
Appendix 3-J
Preliminary Geotechnical Assessment – Burns & McDonnell



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Preliminary Geotechnical Narrative

Project: SoCalGas Ventura Compressor Modernization – Site Alternatives Assessment

Site: Ventura Steel

Date: 7/28/2025

Preliminary Geotechnical Narrative

Note the contents of this Preliminary Geotechnical Narrative specifically excludes design considerations and impacts associated with environmental contaminants, active/decommissioned nearby oil and gas wells, wildfires, and dam inundation risks.

Site Conditions

The Ventura Steel site is located approximately 7000-feet north of the existing Ventura Compressor Station on the east side of the SR-33 corridor in Ventura County, CA. The site is located within an approximately 9-acre brownfield oil extraction area situated within the alluvial valley of the Ventura River. The site is relatively flat and is bounded by North Ventura Avenue to the west, East Shell Rd to the south, and foothills containing active oil fields to the east. An aerial image of the proposed site is presented in Figure 1.



Figure 1: Aerial Image of the Ventura Steel Site (Google Earth, 2025)

Pipeline Alignment Conditions

The proposed pipeline route for the Ventura Steel site consists of an approximately 2.4-mile long subterranean pipeline system (two suction and two discharge pipelines). The discharge alignment is approximately 2.4 miles in length, while the suction alignment is approximately 1.9 miles in length. The proposed subterranean pipeline system consists of approximately 8 total miles of new pipeline. The suction pipeline alignment runs from the proposed Ventura Steel site in the north, along undeveloped hillsides and beneath streets and ties into the existing natural gas transmission pipelines to the south (Figure 2). The discharge pipeline alignment follows the same route as the suction pipeline alignment before diverging to the west and running beneath Rocklite Rd and N Olive St to tie into the existing compressor station (Figure 2). Active oil fields lie along the northern stretch of both alignments. The ground elevation along the proposed suction alignment varies significantly, with approximately 430-ft of total elevation change. Likewise, there is approximately 450-ft of total elevation change along the discharge alignment. Slopes range from <5% to >50% along the alignments.

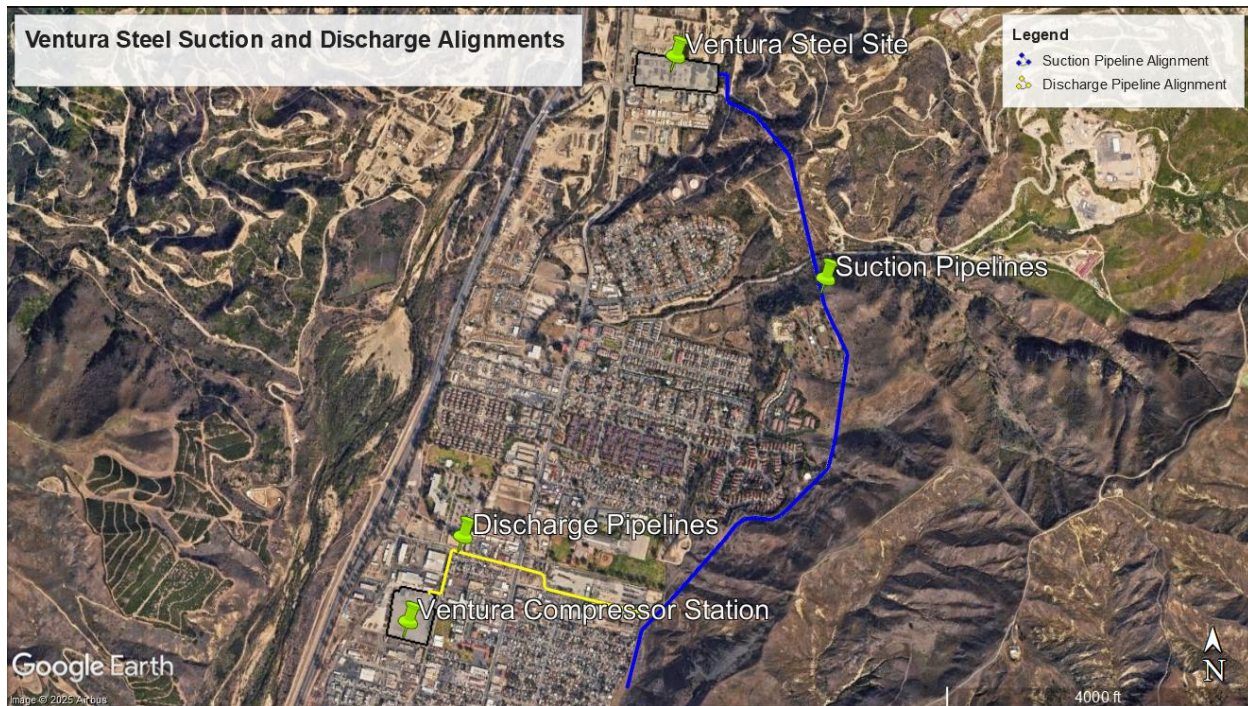


Figure 2: Ventura Steel Proposed Pipeline Alignment (Google Earth, 2025)

General Subsurface Conditions

Based on “Geologic Map of the Ventura 7.5’ Quadrangle Venture County, California: A Digital database” provided by United States Geological Survey (USGS) and the California Department of Conservation (CDC) 2003, identified soil types at the Ventura Steel Site generally consist of Holocene stream terrace deposits [Qht] and Holocene alluvial fan deposits [Qhf]. Holocene stream terrace deposits [Qht] are typically encountered in point bar and overbank settings and consist of unconsolidated clayey sand and sandy clays with gravel. Holocene alluvial fan deposits [Qhf] are typically encountered by streams emanating from mountain canyons onto alluvial valley floors. These deposits originate as debris flows, hyper-concentrated mudflows, or braided stream flows and are composed of moderately to poorly sorted and moderately to poorly bedded sandy clays with some gravel.

Groundwater levels at the site are unknown but are expected to reflect seasonal levels associated with the neighboring Ventura River (approximately 1,500-ft west of the site).

Subsurface Conditions Along Proposed Pipeline Alignments

Geological information about the surficial soils relevant to the design of the proposed pipeline alignments can be found on the “Geologic Map of the Ventura 7.5’ Quadrangle Venture County, California: A Digital database” provided by United States Geological Survey (USGS) and the California Department of Conservation (CDC) 2003. Bedrock composition along the proposed

alignments can be found on the “California Geological Survey 150th Anniversary Geologic Map of California 2010” by Jennings (1977) and Gutierrez et al (2010).

Both alignments cross through undivided Holocene alluvial, colluvial, and active stream deposits on the floors of valleys, composed of unconsolidated sandy clay with some gravel [Qha], Pleistocene Santa Barbara claystone, containing Monterey Formation shale fragments [Qsb], Holocene to Pleistocene landslide deposits and active landslides, composed of weathered broken-up rocks [Qls], the Pliocene undivided Pico Formation, composed of claystone, siltstone, and sandstone which is locally pebbly [Tp], and Holocene alluvial fan deposits, deposited by streams emanating from mountain canyons onto alluvial valley floors [Qhf]. Where it diverges from the suction alignment, the discharge alignment crosses through undivided Holocene alluvial, colluvial, and active stream deposits [Qha] and historically active wash deposits adjacent to an active channel, composed of unconsolidated sands, silts, and gravels [Qw1].

Both alignments cross several mapped active and recent landslides as shown in Figure 3. Surficial soils and bedrock such as Santa Barbara claystone [Qsb], Holocene and Pleistocene landslide deposits [Qls], and the Pico Formation [Tp] are noted as extremely susceptible to landsliding. Landslides along the alignments include debris slides, soil slides, soil topples, earth flows, and rockslides. Mapped landslides are moderate to deeply seated (10- to >50-ft thick). Continued and renewed landsliding is highly likely within previously displaced landslide material.

Groundwater levels along the proposed pipeline alignments are unknown.

Preliminary Geotechnical Narrative (cont'd)

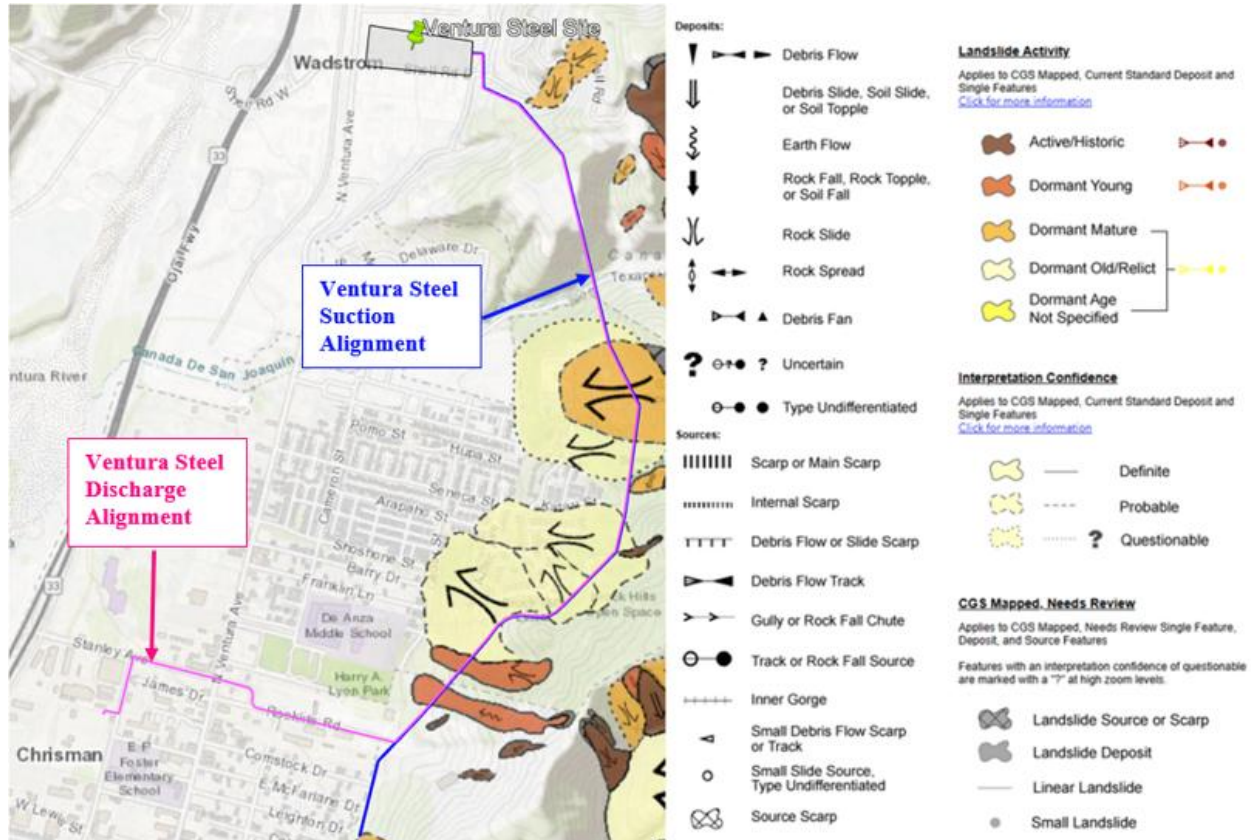


Figure 3: California Geological Survey Landslide Inventory in Relation to the Ventura Steel Pipeline Alignment (California Geological Survey, 2015)

Bedrock along the alignments is sedimentary in nature and consists of sandstone, siltstone, shale, and conglomerate from the Pliocene epoch. Santa Barbara claystone and the Pico formation are also known to underlie sections of the proposed alignments. Commencing at mile marker 0.0, as shown in Figure 4, depth to bedrock is between 4- to 6-ft below grade from approximately mile 0.0 to 0.3. From mile 0.3 to 0.4, bedrock is estimated to be greater than 6-ft below grade. Bedrock from approximately mile 0.4 to 0.5 is between 4- to 6-ft below grade. From approximately mile 0.5 to 0.6, bedrock is at a depth greater than 6-ft below grade. From approximately mile 0.6 to 0.7, the depth to bedrock is between 3- to 4- ft below grade. From approximately mile 0.7 to 1.0, bedrock is deeper than 6-ft below grade. From approximately mile 1.0 to 1.1, bedrock is at a depth between 2- to 3-ft below grade. Bedrock from approximately mile 1.1 to 1.4 is greater than 6-ft below grade. Bedrock from approximately mile 1.4 to 1.5 is between 2- to 3-ft below grade. From approximately mile 1.5 to 1.6, bedrock is greater than 6-ft below grade. Bedrock from approximately mile 1.6 to 1.7 is between 4- to 6-ft below grade. Bedrock from approximately mile 1.7 to 1.8 is greater than 6-ft below grade. Bedrock beneath

the remaining length of the suction and discharge alignments is generally estimated to be deeper than 6-ft below grade.

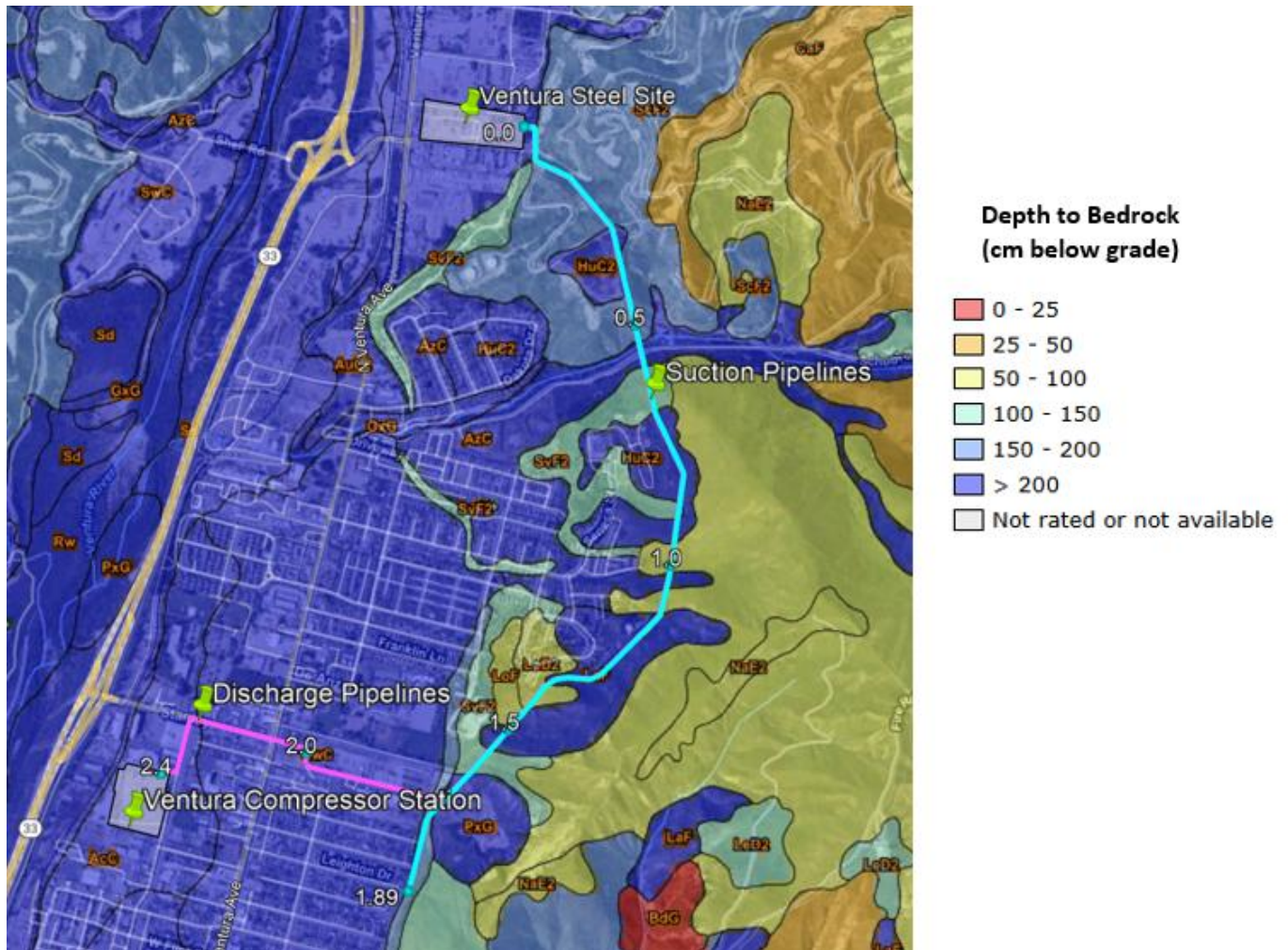


Figure 4: Mapped Depth to Bedrock (United States Department of Agriculture National Resources Conservation Service (USDA NRCS), 2025)

Anticipated GeoHazards

A cursory review of geological hazards from publicly available data pertinent to the Ventura Steel Site and pipeline alignments are summarized in Tables 1 and 2, respectively.

Preliminary Geotechnical Narrative (cont'd)



Page 7

Table 1: Ventura Steel Site GeoHazards Summary

Geohazard	Details	Hazard Level	Source
Fault Rupture	No mapped faults identified to intersect the site.	Low	California Geological Survey (CGS) Fault Maps
Strong Ground Shaking	Mapped $PGA_M = 1.091$, Ground Motion Hazard Analysis required per Section 11.4.8 of ASCE 7-16.	High	American Society of Civil Engineers (ASCE) 7 Hazard Tool
Landslide	Geologic units near the site are noted as moderately to extremely susceptible to landsliding. However, landslide potential for the site is mapped as Low (Figure 6).	High to Low	California Geological Survey (CGS) Landslide Inventory
Liquefaction	Site within mapped hazard area (Figure 7).	High	California Geological Survey (CGS) Seismic Hazard Maps
Flooding	Federal Emergency Management Agency (FEMA) Zone 'X' Designation – Area of Minimal Flood Hazard.	Low	FEMA National Flood Hazard Maps
Tsunamis	Site is outside of mapped hazard area.	Low	California Geological Survey/National Oceanic and Atmospheric Administration Tsunami Hazard Area Map
Shrink/Swell Potential	Soils prone to moisture induced volumetric changes identified at the site.	Moderate	United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) Soil Survey Maps
Corrosion	Soils identified as potentially degradative to exposed buried concrete or steel elements identified at the site.	Low to Moderate	

Table 2: Ventura Steel Suction and Discharge Pipelines GeoHazards Summary

Geohazard	Details	Hazard Level	Source
Fault Rupture	Late Quaternary, moderately constrained, unnamed fault identified to intersect the alignment (Figure 5).	High	California Geological Survey (CGS) Fault Maps
Strong Ground Shaking	Mapped $PGA_M = 0.97$, Ground Motion Hazard Analysis required per Section 11.4.8 of ASCE 7-16.	High	ASCE (American Society of Civil Engineers) 7 Hazard Tool
Landslide	The alignments intersect known active and recent landslide deposits as mapped in 2015 (Figures 3 and 6). Mapped landslides are 10 to >50-ft in thickness. Some geological units along the alignment are noted as being extremely susceptible to landslides (California Geological Survey, 2003). CA Department of Conservation (CDC) and CA Geological Survey (CGS) Earthquake Zones of Required Investigation Map = Alignments span mapped zones of landslide potential (Figure 7).	Moderate to High	California Geological Survey (CGS) Landslide Inventory California Geological Survey (CGS) and California Department of Conservation (CDC)
Liquefaction	The northern part of both alignments and the western part of discharge alignment are within mapped hazard areas (Figure 7).	Low to High	California Geological Survey (CGS) Seismic Hazard Maps
Flooding	Alignments fall within FEMA Zone 'X' Designation – Area of Minimal Flood Hazard. Western part of the discharge alignment is noted as being in FEMA Zone 'X' – Area with Reduced Flood Risk due to Levee (Figure 8)	Low	Federal Emergency Management Agency (FEMA) National Flood Hazard Maps

Table 2 (cont.). Ventura Steel Suction and Discharge Pipelines GeoHazards Summary

Geohazard	Details	Hazard Level	Source
Tsunamis	Alignments fall outside mapped hazard area.	Low	California Geological Survey (CGS)/National Oceanic and Atmospheric Administration (NOAA) Tsunami Hazard Area Map
Shrink/Swell Potential	Soils prone to moisture induced volumetric changes identified along the alignments.	Low to High	United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS) Soil Survey Maps
Corrosion	Soils identified as potentially degradative to exposed buried concrete elements along the alignments. Soils identified as potentially degradative to exposed buried steel elements along the alignments.	Low to Moderate Moderate to High	

Potential Site and Alignment Impacts

Based upon publicly available information, the Ventura Steel site is likely to be comprised of colluvial and alluvial deposits, underlain at depth (>6-ft below grade) by weak sedimentary bedrock. The pipeline alignments are likely to be underlain by a combination of alluvial, colluvial, and active stream deposits in sloped areas, active and recent landslide deposits, alluvial fan deposits, historically active wash deposits, as well as by Santa Barbara claystone and the Pico Formation.

Potential impacts to the proposed compressor station site and pipelines are as follows:

- An ASCE 7-required Ground Motion Hazard Analysis (GMHA) will be required during the future site and alignment-specific geotechnical investigations. At minimum, design foundation and retaining/slope systems will need to consider the effects of strong ground shaking and vet the likelihood of the geohazards described in Tables 1 and 2.

- Although the requirements stated in the 1993 California Alquist-Priolo Earthquake Faulting Zone Act do not apply to pipelines, the pipelines may be negatively impacted by surface fault rupture. The alignments intersect a late quaternary, moderately constrained, unnamed fault spanning approximately 0.15 miles (Figure 5). Although limited data about the fault is available from the California Geological Survey, the pipelines' intersection with the unnamed fault should be thoroughly evaluated by SoCalGas with respect to long-term performance.
- Coordination with local agencies for the identification of any more restrictive requirements beyond State law regarding the alignments' crossing of a mapped fault is recommended. Geotechnical risks to be further identified and/or evaluated through the performance of alignment-specific geotechnical investigations should include a detailed fault study of the proposed pipeline alignments.

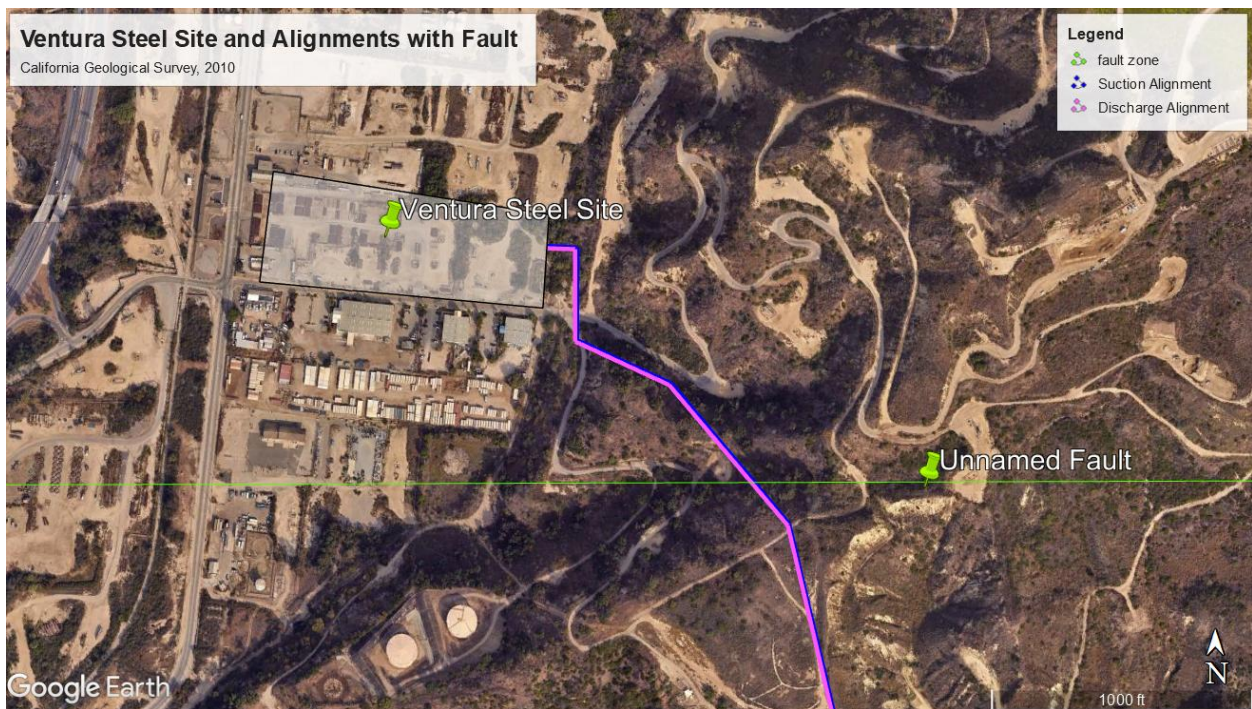


Figure 5: Aerial Schematic of Unnamed Fault Intersecting the Ventura Steel Pipeline Alignments (Google Earth, 2025 and California Geological Survey, 2010)

- The site is located adjacent to a steeply sloped area identified to have high landslide potential ($>15\%$) (Figure 6). While grading activities at the site are not expected to impact the known landslide risks nearby, by virtue of proximity, the site could be negatively impacted by a neighboring slope failure (i.e. blocked access roads). Geotechnical risks to be further identified and/or evaluated through the performance of site and alignment-specific geotechnical investigations should include (but not be limited

to) a static and seismic global stability analysis of slopes near the proposed site and alignments.

- Sections of the proposed alignments span across mapped active and recent landslide deposits as seen in Figure 3 (California Geological Survey, 2015). Additionally, sections of the proposed alignments are located within steeply sloped areas identified to have high landslide potential ($>15\%$) (Figure 6). It is unknown if any of the known slope instabilities have been stabilized. Mapped landslides are moderate to deeply seated (10- to >50 -ft). The alignments also span earthquake-induced landslide zones as shown in Figure 7 (California Geological Survey, 2003). The pipelines may be negatively impacted by slope failures directly along the proposed alignments, resulting in damage to pipelines or blocked access roads.

Given the high landslide potential of the area and the presence of known active and recent landslides, geotechnical risks to be further identified and/or evaluated through the performance of alignment-specific geotechnical investigations should include, but not be limited to:

- o Static and seismic global stability of the existing slopes along the proposed pipeline alignments and access roadways.
- o Drainage and erosion potential of the area relative to any proposed earthwork activities.

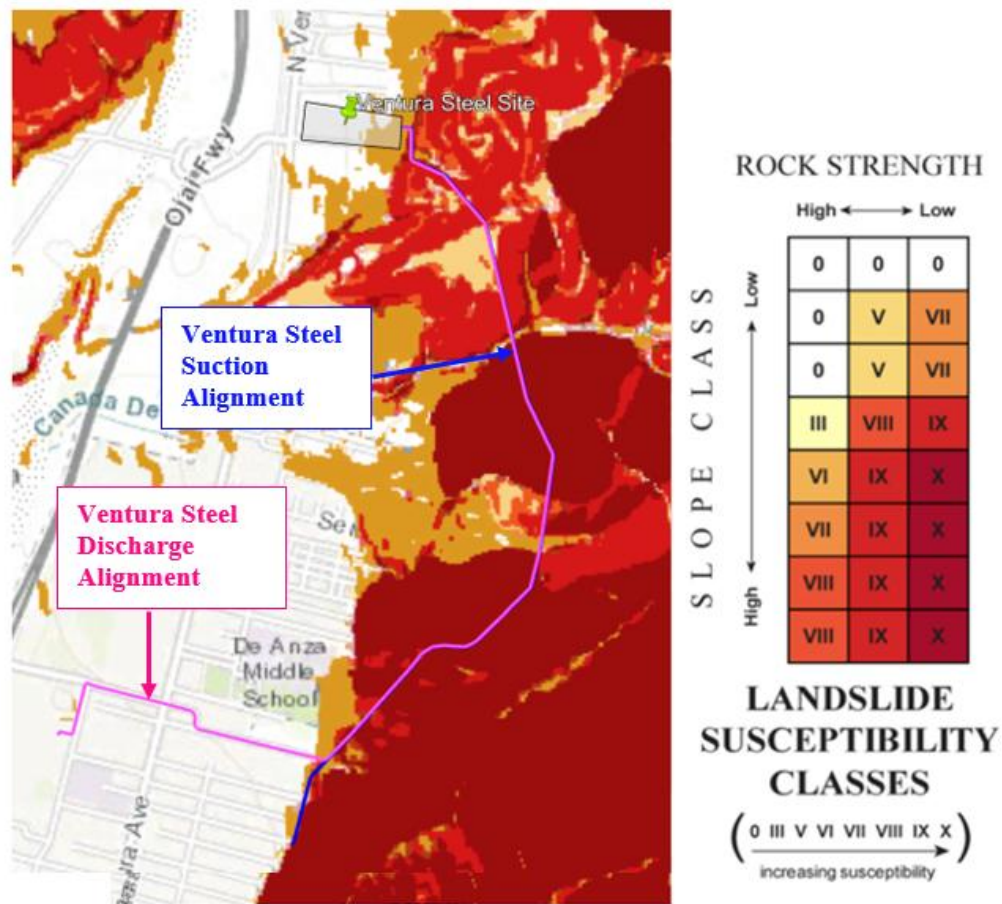


Figure 6: California Geological Survey Landslide Susceptibility Class Map per Wilson and Keefer (1985) and Ponti et al (2008)

- Per California Geological Survey (CGS) Earthquake hazard maps, the compressor station site is in a liquefaction hazard zone (Figure 7). The northernmost section of the proposed suction and discharge alignments and the western part of the discharge alignment also cross into liquefaction hazard zones (Figure 7). Liquefaction is generally defined as a phenomenon that occurs when saturated granular soils are subjected to strong ground shaking. During shaking, in-situ porewater pressures exceed the effective stress of the soil, subsequently reducing its strength and stiffness and making it behave as a fluid. Negative structural effects commonly associated with liquefaction include increased settlements, loss of bearing capacity, and buoyancy uplift effects (buried structures).

The performance of site and alignment-specific geotechnical investigations should further identify the liquefaction susceptibility of the site and alignments as a function of strong ground shaking, subsurface conditions, and depth to groundwater. Structures sensitive to vertical movement at the compressor station and along the pipeline may require deep

foundation systems to prevent bearing capacity failure, limit settlement, and generally mitigate the negative effects of liquefaction.

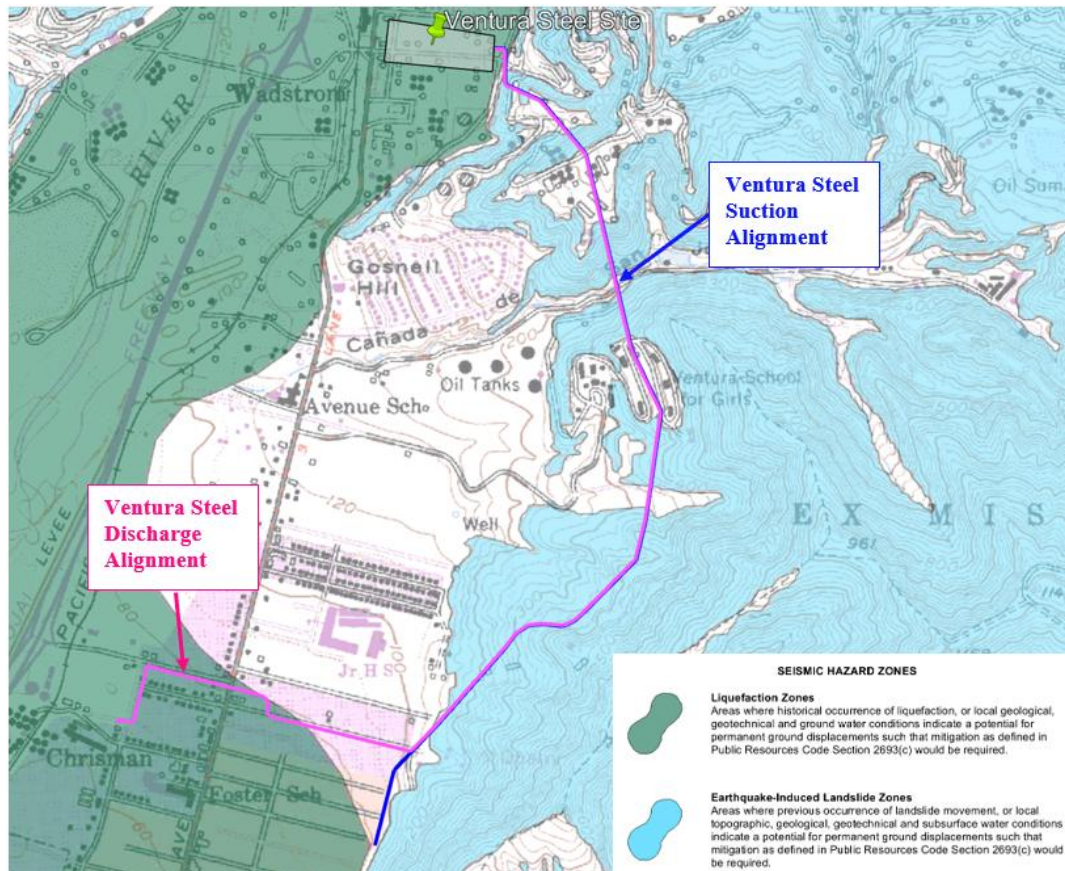


Figure 7: Earthquake Zones of Required Investigation (California Geological Survey, 2003)

- The Ventura Steel suction and discharge alignments run through areas of minimal flood hazard. The westernmost section of the discharge alignment is within an area of reduced flood risk due to the presence of a levee (Figure 8). Supplemental Federal Emergency Management Agency (FEMA) maps are attached in Exhibit A to support both alignments' low risk characterization.

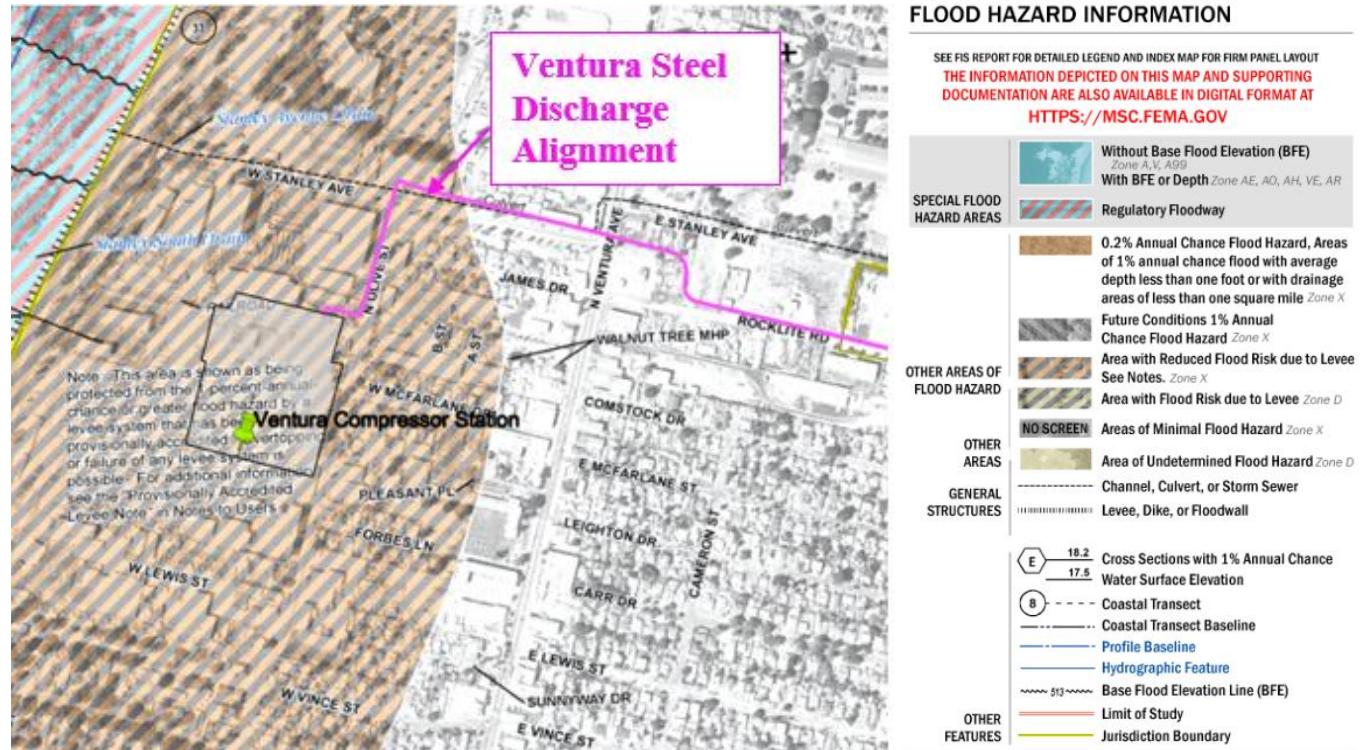


Figure 8: Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for Ventura County, CA (FEMA, 2021)

- Potentially compressive and unsuitable materials in surficial soils may be present at the Ventura Steel site and along the pipeline alignments. For shallow foundations, depending on the severity of the compressibility/shrink-swell potential, additional mitigation measures may be required, such as over-excavation and replacement. If deep foundations are required, increased embedment depths may be needed.
- Concrete and steel foundations could be affected by corrosion, which may lead to an increase in thickness to account for sacrificial steel or the consideration of special coatings. Corrosion potential may impact the overall foundation design and require site-specific investigation.

Exhibits

A – Supplemental Federal Emergency Management Agency (FEMA) National Flood Hazard Maps