



7. ENVIRONMENTAL CONSIDERATIONS

7.1 Geology and Soils

This section provides an updated summary of the Geology and Soils in the Santa Rosa Downtown Station Area Specific Plan. Included in this section is a description of the existing conditions and the opportunities and constraints to development posed by the existing Geology and Soils conditions. Conditions such as weak, erodible, or expansive soils can be mitigated by using suitable grading, engineering, soil modification, drainage controls and other measures while some geological hazards such as seismic shaking, soil liquefaction and others may only be mitigated to an acceptable standard or level of risk.

Geology and soils in the City of Santa Rosa and surrounding Sonoma County are mainly a consequence of the long history of active tectonics near the margin between the Pacific and North American Tectonic Plates, patterns of climate change, and changing land use and vegetation patterns. Typical geologic and soils related constraints on development within the City of Santa Rosa are strong seismic shaking; slope instability that may cause landslides, mudflows, debris flows and other types of slope failure; and basic soil instability, including settlement, shrinking and swelling of soil, and fissuring or cracking of the ground. Secondary seismic effects such as soil liquefaction, seismic induced landsliding, lurch cracking and fissuring and damage to existing structures can also be a constraint to development. These constraints are interrelated and may be exacerbated by periodic heavy rains causing soil erosion, saturation of the ground, flooding and landsliding. Rainfall and runoff can also result in the formation of sinkholes and failure of drainage structures, roads, and utilities resulting in soil erosion, slope or stream bank destabilization and landslides as secondary affects.

Regulatory Setting

City of Santa Rosa Local Hazard Mitigation Plan

On October 30, 2000, the President of the United States signed into law the Disaster Mitigation Act (DMA) of 2000 (Public Law 106-390). A hazard mitigation plan is a formal document that outlays the plans to reduce or eliminate the long-term risk to human life and property from natural or man-made hazards. The City of Santa Rosa Local Hazard Mitigation Plan (LHMP) was prepared in 2016 and adopted by the City. The plan has been designed to identify the areas where people or structures may have higher vulnerability to earthquakes, flood, wildland fires, and other natural hazards. The plan identifies policies and actions that may be implemented by the City to reduce the potential for loss of life and property damage in these areas based on an analysis of the frequency of earthquakes, floods, wildland fires and landslides in terms of frequency, intensity, location, history, and damage effects. The plan has been designed to meet the following goals:

1. Implement the Local Hazard Mitigation Plan to better prepare Santa Rosa for disaster and minimize impacts associated with natural and man-made hazards;
2. Provide for the safety of Santa Rosa community members by maintaining efficient, well-trained, and adequately equipped City personnel;
3. Preserve and enhance the City's water infrastructure by maintaining and enhancing an operational drainage system, preserving drainage capacity, and protecting water quality;
4. Maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating the capacity for economic recovery from those disasters;

5. Reduce the vulnerability of public and private buildings to the effects of earthquakes, flooding, wildfire, and landslides.

City of Santa Rosa General Plan (2035), Noise and Safety Element

The intent of the Noise and Safety Element is to identify and evaluate natural and man-made hazards affecting Santa Rosa including noise generation, geology and seismicity, flooding, hazardous materials, and wildland fires. The Noise and Safety Element identifies goals and policies related to Geology and Soils including preparing for disasters including adopting the Local Hazard Mitigation Plan and prohibiting development in high-risk geologic and seismic hazard areas to avoid exposure to seismic and geologic hazards. Policies include requiring studies prior to development approval to identify active earthquake fault trace locations in accordance with the Alquist-Priolo Earthquake Fault Zoning Act, requiring comprehensive geotechnical investigations prior to development approval (where applicable), restrict development from areas where people might be adversely affected by known natural or manmade geologic hazards, and restrict development of critical facilities in areas determined as high-risk geologic hazard zones. Other policies include identification and evaluation of existing structural hazards related to unreinforced masonry, poor or outdated construction techniques, and lack of seismic retrofit. Also, to require appropriate and feasible seismic retrofit of commercial, industrial and public buildings, and inspection for structural integrity of water storage facilities, water pipelines, electric transmission lines, roadways, water detention facilities, levees, and other utilities after a major seismic event. A policy for mandatory minimum erosion control measures for existing properties and those under construction are also recommended.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed by the California Legislature in 1972 to mitigate the hazard of surface faulting to structures. The act's main purpose is to prevent the construction of buildings used for human occupancy on the surface trace of active faults.

The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards. Local agencies must regulate most development in fault zones established by the State Geologist. Before a project can be permitted in a designated Alquist-Priolo Earthquake Fault Zone, the city or county with jurisdiction must require a geologic investigation to demonstrate that proposed buildings would not be constructed across active faults.

California Seismic Hazards Mapping Act

The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code Sections 2690-2699.6) addresses seismic hazards other than surface rupture, such as liquefaction and seismically induced landslides. The Seismic Hazards Mapping Act specifies that the lead agency for a project may withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into project plans to reduce hazards associated with seismicity and unstable soils. No official Seismic Hazards Map has been completed for the Santa Rosa Quadrangle.

California Building Standards Code

Title 24 of the California Code of Regulations, also known as the California Building Standards Code, sets minimum requirements for building design and construction. The 2016 version of the California Building Standards Code was adopted on January 1, 2017. The California Building Standards Code is a compilation of three types of building standards from three different origins:

- Building standards that have been adopted by state agencies without change from building standards contained in national model codes;

- Building standards that have been adopted and adapted from the national model code standards to meet California conditions; and
- Building standards, authorized by the California legislature, that constitute extensive additions not covered by the model codes that have been adopted to address particular California concerns.

In the context of earthquake hazards, the California Building Standards Code's design standards have a primary objective of assuring public safety and a secondary goal of minimizing property damage and maintaining function during and following seismic event. The 2016 version of the California Building Standards Code continues major revisions incorporated into the 2013 code. The 2016 code assigns a seismic design category (SDC) to each structure. The SDC is assigned as a means of capturing both the seismic hazard, in terms of mapped acceleration parameters (spectral values), site class (defining the soil profile), and the occupancy category (based on its importance or hazardous material contents). The SDC affects design and detailing requirements as well as the structural system that may be used and total height of structures.

State Minerals Classification System

As required by the California Surface Mining and Reclamation Act, which was enacted in 1975 by the State Legislature (Pub. Resources Code, section 2710 et seq.), the California Department of Conservation, Division of Mines and Geology (CDMG) has established a classification system to denote both the location and significance of key extractive resources.

Environmental Setting

Regional Seismicity

The Specific Plan area lies in the tectonically active Coast Ranges Geomorphic Province of Northern California, on the plain of Santa Rosa Creek. Northwest to southeast oriented ridges and valleys are common in the area and are generally parallel to sub-parallel to the structural trend controlled by faults of the San Andreas Fault System. The San Andreas Fault System represents the boundary between the North American and Pacific Tectonic Plates. Active deformation is expressed along this boundary margin by active seismicity which includes earthquakes and fault displacement on the active faults of the region.

Within Sonoma County, faults are characterized by both strike-slip or horizontal displacement, and dip-slip or vertical displacement. Most active faults strike northwest to southeast, and may include many fault strands in a broad zone, or a single actively creeping identifiable fault. Horizontal and vertical movement is distributed on the various fault traces within a fault zone. Over long periods of time the fault traces accommodating movement and active deformation within a fault zone may change, with some traces becoming inactive while other traces are developing. However, over the short period of human history the activity of certain fault traces may be constrained by ascertaining the date of historic and prehistoric ruptures to predict the probability of future earthquakes.

Major active faults that are located within 50 miles of the Specific Plan area include the Healdsburg-Rodgers Creek, San Andreas, Maacama, and Hayward Faults. Each of these faults is capable of producing a large earthquake that would result in strong seismic shaking of the site. An earthquake on the Healdsburg-Rodgers Creek fault could result in violent to very violent ground shaking. The nearest active earthquake fault zone to the Specific Plan area is the Healdsburg-Rodgers Creek fault, which passes approximately 1.4 miles east of the Santa Rosa Downtown Sonoma-Marin Area Rail Transit (SMART) station site and 3,500 feet

east of the eastern edge of the Specific Plan area. As shown in Figure 7.1, this fault is zoned under the Alquist-Priolo Earthquake Fault Zoning Act of 1972 as an active earthquake fault zone. Active earthquake fault zones are those faults which are considered by the California Geological Survey to have had fault movement within the last 11,000 years (Holocene time). Other nearby Alquist-Priolo active earthquake fault zones include the Maacama fault (10 miles north), San Andreas fault (17 miles southwest), West Napa fault (24 miles southeast), Green Valley fault (28 miles east) and Hayward fault (32 miles southeast).

Major seismic events in the region that have resulted in moderate to strong ground shaking of the site include the 1868 Hayward earthquake of estimated magnitude 7.0, the great 1906 San Francisco earthquake of approximate magnitude 7.9, and the 1989 Loma Prieta Earthquake of magnitude 6.9. On October 2, 1969, two earthquakes of Richter magnitude 5.6 and 5.7 struck in the vicinity of Santa Rosa along the Healdsburg fault segment of the Rodgers Creek-Healdsburg fault zone. One fatality occurred due to the earthquake as well as 8.35 million dollars in damages. An earthquake of magnitude 5.2 on the nearby West Napa fault on September 3, 2000, near the town of Yountville, reportedly caused between 15 and 70 million dollars in losses, mostly in Napa, while little or no damage was reported in Santa Rosa. Another seismic event to affect the area was the South Napa earthquake of August 24, 2014, resulting in one fatality and over 200 injuries. Property damage from this earthquake is estimated at 350 million dollars to over one billion dollars. This magnitude 6.0 earthquake occurred along the southern portion of the West Napa fault and exposed fault segments which had not been previously recognized.

The United States Geological Survey Working Group on California Earthquake Probabilities study completed in 2014 estimates there is a 72-percent probability between 2014 and 2044 that a M6.7 or greater magnitude earthquake will occur in the San Francisco Bay region. The combined Hayward-Rodgers Creek fault is considered to have an elevated probability of an earthquake during the study period of 2014 to 2044.

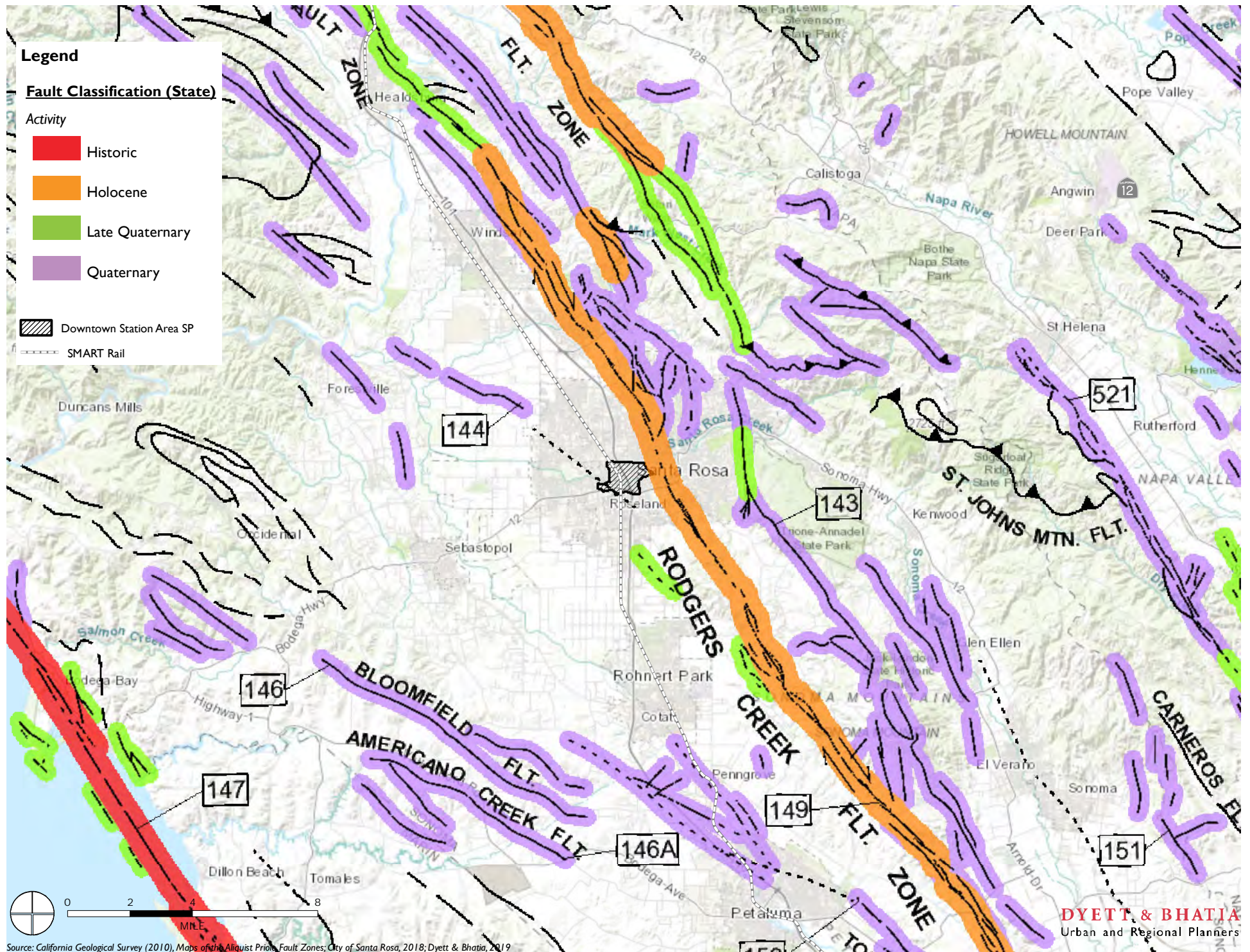
Geology

The Geologic Map of the Santa Rosa 7.5' quadrangle, Sonoma County, California, (USGS OF 2008-1009, 2008, Map 1 of 3) shows the Downtown Station site and Specific Plan area is underlain by alluvial fan and fluvial terrace deposits of Holocene age (deposited in the last 11,000 years) on the alluvial plain of Santa Rosa Creek (Figure 7.2). The Geologic Map describes the materials as “gravel, sand and silt, derived primarily from Pleistocene and older sedimentary and igneous units, including older Tertiary to Pleistocene non-marine gravel, late Tertiary volcanic rocks, Mesozoic bedrock of the Franciscan Complex, Coast Range ophiolite and Great Valley sequence.” The Quaternary Geology Map of the area (USGS Open file report 2006-1037, 2006) confirms this description and indicates the area is underlain by Holocene alluvial fan deposits (Figure 7.3).

Most sediment has been eroded and washed from neighboring Pliocene Age rocks of the Sonoma Volcanic formation that is thought to underlie alluvium at depth. These volcanic deposits of basalt, andesite, rhyolite, and volcanic tuff that are common in the Sonoma Mountains east of the site are thought to have intruded through the older Cretaceous to Jurassic age rocks of the Franciscan Complex between 5 and 2 million years ago. The older Franciscan Complex rocks of estimated age between 65 million and 180 million years are commonly found west of the Santa Rosa Plain in the coastal mountains and along the ridgeline of the Sonoma Mountains. Intermediate Pliocene age sedimentary deposits of both the non-marine Petaluma Formation and marine Wilson Grove Formation show that the area was subject to rising and falling sea level that continued throughout the late Cenozoic era and into the Pleistocene.

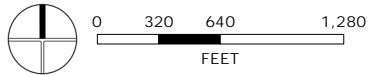
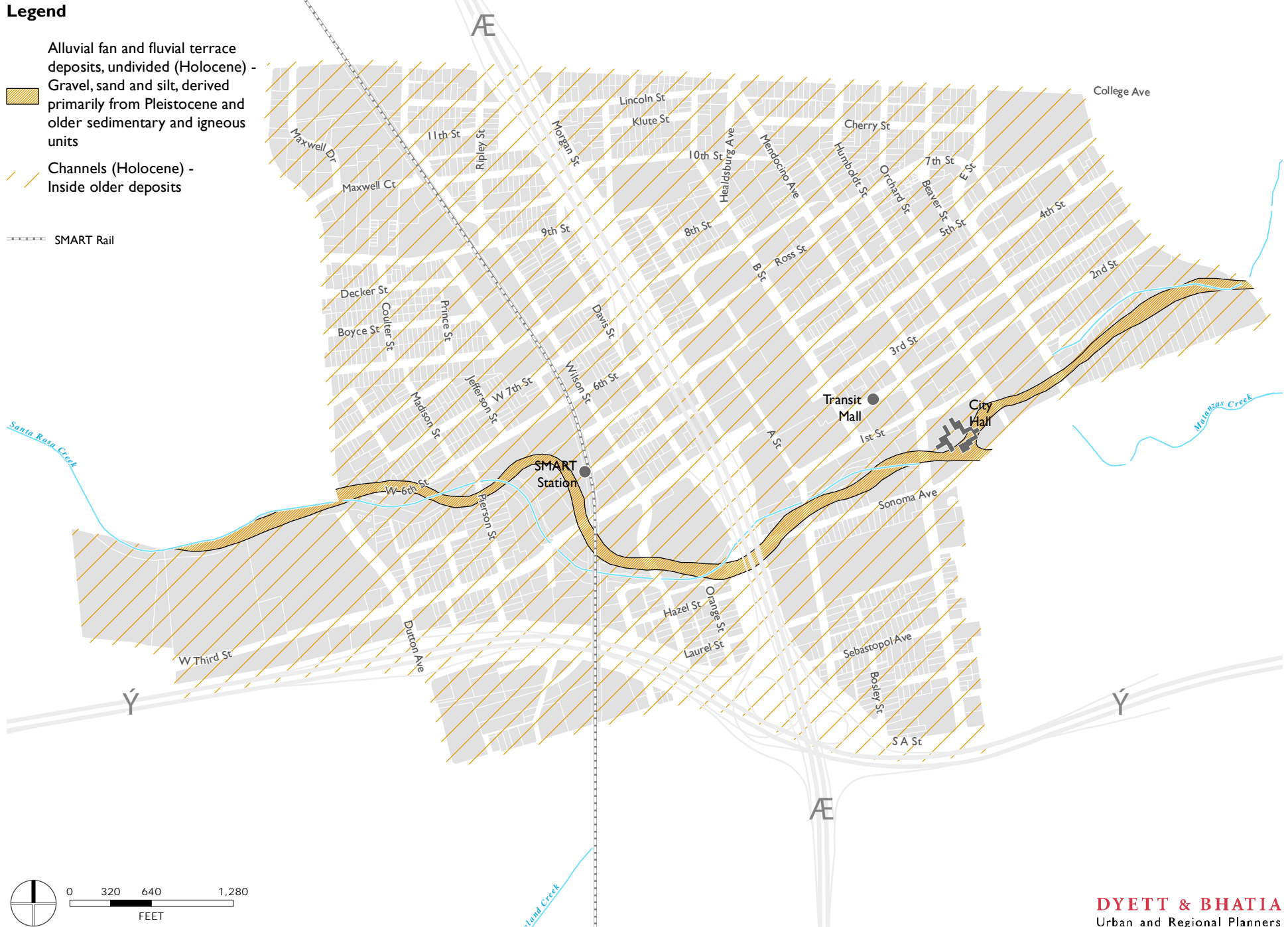
The Franciscan complex is composed of weakly to strongly metamorphosed greywacke (sandstone), siltstone, shale, argillite, limestone, basalt, serpentinite, chert, and other rocks. This rock was accreted onto the edge of the North American continent during the long period of active subduction of the Pacific Plate beneath the North American Plate. The formation is derived from Jurassic oceanic crust

Figure 7.1 Fault Map



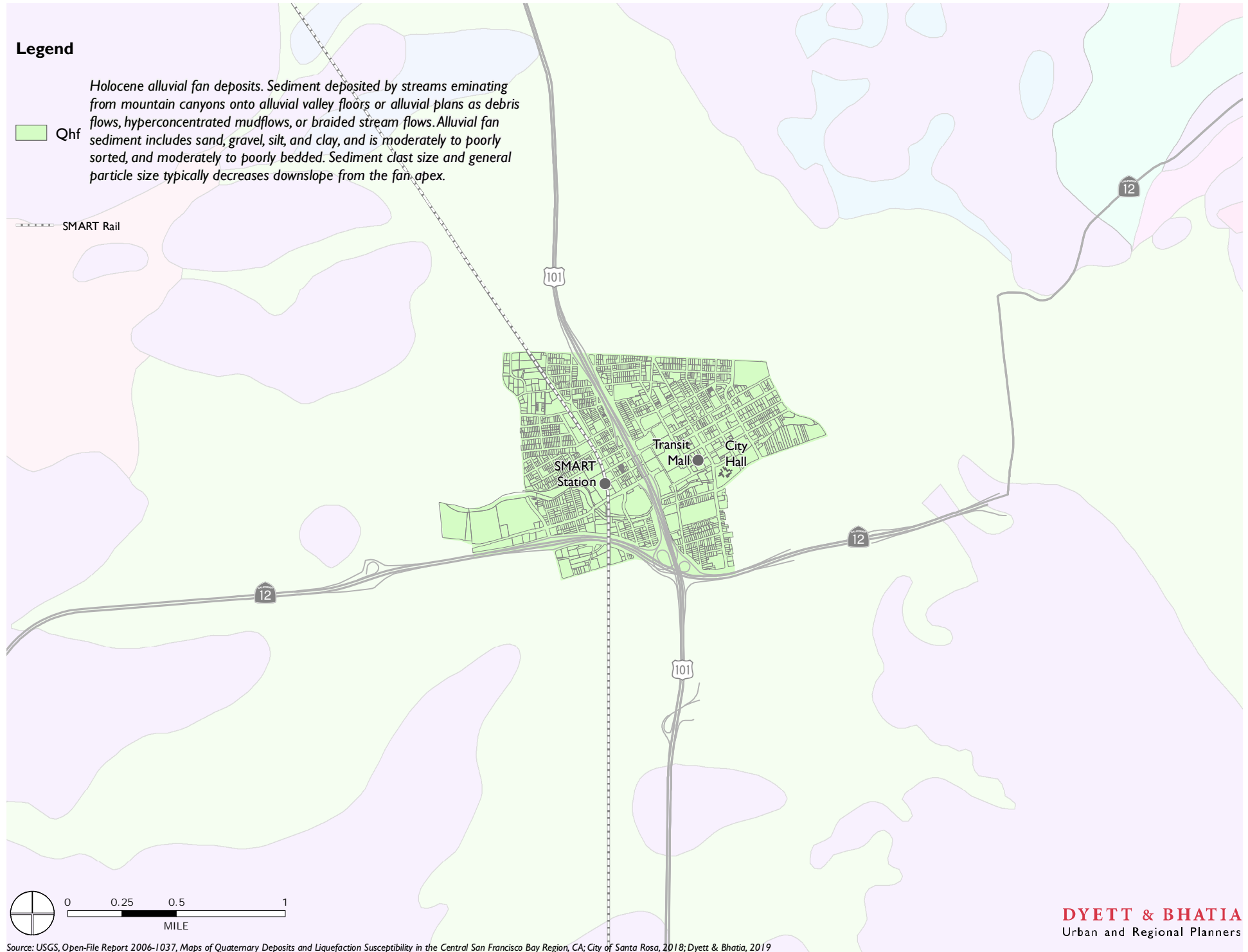
Source: California Geological Survey (2010), Maps of the Aliquist Prior Fault Zones, City of Santa Rosa, 2018; Dyett & Bhatia, 2019

Figure 7.2 Geologic Map



Source: USGS, Open-File Report 2008-1009, Maps of Geologic and Geophysical Framework of the Santa Rosa 7.5' Quadrangle, Sonoma County, California; City of Santa Rosa, 2018; Dyett & Bhatia, 2019

Figure 7.3 Quaternary Geology Map



Source: USGS, Open-File Report 2006-1037, Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, CA; City of Santa Rosa, 2018; Dyett & Bhatia, 2019

and pelagic deposits that are overlain by Late Jurassic to Late Cretaceous sedimentary deposits.

Since the late Cenozoic era subduction has been replaced by transform faulting along faults of the San Andreas Fault System including the nearby Healdsburg-Rodgers Creek fault. There has also been major climate change and dramatic rising and lowering of sea level. Due to the complex geologic history of the area there is a wide variety of volcanic rocks and sedimentary rocks of varying metamorphic grade to be found in the region. These units are often juxtaposed along ancient fault contacts and the structure is complicated by not only ancient deformation, but by active fault deformation. Imprinted on this geology is the drainage pattern of the Santa Rosa Creek Watershed.

Site Soils

According to the USDA Soil Conservation Service, Soil Survey of Sonoma County (1972) and USDA online Soil Survey of Sonoma County (2019), the Specific Plan area north of Santa Rosa Creek is underlain by Yolo Silt Loam and Zamora Silty Clay Loam, while the area southeast of the creek is underlain by Zamora Silty Clay Loam and southwest of the creek is underlain by Yolo Loam and Yolo Clay Loam (Figure 7.4). Deposits within the creek channel were mapped as Riverwash.

Yolo soils are well drained loams underlain by recent alluvium derived from sandstone and shale. Zamora soils are described as well-drained clay loams underlain by alluvium from mixed sedimentary sources. Prior to urbanization these soils would have been considered good for orchards, vineyards, row crops and truck crops. A significant difference is that soils of the Zamora series have high shrink swell potential, compared to low to moderate shrink-swell potential for soils of the Yolo series. With higher clay content soils of the Zamora Series may not drain as well and could promote ponding and more runoff. Riverwash is composed of recent deposits of gravel, sand and silt within the active stream channel areas.

Mineral Deposits

A Mineral Land Classification Map for Aggregate Resources in the Santa Rosa Quadrangle is presented as part of California Geological Survey (formerly CDMG) Special Report 146, Part III, Mineral Land Classification, Aggregate Materials in the San Francisco-Monterey Bay Area (CDMG, 1987). The map does not identify any areas of important aggregate deposits in the Specific Plan area except portions of the Creek channels are identified as “areas containing mineral deposits the significance of which cannot be evaluated from available data” (CDMG Special Report 146, Plate 3.30).

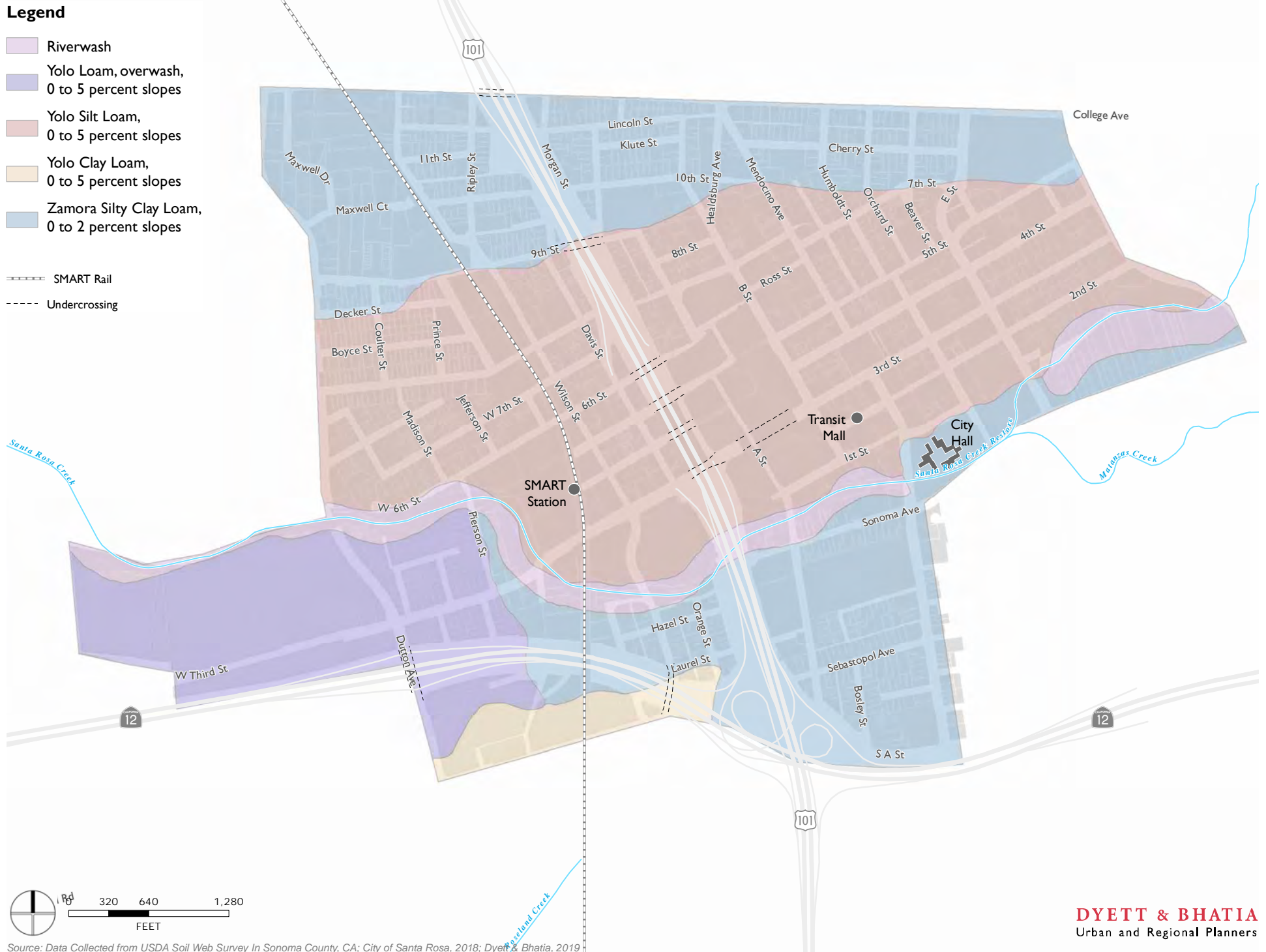
CONSTRAINTS

Slope Stability

Slope steepness is generally the dominant factor governing slope stability, along with drainage, and soil and bedrock conditions. Steep slopes that exceed 50 percent are especially prone to landslides in areas of weak soil and/or bedrock. Debris flows and shallow slope failures are known to occur on very steep slopes with shallow soils. Since the planning area is nearly flat, slope failure is not expected to occur. An exception to this is along the banks of Santa Rosa Creek where steeper slopes can occur and erosion during heavy runoff can cause erosion of stream banks resulting in the increase in instability of the creek banks.

The slopes in the planning area generally rise to the east at an overall slope gradient of approximately 0.5 percent. Geologic, Quaternary geologic and slope stability maps of the area do not show any landslides within the planning area. However, the Quaternary Geology and slope stability maps of the area do not provide sufficient detail to show small slope failures along the banks of Santa Rosa Creek. The occurrence of these bank instabilities has been reduced due to stabilization measures and bank restoration projects that have been completed along the creek. Bank stability in the vicinity of the Downtown Station and railroad

Figure 7.4 USDA Soil Map



Source: Data Collected from USDA Soil Web Survey In Sonoma County, CA; City of Santa Rosa, 2018; Dyett & Bhatia, 2019

crossing area has been stabilized in previous projects along the creek banks such as trail improvement projects.

Expansive Soils and Settlement of Soils

Soils with moderate to high expansion potential are susceptible to shrinking and swelling due to fluctuations in moisture content, and are a common cause of foundation deterioration, cracking of concrete slabs, retaining wall damage, concrete sidewalk cracking and movement, asphalt pavement damage and other damage to site improvements. Expansive soils also typically behave like a plastic when moistened, which means that they will deform constantly under a constant stress resulting in long term settlement of fills and overlying improvements. The range of moisture content for which a soil material behaves as a plastic is called the plasticity index (PI), which is the difference in moisture content between the plastic limit and liquid limit. The higher the PI, the more plastic, and more expansive and compressive, the soil material can be. An important component of any geotechnical investigation is to determine the plasticity index of soils to determine if the soils are expansive or compressible. Soils that are moderately to highly plastic or have high shrink swell potential may require mitigation in order to reduce the potential for damage to man-made structures.

The Soil Survey of Sonoma County (1972) estimated both shrink swell potential and plasticity index for soils within the plan area. This and other key properties that were evaluated are summarized on **Table 7.1**. While soils were not specifically evaluated for foundations, since the intent of the survey was primarily agricultural, this information may be used as a general indicator of suitability.

The primary difference between the soils is that those mapped south of the creek are predicted to be slightly more plastic and have a higher shrink swell potential. A site-specific geotechnical evaluation should establish the actual severity of these hazards based on sampling and laboratory testing.

Settlement caused by subsidence is generally related to ground water extraction from agricultural and municipal wells. The Santa Rosa Valley

Table 7.1: Soils Survey Characteristics							
Soil Type	Area	Shrink Swell Potential	PI	Strength	Compressibility	Runoff Rates	Erosion
Yolo Silty Loam	North of Creek	Low to Moderate	5-15	Faire to Poor	Medium	Slow	Slight
Zamora Silty Clay Loam	South of Creek	Moderate	5-20	Fair to Poor	Medium	Slow	Slight

Source: Sonoma County Soils Survey, 1972, USDA Soils Conservation Service

Plain is known to be undergoing subsidence due to groundwater extraction. Settlement of soils is a primary consideration for the stability of any foundation or structure. Settlement may be due to removal of groundwater trapped in pore spaces within soils. This type of settlement generally occurs in sand and silty sand soils. The reduction in pore pressure would cause the load to compress the pore space causing settlement. Settlement may also occur due to compressibility of dry soils. Fine-grained soils such as silts and clays may also settle. Settlement of fine-grained soils is generally related to density and moisture content of the soils. Low density, high moisture content soils commonly settle during loading. Deep, fine-grained soils are present within the planning area and may be subject to compression and settlement during loading with fill soils or structural foundations.

In general, soils conditions are suitable for development and may be engineered in accordance with the California Building Code and other geotechnical requirements to provide sufficient foundation for structures. Requirements include removal of any non-suitable soils consisting of native subgrade or fill soils, and replacement with

compacted and moisture conditioned engineered fill in accordance with accepted geotechnical standards. Testing will be required to verify that specified foundation conditions are met.

Primary Seismic Hazards- Surface Fault Rupture

A number of active and potentially active faults are present in the region. According to criteria of the State of California Geological Survey, active faults have experienced surface rupture within the last 11,000 years, in the Holocene Epoch. The Alquist-Priolo Earthquake Fault Zoning Act of 1972 initiated a program of mapping active and potentially active faults (faults with displacement within Quaternary time- the last 1.6 million years). According to the program, active faults must be zoned and development projects within the Earthquake Fault Zones investigated to establish the location and age of any faulting across the development site. Active and potentially active faults in Sonoma County have undergone extensive investigation in the past. The California Geological Survey (formerly the California Division of Mines and Geology) has established Alquist-Priolo Earthquake Fault Zone (EFZ) boundaries and has published maps showing the areas that require investigation, including the Santa Rosa Quadrangle (State of California, 1983, Earthquake Fault Zones Map of the Santa Rosa Quadrangle, Revised Official Map). According to the Earthquake Fault Zones Map of the Santa Rosa Quadrangle, the Specific Plan Area is not located within an active Earthquake Fault Zone. The nearest EFZ to the Plan Area is for the Rodgers Creek Fault which is located approximately 3,500 feet east of the eastern edge of the Specific Plan area.

Secondary Seismic Hazards

Ground Shaking

The San Francisco Bay Area is a seismically active region and experts consider it likely that the planning area will be subjected to at least strong seismically induced ground shaking in the near future. According to the

Working Group on California Earthquake Probabilities (WGCEP) assessing the probability of earthquakes in the San Francisco Bay region, there is a 72-percent probability that a major earthquake of Richter Magnitude 6.7 or greater will strike the region during the next 30 years (USGS, 2015, USGS Fact Sheet 2015-3009).

The intensity of ground shaking will vary with the distance and magnitude of the earthquake causing the ground shaking. A major earthquake, such as Magnitude 6.7 or greater along the nearby Rodgers Creek Fault is predicted to generate violent to very violent ground shaking equivalent to a Modified Mercalli Intensity (MMI) level of IX or X (Santa Rosa General Plan 2035, Figure 12-3, Geologic and Seismic Hazards). An earthquake of MMI IX could result in considerable damage to specially designed structures, well designed frame structures could be thrown out-of-plumb, great damage could occur in substantial buildings with some partial collapse, and older structures could be thrown off of their foundations. An earthquake of MMI X could result in heavy damage to some well-built wooden structures and bridges requiring replacement and could result in rails being bent. A major earthquake on the other nearby regional faults such as San Andreas fault, Maacama fault, and Hayward fault, could result in at least strong ground shaking equivalent to MMI of VII. In these more distant seismic events, damage is expected to be negligible in buildings of good design and construction, slight to moderate in well-built ordinary structures, but could be considerable in older poorly built or badly designed structures. Additionally, some house chimneys could be damaged. Structures built to meet modern building codes are expected to fare much better than older structures that have not included any seismic upgrades.

Peak ground accelerations for the Downtown Station site with a 10-percent probability of being exceeded in a 50-year period is estimated to be 0.832 (83.2%) of the acceleration due to gravity (g) at the station (USGS Seismic Design Maps, ASCE 7-10 reference document, 2019). Actual ground motions resulting from ground acceleration may be amplified or dampened depending on the underlying geologic materials, the specific location of the seismic event, and the site location.

Seismically Induced Liquefaction

Liquefaction is the temporary transformation of saturated, cohesionless soil into a viscous liquid as a result of ground shaking. According to the Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region (USGS, 2006, Open-file report 2006-1037) map of liquefaction susceptibility, soils within the Specific Plan area are considered to have moderate susceptibility to liquefaction (Figure 7.5). This assessment is likely due to the occurrence of deep alluvial soils in close proximity to active faults and the active seismic nature of the San Francisco Bay and northern California region.

The Specific Plan area is not shown to be an area with a high liquefaction risk such as the area along the Russian River. While the planning area is shown to have moderate susceptibility it does not have shallow groundwater and well sorted or poorly graded sandy soils like those found along the Russian River that are considered most susceptible, nor does it have deep unconsolidated fill deposits such as those that failed in the Marina District of San Francisco during the 1989 Loma Prieta earthquake of estimated magnitude 6.9. Sandy soils could be present in deposits associated with Santa Rosa Creek. While the location of Santa Rosa Creek is constant in the planning area now due to urbanization, culverts, and other fixed structures, the creek historically meandered across the plain. Therefore, sandy deposits that could be liquefiable could be present underlying the planning area.

In order to assess the liquefaction potential in more detail requires site-specific analysis of soils that would be completed for a geotechnical investigation or geologic assessment as part of site development or redevelopment. While this may have been done for newer structures or renovations within the planning area, it has not been comparatively assessed for all sites. However, general soils characteristics used to determine liquefaction potential may be determined from the soil survey. Most of the soils present in the planning area are clay soils. The exception to this are the sediments that occur in the Santa Rosa Creek channel which are mapped as Riverwash on the soil map.

Seismically Induced Densification

Dynamic densification or ground subsidence can occur when dry cohesionless sand soils collapse as a result of seismic shaking. This may be particularly true of unconsolidated sandy fill, or ground overlying hollow areas due to caves, mines, or areas with excessive groundwater removal. Since soils described within the planning area are considered to have significant quantity of fines and at least low to moderate plasticity soils, they may have enough cohesion to produce only a slight risk of seismically induced densification. However, a site-specific geotechnical investigation should establish the severity of this hazard.

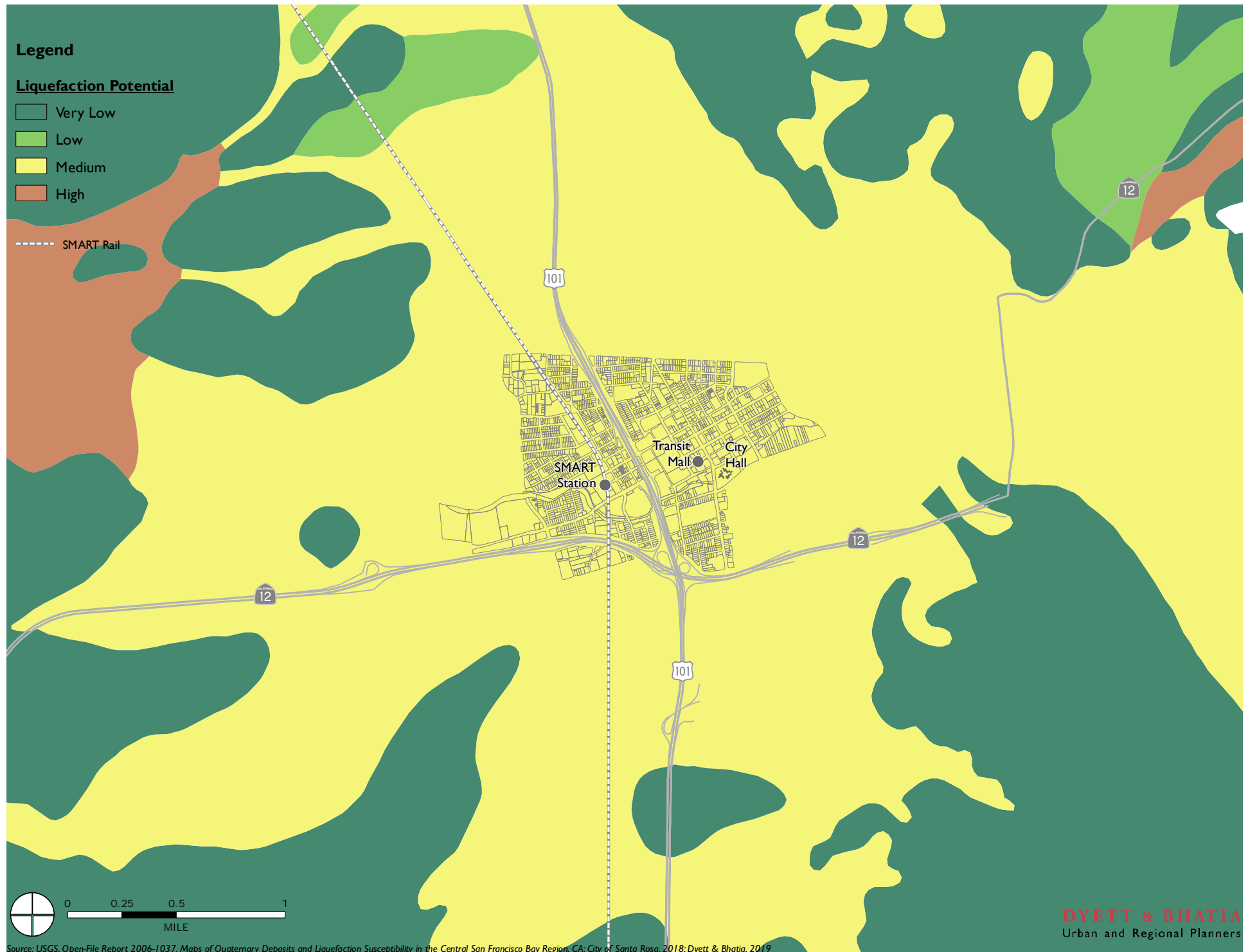
Seismically Induced Lurch Cracking

Lurching is the sudden swaying, rolling, or spreading of the ground during a strong earthquake. Lurch cracking is the development of fissures or cracks on slopes overlain by weak soils. This hazard is considered minimal due to lack of slopes, except at the top of bank next to Santa Rosa Creek.

Seismically Induced Slope Failure

Seismically induced slope failure is another secondary seismic hazard. During earthquake-induced ground shaking, unstable slopes can fail, causing landslides and debris flows. The overall hazard from seismically induced slope failure will be limited by lack of steep slopes in the Specific Plan area, except at the top of bank next to Santa Rosa Creek.

Figure 7.5 Liquefaction Potential



7.2 Hazardous Materials

This section evaluates the potential adverse impacts on human health and the environment due to exposure to hazards and hazardous materials that could be encountered as a result of implementation of the project. The evaluation is based on review of existing environmental documentation available for the project site and adjacent properties, site reconnaissance and conversations. The analysis also considers current laws and regulations on transportation, storage, and use of hazardous materials used during demolition, construction, and the proposed development. Hazardous materials are defined differently between the federal, state, and local levels. For instance, California law defines hazardous material as “any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety or to the environment if released into the workplace or the environment.” A full description of how each level of government defines hazardous materials can be found at the end of the chapter.

Regulatory Setting

This section outlines the agencies that regulate hazardous materials in the area and their jurisdiction. The section also briefly discusses how these agencies work together to enforce regulations and respond to disasters.

Federal

U.S. Environmental Protection Agency (EPA), Region IX for the Pacific Southwest is the chief environmental regulator at the federal level. The EPA maintains and enforces national environmental standards and regulations. Hazardous materials programs and regulations run by the EPA Region IX include the following:

- Superfund Division focuses on Site Cleanup, Federal Facilities and Base Closures, Emergency Response and Planning, Community involvement, site assessment, oil pollution, Brownsfields, and partnerships, land, and revitalization cleanup. This division oversees contaminated sites designated by the EPA on the Superfund cleanup list.
- Enforcement Division focuses on compliance inspection, case development, state oversight, compliance data management and analysis.
- Water Division – This division focuses on environmental issues and related functions pertaining to the Clean Water Act, the Safe Drinking Water Act, and the Marine Protection, Research & Sanctuaries Act. Among the programs instituted under the Clean Water Act are the National Pollutant Discharge Elimination System (NPDES) which mandates programs for stormwater control and the requirements for Storm Water Pollution Prevention Plans (SWPPP), which mandates that all projects over one acres in size devise a plan to show how erosion and contaminated runoff will be prevented from leaving the construction area.
- Toxic Release Inventory (TRI) program is a resource for learning about toxic chemical releases and pollution prevention activities reported by industrial and federal facilities.
- Spill Prevention, Control, and Countermeasure (SPCC) rule regulates the handling and transportation of oil products and the Facility Response Plan (FRP) rules mandates preparation and implementation of plans for the control and cleanup of spills that may occur.

- Underground Storage Tanks (USTs) are regulated by the EPA in partnership with States and Tribal Authorities including regulations for removal, inspections, and cleanups.

Occupational Health and Safety Administration (OSHA) regulates workplace risk and exposure to hazardous materials.

Federal Department of Transportation (DOT) Regulates transportation of hazardous materials especially over highways, railroad systems, and air transportation.

State

Cal EPA- Similar to the U.S. EPA, Cal EPA issues and enforces its own environmental regulations and houses numerous divisions and programs. Such divisions include the California Air Resources Board, the California Department of Toxic Substances Control and the State Water Resources Control Board (see below). Cal EPA also oversees the Certified Unified Program Agencies (CUPA), which are local agencies certified by Cal EPA to implement and enforce Hazardous Materials regulations issued by Cal EPA.

California Department of Toxic Substances Control (DTSC) is chiefly responsible for regulation, handling, use, and disposal of toxic materials in California. DTSC also cleans up hazardous sites in California.

California Air Resources Board (CARB) - Regulates air emissions standards and models air quality.

State Water Resources Control Board (SWRCB) regulates discharge of potentially hazardous materials to waterways and aquifers. This includes the Regional Water Quality Control Boards that regulate water quality. The **North Coast Regional Water Quality Control Board (RWQCB)** is the oversight agency responsible for Santa Rosa and has

jurisdiction over water quality issues, including groundwater contamination.

California Department of Occupational Safety and Health (CAL/OSHA), California regulates exposure to hazardous materials in the workplace.

California Department of Health Services (DHS) Regulates healthcare related to hazardous material cleanup and hazardous waste disposal.

California Department of Transportation (Caltrans) Regulates transportation of hazardous materials on the highway. Caltrans is mandated to enforce Federal DOT regulations in addition to its own standards.

Regional and Local

Bay Area Air Quality Management District (BAAQMD) Regulates the stationary sources of air pollution such as residential wood burning and agricultural and industry emissions. BAAQMD regulates renovation and demolition activities that may result in pollutants such as asbestos and lead being released to the environment.

Santa Rosa Fire Department (SRFD) regulates materials and contaminants in Santa Rosa. The Santa Rosa Fire Department operates as a Certified Unified Program Agency (CUPA) and is designated as such by the State of California for hazardous material regulatory enforcement in Santa Rosa. CUPA programs include the Hazardous Materials Business Plan Program, Hazardous Waste Program, Underground Storage Tank Program, Accidental Release Program, and the portions of the Uniform Fire Code that address hazardous materials. General program requirements include inspections of businesses and review of permit conditions and procedures for the handling, storage, use, and disposal of hazardous materials. The Hazardous Materials Business Plan is used to keep track of the use of hazardous materials by businesses in

accordance with both state and federal laws. The Hazardous Waste Generator Program is based on the Hazardous Waste Control Law found in the California Health and Safety Code Division 20, Chapter 6.5 and regulations found in the California Code of Regulations, Title 22, Division 4.5.

The Santa Rosa Fire Department also administers the Local Oversight Program (LOP). The LOP oversees the investigation and cleanup of fuel releases from underground or above ground storage tanks. Sites are entered into the LOP when a release from an underground or above ground tank is reported. A similar program provides for the permitting, monitoring, and surveillance of septic tanks, chemical toilets, and vaults, as well as abandonment and disposal of septic waste within Sonoma County.

The Santa Rosa Industrial Waste Program enforces regulations issued to businesses that discharge wastewater into the Santa Rosa Subregional Water Reclamation System. The Industrial Waste Program consists of inspections, monitoring, and permitting of businesses to ensure their compliance.

Emergency Response and Regulation Enforcement

First responders to hazardous material emergencies could be the Santa Rosa Fire Department or hazardous material specialists such as the Sonoma County Hazardous Materials Response Team. State law requires that first responders to a release of hazardous materials have a minimum 40 hours of training in accordance with the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) standard (Code of Federal Regulations, 1910.120).

Enforcement of environmental regulations depends upon both public and private reporting of spills, leaks, or other violations. The Santa Rosa Police Department Environmental Crimes Unit also provides enforcement. Officers in this program have specialized training in

environmental crime investigations and hazardous materials recognition and work closely with regulatory specialists from other City departments such as the Santa Rosa Fire Department Hazardous Materials Team; Utilities Department Industrial Waste Section; Community Development Building Code Inspectors; and the Public Works Department Storm Water Management Program, to insure that environmental regulations are adhered to.

The Sonoma County Environmental Health Division is charged with administering the State of California's Medical Waste Program. Regulation of potentially hazardous pesticide and herbicides is under the jurisdiction of the Sonoma County Agricultural Commissioner. The City of Santa Rosa Public Works Department administers the Stormwater Management Program that is designed to reduce urban runoff from polluting local waterways through use of best management practices, monitoring and other techniques.

Standards such as the Total Threshold Limit Concentration (TTLC) and Soluble Threshold Limit Concentration (STLC) have been developed to establish hazardous materials concentrations for landfills through work completed by the California Department of Toxic Substances Control (DTSC). Most of this information can be found through a search of environmental databases and file review at local agencies. Regulatory agencies maintain a database of properties and businesses affected by contamination or properties and businesses where there is significant risk from contamination due to use, storage, or disposal of hazardous materials, underground fuel tanks, or other hazards. A few of the databases with information on hazardous materials are the Federal Superfund list started through the Comprehensive Environmental Response, Conservation, and Liability Act (CERCLA) of 1980, the United States EPA's Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS), HAZNET, the leaking underground storage tank information system (LUST), and the Cortese list. These databases are also a primary source of information for legal disclosures, such as Phase I Environmental Site Assessments (ESA), and may often facilitate interagency cooperation.

Transportation of hazardous materials on the highways is regulated through the Federal Department of Transportation (DOT) and the California Department of Transportation (Caltrans). This includes a system of placards, labels, and shipping papers required to identify the hazards of shipping each class of hazardous materials. Existing federal and state laws address risks associated with the transport of hazardous materials. These laws include regulations outlined in the Hazardous Materials Transportation Act administered by the DOT. Caltrans is mandated to implement the regulations established by the DOT, which is published as the Federal Code of Regulations, Title 49, commonly referred to as 49 CFR. The California Highway Patrol (CHP) enforces these regulations. Regulations of hazardous materials and wastes include the manufacture of packaging and transport containers; packing and repacking; labeling; marking or placarding; handling; spill reporting; routing of transports; training of transport personnel; and registration of highly hazardous material transport.

Santa Rosa General Plan 2035

In addition to conforming with regulatory agencies, the Specific Plan must adhere to the goals and policies of the Santa Rosa General Plan 2035. Cities and counties are required by California law to create a general plan. A general plan is defined as a comprehensive, long-term plan for the physical development of the county or city, and any land outside its boundaries which in the planning agency's judgment bears relation to its planning. This section identifies the goals and policies of the Santa Rosa General Plan 2035 that are applicable to Hazardous Waste.

City of Santa Rosa General Plan (2035), Noise and Safety Element

The intent of the Noise and Safety Element is to identify and evaluate natural and man-made hazards affecting Santa Rosa including noise generation, geology and seismicity, flooding, hazardous materials, and wildland fires. The Noise and Safety Element identifies goals and policies related to Hazardous Materials including preparing for disasters and adopting the Local Hazard Mitigation Plan. Policies include

requiring remediation and cleanup, and evaluate risk prior to reuse, in identified areas where hazardous materials and petroleum products have impacted soil or groundwater and requiring that hazardous materials used in businesses and industry are transported, handled, and stored in accordance with applicable federal, state, and local regulations. Policies also restrict siting of businesses, including hazardous waste disposal facilities, that use, store, process, or dispose large quantities of hazardous materials or wastes in areas subject to seismic fault rupture or very violent ground shaking and identify and regulate appropriate regional and local routes for transportation of hazardous materials and hazardous waste including requiring that fire and emergency personnel can easily access these routes for response to spill incidences. Other policies include requiring commercial and industrial compliance with the Sonoma County Hazardous Materials and Waste Management Plan and to generate and support public awareness and participation in household waste management, control, and recycling through county programs including the Sonoma County Household Hazardous Waste Management Plan.

Environmental Setting

History

Hazardous materials within the Specific Plan area reflect the development history of Downtown Santa Rosa. Downtown Santa Rosa developed rapidly following arrival of the railroad in 1870 with construction of warehouses and mills located in close proximity to the railroad lines. The 1888 to 1893 Sanborn Maps in the vicinity of the original railroad passenger depot shows the Santa Rosa Woolen Mills, Santa Rosa Roller Flouring Mill, Santa Rosa Planing Mill and lumber yard, Santa Rosa Packing Company, and Crawford's Fruit Dryer and fruit packing warehouses, Cutting Fruit Packing Co., Hunt Bros. Fruit Packing Co., and several lumber yards. Later in 1904 to 1908, the California Fruit Canners Association takes over the fruit packing businesses and several new storage facilities were added. Later as

automobiles became popular, service stations and automotive repair facilities opened with accompanying storage and use of petrochemicals. Many of the businesses that developed in the downtown area included potential use and storage of hazardous materials such as Laundry and Printing operations, and Agricultural supply warehouses have continued to operate with the Western Farm Center is still operating on Seventh Street. Other industry has occupied the larger parcels in undesirable areas such as next to Highway 12 and the railroad tracks including wrecking yards, cement factories, and various corporate yards. Much recent contamination is associated with leaking underground fuel tanks, especially older tanks placed in the 1970's and 1980's. Redevelopment must also take into account the hazards associated with old lead-based paint and asbestos containing building materials that may be found in older structures and have to be handled as hazardous materials during demolition activities.

Records Review

An updated EDR Radius Map Report was obtained for the area within 1-mile radius of the existing Downtown Station site and covers the entire Specific Plan area and some of the surrounding adjacent areas. Federal databases that reported sites within the Specific Plan area include the CERCLIS, CERCLIS-NFRAP, and RCRA database lists. State and local databases include REF, CA CORTESE, CA HAZNET, LUST, CA FID, CA SLIC, UST, HIST UST, SWEEPS and NOTIFY 65. There is also a listing of local sites in the City's CUPA Listings section. Many sites are reported in multiple databases.

Federal Databases

CERCLIS, the Comprehensive Environmental Response, Compensation and Liability Information System, contains sites proposed or on the National Priorities List. These sites have been reported to the federal environmental protection agency (EPA). Only one site was documented to be on the list and likely require further remediation. That site is called C&D Batteries, a division of Electra Corporation at 265

Roberts Avenue. C&D batteries is reported for lead contaminated soil and generating aqueous solution with less than 10 percent organic residue. Another site, the PG&E Gas Plant at 5th and Mendocino, underwent remediation in 2015. While the case is currently open under verification monitoring, the site is capped and under land use restrictions. The PG&E site is listed in the CERCLIS-NFRAP (no further remedial action planned) database.

Consulting the EDR report, sites previously active in the Envirostor database were former wrecking yards that have been assessed and closed. Those that are currently listed as active in the Envirostor database have been turned over to the RWQCB. The three listed sites are the former C&D Batteries, and PG&E Gas and Power Plant as discussed above and the Point St. George Fisheries site discussed below.

Resource Conservation and Recovery Act (RCRA) sites transport, store, treat and/or dispose of significant volumes of hazardous waste. Reported sites are Westside Foreign Auto at 12 West 3rd Street, Burt Olhiser Painting at 206 West 6th Street, and De Paz Autobody at 77 West 3rd Street. Westside Foreign Auto is reported for leaking waste oil, storing aqueous solution with less than 10 percent total organic residues, and oil/water separation sludge. The other businesses are small quantity waste generators with no reported violations.

Overview

Often the most significant soil and groundwater contamination is associated with leaking underground storage tanks. Older service stations and other businesses with fuel storage tanks occasionally leaked petroleum hydrocarbons such as gasoline or diesel fuel from underground tanks. Other businesses with contaminant issues are automotive repair sites or maintenance yards, which have a high risk from leaking petrochemicals, solvents, and other hazardous materials. Other types of businesses found through the environmental database search include utility plants, cement factories and even restaurants that may maintain significant volumes of oil and grease considered hazardous.

While a site-by-site analysis of these sites within the planning area is outside the scope of this report the distribution of these sites can be seen from the map produced by EDR.

The distribution of hazardous materials sites is controlled by zoning and proximity to transportation corridors. Residential areas have relatively few or no sites, while there are many sites along the railroad corridor near downtown Santa Rosa. There is also a concentration of sites east of Santa Rosa Plaza in the area between Mendocino Avenue and B Street.

Due to the close proximity of sites there may be an area-wide contamination issue, rather than that constrained to individual sites. The primary factor controlling the spread of subsurface contamination is the depth to groundwater and groundwater flow direction. The flow of groundwater may be constrained through the network of monitoring wells often constructed around sites with contaminated groundwater. The Geotracker database maintained by the State of California includes this information, some of which was included in the EDR report. The EDR report also summarized some basic information about groundwater. According to their map, groundwater flow in the area is generally westerly, except near Santa Rosa Creek, where subsurface flow is influenced by seepage into the creek and is therefore southwesterly north of the creek and northwesterly south of the creek. The depth to groundwater in the area is recorded at between 7 and 25 feet below ground surface, but is primarily found between 9 and 15 feet in depth.

Because there may be general low-level contamination of groundwater due to the industrial and commercial history of fuel and chemical use and storage within the Specific Plan area, it can be difficult to establish a single source for groundwater contamination detected in the area. Remediation of contamination is generally completed on a site-specific basis in accordance with general protection for the underlying groundwater aquifer. A basic assessment for each of the opportunity sites within the Specific Plan area was made by overlaying the map showing the database map of hazardous sites over the City of Santa Rosa

Downtown Station Area Specific Plan showing the opportunity sites in the completion of the original Specific Plan.

Contaminated Soil and Hazardous Material Sites

Table 7.2 presents a summary of the hazardous material and contaminated soil sites in the overall Specific Plan area. Figure 7.6 presents the locations of North Coast RWQCB Leaking Underground Fuel Tank sites within the Specific Plan area. Table 7.3 presents a summary of the Certified Unified Program Agency (CUPA), Small Hazardous Waste Generators within the Specific Plan area. Figure 7.7 presents a map of the locations of the CUPA sites in the Specific Plan area.

Opportunity Site Summary

Opportunity sites were identified on the City of Santa Rosa Downtown Station Area Specific Plan map showing the project area during development of the original Specific Plan. Opportunity sites were proposed for future housing, commercial or parking structures to accommodate railroad users. The following section summarizes an update of documented hazardous materials sites that are contained within or adjacent to each of the opportunity sites identified in the original Specific Plan and the potential contamination issues associated with the sites.

(1) Imwalle Gardens

With a history of holding medium-low density housing and farming operations, this area has a very low potential for harboring hazardous waste. In 1997 there was a small residential diesel spill at 629 Third St. that had been cleaned up the same year. More recently, there has been

Table 7.2. RWQCB Leaking Underground Storage Tanks		
Site	Address	Case Status
10th St. Partnership	24 Tenth Street	Closed
Allefax	1 Sebastopol Road	Closed
Arco #4936	1010 Fourth Street	Closed
AT&T Communications	520 East 3rd Street	Closed
Bertolli Estate	629 Third Street	Closed
Boyett Petro.	171 Santa Rosa Avenue	Open
BP, College	300 College Avenue	Closed
C&D Batteries	265 Roberts Avenue	Open
Chevron #9-8153	136 College Avenue	Closed
Purity Products	1005 Cleveland Avenue	Closed
Clark's Autoparts	203 Santa Rosa Avenue	Open
Creekside Convalescent Hospital	850 Sonoma Avenue	Closed
Crystal Clear Car Wash	257 College Avenue	Closed
Downey Property	109 Chestnut Street	Open
DZ Inc	258 Dutton Avenue	Open
Empire Cleaners	526 Sonoma Avenue	Open
G.K. Hardt	337 South A Street	Closed
Grace Property	802 Donahue Street	Closed

Table 7.2. RWQCB Leaking Underground Storage Tanks		
Greyhound Bus Depot	416 B Street	Closed
Grindaland	400 South A Street	Closed
Groth Motors	505 Santa Rosa Avenue	Closed
Hirsch	230 South A Street	Open
Industrial Machine	928 North Dutton Ave.	Inactive
Jerry Fritsch	218 Roberts Avenue	Open
Kaiser Sand and Gravel	1060 Maxwell Drive	Closed
McGowan Auto	112 Holbrook Street	Open
Mead Clark Lumber	175 Railroad Street	Closed
National Bank Redwoods	90 Santa Rosa Avenue	Closed
NWRR	20 West 6th Street	Closed
Occhipinti One Step	210 Fifth Street	Closed
Old Hospital	437 A Street	Closed
Pt St. George fish	8 Sebastopol Road	Closed
Purity Products	4 Maxwell Court	Closed
S County Water	330 Hewett Street	Open
Santa Rosa Old Town Sewer Replacement	104 College Avenue	Inactive
Santa Rosa Public Safety Bldg	955 Sonoma Avenue	Closed
SCWA	330 Hewett Street	Open

Table 7.2. RWQCB Leaking Underground Storage Tanks		
Shell Gas	200 Fourth Street	Closed
Shell Gas	255 Dutton Avenue	Open
Shell Gas	266 College Avenue	Closed
SR Corporate Yard	819 Donahue Street	Closed
SR Ice and Cold	806 Donahue Street	Closed
Standard Oil	205 Chestnut Street	Open
Texaco	421 Santa Rosa Avenue	Closed
Washington Mutual	888 Fourth Street	Closed
Westside Engine/Mach	12 West 3rd Street	Closed
Westside Plaza Drycleaners	320 West 3rd Street	Open
Yellow & Roadway	270 Dutton Avenue	Closed

Table 7.3. Certified Unified Program Agency (CUPA), Small Hazardous Waste Generators	
<i>Site</i>	<i>Address</i>
Westside Engine	12 Third Street
Paul's Empire Headshot	112 Roberts Avenue
Kelly Moore Paint Company	217 Roberts Avenue
Reliance Fine Finishing	219 Roberts Avenue
Randy's Design and Machine	242 Roberts Avenue
Roadrunner Mobile Truck Repair	256 Dutton Avenue
Darren J Cossey	180 Sebastopol Road
Yellow & Roadway Freight	270 Dutton Ave.
Unocal #4320	370 Sebastopol Road

Figure 7.6 Leaking Underground Fuel Tank Sites Identified by the North Coast Regional Water Quality Control Board

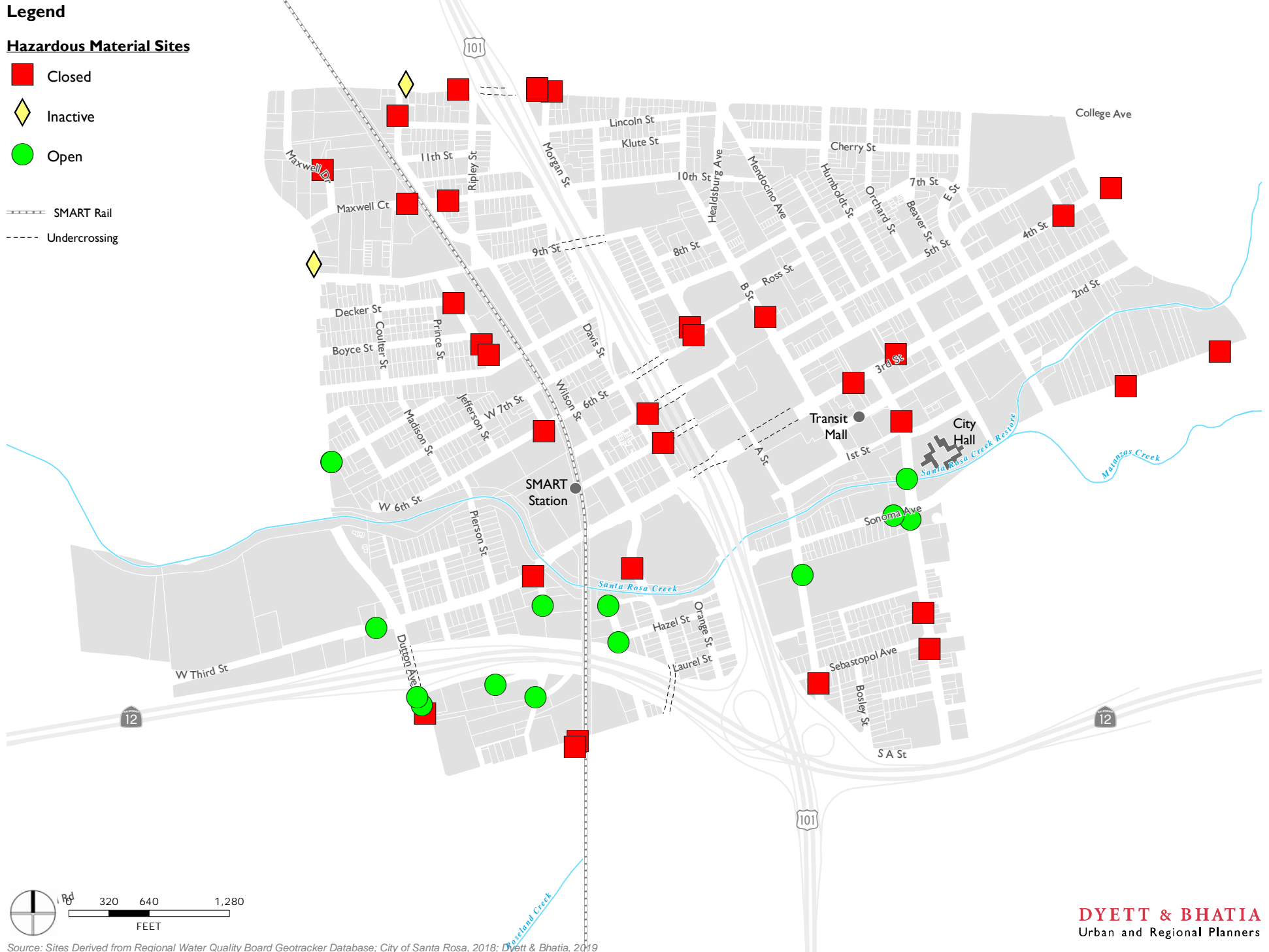



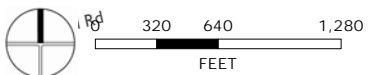
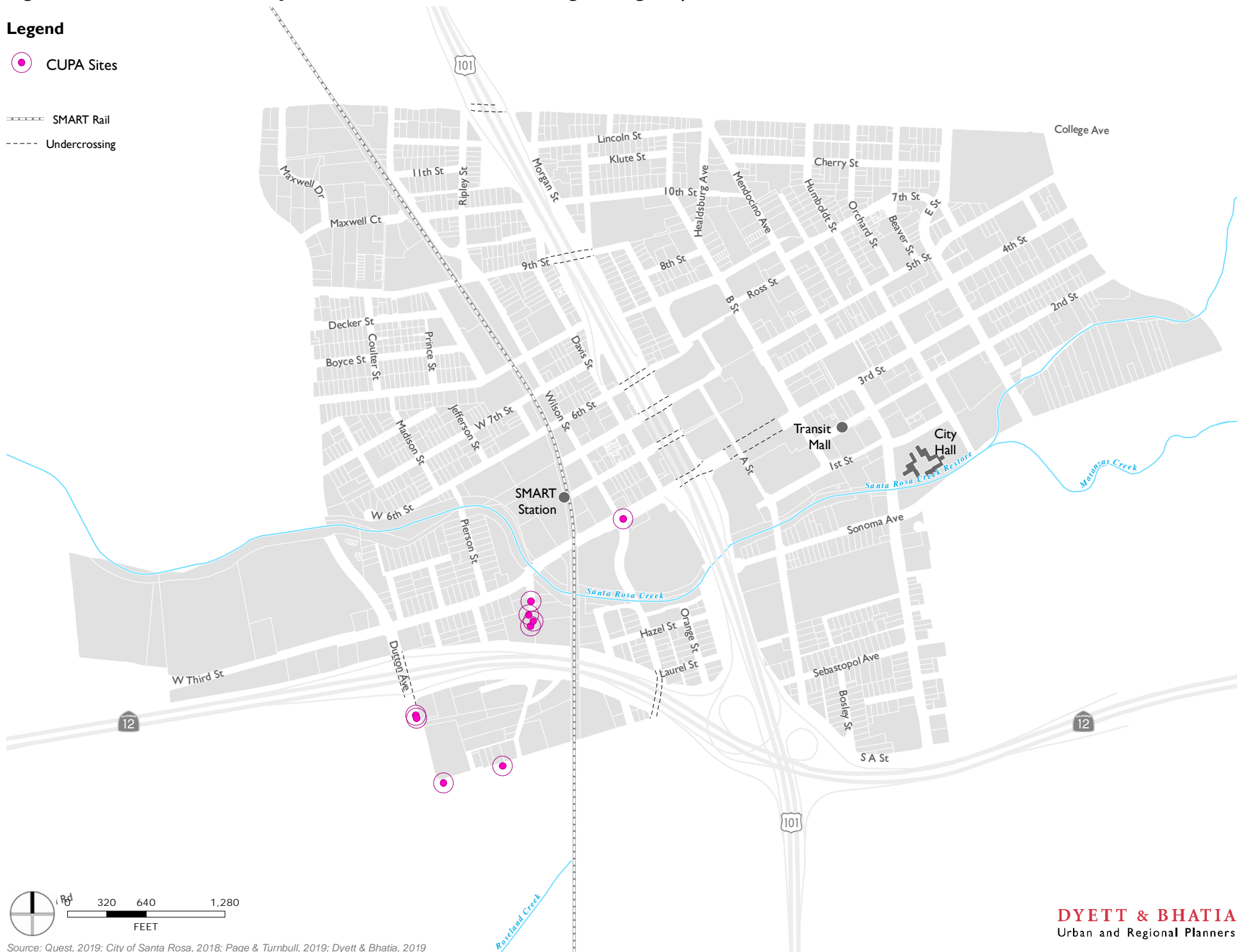


Figure 7.7 Santa Rosa Fire Department Certified Unified Program Agency Sites

Legend

-  CUPA Sites
-  SMART Rail
-  Undercrossing



Source: Quest, 2019; City of Santa Rosa, 2018; Page & Turnbull, 2019; Dyett & Bhatia, 2019

an open site assessment of a Westside Plaza Drycleaners, currently Park Avenue Cleaners, located at 320 W. Third St. According to Geotracker's report, potential contaminants of concern are Tetrachloroethylene (PCE) and Trichloroethylene (TCE) with potential media of concern being aquifers for drinking water supply, indoor air, soil, and soil vapor. If this site was deemed contaminated by dry cleaning by-products, hazardous waste removal would be necessary, including potentially groundwater remediation.

(2) Maxwell Court

Since the Downtown Station Area Specific Plan Hazards and Hazardous Materials Section was originally published, many of the identified sites in this area have been deemed closed by the North Coast Water Board. Potential contaminants of concern at these sites were primarily gasoline, diesel, and automotive waste oil. Kaiser Sand and Gravel, now Bo Dean Asphalt Plant, was reported for a diesel spill in the LUST database, but the site was remediated and verification monitoring was completed in 2012. There is an open remediation site nearby at 2243 Briggs Ave., the location of a former auto salvage yard, which is a potential source of TCE contamination. As of 2015, this site is still in remediation. The site listed as Purity Products in the Specific Plan, a swimming pool, pest, and landscape supply store, was witnessed storing hazardous chemicals in closed drums and polycarbonate containers on a concrete slab next to the building. Once located at 4 Maxwell Court, this business has now relocated or ceased operations. Currently, the only open case in the vicinity is Industrial Machine and Engine at 928 North Dutton Ave. This site was issued a Hazardous Waste Illegal Discharge violation in 1987 and 1990 by the Santa Rosa Fire Department after observing oil staining the ground during site inspections. A laboratory report from a 1992 file indicated that a soil sample was analyzed and contained 120 ppm motor oil, but did not give a sample location on the property. The site is inactive as of 2009.

(3) SCWA site

This approximately 1-acre vacant parcel is located behind the private residence at 330 Hewett Street. The site has elevated concentrations of lead in the soil in the southern part of the site, which according to Geotracker, may have been brought in as fill material. Groundwater had been tested, and was not subjected to lead contamination. As of 2009, the site is under assessment.

(4) Western Farm Center

The old City of Santa Rosa corporate yard that had undergone remediation to remove gasoline contamination has since been turned into a Rite Aid store, which is listed as a small waste generator. The 802/806 Grace property, which had potential for diesel and gasoline contaminating the aquifer, was remediated in 2009 and the site closed after verification in 2013.

(5) TORPA Site (NWWR Site)

The TORPA site, now the N.W.R.R. Site at 20 West Sixth St. that was cited for a leaking underground storage tank has been assessed and the case was closed in 2009. A nearby site, Westside Engine and Machine as well as Westside Foreign Auto, both located at 12 West Third St., had an underground storage tank removed in 1992. Soil samples taken at this time around the tank excavation showed concentrations of TPH-g, ethyl benzene, and total xylenes. In 2008, three soil borings were taken at the site and confirmed that these contaminants were still present in the groundwater at lower concentrations. The site property has since been annexed to the City of Santa Rosa and the case has been transferred to NCRWQCB. The installation of monitoring wells for assessing the property was scheduled in 2018.

(6) Sebastopol Road/Roberts Avenue

The businesses in the area south of Highway 12 and bordered by Interstate 101, Sebastopol Road, and North Dutton Ave. have undergone some turnover. Allefax, Point George Fisheries, C&D Batteries, and McGowen Auto Wrecking Yard have all since closed and a major remediation effort has been put in place to remediate contamination in this industrial area. The Allefax site at 1 Sebastopol Road excavated contaminated soil from former tank locations in 2005 and has undergone soil and groundwater monitoring up until 2013, at which point the site was deemed acceptable and the case closed in 2014. Point St. George Fisheries, a large fish processing and transporting facility, closed in 1993, with the building demolished in 2000. Over 4,000 tons of petroleum contaminated soil was excavated from the site, along with monitoring well installation and soil boring sampling to monitor contamination. It was determined that petroleum constituents no longer posed a threat to human health, and the case was closed in 2013. The site is proposed to redevelop into residential housing, including 110 two-story homes.

C&D Batteries, located at 265 Roberts Ave., was listed as a Superfund Site in the Envirostor Database. In an assessment report from 1997, soil samples collected by the U.S. EPA detected high levels of lead in and around the site. The EPA transferred control to the NCRWQCB in 1999 and the site has been remediated to some extent, but remediation activities appear to be currently inactive as of 2009. This case is still open.

Neighboring McGowen Auto Wrecking, which operated between the 1960s and 1990s, was assessed for potential diesel, nickel, and automotive waste oil contamination. According to the Cleanup Action Report in the SWRCB database, most of the site is now covered in concrete, and as of 2015, the site is inactive, with no ongoing remediation activities.

The Shell Service station and the former DZ petroleum bulk plant, located at 255 and 257 Dutton Ave., respectively, removed four underground storage tanks in 1998. The surrounding soil was contaminated with TPH as gasoline, BTEX, and MTBE, and was removed in 2009. The site is still open with verification monitoring ongoing as of 2015.

(7) Walter Property

Several businesses are present on the Walter Property. Mead and Clark was cited for a leaking gasoline tank in 1986, remediated three times throughout 1989 to 2007, and was closed by the NCRWQCB in 2014. Occhipinti One Step Service Center was reported for a leaking underground storage tank in 1998, was remediated in 2009 and the case was closed in 2013. The location at 210 Fifth St. has since been turned into Parking Lot 15. Hotel La Rose, located at 101 Fifth Street, was cited for a leaking underground storage tank that was remediated and the case was closed in 2014.

(8) Courthouse Square

This site is in close proximity to old Memorial Hospital, where an underground storage tank released diesel fuel in 1991. Subsequently, contaminated soils were excavated and disposed of and the case was closed on August 11, 1998. The Empire Building is located across the street from old Memorial Hospital at 37 Old Courthouse Square and the surrounding sites are around Third Street and B Street. This cost recovery site held a heating oil tank, which was remediated in 2009, with the case being closed in 2015. According to the Geotracker report, however, there are several tanks in the nearby area, such as the former Greyhound Bus Depot and Santa Rosa DPW, that are believed to be contamination point sources.

(9) B Street Parking Lot

This site is located in close proximity to the Greyhound Bus Depot at 416 B Street. It was reported for a minor leak of diesel requiring no further remedial action.

(9) Traverso's

The Traverso's site at 106 B Street located near Santa Rosa Plaza, was cited for diesel, gasoline, and motor oil contamination in 2007. The site was remediated in 2013 and closed in 2014.

(10) D/3rd Street Garage (Garage 5)

The area around the Sonoma Avenue/Santa Rosa Avenue intersection has undergone remediation from a large plume that developed from a former commercial petroleum fueling facility. The site is located nearby or within the current Prince Memorial Greenway. The site has undergone soil excavation, groundwater extraction, and ozone sparging intermittently since 2005. As of 2010, the project is still open and undergoing remediation and monitoring.

(11) South A Street

There are several sites along South A Street, bordering Highway 12 and US Highway 101 in the residential area, that have been identified in the RWQCB LUST site. The Grindaland Estate, located at 400 South A Street, was a former retail gasoline station and auto repair facility, and is located adjacent to the G.K. Hardt property at 337 South A Street, which held potential contaminants of diesel and gasoline. Both of these cases were cleaned up and closed in 2012. The Phil Hirsch site, located at 230 South A Street, was a former dry-cleaning facility that reportedly used a 1,000-gallon tank for storage of cleaning chemicals. The tank was removed in 1987, and several groundwater monitoring wells were

installed. As of 2017, the case is open and under assessment and interim remedial action.

(12) Brookwood Avenue

Along Brookwood Avenue between College Avenue and Sonoma Avenue are several closed sites that had undergone remediation for gasoline and diesel contamination. Washington Mutual, formerly Swift Garage, at 888 Fourth Street was assessed and the case was closed in 2013. Arco #4936 is an active gas station that discovered a petroleum hydrocarbon release when replacing five underground storage tanks in 1989. The petroleum impacted soil was over-excavated and removed from the site in 2003 during a station overhaul, and was open to verification monitoring up until 2012, when the case was deemed closed. The Santa Rosa Public Safety Building, located at 955 Sonoma Avenue, underwent a groundwater impact assessment in 2006 due to the building's former tank system. The case underwent verification monitoring in 2010 and was closed in 2012.

(13) College Avenue

There are many former and current gas stations along College Avenue between Brookwood and North Dutton Avenue. Chevron, BP, Shell, and the current Flyers, as well as former gas stations all had cases of leaking underground storage tanks. These sites were remediated between 1994 and 2013. There are currently no open cases.

Hazardous Materials Constraints

Hazardous materials constraints within the Specific Plan area may be divided into two general categories. These are: (1) demolition and construction hazards related to hazards and hazardous materials exposure to be encountered during site redevelopment and reconstruction; and (2) post development impacts to local residents,

visitors and transit users from hazards and hazardous materials due to site redevelopment, use and maintenance of the railroad.

Identified construction and demolition hazards include inhalation of possible asbestos, lead-based paint and creosote associated with old structures and railroad ties, and general exposure associated with site redevelopment, including remediation. Dust control is a key factor in site redevelopment which includes demolition, site grading and excavation activities. Certain sites will require closure of existing facilities. These sites may contain lingering contamination that will need remediation before redevelopment. In order to protect the community and workers on these sites a Demolition Plan, Soil Management Plan, and Health and Safety Plan will likely need to be developed for each site with identified open hazardous materials issues. The plans will need to include provisions for community protection, methods of demolition and construction, management of soils and stockpiles including off-haul and routes of truck travel, and requirements for personal protective equipment such as respirators, impermeable clothing, and gloves. Other sites that have had leaks or documented contamination that has been cleaned up to where no further action is required by the Fire Department, Department of Toxic Substances Control, Regional Water Quality Control Board, or other jurisdiction will need to be reevaluated to see if that would extend to site redevelopment or was a condition of continued operation of the previous business. Former Industrial and Commercial sites may require a greater level of site cleanup in order to be considered for residential or public use. The level of exposure risk on these sites would be variable. Finally, sites with no hazards or hazardous materials outside of normal construction related risks would have a low exposure risk.

The larger sites with existing industrial development such as the Maxwell Court site and the Sebastopol Road/Roberts Avenue sites will likely require significant remediation following closure of local businesses and subsequent reconstruction. A number of the sites in the Maxwell Court area and Sebastopol Road/Roberts Avenue area previously identified as having site contamination have undergone site cleanup activities and

received no further action letters from the oversight agencies. However, a number of these sites are still active.

At the Imwalle Gardens site, the Park City Cleaners site may have significant contamination issues due to the use, storage and spills of solvents used in the dry-cleaning operations.

The Western Farm Center site, which is still active as of the Specific Plan Update, located next to the existing railroad tracks is reported for leaking underground storage tanks that were likely removed and historic underground diesel tanks. Prior to redevelopment any underground storage tanks would need to be removed within the development footprint, with permits obtained from the Santa Rosa Fire Department.

The other site along the railroad corridor, the TORPA/NWRR site, is in the process of undergoing groundwater monitoring activities required by the NCRWQCB.

Post-development impacts will depend upon the nature of the new development. Replacement of industrial areas with environmentally engineered commercial and residential development would likely lower public risk to hazardous materials exposure.

The general exposure risk to future railroad users and residents and visitors within the plan area from hazardous materials is expected to be negligible since the railroad is not proposed for hazardous material freight and new development is not expected to permit use of hazardous materials. However, there is an increased risk of collisions along the railroad corridor, release of fuel from a collision, and from a collision impacting any hazardous storage facilities along the railroad corridor.

Outlook

The exposure risk during construction can be mitigated through proper worker training and decontamination, while final site remediation should reduce human exposure risk and environmental hazards both during and

after construction to acceptable levels as dictated by regulatory agency oversight. Should newly identified contamination be found on a redevelopment site during construction, remedial efforts would need to be developed and implemented. This would include a soil management plan (SMP) or other site remediation plan. Shallow soil contamination may only require excavation and replacement with clean soils. Contaminated groundwater would likely require more sophisticated cleanup and a network of monitoring wells. Regional Water Quality Control Board (RWQCB) environmental screening levels or site-specific risk assessments would be used to identify remediation goals and cleanup standards protective of proposed land uses. The cost of remediation will depend upon the length and nature of work and would typically be borne by the property owner or responsible party as determined by the regulatory agency responsible for oversight. While hazards and hazardous materials would not preclude development of the project, the cost of remediation as part of site redevelopment would be a significant initial cost if the land purchase were for an “as-is” condition.

7.3 Hydrology and Flooding

This section characterizes the hydrologic setting of the planning area and known flooding risk according to Federal Emergency Management Agency (FEMA) classifications and mapping.

Regulatory Framework

This section summarizes key federal, State and city statutes, regulations and policies that would apply to the Specific Plan.

1. Federal Laws and Regulations

a. Federal Emergency Management Agency

The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to provide subsidized flood insurance to communities that comply with FEMA regulations limiting development in floodplains. FEMA also issues Flood Insurance Rate Maps (FIRMs) that identify which land areas are subject to flooding. These maps provide flood information and identify flood hazard zones in the community. The design standard for flood protection is established by FEMA, with the minimum level of flood protection for new development determined to be the 1-in-100 annual exceedance probability (AEP) (i.e. the 100-year flood event).

b. Federal Clean Water Act

The U.S. Environmental Protection Agency (EPA) is the lead federal agency responsible for water quality management. The Clean Water Act (CWA) of 1972 is the primary federal law that governs and authorizes water quality control activities by the EPA as well as the states. Various elements of the CWA address water quality. These are discussed below. Wetland protection elements, including permits to dredge or fill wetlands, are administered by the U.S. Army Corps of Engineers (USACE) can be found under Section 404 of the CWA.

Under Section 401 of the CWA, an applicant for a Section 404 permit (to discharge dredged or fill material into waters of the United States) must first obtain a certificate from the appropriate State agency stating that the fill is consistent with the State’s water quality standards and criteria. In California, the authority to either grant water quality certification or waive the requirement is delegated by the State Water Resources Control Board (SWRCB) to the nine regional water quality control boards (RWQCBs).

Under Section 303(d) of the CWA, states are required to develop lists of water bodies that would not attain water quality objectives after implementation of required levels of treatment by point-source dischargers (municipalities and industries), Section 303(d) requires that

the State develop a total maximum daily load (TMDL) for each of the listed pollutants. The TMDL is the amount of loading that the water body can receive and still be in compliance with water quality objectives. The TMDL can also act as a plan to reduce loading of a specific pollutant from various sources to achieve compliance with water quality objectives. The TMDL prepared by the State must include an allocation of allowable loadings to point and nonpoint sources, with consideration of background loadings and a margin of safety. The TMDL must also include an analysis that shows the linkage between loading reductions and the attainment of water quality objectives. The EPA must either approve a TMDL prepared by the State or, if it disapproves the State's TMDL, issue its own. National Pollutant Discharge Elimination System (NPDES) permit limits for listed pollutants must be consistent with the waste load allocation prescribed in the TMDL. After implementation of the TMDL, it is anticipated that the problems that led to placement of a given pollutant on the Section 303(d) list would be remediated.

Under federal law, the EPA has published water quality regulations under Volume 40 of the Code of Federal Regulations (40 CFR). Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. As defined by the CWA, water quality standards consist of two elements: (1) designated beneficial uses of the water body in question and (2) criteria that protect the designated uses. Section 304(a) requires the EPA to publish advisory water quality criteria that accurately reflect the latest scientific knowledge on the kind and extent of all effects on health and welfare that may be expected from the presence of pollutants in water. Where multiple uses exist, water quality standards must protect the most sensitive use. In California, the EPA has designated the SWRCB and its RWQCBs with authority to identify beneficial uses and adopt applicable water quality objectives.

The NPDES permit program was established in the CWA to regulate municipal and industrial discharges to surface waters of the United States. Federal NPDES permit regulations have been established for broad categories of discharges, including point-source municipal waste discharges and nonpoint source stormwater runoff. NPDES permits

generally identify effluent and receiving water limits on allowable concentrations and/or mass emissions of pollutants contained in the discharge; prohibitions on discharges not specifically allowed under the permit; and provisions that describe required actions by the discharger, including industrial pretreatment, pollution prevention, self-monitoring and other activities.

In November 1990, the EPA published regulations establishing NPDES permit requirements for municipal and industrial stormwater discharges. Phase 1 of the permitting program applied to municipal discharges of stormwater in urban areas where the population exceeded 100,000 persons. Phase 1 also applied to stormwater discharges from a large variety of industrial activities, including general construction activity if the project would disturb more than five acres. Phase 2 of the NPDES stormwater permit regulations, which became effective in March 2003, required that NPDES permits be issued for construction activity for projects that disturb between one and five acres. Phase 2 of the municipal permit system (known as the NPDES General Permit for Small MS4s) required small municipal areas of less than 100,000 persons to develop stormwater management programs. The RWQCBs in California are responsible for implementing the NPDES permit system (see additional information below).

2. State Laws and Regulations

a. Water Quality

In California, the SWRCB has broad authority over water quality control issues for the State. The SWRCB is responsible for developing statewide water quality policy and exercises the powers delegated to the State by the federal government under the CWA. Other State agencies with jurisdiction over water quality regulation in California include the California Department of Health Services (DHS) (for drinking water regulations), the California Department of Pesticide Regulation, the California Department of Fish and Game (CDFG) and the Office of Environmental Health and Hazard Assessment.

Regional authority for planning, permitting, and enforcement is delegated to the nine RWQCBs. The regional boards are required to formulate and adopt water quality control plans for all areas in the region and establish water quality objectives in the plans. The Specific Plan area is within the jurisdiction of the North Coast RWQCB.

The Porter-Cologne Water Quality Control Act (Porter-Cologne Act) of 1969 is California's statutory authority for the protection of water quality. Under the act, the State must adopt water quality policies, plans, and objectives that protect the State's waters for the use and enjoyment of the people. The act sets forth the obligations of the SWRCB and RWQCBs to adopt and periodically update water quality control plans (Basin Plans). Basin Plans are the regional water quality control plans required by both the CWA and Porter-Cologne Act in which beneficial uses, water quality objectives and implementation programs are established for each of the nine regions in California. As issued under the North Coast RWQCB Water Quality Control Plan, Santa Rosa area falls under the Water Quality Control Plan (Basin Plan) for the North Coast Basin. The act also requires waste dischargers to notify the RWQCBs of their activities through the filing of Reports of Waste Discharge (RWD) and authorizes the SWRCB and RWQCBs to issue and enforce waste discharge requirements (WDRs), NPDES permits, Section 401 water quality certifications, or other approvals.

b. Waterways

The California Department of Fish and Wildlife (CDFG) requires a Streambed Alteration Agreement prior to any construction activity occurring within the bed, channel or banks of any California river, stream or lake (see Fish and Game Code, Section 1601-1603). Such an agreement would be required in the event that redevelopment of the City Hall site would require construction within the creek beds.

3. Local Programs and Regulations

a. City of Santa Rosa General Plan Goals and Policies

The City of Santa Rosa's existing General Plan includes various goals and policies that relate to managing, maintaining, and improving stormwater drainage and capacity. In the Public Services and Facilities Element, Goal PSF-I and Policies PSF-I-1 through PSF-I-9 outline stormwater and other drainage considerations, especially for creek runoff. In the Noise and Safety Element, Goal NS-C and Policy NS-C-7 prohibit water storage facilities, water conveyance facilities, levees, and water detention facilities to be developed in high-risk seismic hazard areas. In terms of flooding, Goal NS-D and Policies NS-D-1 through NS-D-4 describe how to minimize hazards with storm flooding and drainage requirements for new development.

b. Santa Rosa Storm Water Management Plan

In 1997, Santa Rosa was issued a joint NPDES permit with the County of Sonoma and Sonoma County Water Agency (SCWA) by the RWQCB. The NPDES permit identifies the Storm Water Management Plan (SWMP) implemented by the City to control and eliminate stormwater pollution discharge. The City must comply with the provisions of the permit by ensuring that new development and redevelopment mitigate water quality impacts to storm water runoff both during construction and operation periods of projects.

Under direction from the SWRCB, the City prepared a Standard Urban Stormwater Mitigation Plan (SUSMP). The SUSMP was developed in 2003 as a part of the NPDES permit for the City of Santa Rosa, the County of Sonoma and the SCWA. The purpose of the SUSMP is to manage the quality and quantity of storm water runoff in the Santa Rosa area and to aid in the conservation of natural areas in the region. The SUSMP describes and evaluates various "Best Management Practices" (BMPs) for storm water management and outlines procedures for BMP maintenance and inspection. Both private-sponsored and public capital

improvement projects in the Santa Rosa area are governed by SUSMP requirements.

Additionally, a Notice of Intent (NOI) with the RWQCB is required to be covered under the State NPDES General Construction Permit for discharges of storm water associated with construction activity. A developer must propose control measures that are consistent with the State General Permit. A Storm Water Pollution Prevention Plan (SWPPP) must be developed and implemented for each site covered by the general permit. According to the City of Santa Rosa Public Works Department's Storm Water Management Plan, a SWPPP should include SUSMP BMPs designed to reduce potential impacts to surface water quality during construction of the project.

c. The Citywide Creek Master Plan

The Citywide Creek Master Plan provides a set of creek-related policies and recommendations for site-specific improvements to the nearly 100 miles of creeks found throughout Santa Rosa. The plan was first adopted in 2007 and was updated in 2013. Recommendations include areas for habitat conservation, design guidelines, creek restoration, watershed-specific recommendations and plan concepts. Section 4.2.1 of The Citywide Creek Master Plan provides watershed specific recommendations for Santa Rosa Creek. This plan splits up the Santa Rosa Creek watershed into 8 reaches; reaches 3, 4 and 5 are within the downtown specific plan area and are summarized in the next section.

d. Groundwater Master Plan

In 2013, the City of Santa Rosa adopted a Groundwater Master Plan (GWMP) which proves a strategic road map on how available groundwater can be most effectively used in a sustainable manner to meet the current and future needs of Santa Rosa residents. The GWMP includes recommendations and policies designed to guide the future role of groundwater and promote balanced use and sustainability for the groundwater resources available to the City.

e. Other Plans

In addition to the plans listed above, below is a list of other plans that have been adopted by the City of Santa Rosa that contains policies and recommendations to hydrology and water use:

- Incremental Recycled Water Program Master Plan (2007)
- Sewer Master Plan (2014)
- Urban Water Management Plan (2015)
- Water Master Plan (2014)
- Salt and Nutrient Plan (2014)

Environmental Setting

This section discusses the existing hydrology and water quality setting of the Specific Plan area.

1. Climate and Topography

The Specific Plan area is located in Downtown Santa Rosa, near the juncture of Highway 101 and Highway 12. The topography of the area is generally flat and slopes gently toward the southwest. Ground elevations range from approximately 140 feet above mean sea level (msl) at the western boundary of the Specific Plan area to 165 feet above msl at the eastern boundary.

The regional climate is characterized as Mediterranean, with dry, mild summers and moist, cool winters. About 80 percent of the total annual precipitation occurs during the months of November through March, with an average annual precipitation of 30 inches. According to the Western Regional Climate Center, average monthly temperatures range from a high of 83 degrees Fahrenheit in the summer to a low of 37 degrees Fahrenheit in the winter.

2. Regional Hydrology

The Specific Plan area is contained within the Santa Rosa Creek and Laguna de Santa Rosa sub-watersheds of the greater Russian River watershed (USGS Hydrologic Unit 18010110). Santa Rosa Creek, which passes through the southern portion of the Specific Plan Area, flows into the Laguna de Santa Rosa, which flows into the Russian River and ultimately drains into the Pacific Ocean near the town of Jenner on the Sonoma Coast. Together, the Santa Rosa Creek and Laguna de Santa Rosa sub-watersheds cover approximately 170 square miles in eastern and central Sonoma County.

Both the Santa Rosa Creek and Laguna de Santa Rosa sub-watersheds provide habitat for a number of rare, threatened and endangered species. The Laguna de Santa Rosa is the second largest freshwater wetland complex in Northern California and is an important migratory stopover for over 200 species of birds along the Pacific Flyway. Both the Laguna and Santa Rosa Creek are passageways for Coho salmon, Chinook salmon and steelhead. However, agricultural and urban developments over the past 150 years have significantly degraded the environmental quality of the major waterways of the region.

Santa Rosa Creek and the Laguna de Santa Rosa are currently listed on the Clean Water Act Section 303(d) List of Impaired Waterbodies. In this section, impairments for Santa Rosa Creek are indicated to be pathogens, sedimentation-siltation, and elevated water temperature and impairments for Laguna de Santa Rosa are indicated to be excessive sedimentation-siltation, phosphorous, nitrogen, mercury, low dissolved oxygen and elevated water temperatures.

3. Specific Plan Area Drainage

Santa Rosa Creek runs from east to west through the southern portion of the Specific Plan area. Throughout the Specific Plan area and larger Downtown area, the creek is contained in a trapezoidal channel for flood control purposes. The City is currently in the process of “naturalizing”

Santa Rosa Creek in the Downtown area, including removing hardscape elements and providing habitat enhancement. Runoff from the paved surfaces of the Specific Plan area is collected in curbside gutters and storm drain inlets and routed through the City’s subterranean storm drain system to various outlets along the creek.

In the vicinity of the proposed SMART rail station and in most areas south of the station site, the land within the existing railway easement (approximately 25 to 30 feet on either side of the railroad tracks) is unpaved. There are no storm drain inlets in these areas; surface runoff ponds on top of the soil and gravel beside the railroad tracks and eventually infiltrates into the sub-surface.

4. Groundwater

The California Department of Water Resources (DWR) defines State groundwater basins based on geologic and hydrogeologic conditions. According to the DWR, the Specific Plan area is located in the Santa Rosa Plain Sub-basin of the greater Santa Rosa Valley Groundwater Basin. US Geological Survey Water Supply Paper 1427 established that the primary water-bearing unit of the Santa Rosa Plain Sub-basin is the Merced Formation, a Pliocene marine deposit of fine sand and sandstone with thin interbeds of clay and silty-clay, some lenses of gravel and localized fossils. Lower water-bearing units in the Santa Rosa Plain Sub-basin include the Glen Ellen Formation and Alluvium.

The City maintains a total of six municipal groundwater wells within the Santa Rosa Plain Sub-basin of the Santa Rosa Valley Groundwater Basin. Two wells are operated primarily to provide some landscape irrigation, and these wells are also permitted by the California Department of Health Services (DHS) to operate during an emergency outage condition; the status of two wells (Farmers Lane Wells No. 1 and 2) were recently changed from emergency to active status (by DHS on July 20, 2005); one well is operated to provide minor amounts of landscape irrigation water supply only; and one well only provides water during an emergency outage condition. Since 2000, the City has only pumped an estimated 161

acre-feet of groundwater from these wells, which averages approximately 27 acre-feet per year (afy) for the last six years. According to the Water Supply Assessment for Downtown Station Area Specific Plan, based on projected future use of the converted Farmers Lane wells, projected City groundwater pumpage is anticipated to be up to 2,300 afy, about 6.6 percent of the City's projected total water supply, by the year 2020.

According to a 1982 DWR study "Evaluation of Groundwater Resources in Sonoma Valley, Volume 2: Santa Rosa Plain" groundwater quality in the sub-basin is generally in compliance with drinking water quality standards; most groundwater problems in the basin are aesthetic issues associated with high hardness or high concentrations of iron and manganese. However, low-level contamination of groundwater exists within the Specific Plan area due to the industrial history of the area. Groundwater quality within the Specific Plan area is described in the Hazardous Materials as well.

According to well log data maintained by the DWR with data from Environmental Data Resources, depth to groundwater in the Specific Plan area ranges between seven and 25 feet below ground surface (bgs), with most groundwater located between nine and 15 feet bgs. Groundwater flow in the area is generally westerly. However, based on the relatively shallow depth to groundwater and the depth of the creek channel, some local groundwater is assumed to flow into Santa Rosa Creek on a seasonal basis.

According to the DWR Bulletin 118, a groundwater model for the Santa Rosa Plain Sub-basin was prepared by the DWR in 1982. The 15-year period from 1960-61 through 1974-75 was selected as the study period for the Santa Rosa Plain Sub-basin because it contained a mixture of wet and dry years approximating long-term climatic conditions. The City of Santa Rosa 2006 Water Supply Assessment for Downtown Station Area Specific Plan found that the average annual natural recharge for the period 1960 to 1975 was estimated to be about 29,300 afy. Average annual pumping during the same time period was estimated to be

approximately 29,700 afy, indicating that the annual natural recharge and the annual pumping within the sub-basin were essentially in balance.

5. Flooding

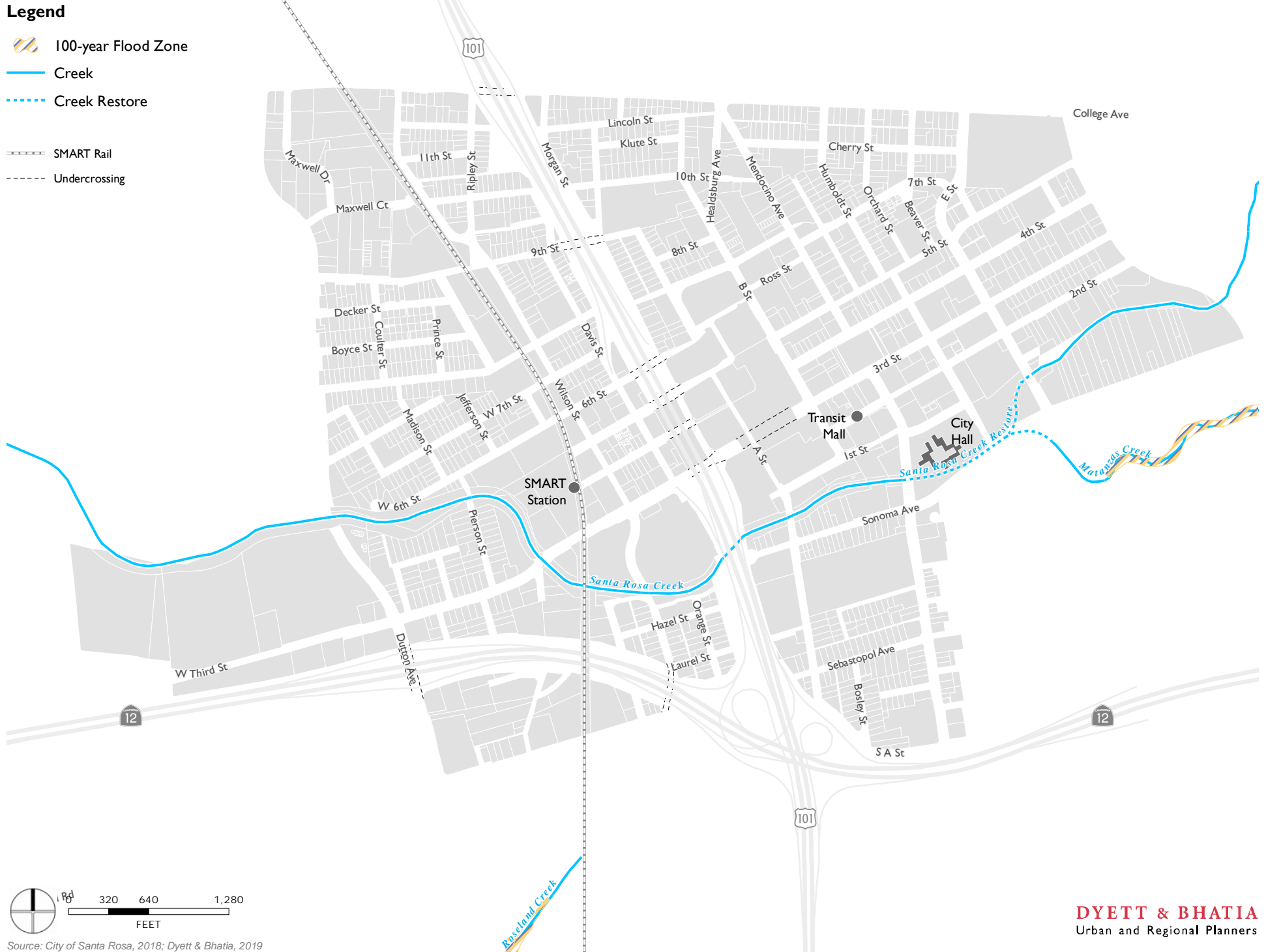
In response to major flooding in the 1930s and 1950s, many of Santa Rosa's waterways were channelized and several weirs and reservoirs were constructed. This flood control work was completed in the 1970s and is detailed in the 1958 Central Sonoma Watershed Plan. In the late 1990s, the Army Corps of Engineers (ACOE) initiated a study that considered removal of levees paired with creek restoration and additional flood control measures. The study was dropped by the ACOE in 2015, but is expected to resume under the custodianship of Sonoma Water. Associated with this initiative, new Federal Emergency Management Agency (FEMA) flood maps are being produced, which have the potential to expand the mapped 100-year flood plain into portions of the DSASP plan area. Additionally, a storm drain master plan is expected to be prepared and adopted within the DSASP study window. The current FEMA flood map has been prepared for the Specific Plan Area and shown in Figure 7.8.

6. Creeks

Description of the Creeks

Figure 7.8 shows the location of the two creeks within the study area: Matanzas Creek and Santa Rosa Creek. Only a small portion of Matanzas Creek is in the study area and acts as a tributary to Santa Rosa Creek. Section 4.2.1 of The Citywide Creek Master Plan provides watershed specific recommendations for Santa Rosa Creek. This plan splits up the Santa Rosa Creek watershed into 8 reaches; reaches 3, 4 and 5 are within the Downtown Station Area Specific Plan and are summarized in this section. Currently, there are no trails along Matanzas Creek and the creek is lined with private property owners. However, if it is decided to add a trail, there is an opportunity to connect Downtown Santa Rosa to the

Figure 7.8 FEMA Flood Map and Nearby Creeks



proposed Southeast Greenway, which is outside the study area near Montgomery High School and Hoen Avenue.

Santa Rosa Creek Reach 3: Farmers Lane to E Street (stretch east of City Hall)

Reach 3 is located on the western side of the study area and is recommended for preservation due to its value as fish and wildlife habitat. There is a proposed paved trail planned that would be located on the south/left bank of the creek between Memorial Hospital and Brookwood Avenue, west of Brookwood Avenue on the north/right bank of the creek, and the stretch between Memorial Hospital and E Street, the trail can be located on either side of the creek as an alternate. Additional trail undercrossings at Montgomery Drive and Brookwood Avenue are proposed as well.

Santa Rosa Creek Reach 4: E Street to Pierson Street (City Hall to SMART station area)

Reach 4 is the primary stretch within the Specific Plan area. The western stretch is culverted underneath City Hall, Sonoma Avenue, and the Federal Building at 777 Sonoma Ave, with the confluence of Matanzas and Santa Rosa creeks happening near D Street and Sonoma Avenue. The Prince Memorial Greenway Trail starts from Santa Rosa Avenue at Gateway Park and continues west and becomes Santa Rosa Creek Trail at West Third Street. The Citywide Creek Master Plan supports daylighting and restoring the culverted Santa Rosa Creek and Matanzas Creek through this area and potentially extending the Prince Memorial Greenway or adding a Creek Walk. Near the SMART station area, the Prince Memorial Greenway connects to the Joe Rodota Trail. The Joe Rodota Trail is proposed to be extended through to West Third Street and could be extended up north to connect to the SMART Trail system.

Santa Rosa Creek Reach 5: Pierson Street to Stony Point Road (stretch west of the SMART station area)

Reach 5 extends west of the SMART station within the Specific Plan area and runs along the northern edge of Imwalle Gardens. There is an existing Class 1 paved access road/trail along the north/right bank and an unpaved access road/trail along the south/left bank of the creek for the entire distance of this reach. While both trails go underneath Dutton Avenue, currently only the north/right bank trail connects up to the street. There are multiple entries proposed along this stretch which could be incorporated in the Specific Plan.

7.4 Key Findings and Planning Considerations

Geology and Soils

- In general, soils conditions are suitable for development and may be engineered in accordance with the California Building Code and other geotechnical requirements to provide sufficient foundation for structures.
- Any development along Santa Rosa Creek may be susceptible to significant site constraints or mitigation requirements, including liquefaction and slope stability. This is particularly important if the City Hall site is redeveloped.
- Like the rest of California, Downtown Santa Rosa is subject to earthquakes. While the planning area is not directly on top of active earthquake fault zone, it is adjacent to the active Healdsburg-Rodgers Creek fault, located approximately 1.4 miles east of the Santa Rosa Downtown SMART station site and 3,500 feet east of the eastern edge of the planning area. As such, new buildings should be seismically reinforced and historic buildings could be examined and retrofitted.

- Due to the 2014 South Napa earthquake, additional fault segments which had not been previously recognized emerged along the southern portion of the West Napa fault, located 24 miles southeast of the planning area.

Hazardous Materials

- Often the most significant soil and groundwater contamination is associated with leaking underground storage tanks, especially older tanks placed in the 1970s and 1980s or earlier.
- Redevelopment of sites with older structures must consider the hazards associated with old lead-based paint and asbestos containing building materials that may be found in older structures and be handled as hazardous materials during demolition activities.
- The distribution of hazardous materials sites is controlled by zoning and proximity to transportation corridors. Downtown residential areas have relatively few or no sites, however, there are many hazardous materials sites along the railroad corridor near downtown Santa Rosa. There is also a concentration of sites east of Santa Rosa Plaza in the area between Mendocino Avenue and B Street. Due to the close proximity of sites there may be an area-wide contamination issue, such as contaminated groundwater, rather than constrained to individual sites.
- Sites that are already remediated or do not have any hazardous materials associated with the land should be prioritized to be developed first. Much of the larger industrial sites, such as the Maxwell Court site and the Sebastopol Road/Roberts Avenue sites will likely require significant remediation following closure of local businesses and subsequent reconstruction. The cost of remediation will depend upon the length and nature of work and would typically be borne by the property owner or responsible

party as determined by the regulatory agency responsible for oversight. While hazards and hazardous materials would not preclude development of the project, the cost of remediation as part of site redevelopment would be a significant initial cost if the land purchase were for an “as-is” condition.

- Post development impacts will depend upon the nature of the new development. Redevelopment of industrial areas with environmentally engineered commercial and residential development would likely lower public risk to hazardous materials exposure.

Hydrology and Flooding

- Based on current FEMA flood mapping, there is minimal risk of flooding downtown; however, Sonoma Water is currently undertaking a study of additional flood control measures to be paired with creek bed naturalization and the removal of levees. It is anticipated that this initiative could expand the 100-year flood plain into the downtown planning area and FEMA flood maps will be updated to reflect new conditions in parallel with the Sonoma Water initiative.
- The Santa Rosa General Plan and the Santa Rosa Storm Water Management Plan include measures applicable to new development to manage the volume and velocity of stormwater and minimize flooding risk. Additionally, the City is currently preparing a storm drain master plan, which will identify and address currently and future needs in the area, accounting for existing and planned development in the planning area.