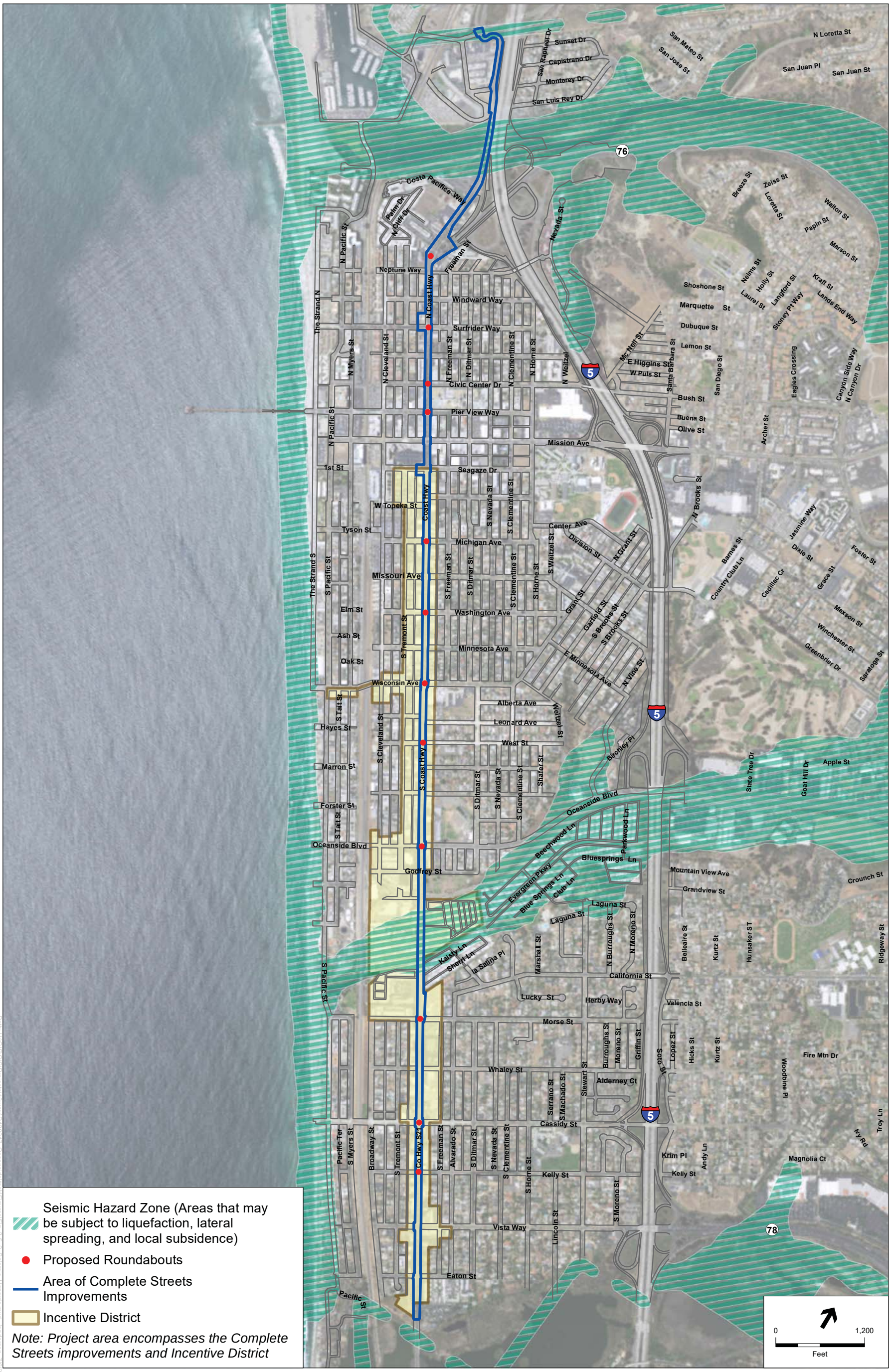
Federal Occupational Safety and Health Administration Regulations

The Occupational Safety and Health Administration's (OSHA's) Excavation and Trenching standard, Title 29 of the Code of Federal Regulations (CFR), Part 1926.650, covers requirements for excavation and trenching operations. OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area.

State

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to protect structures for human occupancy from the hazard of surface faulting. In accordance with the act, the State Geologist has established regulatory zones—called earthquake fault zones—around the surface traces of active faults, and has published maps showing these zones. Buildings for human occupancy may not be constructed across surface traces of faults that are determined to be active. As noted above in Section 3.5.1, there are no known active faults within the project area.



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SOURCE: City of Oceanside 2016

City of Oceanside Coast Highway Corridor Study. 130217

Figure 3.5-2
Seismic Hazards

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Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was passed in 1990 following the Loma Prieta earthquake to reduce threats to public health and safety and to minimize property damage caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones, and cities, counties, and other local permitting agencies to regulate certain development projects within these zones. For projects that would locate structures for human occupancy within designated Zones of Required Investigation, the Seismic Hazards Mapping Act requires project applicants to perform a site-specific geotechnical investigation to identify the potential site-specific seismic hazards and corrective measures, as appropriate, prior to receiving building permits. The *CGS Guidelines for Evaluating and Mitigating Seismic Hazards* (Special Publication 117A) provides guidance for evaluating and mitigating seismic hazards (CGS 2008b). The CGS is in the process of producing official maps based on USGS topographic quadrangles, as required by the act. To date, the CGS has not completed delineations for any of the USGS quadrangles in northern San Diego County, including the quadrangle that the proposed project is located in.

California Building Code

The CBC, which is codified in Title 24 of the California Code of Regulations, Part 2, was promulgated to safeguard the public health, safety, and general welfare by establishing minimum standards related to structural strength, egress facilities, and general building stability. The purpose of the CBC is to regulate and control the design, construction, quality of materials, use/occupancy, location, and maintenance of all building and structures within its jurisdiction. Title 24 is administered by the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under state law, all building standards must be centralized in Title 24 or they are not enforceable. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure or any appurtenances connected or attached to such buildings or structures throughout California.

The 2016 edition of the CBC is based on the 2015 International Building Code published by the International Code Council. The code is updated triennially, and the 2016 edition of the CBC was published by the California Building Standards Commission on July 1, 2016, and took effect starting January 1, 2017. The 2016 CBC contains California amendments based on the American Society of Civil Engineers Minimum Design Standard ASCE/SEI 7-16, *Minimum Design Loads for Buildings and Other Structures*, provides requirements for general structural design, and includes means for determining earthquake loads[1] as well as other loads (such as wind loads) for inclusion into building codes. Conformance to the current building code recommendations does not constitute any kind of guarantee that significant structural damage would not occur in the event of a maximum magnitude earthquake. However, it is reasonable to expect that a structure designed in accordance with the seismic requirements of the CBC should not collapse in a major earthquake.

[1] A load is the overall force to which a structure is subjected in supporting a weight or mass, or in resisting externally applied forces. Excess load or overloading may cause structural failure.

California Excavation Notification Requirements

California Code of Regulations Section 4216 requires that construction contractors report a project that involves excavation 48 hours prior to breaking ground. This program allows owners of buried installations to identify and mark the location of its facilities before any nearby excavation projects commence. Adherence to this law by contractors of projects reduces the potential of inadvertent pipeline and utility damage and leaks.

California Occupational Safety and Health Administration Regulations

Occupational safety standards exist in federal and state laws to minimize worker safety risks from both physical and chemical hazards in the work place. In California, the California Division of Occupational Safety and Health (Cal/OSHA) and the federal OSHA are the agencies responsible for ensuring worker safety in the workplace. The OSHA Excavation and Trenching standard (29 CFR 1926.650), described earlier in Section 4.2.2.1, Federal Regulations, covers requirements for excavation and trenching operations, which are among the most hazardous construction activities. Cal/OSHA is the implementing agency for both state and federal OSHA standards.

National Pollutant Discharge Elimination System Construction General Permit

Construction associated with the proposed project may disturb more than 1 acre of land surface and thus affect the quality of stormwater discharges into waters of the United States. Therefore, if ground disturbance is greater than 1 acre of land, the proposed project would be subject to the National Pollutant Discharge Elimination System (NPDES) Construction General Permit (Order 2009-0009-DWQ, NPDES No. CAS000002). The Construction General Permit regulates discharges of pollutants in stormwater associated with construction activity to waters of the United States from construction sites that disturb 1 or more acres of land surface, or that are part of a common plan of development or sale that disturbs more than 1 acre of land surface. The permit regulates stormwater discharges associated with construction or demolition activities, such as clearing and excavation; construction of buildings; and linear underground projects, including installation of water pipelines and other utility lines.

The Construction General Permit requires that construction sites be assigned a Risk Level of 1 (low), 2 (medium), or 3 (high), based both on the sediment transport risk at the site and the receiving waters' risk during periods of soil exposure (e.g., grading and site stabilization). The sediment risk level reflects the relative amount of sediment that could potentially be discharged to receiving water bodies and is based on the nature of the construction activities and the location of the site relative to receiving water bodies. The receiving waters' risk level reflects the risk to the receiving waters from the sediment discharge. Depending on the risk level, the construction projects could be subject to the following requirements:

- Effluent standards
- Good site management "housekeeping"
- Non-stormwater management
- Erosion and sediment controls
- Run-on and runoff controls
- Inspection, maintenance, and repair
- Monitoring and reporting requirements

The Construction General Permit requires the development and implementation of a Stormwater Pollution Prevention Plan (SWPPP) that includes specific best management practices (BMPs) designed to prevent sediment and pollutants from contacting stormwater from moving off-site into receiving waters. Routine inspection of all BMPs is required under the provisions of the Construction General Permit.

The SWPPP must be prepared before the construction begins. The SWPPP must contain a site map(s) that delineates the construction work area, existing and proposed buildings, parcel boundaries, roadways, stormwater collection and discharge points, general topography both before and after construction, and drainage patterns across the project area. The SWPPP must list BMPs and the placement of those BMPs that the applicant would use to protect stormwater runoff. Additionally, the SWPPP must contain a visual monitoring program; a chemical monitoring program for "non-visible" pollutants to be implemented if there is a failure of BMPs; and a sediment monitoring plan if the site discharges directly to a water body listed on the 303(d) list for sediment. Examples of typical construction BMPs include scheduling or limiting certain activities to dry periods, installing sediment barriers such as silt fence and fiber rolls, and maintaining equipment and vehicles used for construction. Non-stormwater management measures include installing specific discharge controls during certain activities, such as paving operations and vehicle and equipment washing and fueling. The Construction General Permit also sets post-construction standards (i.e., implementation of BMPs to reduce pollutants in stormwater discharges from the site following construction).

In the project area, if ground disturbance is greater than 1 acre of land, the Construction General Permit is implemented and enforced by the San Diego Regional Water Quality Control Board (RWQCB), which administers the stormwater permitting program. Dischargers are required to electronically submit a notice of intent (NOI) and permit registration documents (PRDs) in order to obtain coverage under this Construction General Permit. Dischargers are responsible for notifying the RWQCB of violations or incidents of noncompliance, as well as for submitting annual reports identifying deficiencies of the BMPs and how the deficiencies were corrected. The risk assessment and SWPPP must be prepared by a state-qualified SWPPP Developer and implementation of the SWPPP must be overseen by a state-qualified SWPPP Practitioner. A Legally Responsible Person, who is legally authorized to sign and certify PRDs, is responsible for obtaining coverage under the permit.

Local

City of Oceanside Standard Urban Stormwater Mitigation Plan

The City has prepared a Standard Urban Stormwater Mitigation Plan (SUSMP) that details measures that must be implemented on-site to protect stormwater quality from on-site conditions, including erosion. The SUSMP includes requirements for all development projects that include the implementation of appropriate source control BMPs, temporary construction BMPs, and permanent stabilization/erosion-control BMPs. The SUSMP includes a low-impact development (LID) design guide for projects that includes incorporation of design features on-site that would control runoff (City of Oceanside 2010).

City of Oceanside General Plan

The City of Oceanside's General Plan Public Safety Element identifies and addresses features or characteristics existing in or near the city that represent a potential hazard to the community's citizens, sites and structures, public facilities, and infrastructure. The following goals and policies from the Public Safety Element are relevant to the proposed project:

Goal: Take the action necessary to ensure an acceptable level of public safety for prevention and reduction of loss of life and personal property of the citizens of Oceanside.

Seismic and Geologic Hazards

1. Consider seismic and geologic hazards when making land use decisions particularly in regard to critical structures.

2. Minimize the risk of occupancy of all structures from seismic and geologic occurrences.

3. Provide to the public all available information about existing seismic and geologic conditions.

City of Oceanside Grading Ordinance

The City Grading Ordinance established a set of standards regulating the design and construction of building sites and the development of property by grading; to regulate the alteration of the ground surface; to minimize differential settlement and the slipping or sliding of the earth; and to require engineering analysis of expansive soil conditions, erosion control, and drainage. This ordinance involves grading permit provisions (City of Oceanside 1982). All projects requiring grading must submit a grading and erosion-control plan to the City Engineering Division for review. This plan encompasses multiple components, including but not limited to an erosion-control plan, a drainage study, soils report, and site plan (City of Oceanside 2016).

3.5.3 Impacts and Mitigation Measures

Significance Criteria

Based on Appendix G of the CEQA Guidelines, the project would result in a significant impact on geology and soils if it would:

1. Expose people or structures to potential substantial adverse effects, including risk of loss, injury, or death involving:
    i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.
    ii. Strong seismic ground-shaking.
    iii. Seismic-related ground failure, including liquefaction.
    iv. Landslides.
2. Result in substantial soil erosion or the loss of topsoil.

3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in onsite or offsite landslides, lateral spreading, subsidence, liquefaction, or collapse.
4. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994) [2], creating substantial risks to life or property.
5. Have soils incapable of adequately supporting septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Impact Analysis

Issue 1: Would the proposed project expose people or structures to potential substantial adverse effects, including the risk of loss, injury or death involving rupture of a known earthquake fault; strong seismic ground shaking; or seismic-related ground failure, including liquefaction or landslides?

Faulting and Ground Shaking

No active faults are located within the city of Oceanside, including the project area. The closest earthquake fault zone to the project area is the Rose Canyon fault, located approximately 5 miles offshore. As the project area is not located on an active fault zone, surface rupture is not anticipated. However, a seismic event could cause strong ground shaking within the project area. Any development occurring within the project area would be required to be constructed in accordance with the CBC and the City's Municipal Code. The CBC requires structural design that can accommodate ground accelerations expected from known active faults. While the project area is located in a seismically active region, and some risk related to seismic ground shaking would remain, compliance with the applicable regulatory CBC standards would lower this risk to less than significant.

Seismic-Related Ground Failure

Complete Streets Improvements

As shown in Figure 3.5-2, a portion of the Complete Streets improvements would be located on soils that are subject to liquefaction hazards. The majority of the Complete Streets improvements would occur on the existing paved road surface itself and would not disturb soils. However, the construction of roundabouts, curb adjustments, and raised medians would require ground disturbance and excavation. In compliance with the CBC, the City would prepare design-level geotechnical evaluations prior to final design and construction of the Complete Streets improvements. Implementing the regulatory requirements in the CBC and local codes regulating construction and the application of proven design criteria that are standard engineering practice would ensure that the improvements are designed to withstand seismic events without sustaining substantial damage. Therefore, impacts related to liquefaction in the Complete Streets improvements area are considered less than significant.

[2] The CBC, based on the International Building Code and the now defunct Uniform Building Code, no longer includes a Table 18-1-B. Instead, Section 1803.5.3 of the CBC describes the criteria for analyzing expansive soils.

Incentive District

Implementation of the Incentive District would encourage redevelopment, including the potential construction of commercial, mixed-use, and residential uses in an area that is currently developed with urban uses. As shown in Figure 3.5-2, the Incentive District is located on underlying soils that could be subject to seismic-related ground failure from liquefaction hazards, increasing the risk of placing development projects on unstable and liquefiable soils. However, through compliance with the CBC, all potential projects within the Incentive District would be required to undergo appropriate design-level geotechnical evaluations prior to final design and construction. Implementing the regulatory requirements of the CBC, adherence to the current CBC and local codes regulating construction, and the application of proven design criteria that are standard engineering practice would ensure that structures are designed to withstand seismic events without sustaining substantial damage or collapsing. Therefore, impacts from seismic-related ground failure from liquefaction in the Incentive District are considered less than significant.

Landslides

The project area varies in its topography, but is relatively flat with gradual sloping to the west and south. Areas within the city susceptible to landslides are located inland, starting approximately 2 miles from the coast (City of Oceanside 2002). The project area is located near the coast in an area where susceptibility to landslides is very low. Therefore, the project area would not likely be subject to landslides or other slope failure. As a result, potential hazards related to landslides would be less than significant.

Mitigation Measures: No mitigation measures are required.

Significance Determination: Less than significant

Issue 2: Would the proposed project result in substantial soil erosion or the loss of topsoil?

Complete Streets Improvements

The majority of the Complete Streets improvements would occur on the existing paved road surface itself and would not disturb soils. However, the construction of roundabouts, curb adjustments, and raised medians would require ground disturbance and excavation, thereby exposing soils and potentially resulting in soil erosion or topsoil loss. Landscape enhancements to sidewalks and medians could also disturb existing soils. Construction of the Complete Streets improvements would occur in phases, and may or may not affect 1 acre or greater of ground surface at a time. If 1 acre or greater is disturbed at a time, the project would be required to comply with the Construction General Permit. This entails preparation and implementation of a site-specific SWPPP that includes erosion- and sediment-control BMPs designed to prevent erosion from occurring on-site and to retain any eroded soils within site boundaries to be redeposited on-site following construction. Areas of ground disturbance that are less than 1 acre would also be required to reduce erosion and sedimentation through compliance with City requirements. The City Grading Ordinance requires submittal of a grading and erosion-control

plan to the City for review prior to issuance of a grading permit, which would ensure erosion-control measures proposed on-site are appropriate for stabilizing soils during construction. Although the Complete Streets improvements constitute a project type that is exempt from City SUSMP treatment requirements, the SUSMP requires all development projects to implement temporary sediment-control BMPs. Erosion and topsoil loss impacts would be less than significant during construction of the Complete Streets improvements.

Following completion of the Complete Streets improvements, the majority of the project area would continue to be paved and developed, and would not contain large areas of exposed soil. Areas of landscaping would contain permeable soils, stabilized by vegetation, resulting in less runoff. Per City SUSMP requirements, all development projects must implement permanent stabilization and erosion-control BMPs to prevent erosion and topsoil loss from occurring during development operation. Therefore, impacts related to erosion and top soil loss during operation of the Complete Streets improvements would be less than significant.

Incentive District

The Incentive District would encourage redevelopment, including increased residential, commercial, and mixed-use development in an area that is entirely developed with urban uses. Although the majority of the Incentive District is developed, ground disturbance activities (e.g., excavation and grading) associated with demolition of existing development and construction of new development has the potential to result in erosion and topsoil loss within the Incentive District. Areas of ground disturbance 1 acre or greater in size would be required to comply with the Construction General Permit, which involves implementation of erosion- and sediment-control BMPs as detailed in the SWPPP prepared for the ground-disturbing activity. These BMPs would help prevent erosion from occurring on-site and retain any eroded soils within site boundaries. Further, any development requiring grading (including those less than 1 acre in size) would be required to comply with the City of Oceanside Grading Ordinance, which includes submittal of a grading and erosion-control plan to the City for review to ensure that erosion and topsoil loss would be minimized during grading activities. All development types, regardless of ground disturbance size, would be required to implement temporary sediment-control BMPs per City SUSMP requirements. Impacts to erosion and topsoil would be less than significant during construction of future development enabled by the Incentive District.

Redevelopment within the Incentive District could encourage new open space, as project applicants would be able to receive a residential density bonus by providing public open space. New open space areas are expected to be landscaped, and vegetation would secure soils in place, which would result in less runoff due to permeable soils. All future projects would be required to incorporate various LID features into their design per City SUSMP requirements; these LID features are intended to control site runoff and in doing so prevent a concentration or increase in flows that could cause erosion and topsoil loss. For these reasons, impacts related to erosion and topsoil loss during operation of development enabled by the Incentive District would be less than significant.

Mitigation Measures: No mitigation measures are required.

Significance Determination: Less than significant

Issue 3: Would the proposed project be located on a geologic unit or soil that is unstable or that would become unstable as a result of the proposed project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?

Complete Streets Improvements

The Complete Streets improvements would include ground-disturbing activities to construct roundabouts, curb adjustments, and raise medians in an area that is entirely developed with right-of-way uses. The majority of the project area has not been identified as containing unstable geologic units or soils. As discussed under Issue 1, because of the flat nature of the landscape, the project area and the surrounding off-site area would not likely be subject to landslides. The USGS has not recorded historical or current subsidence within the city of Oceanside or the surrounding cities (USGS 2016). However, according to mapping by the City of Oceanside, a portion of the Complete Streets improvements would be located on unstable soils subject to liquefaction, lateral spreading, and subsidence hazards (Figure 3.5-2). The northern portion of the Complete Streets improvements overlapping this seismic hazard zone would take place on a bridge crossing over the San Luis Ray River, and thus improvements would not be located directly on soils subject to hazards. In addition, a small portion of the Complete Streets improvements overlapping the southern seismic hazard zone would also take place on a bridge crossing the Loma Alta Slough, and thus improvements would not be located directly on soils subject to hazards. Nevertheless, as discussed within Issue 1, the City would be required to prepare design-level geotechnical evaluations prior to final design and construction to ensure a reduction of hazards associated with unstable soils. Adherence to the current CBC and local codes regulating construction would ensure that improvements are designed to withstand unstable soil. Therefore, impacts related to unstable soils within the Complete Streets improvements area are considered less than significant.

Incentive District

Implementation of the Incentive District would encourage redevelopment, including the potential construction of commercial, mixed-use, and residential uses in an area that is entirely developed with urban uses. As discussed under Issue 1, the project area and the surrounding off-site area would not likely be subject to landslides due to the flat nature of the area. As shown in Figure 3.5-2, a portion of the Incentive District would be located on unstable soils subject to liquefaction, lateral spreading, and subsidence hazards. However, future project applicants and private developers submitting projects under the Incentive District would be required to prepare design-level geotechnical evaluations prior to final design and construction. While the Incentive District could encourage development on unstable soil, completion of a comprehensive design-level geotechnical investigation and adherence to the current CBC and local codes regulating construction would ensure that structures are designed to withstand unstable soil without sustaining substantial damage

or collapsing. Therefore, impacts related to unstable soils in the Incentive District are considered less than significant.

Mitigation Measures: No mitigation measures are required.

Significance Determination: Less than significant

Issue 4: Would the proposed project be located on an expansive soil, creating substantial risks to life or property?

Complete Streets Improvements

The majority of the Complete Streets improvements would occur on the existing paved road surface itself and would not disturb soils. However, the construction of roundabouts, curb adjustments, and raised medians would require ground disturbance and excavation. Soils along the Complete Streets improvements have been mapped as Tujunga sandy loam, Marina loamy coarse sand, Huerhuero loam, tidal flats, terrace escarpments, and Carlsbad-Urban land complex (see Figure 3.5-1). According to the County of San Diego, Huerhuro soils have potential expansive properties (San Diego County 2007). Huerhuro soils are located on a small northern portion of the Complete Streets improvements. However, this portion of soil would not have any ground-disturbing activities. As explained in Chapter 2, Project Description, this segment would be reduced from a total of four lanes to one lane in each direction, and would include Class II striped bicycle lanes and angled parking. These improvements would occur on the existing paved road surface itself. Nevertheless, as discussed under Issue 1 and Issue 3, the City would be required to prepare a design-level geotechnical investigation prior to final design and construction in areas where ground disturbance would occur. Adherence to the current CBC and local codes regulating construction would ensure that expansive soils would be treated or removed prior to construction. Therefore, impacts related to expansive soils within the Complete Streets improvements area would be less than significant.

Incentive District

As shown on Figure 3.5-1, the Incentive District is mapped as Tujunga sand, Chesterton fine sandy loam, made land (fill), and Carlsbad-Urban land complex. None of the soils within the Incentive District include expansive properties and the entire project area subject to the Incentive District is currently developed with urban uses. As such, it is not anticipated for any future project within the Incentive District to be situated on expansive soils such that substantial risks to life or property occur. In addition, adherence to the current CBC and local codes regulating construction would ensure that expansive soils are treated or removed prior to the construction of structures. Therefore, impacts related to expansive soils within the Incentive District are considered less than significant.

Mitigation Measures: No mitigation measures are required.

Significance Determination: Less than significant

Issue 5: Would the proposed project have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water?

Complete Streets Improvements

Sewage generated in the city is currently collected by the municipal sewage system and treated at two wastewater treatment plants (see Section 3.15, Utilities and Service Systems, for more details on wastewater treatment). The Complete Streets improvements do not include the installation of septic systems in the project area and would not affect the city's existing sewer system facilities. Therefore, the Complete Streets improvements would result in no impact regarding soils incapable of adequately supporting septic tanks or alternative waste disposal systems.

Incentive District

The Incentive District would encourage redevelopment, which could increase residential, commercial, and mixed-use development. As described in Section 3.15, Utilities and Service Systems, development would be served by the existing sewage system, and would not include the installation of septic systems or alternative waste water disposal systems. Therefore, the Incentive District would have no impact regarding soils incapable of adequately supporting septic tanks or alternative waste disposal systems.

Mitigation Measures: No mitigation measures are required.

Significance Determination: No impact