6 Alternatives

6.1 Introduction

This chapter describes alternatives to the proposed Newell Creek Pipeline (NCP) Improvement Project (Proposed Project), consistent with California Environmental Quality Act (CEQA) Guidelines Section 15126.6. This chapter presents the objectives of the Proposed Project, a summary of its significant environmental impacts, and a description of the alternatives that were considered but eliminated from further consideration, followed by an analysis of the three alternatives evaluated, including the No Project Alternative. A comparison of the alternatives to the Proposed Project is provided and the environmentally superior alternative is identified.

According to CEQA Guidelines Section 15126.6, an environmental impact report (EIR) shall describe a range of reasonable alternatives to the project or to the location of the project, that would feasibly attain most of the basic objectives of the project and could avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives. This section of the guidelines further requires that the discussion focus on alternatives capable of eliminating significant adverse impacts of the project or reducing them to a level of insignificance even if these alternatives would impede to some degree the attainment of the project objectives or would be more costly. The alternatives analysis also should identify any significant effects that may result from a given alternative.

For alternative project site locations and in accordance with CEQA Guidelines Section 15126.6(f)(2), the key question and first step in analysis of alternative site locations is whether any of the significant effects of the project would be avoided or substantially lessened by putting the project in another location. Only locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR. If the lead agency concludes that no feasible alternative locations exist, it must disclose the reasons for this conclusion, and should include the reasons in the EIR.

The lead agency is responsible for selecting a reasonable range of potentially feasible project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. The range of alternatives is governed by a "rule of reason" that requires the EIR to set forth only those potentially feasible alternatives necessary to permit a reasoned choice. The alternatives shall be limited to those that would avoid or substantially lessen any of the significant effects of the project. Of those alternatives, the EIR need examine in detail only those that the lead agency determines could feasibly attain most of the basic objectives of the project while substantially lessening any of the significant effects of the project. An EIR need not consider every conceivable alternative to a project. Rather, it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation.

An EIR is not required to consider alternatives which are infeasible. "Feasible" means capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors (CEQA Guidelines Section 15364). Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context),

and whether the proponent can reasonably acquire, control, or otherwise have access to the alternative site (or already owns the alternative site). None of these factors establishes a fixed limit on the scope of reasonable alternatives. Under CEQA case law, the concept of feasibility also "encompasses 'desirability' to the extent that desirability is based on a reasonable balancing of the relevant economic, environmental, social, and technological factors." (*City of Del Mar v. City of San Diego* [1982] 133 Cal.App.3d 410, 417; *California Native Plant Society v. City of Santa Cruz* [2009] 177 Cal.App.4th 957.) In assessing the feasibility of alternatives, agency decisionmakers may also take account of the extent to which the alternatives meet or further the agency's underlying purpose or objectives in considering a proposed project. (*Sierra Club v. County of Napa* [2004] 121 Cal.App.4th 1490, 1506-1509; *Citizens for Open Government v. City of Lodi* [2012] 296 Cal.App.4th 296, 314-315; *In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* [2008] 43 Cal.4th 1143, 1165, 1166.)

6.2 Summary of Project Objectives and Significant Project Impacts

6.2.1 Summary of Project Objectives

As indicated in Chapter 3, Project Description, Section 15124 of the CEQA Guidelines indicates that the EIR project description shall include a statement of the objectives sought by the Proposed Project. A clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to evaluate in the EIR. In conducting the alternatives analysis, consideration must be given as to how, and to what extent, an alternative can meet the project's basic objectives. The objectives for the Project are as follows:

1. Address identified deficiencies in the NCP conditions in order to maintain full system functioning without interruption, in order to protect water supply reliability and service to the City's customers.

2. Improve long-term reliability of the City's water supply infrastructure between Loch Lomond Reservoir and the Graham Hill Water Treatment Plant (GHWTP) such that it can continue to function as an integral part of the City's overall water supply system.

3. Improve access to the NCP to facilitate inspection, maintenance, and repair of the pipeline system, while minimizing the potential for environmental and propety damage impacts (such as may occur in State Parks and other sensitive areas).

4. Site the NCP to consider constructability, optimize accessibility for maintenance, minimize the potential for future failures due to unstable terrain, and avoid risks (e.g., public safety, property damage) and impacts to adjacent uses associated with pipeline failures during the life of the pipeline.

5. Implement NCP project segments that are cost-effective in terms of both capital and operation/maintenance costs.

6.2.2 Significant Project Impacts

The following potentially significant impacts have been identified, all of which can be mitigated to a less-than-significant level, except for NOI-2, noise increases in the Brackney North and potentially Brackney South sections.

- **BIO-1A: Special-Status Plant Species.** The Proposed Project could have a substantial adverse effect on special-status plant species during construction.

- **BIO-1B: Special-Status Wildlife Species.** The Proposed Project could have a substantial adverse effect on special-status wildlife species during construction.

- **BIO-2: Sensitive Vegetation Communities.** The Proposed Project could have a substantial adverse effect on sensitive vegetation communities and habitats during construction that would result in both temporary and permanent impacts.

- **BIO-3: Jurisdictional Wetlands and Waters.** The Proposed Project would not have a substantial adverse effect on jurisdictional wetlands, but could have a substantial adverse effect on jurisdictional non-wetland waters during construction that would result in both temporary and permanent impacts.

- **GEO2: Unstable Geologic Unit or Soils.** The Proposed Project could potentially cause adverse effects involving landslides or be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Proposed Project, and potentially result in on- or off-site landslide, slope failure/instability, subsidence, or collapse.

- **GEO4: Paleontological Resources.** The Proposed Project could potentially directly or indirectly destroy a unique paleontological resource or site during construction. However, the Proposed Project would not directly or indirectly destroy a unique geological feature.

- **HAZ-4: Hazardous Materials Sites.** The Proposed Project would be located adjacent to sites included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment.

- **HYD-1: Surface Water Quality Standards and Waste Discharge Requirements.** Construction and operation of the Proposed Project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality, except for potential inadvertent release of drilling fluids in the Brackney North pipe section . In addition, the Proposed Project would not conflict with or obstruct implementation of a water quality control plan related to surface water.

- **NOI-2: Substantial Increase in Ambient Noise Levels in Excess of Standards.** Construction of the Proposed Project would result in generation of a substantial temporary increase in ambient noise levels in the vicinity of some Proposed Project pipe sections in excess of applicable standards established in local general plans or noise ordinances.

6.3 Alternatives Considered but Eliminated

The EIR should briefly describe the rationale for selecting the alternatives to be discussed. The EIR also should identify any alternatives that were considered by the lead agency but were rejected, and briefly explain the reasons underlying the lead agency's determination. Among the factors that may be used to eliminate alternatives from detailed consideration in an EIR are:

(1) failure to meet most of the basic project objectives,

(2) infeasibility, or

(3) inability to avoid significant environmental impacts.

The City of Santa Cruz Water Department (City) considered the following Project alternatives, which were eliminated from further consideration as explained in the following sections:

- Rehabilitation of the Existing Newell Creek Pipeline (NCP)
- Replace Existing Pipeline in Existing Location in Place
- Alternative Alignment Locations
    - Northern Segment: Highway 9, High School Trail (west of Highway 9) and Hihn Road sections
    - Southern Segment: Existing alignment, Railroad right-of-way (ROW) (west of existing NCP) sections

The City also considered a "Do Nothing" scenario that would leave the pipeline in place in its existing condition without modifications or repair. However, this alternative was eliminated from consideration as it does not solve the primary goal of the project which is to improve potable water reliability to the City. Due to the age of the infrastructure and its condition, the existing NCP must be repaired or replaced to meet the project goals (HDR 2019b). Additionally, identified project impacts relate to the construction of the Proposed Project, and ongoing operations and maintenance would not result in significant impacts. Therefore, alternatives related to reduced pipe size and changes in pipe capacity were not considered.

6.3.1 Rehabilitation of Existing Pipeline

This option consists of rehabilitation and repairs to the existing NCP sections using in-situ methods such as cured-in-place piping (CIPP). This would involve insertion of a new pipe within the existing pipe, which would reduce the overall interior pipe diameter.

The City reviewed sections of the NCP and assessed potential rehabilitation of existing pipeline sections (HDR 2019b). The review concluded that rehabilitation of the pipeline in its current location was not possible along the Pipeline Road section in Henry Cowell Redwoods State Park as it would not meet the basic Project goals regarding long-term reliability of the City's water supply system due to continued risks of pipeline breaks and access constraints for rehabilitation and ongoing maintenance. Rehabilitation would also reduce the interior pipeline size that could affect pumping capacities. As a result, the Rehabilitation alternative was eliminated from further analysis.

6.3.2 Replacement of Existing Pipeline in Place

Replacement of the pipe within the existing alignment was considered and could be achieved using one of the following methods:

1. Excavation and removal of the existing pipe and installation of the pipeline in the same location. This may require installation of a temporary bypass line to maintain water supply to the GHWTP.

2. Utilization of pipe bursting technique on the existing NCP to install a new pipeline in the current alignment.

The City reviewed sections of the NCP and assessed potential rehabilitation of existing pipeline sections (HDR 2019b). The review concluded that replacement of the pipeline in its current location was not possible along the Pipeline Road section in Henry Cowell Redwoods State Park as it would not meet the basic Project goals regarding long-term reliability of the City's water supply system. In addition, this alternative would require construction of a temporary bypass water line in order to maintain service during construction. As a result, the Replacement alternative was eliminated from further analysis.

6.3.3 Alternative Alignment Locations

6.3.3.1 Northern Segment

Highway 9

The Highway 9 alternative pipe section extends approximately 4.4 miles from Glen Arbor Road to the Felton Booster Pump Station (FBPS). The pipeline would tie into the existing Glen Arbor Road section and continue along Glen Arbor Road to Highway 9, crossing the San Lorenzo River at Glen Arbor Road. The alignment would then follow Highway 9 for approximately 1.8 miles to Graham Hill Road, where the alignment turns east to follow Graham Hill Road back across the San Lorenzo River and to the FBPS shown on Figure 6-1A.

The Highway 9 alignment would entirely replace the existing Brackney North, Brackney South, San Lorenzo Way, and Felton Booster Pump Station pipeline sections. The Newell Creek Road and Glen Arbor Road sections would remain the same as the Proposed Project. This alignment would include five new river or creek crossings: four crossings of the San Lorenzo River and one crossing of Fall Creek. This alignment has a maximum elevation of approximately 390 feet above mean sea level (amsl), therefore water would flow by gravity and would not require a new pump station (HDR 2019a).

Installation of the pipeline in Highway 9 would require obtaining approval and easement from Caltrans that may not be successful given Caltrans requirements for construction in state ROWs. Due to the likelihood that an encroachment permit may not be successfully obtained, this alternative was not deemed feasible since the City may not be able to reasonably acquire, control, or otherwise have access to this alternative pipeline alignment. Therefore, due to potential infeasibility of obtaining easements from Caltrans in addition to five new creek crossings, this alternative alignment was eliminated from further consideration.

High School Trail

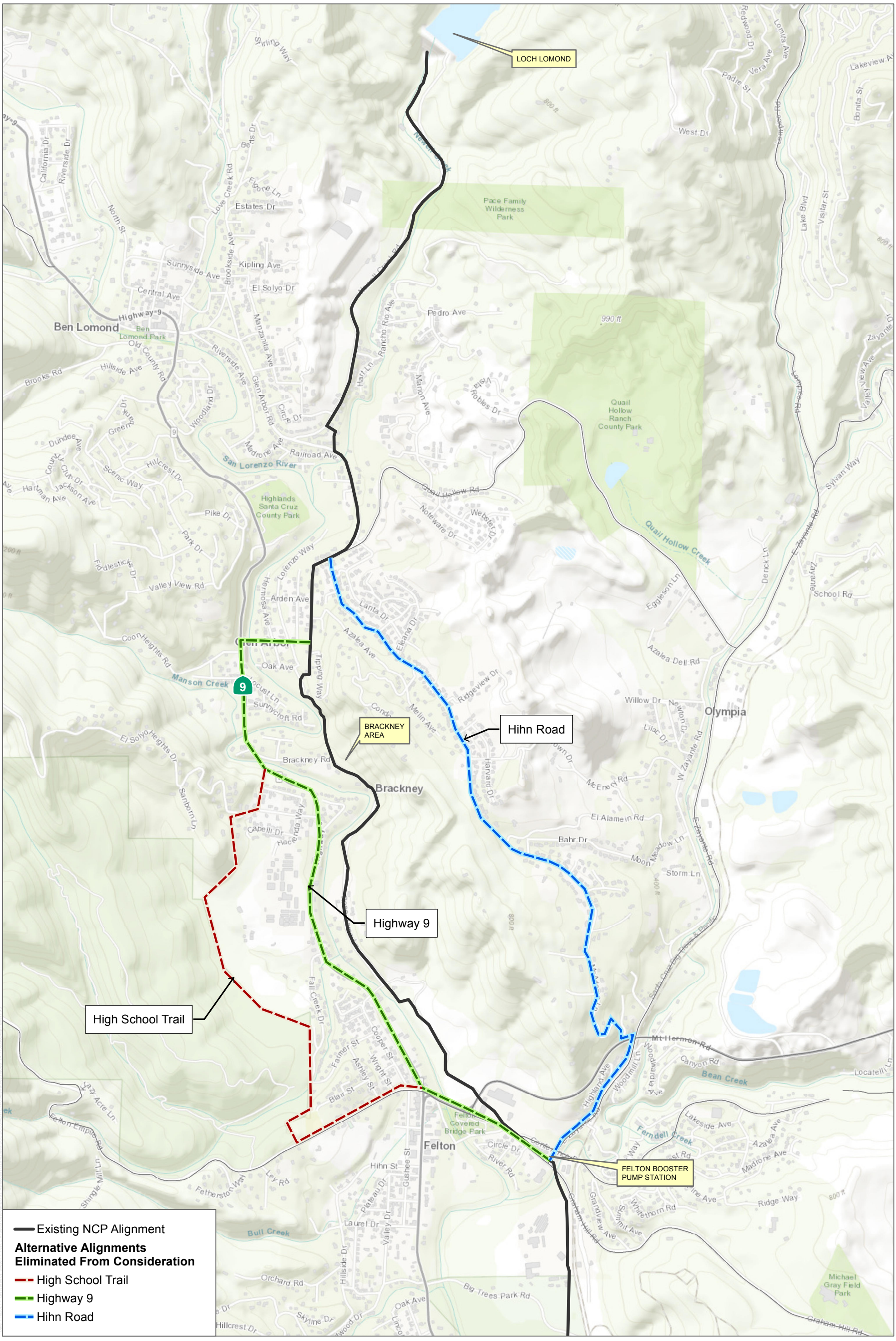
Like the Highway 9 alignment alternative, the High School Trail alignment would tie into the existing Glen Arbor Road section and continue to Highway 9, crossing the San Lorenzo River at Glen Arbor Road (see Figure 6-1A). The alignment would follow Highway 9 south for approximately 0.5 miles, with two more crossings of the San Lorenzo River before diverting southwest along Hillview Drive, then to the west of San Lorenzo Valley Middle, Elementary, and High Schools along High School Trail. The alignment follows the trail with two creek crossings before reaching Felton Empire Road, then follows Felton Empire Road east to Graham Hill Road, crossing the San Lorenzo River a fourth time before continuing on to the FBPS. The High School Trail alignment would entirely replace the existing Brackney, San Lorenzo Way, and Felton Booster Pump Station pipe sections (HDR 2019a).

There is no road access to the area behind the existing schools, however there are walking trails. This alignment includes four crossings of the San Lorenzo River. Aligning the pipeline with Highway 9 even for this short length will require obtaining approval and easement from Caltrans, which may not be feasible for the reasons explained above. The construction behind the schools presents access issues for construction and maintenance and includes additional coordination and approvals with the San Lorenzo Valley Unified School District. The pipeline would be constructed at the base of the adjacent hill behind the schools. The stability of the hillside is unknown and given the City's recent experience with geotechnical issues within the existing NCP alignment, the risk is not considered acceptable. The southern portion of this section is within Henry Cowell State Park, and approvals from California State Parks would be required. In addition to permits and coordination required for construction within the State Park, the alignment presents additional concerns related to potential environmental impacts (due to pipeline failures, leaks, and slope instability) as currently exist along Pipeline Road. As a result, this alternative alignment was not found to be feasible due to unsuitable site conditions and the potential inability of the City to obtain permits and thus have access to the site (HDR 2019a). Therefore, for these reasons and the additional creek crossings, this alternative alignment was eliminated from further consideration.

Hihn Road

The Hihn Road alignment would follow Hihn Road south from Glen Arbor Road to McAdams Lane. The pipeline would then run along McAdams Lane and Covenant Lane to Mount Hermon Road. The alignment would then follow Mount Hermon Road west to FBPS for a total distance of approximately 4.5 miles as shown on Figure 6-1A. The Hihn Road alignment would entirely replace Brackney, San Lorenzo Way, and Felton Booster Pump Station pipe sections and part of the existing Glen Arbor Road section. Road access is uncertain in sections of this alignment. This alignment has a maximum elevation of approximately 685 feet amsl, which would require an additional pump station due to the elevation gain required. This alignment would require two creek crossings (HDR 2019a).

Hihn Road terminates into private property to the south. The pipeline would require trenching across approximately 0.5 mile of private property to connect to East Zayante Road or be constructed with trenchless construction methods. Hihn Road has a shoulder width of approximately 2-4 feet beyond the white line on each side of the road. Limited roadway shoulder and presence of structures and retaining walls would make access difficult. As a result, this alternative alignment was not found to be feasible due to unsuitable site conditions and the potential inability of the City to obtain easements across private property, and thus, not have access to the site.



SOURCE: ESRI 2020, County of Santa Cruz 2020, City of Santa Cruz 2020

DUDEK

0 750 1,500 Feet

FIGURE 6-1A

Alternative Alignments Eliminated from Further Consideration, Northern Segment

Newell Creek Pipeline Improvement Project

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Additionally, the entire area is mapped as potential sensitive Sandhills habitat according to County of Santa Cruz GIS mapping (County of Santa Cruz 2021). Installation of the pipeline along Hihn Road could result in impacts to special status species and sensitive habitat during construction similar to the Proposed Project. In accordance with CEQA Guidelines Section 15126.6(f)(2), only alternative locations that would avoid or substantially lessen any of the significant effects of the project need be considered for inclusion in the EIR. Because potentially significant biological resource impacts would not be avoided or substantially lessened as well as potential infeasibility of obtaining easements and access, this alternative was eliminated from further consideration.

6.3.3.2 Southern Segment

Existing Alignment

The southern segment of the existing NCP alignment consists of four existing sections spanning a distance of approximately 4.8 miles with a maximum elevation of 568 feet amsl as shown on Figure 6-1B. Installation of a new pipe in the existing pipeline alignment would require three creek crossings. A significant portion of the northernmost section is currently private property owned by the San Lorenzo Lumber Yard.

In addition, the pipeline has been exposed in several areas along the pipeline section due to slides and washout. The existing pipeline road alignment transverses numerous unstable and extreme slopes with a long history of failures that have threatened or compromised the integrity of the pipeline. While some slides were repaired with soldier pile walls, the roads and soldier walls are experiencing further damage which would require additional engineering controls to stabilize the area if this route were used for the new pipeline alignments.

The Pipeline Road section has the highest recent break history primarily associated with corrosion, land movement, and clogged or undersized culverts resulting in significant washout exposing the pipeline and limiting access to make repairs. The entire Pipeline Road section is within Henry Cowell Redwoods State Park and follows Pipeline Road, a mostly paved road within the park that doubles as a hiking trail. The paved road is only accessible to State Park and City vehicles. The Pipeline Road section is connected to the Henry Cowell State Park section to the north and the Graham Hill Road section on the south. The remote terrain along both of these sections creates difficulty for City operations to access the alignment for operations and maintenance which is a high priority goal of the City for future reliability of the system. Furthermore, the narrow corridor also presents problems for access for construction equipment. In order to make this alignment a reliable and accessible route for a new pipeline, significant improvements to the existing road would be required to allow installation of a new drainage system to reduce erosion damage to the pipeline that has been experienced in the past (HDR 2019a). Retaining walls would also be needed to stabilize many of the active slopes threatening the existing road and pipeline. As a result, this alternative alignment was not found to be feasible due to unsuitable site conditions and was eliminated from further consideration.

Railroad ROW

The Railroad section would follow existing San Lorenzo Lumber Yard pipe section from the FBPS, and then continue following the Santa Cruz Big Trees & Pacific Railroad south to Vernon Street in the city of Santa Cruz where it would turn east for about 500 feet and tie into the existing Coast Pump Station that pumps to the GHWTP. The Railroad alignment would entirely replace all of the existing pipeline sections in the

Southern Segment of the Proposed Project, including Henry Cowell State Park and Pipeline Road sections, but does not entirely bypass the state park property.

Site suitability is constrained because construction would be difficult due to very limited space for a pipeline along the alignment, and the pipeline would be constructed in a highly active geologic area, requiring numerous retaining walls as well as trestle crossings. Future access for maintenance and operations also would be difficult. This alternative would require coordination and authorization from the Santa Cruz Big Trees & Pacific Railroad, California State Parks, and Caltrans and will include two crossings of the San Lorenzo River and two crossings of Highway 9. This alternative alignment would also reduce the City's supply reliability by causing all source water for the GHWTP to flow through the 24-inch raw water transmission main between the Coast Pump Station and the GHWTP. Since the Coast Pump Station is subject to flooding, the City has benefited from having redundancy in the raw water supply by having an entirely independent source to supply the GHWTP (HDR 2019a).

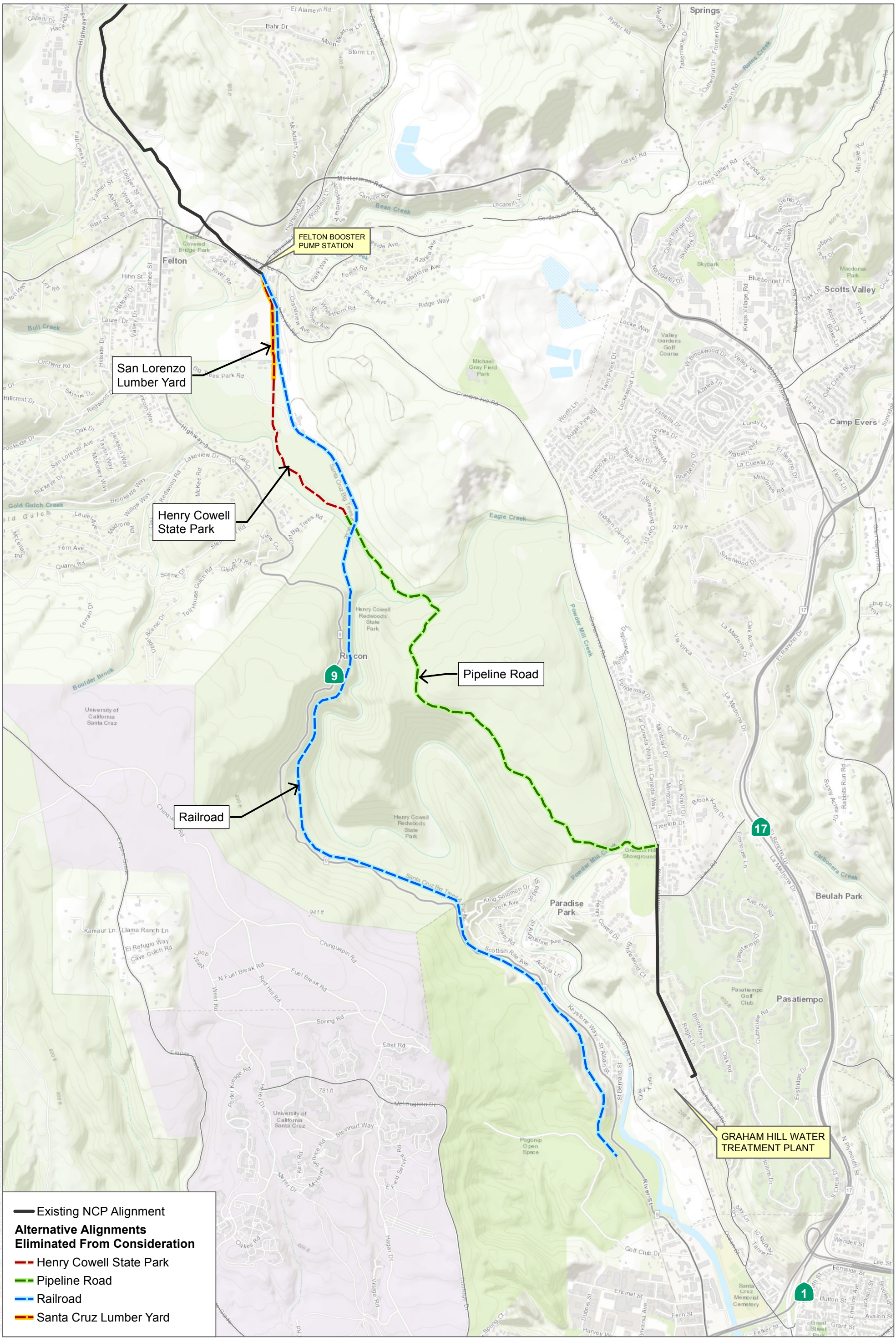
Thus, this alternative was not found to be feasible due to constrained site suitability and lack of access control. In addition, it was found to not meet the basic Project objective to improve long-term reliability of the City's water supply infrastructure. Therefore, this alternative was eliminated from further consideration.

6.3.4 Brackney North Pipe Section Alternative Construction Methods

An alternatives analysis was completed (Mott MacDonald 2021a) to evaluate and determine the preferred construction method in the Brackney North section. The analysis was based on available data, including field mapping, a geophysical survey, topographic survey, completion of five geotechnical borings, and potholing to determine the depth of the existing pipeline. The alternatives analysis included the following construction methods:

- Tunnel (including microtunnel, conventional bored tunnel, and conventionally mined tunnel)
- HDD
- Deep open cut into rock
- Shallow open cut with pipe supports anchored to bedrock
- Shallow open cut with a flexible pipeline (i.e., earthquake resistant ductile iron pipe)
- Auger bore

The deep and shallow open cut methods were considered but determined to be infeasible due to issues with constructability. Although these are traditional installation methods, several factors limit feasibility of constructability. First, it is not feasible to construct the new pipeline within the City's existing 10-foot easement while maintaining the existing pipeline in service, thus requiring the City to acquire additional easement(s). Even with an additional easement, the existing Brackney North site is constrained by limited size and steeply sloping terrain on both the upslope and downslope sides of the existing easement that limit vehicle and equipment access. In many cases, there may not be sufficient available space to allow these pieces of equipment to work together, a longer construction timeline may be required, or additional space may be required. For the shallow open cut construction methods, additional methods may be required, such as cantilevered retaining walls, to stabilize slopes and provide a safe trench for installation (Mott MacDonald 2021).



SOURCE: ESRI 2020, County of Santa Cruz 2020, City of Santa Cruz 2020

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0 950 1,900 Feet

FIGURE 6-1B

Alternative Alignments Eliminated from Further Consideration, Southern Segment

Newell Creek Pipeline Improvement Project

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Trenching within the easement and adjacent to the unstable slopes would require extreme care and, likely, additional methods, such as a continuous cantilevered retaining wall to the west and a tieback wall to the east, to stabilize slopes and provide a safe trench for installation. Slope and trench stability are significant concerns during construction. If there is destabilization of soils surrounding the existing pipeline, the pipeline could shift, causing damage during construction. This could occur if unstable soil conditions resulted in landslide conditions or if soils experience movement during trenching, trench stabilization, or backfilling operations. The deep open cuts will need to account for risks of undercutting soil and rock debris from previous landslides as well as generating new slope instabilities or triggering a landslide during construction. There is also a long-term risk of damage to the pipeline from future landslides, earthquakes, and erosion. The project would likely need to stabilize the slope under permanent long-term scenarios to reduce future risk exposure to the City. Furthermore, construction would be immediately upslope of the San Lorenzo River, which would require implementation and maintenance of extensive erosion and sediment control measures to avoid depositing sediment into the river, which is a drinking water source (Mott MacDonald 2021).

Therefore, due to the significant risks during construction, potentially significant impacts related to geologic hazards, erosion, and water quality, and feasibility of acquiring additional easements to provide adequate construction areas, deep and open cut construction methods in the Brackney North area were eliminated from further consideration.

The City's engineering team also considered several trenchless methods: HDD, microtunneling, and auger bore construction. The auger bore method, sometimes referred to as "horizontal auger bore" or "jack and bore" was considered a potentially suitable method to install the pipeline within a casing into bedrock below potential landslide hazard zones. This option would install the pipeline within a temporary casing, approximately 48 inches in diameter with three temporary shafts required to construct the pipeline. The auger bore installation would be constructed with two approximately 350-foot-long straight drives. The casing would be installed approximately 35 ft below the ground surface, into stable bedrock. Each shaft location would require a level platform, potentially 30 ft wide. This would require widening of the existing dirt road at the shafts likely using cantilevered pile shoring or a similar method (Mott MacDonald 2021).

However, there are significant geotechnical risks to successful installation (Mott MacDonald 2021). The presence of fractured water bearing rock and the Ben Lomond Fault pose significant risks to a successful installation; adverse impacts could occur, such as flooding of the casing and shaft and loose rock jamming the cutting head. One area of significant risk is the Ben Lomond Fault which may act as a conduit for groundwater and may generally be surrounded by more fractured rock, and the receiving shaft would be located on or very close to the fault. Pre-excavation or dewatering the rock with wells constructed from the ground surface could be utilized but would require a specialized contractor. The auger bore method would significantly reduce the long-term risk of damage to the pipeline from landslides and erosion. However, due to site topography and the required lengths of installation, the auger bore method may not be able to completely avoid the landslide hazard area that exists in the area. For example, the northern shaft would be located within an area previously mapped as a landslide area, and it is not possible to continue while curving the auger bore past this area.

Therefore, due to the significant risks during construction and feasibility of construction, the auger bore construction method in the Brackney North area was eliminated from further consideration. The HDD method was selected as the preferred alternative and is included in the Proposed Project evaluated in this EIR. The microtunneling method is discussed as an alternative in Section 6.4.3, Brackney North Alternative Construction Methods.

6.4 Alternatives Selected for Analysis in EIR

This section describes the alternatives to the Proposed Project that were selected and analyzed according to CEQA Guidelines Section 15126.6(a) after elimination of some considered alternatives as explained in Section 6.3, Alternatives Considered but Eliminated. The analyzed alternatives, including the No Project Alternative, represent a reasonable range of alternatives to the Proposed Project that would feasibly attain most of the Proposed Project's basic objectives, and would avoid or substantially lessen the significant adverse environmental effects of the Proposed Project. The Proposed Project's objectives are listed in Section 6.2. Significant Project Impacts are summarized in Section 6.2 and described in detail in Chapter 4, Environmental Setting, Impacts, and Mitigation Measures.

The following three alternatives were selected for comparative analysis in this EIR:

- **No Project Alternative –** The No Project Alternative is required by CEQA and consists of the circumstances under which the Proposed Project does not proceed
- **Alternative 1A –** Alternative Pipe Alignment: Quail Hollow Road in the northern segment as shown on Figure 6-2
- **Alternative 1B –** Alternative Pipe Alignment: Mount Hermon Road in the southern segment as shown on Figure 6-2
- **Alternative 2 –** Brackney North Pipe Section Alternative Construction Methods

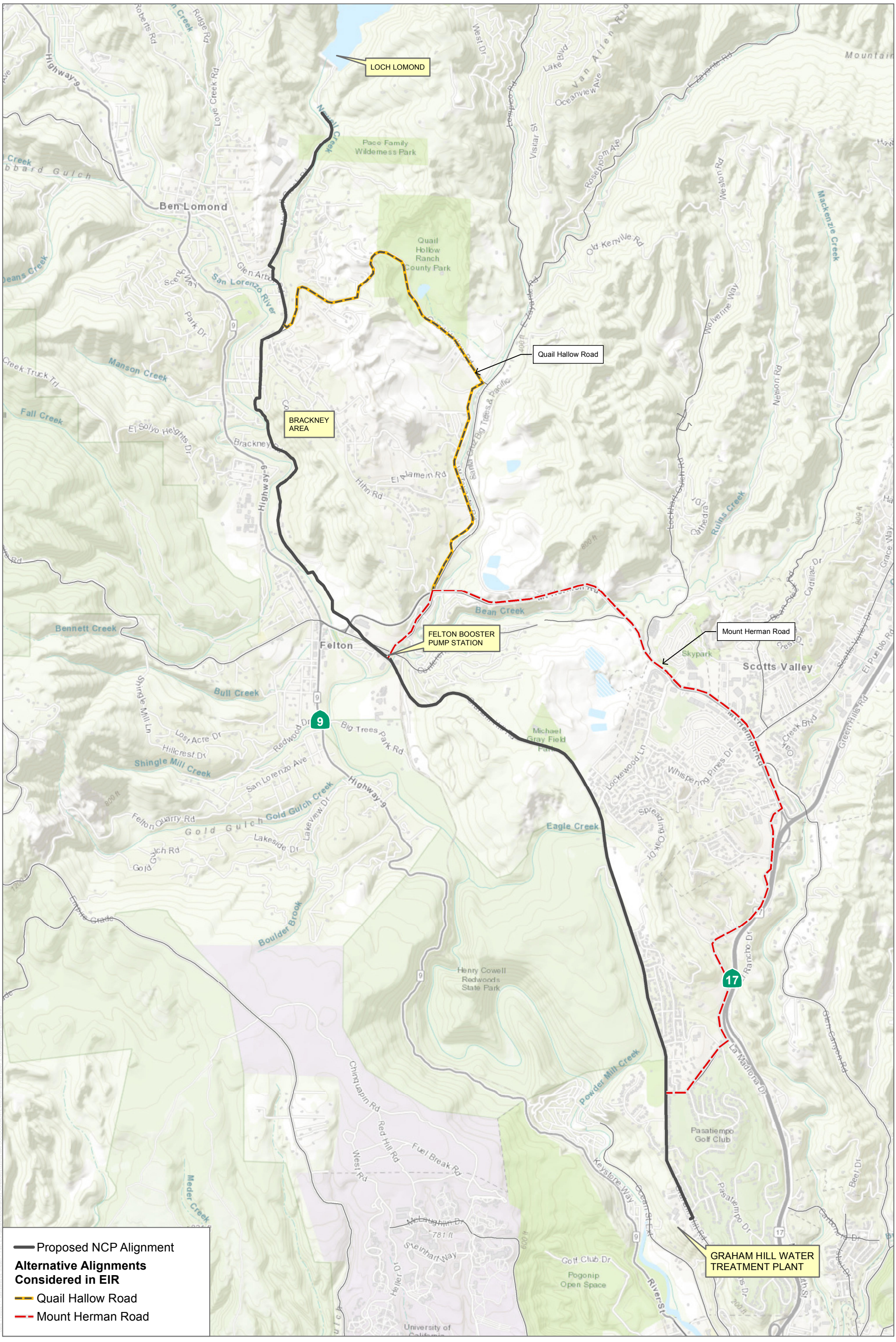
Each alternative is described below. Additionally, the Standard Construction Practices identified in Chapter 3, Project Description, would apply to all alternatives, where relevant. The following discussion reviews whether the alternative would avoid or substantially lessen identified project impacts, whether new significant impacts may occur, and the ability of the alternative to meet project objectives.

No Project Alternative

6.4.1.1 Description

Section 15126.6(e) of the State CEQA Guidelines requires that the impacts of a "no project" alternative be evaluated in comparison to the Proposed Project. Section 15126(e) also requires that the No Project Alternative discuss the existing conditions that were in effect at the time the Notice of Preparation was published, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.

Under the No Project Alternative, the Proposed Project would not be constructed. The City would continue to repair and/or replace pipeline sections as failures occurred or conditions worsen.



SOURCE: ESRI 2020, County of Santa Cruz 2020, City of Santa Cruz 2020

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FIGURE 6-2

Alternative Pipeline Alignments Considered in EIR

Newell Creek Pipeline Improvement Project

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6.4.1.2 Impact Analysis

Under the No Project Alternative, the Proposed Project would not be constructed, and the existing NCP would remain in use. Thus, none of the impacts identified in the EIR would occur, including the potentially significant impacts associated with constructing the Proposed Project, such as those related to biological resources (Impacts BIO-1A, BIO-1B, BIO-2, and BIO-3), slope stability hazards (Impact GEO-2), paleontological resources (Impact GEO-4), hazardous materials release (Impact HAZ-2), and permanent or temporary increase in noise in excess of standards (Impact NOI-2).

However, the No Project Alternative likely would require future repairs to the existing NCP, especially along Pipeline Road in Henry Cowell Redwoods State Park. As indicated in Section 6.3.3.2, Southern Segment, the existing pipeline road alignment transverses numerous unstable and extreme slopes with a long history of failures that have threatened or compromised the integrity of the pipeline. While some slides were repaired with soldier pile walls, the roads and soldier walls are experiencing further damage which would require additional engineering controls to stabilize the area if this alignment were continued to be used. The Pipeline Road section has the highest recent break history primarily associated with corrosion, land movement, and clogged or undersized culverts, resulting in significant washout exposing the pipeline and limiting access to make repairs. In addition to affecting water supply reliability, pipe breaks can cause sediments to enter drainages and creeks, resulting in potential water quality impacts. In addition, the remote terrain along this section creates difficulty for City operations to access the alignment for operations and maintenance which is a high priority goal of the City for future reliability of the system. Furthermore, the narrow corridor also presents problems for construction equipment access.

In order to make this alignment a reliable and accessible route for the new pipeline, if it were to be repaired or replaced in the same location, significant improvements to the existing road would be required to allow installation of a new drainage system to reduce erosion damage to the pipeline that has been experienced in the past (HDR 2019a). Retaining walls would also be needed to stabilize many of the active slopes threatening the existing road and pipeline. These improvements could result in potential significant, temporary, construction-related impacts to special status species and sensitive habitat due to presence of Sandhills and Special Forest sensitive habitats.

6.4.1.3 Ability to Meet Project Objectives

The No Project Alternative would not meet any of the identified project objectives. In particular, the No Project Alternative would not address deficiencies in the existing NCP (Objective #1), improve long-term reliability of the City's water infrastructure between Loch Lomond Reservoir and GHWTP (Objective #2), or improve access to the NCP to facilitate inspection, maintenance and repair (Objective #3). The No Project Alternative also would not meet project objectives related to siting the NCP to optimize accessibility and minimize the potential for future failures (Objective #4), and implementing NCP project segments that are cost-effective in terms of both capital and operation/maintenance costs (Objective #5).

6.4.2 Alternative 1A: Alternative Northern Segment Alignment-Quail Hollow Road

6.4.2.1 Description

The Alternative 1A alignment in the northern segment of the Proposed Project would follow Quail Hollow Road from Glen Arbor Road to East Zayante Road and then follow East Zayante Road to the FBPS at Graham Hill Road as shown on Figure 6-2 for a total distance of approximately 5.7 miles. As with the Proposed Project, the Alternative 1A alignment would include the Newell Creek Road and Glen Arbor Road sections, which include the replacement of two existing crossings of Newell Creek. Key elements for the northern segment pipeline alignment with the Alternative 1A section are summarized in Table 6-1. This alignment would completely replace the Brackney North, Brackney South, San Lorenzo Way, and Felton Booster Pump Station sections and part of the Glen Arbor Road section that are part of the Proposed Project. The Proposed Project southern segment would remain the same under this alternative.

Table 6-1. Key Proposed Features of Alternative 1A and 1B Pipeline Sections

Project Feature	Northern Segment Quail Hollow Road Section	Southern Segment Mount Hermon Road Section
Alignment Length (feet)	30,179	33,581
Number of Creek or River Crossings	2	1
Maximum Elevation (feet amsl)	655	611
New Pump Station Required	Yes	No

Source: HDR 2019a.

As with the Proposed Project, it is expected that the pipe would be installed in existing paved and unpaved roadways or ROW. It is expected that construction would consist of conventional open trench methods similar to what is planned for the Proposed Project, except in Brackney North and potentially Brackney South sections, where trenchless methods are planned for most of the Brackney North section and potentially for the Brackney South section. Other components would include installation of minor appurtenances, such as air release valves and isolation valves as with the Proposed Project. Once the new pipeline is installed and the interconnections are made, the existing NCP generally would be abandoned in place. As indicated above, Standard Construction Practices would be implemented as with the Proposed Project. Upon completion of construction, construction sites would be revegetated and/or restored, and disturbed roadways where trenching occurred to install the pipeline would be repaved in accordance with County requirements as with the Proposed Project.

The Alternative 1A alignment has a maximum elevation of approximately 655 feet amsl, which would require an additional pump station due to the elevation gain required. It is estimated that approximately 5,000-10,000 square feet would be needed for a pump station, although a specific location, facility footprints, and equipment characteristics and sizing are not known at this time. Given typical pump stations in Santa Cruz County, these types of facilities are expected to be single-story buildings with outdoor paved areas surrounded by security fencing. They would also include security lighting that would be limited to low-wattage, shielded outdoor lighting, directed onto the site.

6.4.2.2 Impact Analysis

Biological Resources

The majority of the area along Quail Hollow Road and some areas along East Zayante Road are mapped as potential sensitive Sandhills habitat according to County of Santa Cruz GIS mapping (County of Santa Cruz 2021). The two-lane paved road width on Quail Hollow Road is estimated to be approximately 22 feet wide, and has 2- to 4-foot-wide shoulders adjacent to the pavement (HDR 2019a). However, East Zayante Road is narrower and generally lacks off-road shoulders.

The pipeline is expected to be installed in the paved road, thus avoiding permanent impacts to sensitive habitat. However, construction could result in inadvertent impacts to special status plant and wildlife species associated with Sandhills habitat as well as potential temporary disturbance to sensitive sandhills habitat along both roads, requiring the same mitigation as with the Proposed Project. Potentially significant indirect impacts to sensitive riparian habitat at Newell Creek would remain the same as with the Proposed Project. While some seasonal wetlands would be avoided and impacts to jurisdictional wetlands could be lessened, the Alternative 1A route has at least 18 culverted stream crossings where jurisdictional wetlands may be present (HDR 2019a). Depending on the location and siting of a pump station, new significant impacts to special status species and sensitive habitat, particularly Sandhills habitat and species could occur with Alternative 1A. Therefore, Alternative 1A would not avoid or substantially lessen impacts to special status species, sensitive habitat or jurisdictional wetlands.

Geology and Soils

The Proposed Project would potentially cause adverse effects involving landslides or be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Proposed Project, and potentially result in on- or off-site landslide, slope failure/instability, or collapse due to the proposed HDD method proposed at the Brackney North pipe section. This impact, which would occur in the Brackney North section with the Proposed Project, would be avoided under Alternative 1A as the pipeline would be installed in Quail Hollow Road instead of in the Brackney North section where the impact would occur, and conventional open trench construction methods would be used in Quail Hollow Road and East Zayante Road. Other less-than-significant impacts related to seismic and geologic hazards and expansive soils would remain the same as the Proposed Project.

The Proposed Project could potentially destroy a unique paleontological resource during construction. Construction under Alternative 1A would avoid sensitive geologic formations with potential paleontological resources in the Brackney North and Brackney South sections. However, most of the Quail Hollow Road area and part of the East Zayante Road area are located in the sensitive Santa Margarita formation, which covers more area in the northern segment than with the Proposed Project. Thus, Alternative 1A could potentially result in more significant impacts to paleontological resources than the Proposed Project as a larger area is in sensitive formations. Therefore, Alternative 1A would not avoid or substantially lessen potential significant impacts to paleontological resources, and could result in increased impacts.

Hazardous Materials

The Proposed Project would be located adjacent to sites included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment. Alternative 1A would substantially lessen this impact as the alignment along Quail Hollow Road and East Zayante Road is not located in proximity to any identified California Department of Toxic Substance Control hazardous sites or leaking underground storage tanks (LUST) sites.

Hydrology and Water Quality

Construction and operation of the Proposed Project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality, except that the HDD construction method proposed in the Brackney North section could result in release of drilling fluids into San Lorenzo River without mitigation. This impact would be avoided under Alternative 1A as the pipeline would be installed in Quail Hollow Road instead of in the Brackney North section where this impact could occur. Generally, the less-than-significant impact related to drainage would remain similar to the Proposed Project. However, there would be a slight increase in impervious surfaces with construction of a pump station required under Alternative 1A. Such a facility would be relatively small and would not substantially alter drainage patterns or indirectly cause erosion, flooding or exceed capacity of stormwater systems.

Noise

Construction of the Proposed Project would result in generation of a substantial temporary increase in ambient noise levels in the vicinity of some Proposed Project pipe sections in excess of applicable standards established in local general plans or noise ordinances, with a significant unavoidable impact in the Brackney North and Brackney South sections due to limited nighttime construction. Alternative 1A would eliminate the significant and unavoidable noise impact by installing the pipe in Quail Hollow Road and avoiding the Brackney North and Brackney South sections. However, construction would result in temporary construction-noise impacts to residents along Quail Hollow Road and East Zayante Road, requiring mitigation as with the Proposed Project. Thus, Alternative 1A would substantially lessen significant construction-related noise impacts. However, depending on the location and siting of the pump station, there could be new operational noise-related impacts associated with this facility.

Other Impacts

Other less-than-significant impacts that would result from construction of the Proposed Project are expected to remain the same under Alternative 1A, specifically cultural resources and wildfire impacts. No recorded cultural resources were identified as part of the cultural resources records search, except for historical resources at Quail Hollow Ranch that likely would not be impacted with pipeline construction within the roadway.

Because the pipeline length is longer with Alternative 1A than the Proposed Project (approximately 8.0 miles compared to approximately 4.5 miles with the Proposed Project), Alternative 1A could result in increased construction days and associated construction-relation emissions, although it would not be expected to substantially increase daily emissions or exceed Monterey Bay Air Resources District criteria pollutant emission standards. Similarly, construction would result in increased greenhouse gas (GHG) emissions, but similar to

criteria air pollutants, would not be expected to exceed thresholds; even with a doubling in GHG emissions, Alternative 1A would not exceed GHG emissions thresholds as amortized over a 30-year period.

The pump station needed with Alternative 1A would result in increased permanent energy demand, and indirect emissions due to operations and worker trips, although it would not be expected to result in inefficient or wasteful use of energy resources.

Given the narrow width of East Zayante Road, construction may result in temporary road closure, requiring detours for local traffic (HDR 2019a). However, closures would only occur during the work day and would be short term and temporary and would not significantly impact emergency access. Therefore, Alternative 1A would result in new traffic-related delays on roads in the northern segment that were not identified for the Proposed Project, but with required traffic controls and detours, would not prelude emergency access to the area.

6.4.2.3 Ability to Meet Project Objectives

Alternative 1A would meet most of the project objectives, including addressing deficiencies in the existing NCP (Objective #1), improving long-term reliability of the City's water infrastructure between Loch Lomond Reservoir and GHWTP (Objective #2), and improving access to the NCP to facilitate inspection, maintenance and repair (Objective #3). Alternative 1A would partially meet the project objective related to siting the NCP to optimize accessibility and minimize the potential for future failures (Objective #4) due to the increased length in the pipeline. However, Alternative 1A would not meet the project objective to regarding cost-effectiveness (Objective #5) as additional operation/maintenance costs would be incurred with construction of a pump station needed to support a pipeline for the Alternative 1A alignment. Additionally, substantial construction and material costs would be incurred relative to the Proposed Project due to the increased length of pipeline (4.5 miles for the Proposed Project compared to 8.0 miles for Alternative 1A). See Table 6-2 at the end of this section for comparison on each alternative's ability to attain project objectives.

6.4.3 Alternative 1B: Alternative Southern Segment Alignment-Mount Hermon Road

6.4.3.1 Description

The Alternative 1B alignment in the southern segment would extend from the FBPS to Mount Hermon Road to La Madrona Drive to Sims Road and then west along Sims Rd to Graham Hill Road, tying into the existing Graham Hill Road pipeline alignment as shown on Figure 6-2, for a total distance of approximately 6.5 miles. Key elements for the southern segment pipeline alignment with the Alternative 1B section are summarized in Table 6-1. It is expected that the pipeline would be installed in existing road pavement or right-of-way. This alignment would replace existing pipeline sections (Pipeline Road, Henry Cowell State Park, and San Lorenzo Lumber Yard), completely bypassing Henry Cowell Redwoods State Park as with the Proposed Project. Alternative 1B also would realign 1,050 feet of the current Graham Hill Road alignment. The Proposed Project northern segment would remain the same under this alternative.

This alignment has a maximum elevation of 611 feet amsl, and would not require a new pump station, although there would be one crossing of Zayante Creek and one crossing of Bean Creek (HDR 2019a). The

route starts on East Zayante Road from the FBPS and heads north until connecting with Mount Hermon Road; however East Zayante Road extends under Mount Hermon Road. This results in approximately 450 feet of elevated road over both East Zayante Road and Zayante Creek which would require an elevated bridge dedicated to the new NCP.

Except for the creek crossings, it is expected that the pipe would be installed in existing paved roadways or ROW as with the Proposed Project. It is expected that construction would consist of conventional open trench methods similar to what is planned for the Proposed Project. Other components would include installation of minor appurtenances, such as air release valves and isolation valves as with the Proposed Project. Once the new pipeline is installed and the interconnections are made, the existing NCP generally would be abandoned in place. As indicated above, Standard Construction Practices would be implemented as with the Proposed Project. Upon completion of construction, construction sites would be revegetated and/or restored, and disturbed roadways where trenching occurred to install the pipeline would be repaved in accordance with County requirements as with the Proposed Project.

6.4.3.2 Impact Analysis

Biological Resources

The majority of the area along East Zayante Road and Mount Hermon Road, as well some areas along Sims Road, are mapped as potential sensitive Sandhills habitat according to County of Santa Cruz GIS mapping (County of Santa Cruz 2021). The majority of Mount Hermon Road has 3-4 four lanes with 4- to -6-foot shoulders; where the road narrows the number of lanes reduces to 2. The shoulder beyond the white lines remains 4-6 feet on both side of the road. The other roads are narrower and lack shoulders.

The pipeline is expected to be installed in the paved road, thus avoiding permanent impacts to sensitive habitat. However, construction could result in inadvertent impacts to special status plant and wildlife species associated with Sandhills habitat if present in the area during construction, as well as potential temporary disturbance to sensitive sandhills habitat along both roads, requiring the same mitigation as with the Proposed Project. The impact would be similar to the Proposed Project, and possibly greater because the Alternative 1B alignment is longer than the Proposed Project.

Potentially significant indirect impacts to sensitive riparian habitat at Newell Creek would remain the same as with the Proposed Project. A crossing over Zayante Creek would be required and given the steep terrain, a bridge to support the pipe would be considered. Additionally, a second crossing over or under Bean Creek would be required. Riparian vegetation could be temporarily removed or impacted during construction at these locations. Additionally, dewatering and stream bypass may also be required for the additional creek crossings, which could result in additional impacts to aquatic species. Thus, impacts to riparian habitat would remain unchanged or potentially be greater than those with the Proposed Project. While some seasonal wetlands would be avoided and impacts to jurisdictional wetlands could be lessened along Graham Hill Road, Alternative 1B also has the potential to temporarily disturb jurisdictional wetlands adjacent to culverted drainages and other intermittent drainages present along the roads in Alternative 1B. Therefore, Alternative 1B would not avoid or substantially lessen impacts to special status species, sensitive habitat or jurisdictional wetlands.

Geology and Soils

The Proposed Project would potentially cause adverse effects involving landslides or be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Proposed Project, and potentially result in on- or off-site landslide, slope failure/instability, subsidence, or collapse due to the proposed HDD method proposed at the Brackney North pipe section. This impact would remain the same as the Proposed Project as Alternative 1B does not change the alignment in the northern segment. Other less-than-significant impacts related to seismic and geologic hazards and expansive soils would remain the same as the Proposed Project. While there is a mapped landslide hazard area east of Mount Hermon Road near Locatelli Road, Alternative 1B does not traverse any areas of known landslide deposits. However, the alignment does traverse an area of potential liquefaction in Scotts Valley that would require additional review.

The Proposed Project could potentially destroy a unique paleontological resource during construction. Construction under Alternative 1B would avoid sensitive geologic formations with potential paleontological resources in the Graham Hill Road section. Alternative 1B also would traverse sensitive Santa Margarita formation that has high sensitivity for paleontological resources. It appears that a similar area is covered in this formation as the Proposed Project. Therefore, potential impacts to paleontological resources under Alternative 1B would be similar to those with the Proposed Project. Therefore, Alternative 1B would not avoid or substantially lessen potential significant impacts to paleontological resources, and could result in increased impacts.

Hazardous Materials

The Proposed Project would be located adjacent to sites included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment. There are several existing hazardous materials sites on Mount Hermon Road, as well as several LUST sites. Therefore, Alternative 1B would be potentially exposed to release of hazardous materials during construction as with the Proposed Project, requiring the same mitigation. Therefore, Alternative 1b would not avoid or substantially lessen potential significant impacts to paleontological resources, and could result in increased impacts.

Hydrology and Water Quality

Construction and operation of the Proposed Project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality, except that the HDD construction method proposed in the Brackney North section could result in release of drilling fluids into San Lorenzo River without mitigation. This impact would remain the same as the Proposed Project with Alternative 1B since the alternative does not change the alignment in the northern segment. The less-than-significant impact related to drainage would remain similar to the Proposed Project as construction would not result in new impervious surfaces that would alter drainage patterns or indirectly cause erosion, flooding or exceed capacity of stormwater systems.

Noise

Construction of the Proposed Project would result in generation of a substantial temporary increase in ambient noise levels in the vicinity of some Proposed Project pipe sections in excess of applicable standards established

in local general plans or noise ordinances, with a significant unavoidable impact in the Brackney North and potentially Brackney South sections due to limited nighttime construction. Alternative 1B would not eliminate the significant unavoidable impact at Brackney North section as Alternative 1B does not change the alignment in the northern segment. Construction would result in temporary construction-noise impacts to residents, particularly along Sims Road and a portion of La Madrona Drive. The majority of land uses along Mount Hermon Drive are non-residential without sensitive receptors. Therefore, Alternative 1B could result in some lessening of construction-related noise impacts because there are fewer sensitive receptors along the alignment than with the Proposed Project.

Other Impacts

Other less-than-significant impacts that would result due to construction of the Proposed Project are expected to remain the same under Alternative 1B related to cultural resources and wildfire impacts. No recorded cultural resources were identified as part of the cultural resources records search.

Because the pipeline length is longer with Alternative 1B than the Proposed Project (approximately 6.5 miles compared to approximately 4.5 miles with the Proposed Project), Alternative 1B could result in increased construction days and associated construction-relation emissions, although it would not be expected to substantially increase daily emissions or exceed Monterey Bay Air Resources District criteria pollutant emission standards, but would extend the number of construction days with emissions. Similarly, construction would result in increased GHG emissions, but similar to criteria air pollutants, would not be expected to exceed thresholds; even with a doubling in GHG emissions, Alternative 1B would not exceed GHG emissions thresholds as amortized over a 30-year period. Similarly, there could be some increase in constructed-related fuel use with the longer alignment and additional construction days. However, such consumption would not be expected to result in inefficient or wasteful use of energy resources, similar to the Proposed Project.

Mount Hermon is a 4-lane arterial road, but East Zayante, La Madrona, and Sims Roads are all 2-lane roads. Given the narrow width of East Zayante Road, construction may result in temporary road closure, requiring detours for local traffic (HDR 2019a). However, closures would only occur during the work day and would be short term and temporary and would not significantly impact emergency access. Adequate road width is available on the other roads so temporary, daily lane closures likely would occur but not complete road closures (HDR 2019a). Therefore, Alternative 1B would result in new traffic-related delays on roads in the northern segment that were not identified for the Proposed Project, but with required traffic controls and detours, would not prelude emergency access to the area.

6.4.3.3 Ability to Meet Project Objectives

Alternative 1B would meet most of the project objectives, including addressing deficiencies in the existing NCP (Objective #1), improving long-term reliability of the City's water infrastructure between Loch Lomond Reservoir and GHWTP (Objective #2), and improving access to the NCP to facilitate inspection, maintenance and repair (Objective #3). Alternative 1B would partially meet the project objective related to siting the NCP to optimize accessibility and minimize the potential for future failures (Objective #4) due to the increased length in the pipeline. However, Alternative 1B would not meet the project objective to regarding cost-effectiveness (Objective #5) as additional operation/maintenance costs would be incurred with construction of a pump station needed to support a pipeline in the Alternative 1B alignment. See Table 6-2 at the end of this section for comparison on each alternative's ability to attain project objectives.

6.4.4 Alternative 2: Brackney North Pipe Section Alternative Construction Methods

6.4.4.1 Introduction

As indicated in Section 6.3.3, Brackney North Pipe Section Alternative Construction Methods, several trenchless construction methods were evaluated by the City and its design engineers for construction in the Brackney North section. The Proposed Project consists of the HDD method, and a second option was evaluated. The alternative HDD Option A in the Alternatives Analysis for Brackney North (Mott MacDonald 2021) is an approximate 2,075-foott long pipeline that extends from Glen Arbor Road in the north (instead of Schaaf Road with the Proposed Project) to Brackney Road in the south. This alternative alignment is also included as an option in the 30% engineering plans. This alternative HDD option would reach a depth of 100+ feet below the elevation of the HDD entry and exit point. The drilling activities would be conducted from a temporary work area at the south end of the alignment, alongside Brackney Road, the same as the Proposed Project (Mott MacDonald 2021).

The primarily difference between this HDD alternative and the Proposed Project is that the alternative HDD work area at the north end of the alignment is located within Glen Arbor Road and Caledonium Avenue instead of Schaaf Road with the Proposed Project. A single lane of road would need to be shut down during drilling activities, and during pullback, the road would need to be temporarily closed to give space for a pullback drill rig, drilling mud plant, and other materials and equipment. Road detours and other traffic control measures would be required at the HDD exit area in Glen Arbor Rd. The alignment would deviate outside the existing city easement for most of its length, thus requiring acquisition of permanent easement for the new pipeline (Mott MacDonald 2021).

Except for the change described above, the alternative HDD method would not change significant and other less-than-significant impacts identified and evaluated for the Proposed Project. Therefore, this alternate HDD method is not further evaluated as impacts would be the same as the Proposed Project, and the following section evaluates the microtunneling construction method.

6.4.4.2 Alternative Microtunneling Method Project Description

The microtunnel Alternative 2 consists of a near horizontal excavation originating from a launch or jacking shaft and ending at a reception or receiving shaft. Generally, microtunneling is a guided and steered trenchless construction method that does not require person entry. Microtunneling utilizes a highly automated and mechanized tunnel boring machine called a microtunnel boring machine (MTBM) which is advanced through the ground using the pipe jacking method. Other features of the method include earth and hydrostatic counter balancing methods to control ground and groundwater inflow into the tunnel. Microtunneling can be performed in soil, rock, and mixed face conditions, has the ability to complete drive lengths up to 2,000 feet or more, and can navigate horizontal and/or vertical curves in the alignment. Diameters range from 16 inches to 16 feet, though the minimum diameter increases with tunnel length to ensure the machine has enough thrust force to complete the longer lengths. A variety of casing materials are available with the most typical being steel, reinforced concrete, and centrifugally cast glass-fiber-reinforced polymer mortar (CCFRPM) as manufactured by Hobas® (Mott MacDonald 2021).

Several microtunnel options were considered, all of which would be installed via a two-pass system. The first pass consists of an oversized initial support system installed behind the boring machine, shield, or excavator. The second pass consists of the installation of the carrier pipe within the completed tunnel. The space between the initial support and carrier pipe is typically backfilled with low strength material but can remain open if desired (Mott MacDonald 2021).

- Tunnel Option A - Tunnel launch would be from Brackney Road, and tunnel reception would be within the Caledonium Avenue public right-of-way. The alignment is approximately 1,400 feet long and consists of two 800-foot radius curves. The depths of shafts are approximately 50 feet at Brackney Road and 55 feet at Caledonium Avenue.
- Tunnel Option B - Tunnel launch would be the same as Tunnel Option A, and tunnel reception would be at the end of Fremont Avenue. The alignment is approximately 1,150 feet long and consists of one 800-foot radius curve. The depths of shafts are approximately 45 feet at Brackney Road and 35 feet at Fremont Avenue.
- Tunnel Option C – Tunnel launch would be the same as Tunnel Options A and B, but the tunnel reception would be within Schaaf Road. The alignment is approximately 1,700 feet long and consists of one 800-foot radius curve. The depths of shafts are approximately 35 feet at Brackney Road and 35 feet at Schaff Road (Mott MacDonald 2021).

6.4.4.3 Impact Analysis

Biological Resources

The northern end of the construction zone for the microtunneling construction method is within a sensitive Sandhills habitat area, and thus, potentially significant impacts related to special status species and temporary disturbance to Sandhills habitat and jurisdictional wetlands would remain the same as the Proposed Project in this location, thus requiring similar mitigation . Therefore, Alternative 2 would not avoid or substantially lessen impacts to special status species, sensitive habitat or jurisdictional wetlands.

Geology and Soils

The Proposed Project would potentially cause adverse effects involving landslides or be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Proposed Project, and potentially result in on- or off-site landslide, slope failure/instability, subsidence, or collapse due to the proposed Horizontal Directional Drilling (HDD) method proposed at the Brackney North pipe section. This impact would not be avoided or substantially lessened under Alternative 2 as the microtunneling construction method also could result in inadvertent release of fluids during construction as explained below.

Microtunneling operations use three types of fluids: slurry at the face of the machine, lubrication within the annular space between the casing and the ground to reduce frictional forces, and contact grout within the same annular space to reduce future ground movement at the surface. Conventional bored tunneling operations may also inject grout between installed liner plate and the ground. Inadvertent returns of these fluids can occur when the fluid pressure is greater than the pressure of the surrounding ground. Topography with high relief such as the steep slopes of this project site carry higher risk of inadvertent returns because there is less ground pressure resisting the fluid pressure in the horizontal direction. Mitigation includes

optimization of the horizontal alignment during design, increasing the depth of the tunnel, and monitoring of fluid pressures during construction. Potential mitigation also includes building a berm and retaining wall to increase the distance from the tunnel to the open slope (Mott MacDonald 2021).

All tunnel alignment alternatives cross the Ben Lomond fault, which is assumed to be inactive, and therefore, the risk of fault rupture is very low, same as the Proposed Project. However, conventional bored tunneling may encounter problems within the fractured rock near a fault zone including highly adverse groundwater and ground inflow. Mitigation of adverse ground and groundwater conditions usually entails pre-excavation ground treatment (i.e. grouting or dewatering), pressurized face tunneling such as microtunneling, or a combination of the two. As long as the tunnel alignment is located fully within rock, the risk of triggering a landslide during construction should be low. The tunnel should be located deep enough to reduce the risk of encountering low-points in the soil/rock profile which could lead to ground loss. (Mott MacDonald 2021).

The Proposed Project could potentially directly or indirectly destroy a unique paleontological resource or site during construction. Construction under Alternative 2 would not avoid or substantially reduce impacts to sensitive geologic formations with potential paleontological resources as this alternative includes the same work area as the Proposed Project. It is noted that only a small portion of the pipe section at the southern end is within a paleontologically sensitive (Monterey Formation) area.

Hazardous Materials

The Proposed Project would be located adjacent to sites included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, could create a significant hazard to the public or the environment. However, the Brackney North section is not located in proximity to identified hazardous materials sites, and no changes are made to other sections of the Proposed Project under Alternative 2. Therefore, Alternative 2 would not avoid or substantially lessen impacts related to hazardous materials sites.

Hydrology and Water Quality

Construction and operation of the Proposed Project would not violate any water quality standards or waste discharge requirements or otherwise substantially degrade surface water quality, except that the HDD construction method proposed in the Brackney North section could result in release of drilling fluids into San Lorenzo River without mitigation. This impact would not be avoided or substantially lessened under Alternative 2 as the alternative microtunneling construction method has the same potential for inadvertent release of fluids as the Proposed Project.

Noise

Construction of the Proposed Project would result in generation of a substantial temporary increase in ambient noise levels in the vicinity of some Proposed Project pipe sections in excess of applicable standards established in local general plans or noise ordinances, with a significant unavoidable impact in the Brackney North section due to limited nighttime construction. For microtunneling, the primary sources of noise are the slurry separation plant and generator that could result in significant noise impacts, and depending on the selected method, construction of the shafts can cause noise and vibrations. Rock excavation for the shafts could require impact-type excavation methods, such as hoe-rams, however blasting is not anticipated based

on potential rock types and geophysics results. Tunneling can also cause vibrations at the surface though the tunnel alternatives are considered deep enough to mitigate these impacts (Mott MacDonald 2021). Therefore, Alternative 2 would not avoid or substantially lessen noise impacts associated with the HDD construction method of the Proposed Project, and could potentially result in temporary increased vibration levels during construction.

Other Impacts

Other less-than-significant impacts that would result due to construction of the Proposed Project are expected to remain the same under Alternative 2 related to cultural resources and wildfire impacts. No recorded cultural resources were identified in the Brackney North area as part of the project archaeological investigation. Because the microtunneling method would result in a similar construction duration period as the Proposed Project, less-than-significant impacts related to air quality, energy, GHG emissions, and transportation are expected to be the same or similar to the Proposed Project.

6.4.4.4 Ability to Meet Project Objectives

Alternative 2 would meet most of the project objectives, including addressing deficiencies in the existing NCP (Objective #1), improving long-term reliability of the City's water infrastructure between Loch Lomond Reservoir and GHWTP (Objective #2), improving access to the NCP to facilitate inspection, maintenance and repair (Objective #3), and siting the NCP to optimize accessibility and minimize the potential for future failures (Objective #4). However, Alternative 2 would not fully meet the project objective to regarding cost-effectiveness (Objective #5) as the microtunneling alternative is estimated to cost approximately $14-18 million dollars, which is about four times the cost of the Proposed Project. See Table 6-2 at the end of this section for comparison on each alternative's ability to attain project objectives.

6.5 Environmentally Superior Alternative

The CEQA Guidelines (Section 15126.6[a]) requires that an EIR's analysis of alternatives identify the "environmentally superior alternative" among all of those considered. In addition, Section 15126.6(e)(2) states that if the environmentally superior alternative is the No Project Alternative, the EIR must also identify an environmentally superior alternative among the other alternatives. Furthermore, Public Resources Code Sections 21002 and 21081 require lead agencies to adopt feasible mitigation measures or feasible alternatives in order to substantially lessen or avoid otherwise significant adverse environmental effects, unless specific economic, legal, social, technological, or other conditions make such mitigation measures or alternatives infeasible.

Table 6-3 presents a comparison of project impacts between the Proposed Project and the alternatives. The No Project Alternative would reduce or avoid impacts to some environmental resources. Alternative 1A would avoid significant impacts related to geology (GEO-2), hazardous materials (HAZ-3), and hydrology (HYDRO-1). Other significant impacts would remain the same as with the Proposed Project, except that biological resource impacts (BIO-1A, BIO-1B, BIO-2) and paleontological resource impacts (GEO-4) could increase in severity over the Proposed Project. However, Alternative 1A would reduce impacts associated with noise impacts (NOI-2) from significant unavoidable to less than significant with mitigation. Alternative 1B would lessen significant impacts related to some biological resources (BIO-1A, BIO-3-jurisdictional wetlands) and paleontological

impacts (GEO-4), but impacts would continue to be significant, requiring mitigation as with the Proposed Project. Other significant impacts would remain the same as the Proposed Project, except that some biological resource impacts (BIO-1B, BIO-2) and hazardous materials impacts (HAZ-3) could increase in severity over the Proposed Project. Alternative 2 would not avoid or substantially reduce any identified significant impacts.

Overall, of the alternatives considered, Alternative 1A would eliminate or reduce the severity of more identified significant impacts than the other alternatives reviewed and also attain most of the project objectives. Therefore, Alternative 1A is considered the environmentally superior alternative of the CEQA alternatives reviewed.

Table 6-2. Ability of Alternatives to Meet Project Objectives

Objective	Proposed Project	No Project Alternative	Alternative 1A	Alternative 1B	Alternative 2
Objective #1: Address identified deficiencies in the NCP conditions in order to maintain full system functioning without interruption, in order to protect water supply reliability and service to the City's customers.	Excellent	Poor	Excellent	Excellent	Excellent
Objective #2: Improve long-term reliability of the City's water supply infrastructure between Loch Lomond Reservoir and the Graham Hill Water Treatment Plant (GHWTP) such that it can continue to function as an integral part of the City's overall water supply system.	Excellent	Poor	Excellent	Excellent	Excellent
Objective #3: To Improve access to the NCP to facilitate inspection, maintenance, and repair of the pipeline system, while minimizing the potential for environmental and propety damage impacts (such as may occur in State Parks and other sensitive areas).	Excellent	Poor	Excellent	Excellent	Excellent
Objective #4: Site the NCP to consider constructability, optimize accessibility for maintenance, minimize the potential for future failures due to unstable terrain, and avoid risks (e.g., public safety, property damage) and impacts to adjacent uses associated with pipeline failures during the life of the pipeline.	Excellent	Poor	Moderate	Moderate	Excellent
Objective #5: Implement NCP project segments that are cost-effective in terms of both capital and operation/maintenance costs.	Excellent	Poor	Poor	Moderate	Poor

Table 6-3. Comparison of Significant Impacts from the Alternatives

Environmental Issue	Proposed Project	No Project Alternative	Alternative 1A	Alternative 1B	Alternative 2
Impact BIO-1A: Special-Status Plant Species	LSM	NI	LSM↑	LSM ↓	LSM
Impact BIO-1B: Special-Status Wildlife Species	LSM	NI	LSM↑	LSM↑	LSM
Impact BIO-2: Riparian and Sensitive Vegetation Communities (Sandhills, Special Forest)	LSM	NI	LSM↑	LSM↑	LSM
Impact BIO-3: Jurisdictional Aquatic Resources	LSM	NI	LSM	LSM ↓	LSM
Impact GEO-2: Unstable Geologic Unit or Soils	LSM	NI	NI	LSM	LSM
Impact GEO-4: Paleontological Resources	LSM	NI	LSM↑	LSM ↓	LSM
Impact HAZ-3: Hazardous Materials Sites	LSM	NI	NI	LSM↑	LSM
Impact HYD-1: Surface Water Quality	LSM	LSM↑	NI	LSM	LSM
Impact NOI-2: Substantial Increase in Ambient Noise Levels in Excess of Standards	SU[1]	NI	LSM	SU[1]	LSM↑

Notes: B = beneficial impact; NI = no impact; LS = less than significant; LSM = less than significant with mitigation; SU = significant and unavoidable; ↑ = greater; ↓ = lesser.

[1] The significant unavoidable construction noise impact associated with the Proposed Project (Impact NOI-2) would result only from construction activities at the Brackney North pipe section. The impacts of all other construction activities would be either less than significant or less than significant with mitigation.

6.6 References

County of Santa Cruz. 2021. Geographic Information Services. Accessed September 27, 2021 at https://www.santacruzcounty.us/Departments/GeographicInformationSystems(GIS).aspx.

HDR. 2019a. "Newell Creek Pipeline Alternatives Analysis Technical Memorandum." Santa Cruz Water Program. October 9, 2019.

HDR. 2019b. "Newell Creek Pipeline Rehab/Replacement Revised Technical Memorandum, Subject: Newell Creek Pipeline (NCP) Pipeline Prioritization of Pipeline Risk (Revised)." Santa Cruz Water Program. March 4, 2019.

Mott Macdonald. 2021. Alternative Analysis Memo Final-Brackney Landslide Area Pipeline Risk Reduction Project. May 14, 2021.