4. EVALUATION OF ALTERNATIVES

4.1. ALTERNATIVE ANALYSIS METHODOLOGY

4.1.1. Evaluation Criteria

The SAA evaluation methodology consists of a comparative performance evaluation of the four Build Alternatives defined in Chapter 3. The Build Alternatives are compared against one another using evaluation criteria which are reflective of the overall Purpose and Need Statement and measure the Build Alternatives’ ability to address project goals as defined in Chapter 2. The evaluation criteria described in Chapter 2 have been grouped by project goal.

Community input is not an evaluation criterion, but it is an important factor in the decision-making process, as it takes into account public and stakeholder preferences and concerns regarding the project and its alternatives. Chapter 5 summarizes the types of community outreach performed as part of developing this SAA, as well as the public input received through open houses and other outreach activities. All public comments received are summarized in Appendix B: Public and Agency Outreach.

Goal 1: Improve Mobility

Goal 1 includes evaluation criteria that measure potential improvements to the regional transportation system. The evaluation criteria in this category are as follows:

- **Travel Time/Reliability**: introduce high-frequency transit service options
- **System Connectivity**: provide high quality connections to transportation hubs and existing or planned transit lines
- **Ridership**: change in ridership as a result of the Proposed Project
- **Change in VMT**: encourage a mode shift to transit, reducing VMT
- **Accessibility**: improve accessibility to transit and provide more direct connections to regional destinations
Goal 2: Minimize Environmental Impacts

There would be potential environmental benefits and effects associated with implementing a new transit service. The alternatives are evaluated based on the following environmental topics which serve as the evaluation criteria for Goal 2.

- Air Quality
- Climate Change
- Communities and Neighborhoods
- Construction Effects
- Cumulative Effects
- Displacement and Relocations
- Ecosystems and Biological Resources
- Energy
- Geology, Soils, and Seismicity
- Growth-Inducing Effects
- Hazardous Materials and Waste
- Historical, Archeological, and Paleontological Resources
- Noise and Vibration
- Parklands and Community Facilities
- Safety and Security
- Section 4(f) and Section 6(f)
- Transportation
- Visual Resources and Aesthetics
- Water Resources

Goal 3: Ensure Cost Effectiveness and Financial Feasibility

Goal 3 includes evaluation criteria that measure and compare the relative costs and benefits of each Build Alternative. The evaluation criteria in this category are as follows:

- **Capital Costs**: costs related to design and construction of the Proposed Project, including elements such as guideways, vehicles, and support system facilities
- **Operations & Maintenance (O&M) Costs**: costs associated with the day-to-day operations of the transit system including labor, vehicle maintenance, fuel, and parts/supplies
- **Cost Per Rider**: annualized costs divided by annual ridership
- **Financial Feasibility**: Availability of funding sources to carry out all construction phases
Goal 4: Support Local and Regional Land Use Plans and Policies

Goal 4 analyzes the relationship between the alternatives and their surrounding contexts, in addition to the land use plans of local and regional agencies to determine the Proposed Project’s compatibility with its potential surroundings. Its evaluation criteria include:

- **Accessibility**: improve accessibility to transit and provide more direct connections to regional destinations (also evaluated under Goal 1: Improve Mobility)
- **Land Use Consistency**: consistency with existing land use plans and the potential to add a new physical barrier to existing communities
- **Economic and Fiscal Effects**: short-term economic effects of construction and long-term economic development potential as a result of adding LRT service

Goal 5: Ensure Equity

Goal 5 identifies the location of socioeconomically disadvantaged populations near the Proposed Project. This goal is designed to prepare a basis for analyzing potential disproportionately high and adverse effects from the Proposed Project on environmental justice (EJ) communities, defined as populations over 50 percent minority, low-income, or limited English proficiency (LEP). This analysis complies with federal and state law and guidance to ensure disadvantaged populations are able to participate in the benefits of public projects. The SAA identifies the location of EJ communities, and a full analysis of any disproportionately high and adverse effects would occur in the next phase of the project.

4.1.2. Rating System

The alternatives were evaluated based on the evaluation criteria described above, and an overall score was determined for each of the project goals. As described previously, Community input was not scored, but it was taken into consideration throughout the decision-making process and summarized in Chapter 5. The scores are represented with Harvey Balls as shown in Table 4.1. An empty Harvey Ball represents the lowest performance, in terms of the alternative’s ability to meet the Proposed Project’s goals and objectives, while a full Harvey Ball represents the highest performance.

<table>
<thead>
<tr>
<th>Rating</th>
<th>Low Performance</th>
<th>Medium Performance</th>
<th>High Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○</td>
<td>◇</td>
<td>●</td>
</tr>
</tbody>
</table>

After the alternatives were assigned Harvey Ball scores for each of the project goals, the scores were summarized and an overall score (based on the “low”, “medium”, and “high” ratings) was assigned to each alternative. No weighting was applied to the results.
4.2. **GOAL 1: IMPROVE MOBILITY**

This section describes the alternatives based on the evaluation criteria identified for Goal 1: Improve Mobility.

4.2.1. **Travel Time/Reliability**

Travel time and reliability are important factors in determining the performance of a new transit investment. Short travel times and reliable frequency of service may encourage a shift to transit. Travel times for each alternative are illustrated in Figure 4.1.

All Build Alternatives would operate with the same headways (assumed to be 6 minutes during peak hours in 2040). Alternatives 1 and 2 would have the shortest travel times and highest reliability, as they would operate within the dedicated Metro ROW and would not be delayed by any at-grade crossings (which would be gated). Alternative 4 would have a similar level of travel time reliability as 1 and 2, as it would be on an aerial structure along I-405 and Hawthorne, Redondo Beach, and Artesia Boulevards and would be within dedicated Metro ROW otherwise. However, the travel time of Alternative 4 would be higher due to the extra distance traveled along Redondo Beach Boulevard and Artesia Boulevard to reconnect with the Metro ROW from Hawthorne Boulevard.

Alternative 3 would have the longest travel time and lowest reliability due to variable travel times in the at-grade part of the alignment along Hawthorne Boulevard. In this segment, there would not be crossing gates or signal preemption at the signalized intersections, and therefore the trains would wait for east-west cross-traffic for variable amounts of time.
4.2.2. System Connectivity

Poor connections to transit has been identified as a transportation deficiency in the Project Area. Alternatives that provide connections to transportation hubs and existing or planned transit lines can greatly improve mobility throughout the region.

All Build Alternatives would serve the proposed Torrance TC, and would allow for a connection north to LAX and the Metro Expo Line, once the Metro Crenshaw/LAX Transit Project is completed. Alternatives 1, 2, and 4 would serve the planned Redondo Beach TC, but Alternative 3 would not connect to the proposed transit hub. Figure 4.2 displays the proposed alternatives as they relate to the existing transit network and planned transit centers.

While many of the same lines are expected to serve both the proposed South Bay Galleria Station and the proposed Redondo Beach TC Station, the latter would offer advantages for transfers. The station at Redondo Beach TC would offer more comfortable amenities for transferring passengers such as a passenger waiting area, public restrooms, and an information center. Alternatives 1, 2, and 4 would serve the Redondo Beach TC, while Alternative 3 would not.
Figure 4.2. Anticipated System Connectivity (2040)

Source: AECOM, STV, Metro, Municipal Bus Operators, 2018
4.2.3. Ridership

Ridership estimates predict how many people would use the LRT service provided by an alternative, and if people might use the new transit investment instead of a private vehicle. The SAA estimates are derived from a holistic regional transportation model called the Metro Travel Demand Model, which was updated with land use and trip table data from the 2016 SCAG RTP/SCS. This model projected ridership based on socioeconomic and transportation characteristics, the market share of various transportation modes, and the routing of trips in the Project Area over the highway and transit networks.

The version of the Metro model used for this study was validated regionally as part of recent studies, including the Crenshaw/LAX Northern Extension Feasibility Study and the Los Angeles and San Bernardino Inter-County Transit and Rail Connectivity Study. The Project Area transit routes and corridor level transit boarding comparisons were estimated based on observed boardings from 2011 Metro surveys and 2012 Metro ridership statistics.

Figure 4.3 displays projected daily ridership on the extension, between Redondo Beach (Marine) Station and the Torrance TC Station. While travel times for Alternatives 3 and 4 are projected to be longer, they would provide service to more key destinations and to a greater pool of residents living along the Hawthorne Boulevard commercial corridor. Nevertheless, the difference in ridership between Alternatives 3 and 4 compared to Alternatives 1 and 2 is very small, at about 3%.

![Figure 4.3. Daily Ridership](source: AECOM, 2017; STV, 2018)
Ridership projections also measure how many new riders are expected to use the Proposed Project instead of a private automobile. New riders per Build Alternative are displayed in Table 4.2. While Alternative 3 would have more total riders as shown in Figure 4.3, it would attract fewer total new riders to using transit. This is due to the expected use of the Proposed Project under Alternative 3 by existing riders of bus lines along Hawthorne Boulevard. These riders already use public transit and as a result, Alternative 3 would attract fewer total new riders. However, ridership projections are still generally similar across Build Alternatives.

<table>
<thead>
<tr>
<th></th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Riders (Daily)</td>
<td>4,570</td>
<td>4,570</td>
<td>4,400</td>
<td>4,590</td>
</tr>
<tr>
<td>New Riders (Annual)</td>
<td>1.45 million</td>
<td>1.45 million</td>
<td>1.40 million</td>
<td>1.46 million</td>
</tr>
</tbody>
</table>

Source: AECOM, 2017; STV, 2018

4.2.4. *Change in VMT*

Vehicle miles traveled (VMT) is the number of miles driven by all cars within an area daily. A change in VMT is closely related to ridership projections and can be used to determine the effect of a new transportation investment on the use of private vehicles in a given area. Reductions in VMT generally are a result of people switching from driving to transit. Therefore, alternatives that attract more new riders would result in greater reductions in VMT. Anticipated reductions in daily VMT for all Build Alternatives, compared to the No Build Alternative, are displayed in Figure 4.4.

**Figure 4.4. Change in VMT (Daily) by Alternative**

Source: AECOM, 2017; STV, 2018
Based on anticipated ridership projections as discussed in Section 4.2.3, all Build Alternatives are expected to result in a reduction in VMT compared to the No Build Alternative. Alternatives 1, 2, and 4 are expected to have very similar reductions in VMT. Alternative 3 is expected to have the lowest reduction in VMT. This is due to more of the projected ridership on Alternative 3 being from existing transit riders who have shifted from using buses along Hawthorne Boulevard to using the new LRT service, as opposed to new riders who would be shifting from private vehicle use to transit use (which is more prevalent for Alternatives 1, 2, and 4).

4.2.5. Accessibility

Improving transit accessibility is another important system performance criterion. Introducing high-quality transit within the communities along the corridor as well as providing direct connections to key destinations is expected to increase transit ridership. The major destinations served by each Build Alternative and number of residents within a half-mile buffer of proposed station locations are displayed in Figure 4.5.

![Figure 4.5. Access to Transit and to Key Destinations by Alternative](source: STV, 2018)

To compare how the alternatives would perform in regards to providing residents new access points to transit, the population within a half-mile buffer of the proposed station areas was examined. As all alternatives would end at the Torrance TC Station and the population densities around the Redondo Beach TC and South Bay Galleria stations are similar, the only
differentiator between alternatives was the proposed station in the north: Manhattan Beach /Inglewood Station for Alternatives 1 and 2, and Hawthorne Boulevard/166th Station for Alternatives 3 and 4. The analysis showed that nearly twice as many residents live within a half-mile of the proposed Hawthorne Boulevard/166th Station than the Manhattan Beach /Inglewood Station. Therefore, Alternatives 3 and 4 would potentially provide transit access to more residents.

In terms of access to key destinations, Alternatives 1 and 2 would serve the commercial area near the intersection of Inglewood Avenue and Manhattan Beach Boulevard. Alternatives 1 and 2 would also accommodate a pathway in the Metro ROW for public use, which would improve the active transportation network in the Project Area and connect to proposed Metro Rail stations.

Alternative 3 would serve a larger commercial corridor along Hawthorne Boulevard from approximately 162nd Street to Artesia Boulevard, as well as the regional commercial center anchored by the South Bay Galleria. Alternative 4 would serve the Hawthorne Boulevard commercial area only between 162nd Street and Artesia Boulevard. Pathways would not be accommodated in the designs for Alternatives 3 or 4.

4.3. **Goal 2: Minimize Environmental Impacts**

This section describes the alternatives based on the evaluation criteria identified for Goal 2: Minimize Environmental Impacts, using the topics listed in Section 4.1.1.

This section performs a preliminary analysis of environmental benefits and impacts of the Proposed Project with a high-level analysis that provide a basis of comparison between alternatives. This section helps inform what potential environmental effects could be caused by each of the alternatives being considered. The alternative(s) that emerge from this SAA and that are advanced for the environmental clearance process would undergo more detailed environmental impact analysis consistent with the requirements of the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA).

Several environmental topics examine potential effects within a half-mile or quarter-mile radius of proposed alternatives. Figure 4.6 displays these resource study areas.
The image is a map illustrating the Green Line Extension to Torrance. The map shows various stations along the extension route, including Douglas Station, Redondo Beach (Marine) Station, Manhattan Beach/Inglewood Station, Redondo Beach Transit Center Station, South Bay Galleria Station, Hawthorne/166th Station, and Torrance Transit Center Station. The map also indicates the Project Area and delineates buffers of 1/2 and 1/4 miles.
4.3.1. Air Quality

Overview
Air quality is closely tied to Greenhouse Gas (GHG) emissions from fossil fuel combustion engines, VMT, and construction-related activity. Airborne pollutants are regulated by various federal, state and regional agencies through implementation of emission standards, ambient air quality thresholds, and regulatory requirements.

Potential Effects
Under the No Build Alternative, there would be no short-term increases in emissions as there would be no new construction activities for an extension of LRT service into the South Bay. All Build Alternatives would likely result in short-term, temporary increases in emissions as a result of construction activities (including construction of bridges, retaining walls, stations, tracks, systems, and use of diesel-fueled or gasoline-powered construction equipment and trucks). Potential localized effects include temporary increases in emissions such as Volatile Organic Compounds (VOC) and Nitrogen Oxide (NOx).

Alternative 1 would likely have the least negative construction-related effects on air quality due to a shorter construction phase and fewer emissions. Alternative 1 is expected to have the shortest construction timeframe because it would not require excavations for a trench as in Alternative 2, and would not require as much roadway preparation and aerial structure construction as in Alternatives 3 and 4.

During operations, potential emissions increases are possible as a result of the increased likelihood of idling vehicles at at-grade crossings. Alternatives 1 and 2 have two at-grade crossings, and Alternative 4 has one at-grade crossing, where increased traffic queuing could occur. Alternative 3 would have six at-grade crossings along Hawthorne Boulevard, but as the existing traffic signal phases are expected to remain the same as existing conditions; cross-traffic queuing is not expected to change substantially. Alternative 3 would also have four crossing closures, which would close access to cross-traffic at locations along Hawthorne Boulevard, though right-turn movements would be allowed. These four crossing closures associated with Alternative 3 could result in traffic rerouting during operation of the project. Though generally similar, Alternatives 1, 2, and 4 would likely result in better air quality conditions compared to Alternative 3 due to its high number of at-grade crossings.

Potential Benefits
The No Build Alternative would not result in reductions in projected regional VMT. For all Build Alternatives, there would likely be long-term reductions in mobile source emissions as a result of reductions in regional VMT. As shown in Figure 4.4, Alternatives 1 and 2 have the greatest potential daily VMT reductions, and thus are expected to provide the greatest potential environmental benefits from reduced emissions, followed by Alternative 4 and Alternative 3. Refer to Section 4.2.3 and 4.2.4 for additional information on the model used to derive ridership and VMT reduction.

Ambient population growth would result in an increase in VMT under the No Build Alternative. The Proposed Project would provide a benefit compared to the No Build Alternative, by introducing an electric-powered LRT alternative to driving; it would help to
reduce future increases in automobile traffic and related air quality effects from GHG-emitting vehicles.

4.3.2. Climate Change

Overview
Climate change is a global environmental issue that refers to any substantial change in measures of climate including temperature, precipitation, or wind which extends for a period (decades or longer) of time. Climate change is a result of both natural factors, such as volcanic eruptions, anthropogenic, or human-made factors including changes in land use and burning of fossil fuels. This section briefly discusses the potential increase in GHG emissions from construction and operation of the proposed alternatives, and the potential for GHG emissions to cause a cumulatively considerable effect on climate change. These criteria are consistent with the South Coast Air Quality Management District’s guidance pursuant to CEQA Guidelines, and California planning documents designed to evaluate and mitigate climate change effects such as Assembly Bill 32 and Senate Bill 375.

Potential Effects
Under the No Build Alternative, there would be no new construction or operational activities for an extension of LRT service into the South Bay. For All Build Alternatives, the construction sources for which GHG emissions are calculated include operating diesel-fueled construction equipment and gasoline-powered haul and delivery trucks, which require different levels of use based on the constraints of construction sites. Construction activities for Alternatives 1 and 2 are expected to occur mostly within the existing Metro ROW, while Alternatives 3 and 4 would require more construction in public roadways. Since Alternatives 3 and 4 may face greater ROW constraints within the public roadways during construction, this could create construction scenarios which require longer durations of activity from GHG-emitting construction vehicles, potentially resulting in greater overall GHG emissions. As a result, Alternatives 3 and 4 may have greater effects on climate change during construction.

The project-related operational sources of GHG emissions include indirect emissions from off-site electricity generation required to power the LRT vehicles, as well as the energy demands of the proposed stations. Direct GHG emission sources during operation include regional traffic, station landscaping, motor vehicle emissions associated with transit rider parking activities, and circuit breaker leakage from traction power substations (TPSS).

Under all Build Alternatives, potential increases in GHG emissions from new offsite electricity generation to power trains and supporting systems would likely be offset by the reduction in GHG emissions due to projected reductions in VMT compared to the No Build Alternative. As described in Section 4.3.1, Alternatives 1 and 2 would likely have greater daily VMT reductions compared to Alternatives 3 and 4, as shown in Figure 4.4.

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Potential Benefits
Ambient population growth would result in an increase in VMT under the No Build Alternative. The Proposed Project would provide a benefit compared to the No Build Alternative, by introducing an electric-powered LRT alternative to driving; it would help to reduce future increases in automobile traffic and related air quality effects from GHG-emitting vehicles.

4.3.3. Communities and Neighborhoods

Overview
Transit projects can potentially result in changes to the physical layout of an area, its demographics, land uses, and the sense of neighborhood in communities. A community is defined as a population rooted in one place, where the daily life of each member involves contact with and dependence on other members, whereas a neighborhood is usually a sub-area within a larger community. Communities and neighborhoods can be delineated by physical barriers such as highways, waterways, or open space. This analysis addresses potential changes to communities and neighborhoods by examining division of communities and disruption of access.

Potential Effects
Under Alternatives 1 and 2, the residential communities considered are those on either side of the Metro ROW, from approximately Inglewood Avenue to Hawthorne Boulevard. Under Alternatives 3 and 4, residential communities considered are those on either side of Hawthorne Boulevard, from approximately the Metro ROW to Freeman Avenue/Amie Avenue. All residential communities considered in this section are located approximately between Manhattan Beach Boulevard and 190th Street. None of the Build Alternatives are expected to result in a change of demographics in the surrounding neighborhoods.

Under the No Build Alternative, there would be no potential for new physical barriers as there would not be an extension of LRT service into the South Bay. The existing Metro ROW with its active freight operations currently functions as a physical barrier and would remain under the No Build Alternative. Alternatives 1 and 2 would utilize the existing ROW, but it would change how the corridor functions by introducing additional trains, potentially increasing the division of the neighborhood. As described in Section 4.3.1, Alternative 3 would include several crossing closures, and has the potential to introduce a physical barrier along Hawthorne Boulevard. Alternative 4 would also travel down Hawthorne Boulevard, as well as Redondo Beach Boulevard and Artesia Boulevard, but as it would be an aerial alignment with no crossing closures, it would likely not introduce new physical barriers that would disrupt access.

Alternative 3 would affect circulation and access for communities and neighborhoods, as a result of the proposed crossing closures that restrict east-west access across Hawthorne Boulevard. The proposed closures would occur at 164th Street (east and west access), 171st Street (west access), 179th Street (east and west access), and 180th Street (east and west access). While right-turn movements would still be allowed, these crossing closures could block access to community assets, including the commercial and retail uses along Hawthorne
Boulevard.

**Potential Benefits**
The Proposed Project’s goals and objectives include, among others, enhancing the regional transit network and improving transit accessibility for residents of communities along the corridor. As described in Chapter 3, a potential pedestrian/bicycle pathway could be accommodated along the Metro ROW under Alternatives 1 and 2. This pathway would support the goals of enhancing the regional transit network and improving transit accessibility, as it would connect directly to at least one proposed station. Alternatives 3 and 4 would not include potential pathways.

### 4.3.4. Construction Effects

**Overview**
Spatial requirements of staging areas and construction-related effects on transportation must be considered in the evaluation of the Proposed Project. For alignments within the Metro ROW, there would generally be enough space to accommodate construction without requiring additional land, and few transportation-related effects on the surrounding community. Construction effects would also depend on the length of the construction staging period and the type of activity required to build certain project elements.

**Potential Effects**
Under the No Build Alternative, there would be no new construction activities for an extension of LRT service into the South Bay. Alternatives 1 and 2 would be located within the existing Metro ROW, where sufficient land is available for construction use throughout most of the corridor. More construction effects may occur near the proposed Manhattan Beach/Inglewood Station, as construction activities would involve large workforces and potentially utilize on-street parking for construction activities. Furthermore, construction activities could affect operations of bus routes, such as Metro Line 126 on Manhattan Beach Boulevard, potentially requiring temporary rerouting and relocation of bus stops in the area.

Since large portions of Alternatives 3 and 4 are located within public roadways, temporary ROW may be needed for construction activities. This would likely result in greater negative construction effects compared to Alternatives 1 and 2 due to potential travel lane reconfiguration along Hawthorne Boulevard (and Artesia and Redondo Beach Boulevards under Alternative 4). Additionally, construction along street ROW may require temporary closures of sidewalks and roadways that would potentially affect pedestrian and other active transportation access along Hawthorne Boulevard (and Artesia and Redondo Beach Boulevards under Alternative 4). Construction activities within the public roadways could also result in temporary increased traffic delays, rerouting of bus service (Metro Lines 40, 210, 211/215, and 344, Garden Transit Route 3, Torrance Transit Route 8, and Beach Cities Route 102), and reduced street access for automobiles.

Additionally, Alternative 3 would likely result the widening of the east side of Hawthorne Boulevard south of Artesia Boulevard to accommodate the LRT station and tracks while maintaining a lane configuration similar to existing conditions. Construction activities for this
road widening, which would only occur under Alternative 3, would likely also result in traffic and bus delays in that section of Hawthorne Boulevard during construction.

Finally, as discussed in Section 4.3.1, Alternative 1 would likely have the shortest construction timeframe, at approximately four years. The trench for Alternative 2 would require an additional estimated six months and additional activity for earthmoving, for a total of four and a half years. Alternatives 3 and 4 would require an estimated 4 and a half years and 5 years, respectively, due to the additional aerial structures and preparation of Hawthorne Boulevard for LRT service. Longer construction timeframes may result longer periods of activity which could result in noise or GHG emissions from construction equipment and vehicles.

4.3.5. Cumulative Effects

Overview
Cumulative effects refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental considerations. The individual effects may be changes resulting from a single project or a number of separate projects; whereas the cumulative effect is the change in the environment from the incremental effect of the Proposed Project when added to other closely related past, present and reasonably foreseeable future projects. Cumulative effects can result from individually minor, but collectively significant, projects taking place over a period of time.

The Proposed Project is considered in the 2016 SCAG RTP/SCS, which evaluates potential transportation projects out to the year 2040. The Proposed Project is included in SCAG’s list of projects and environmental analysis.

Potential Effects
Other projects in the Project Study Area include the proposed Redondo Beach TC, the planned redevelopment of the South Bay Galleria, and the under-construction Torrance TC. Overall, potential environmental effects that could occur as a result of the Proposed Project would need to be analyzed in conjunction with other closely related past, present, or reasonably foreseeable future projects such as these when the project undergoes CEQA/NEPA environmental clearance at a future date. At this time, there is no differentiating factor regarding potential cumulative effects among the Build Alternatives.
4.3.6. Displacement and Relocations

Overview
Build Alternatives that require limited property acquisitions and relocations would have fewer potential effects over those that may require more substantive land takes and/or relocations. Minimizing acquisitions and relocations helps maintain the existing character of corridor-adjacent communities. This analysis identified parcels that may be affected using a combination of aerial photography, assessor parcel maps and records, and preliminary conceptual engineering drawings of the proposed alignments and stations. Parcel boundaries that touch the proposed alignment and/or stations were considered potentially affected properties. This analysis does not distinguish between full and partial property acquisitions, nor does it distinguish between temporary and permanent acquisitions; this level of analysis would be completed in future environmental documents.

Potential Effects
Under the No Build Alternative, there would be no potential for displacements or relocations as there would be no extension of LRT service into the South Bay. Alternatives 1 and 2, which primarily are located within the existing Metro ROW, would have fewer property effects compared to Alternatives 3 and 4. The effects would mainly be focused in station and junction areas, but also would occur along some portions of the Metro ROW where it is constrained. Alternatives 3 and 4, which have large portions located outside the Metro ROW, would require larger amounts of ROW acquisitions from the adjacent commercial, industrial, utility, and residential properties, particularly in the segment along I-405 between Inglewood Avenue and Hawthorne Boulevard. Alternative 3 would require ROW acquisitions along Hawthorne Boulevard south of Artesia Boulevard and near 190th Street, while Alternative 4 would require ROW acquisitions along Redondo Beach and Artesia Boulevards.

Furthermore, intersections identified for possible grade separations, such as where Hawthorne Boulevard intersects Redondo Beach and Artesia Boulevards, may also require additional ROW acquisitions. A more detailed grade-separation analysis during future environmental clearance is recommended. Table 4.3 shows the potential parcels affected for each Build Alternative by land use type, while Table 4.4 shows the number of parcels potentially affected by city.
Table 4.3. Parcels Potentially Affected Per Build Alternative & Land Use*

<table>
<thead>
<tr>
<th>Land Use</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Parcels affected due to track alignment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>16</td>
</tr>
<tr>
<td>Industrial</td>
<td>1</td>
<td>1</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>Utility</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Residential</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>Sub-total</td>
<td>5</td>
<td>5</td>
<td>33</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Parcels affected due to station location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commercial</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Industrial</td>
<td>7</td>
<td>7</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Utility</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Residential</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sub-total</td>
<td>8</td>
<td>8</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>13</td>
<td>34</td>
<td>32</td>
</tr>
</tbody>
</table>

Source: STV, AECOM, Epic Land Solutions, 2018
*This analysis does not distinguish between full and partial property acquisitions or temporary and permanent acquisitions; this level of analysis would be completed in future environmental documents.

Table 4.4. Parcels Potentially Affected Per City*

<table>
<thead>
<tr>
<th>City</th>
<th>Alternative 1</th>
<th>Alternative 2</th>
<th>Alternative 3</th>
<th>Alternative 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>City of Lawndale</td>
<td>6</td>
<td>6</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>City of Redondo Beach</td>
<td>6</td>
<td>6</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>City of Torrance</td>
<td>1</td>
<td>1</td>
<td>14</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>13</td>
<td>34</td>
<td>32</td>
</tr>
</tbody>
</table>

Source: STV, AECOM, Epic Land Solutions, 2018
*This analysis does not distinguish between full and partial property acquisitions; this level of analysis would be completed in future environmental documents.

Alternatives 3 and 4 would have similar numbers of properties potentially affected, as the majority of parcels potentially affected are located in the segment where their alignments are identical. This identical segment is where the alignment runs parallel to the I-405 freeway between Inglewood Avenue and Hawthorne Boulevard. South of Redondo Beach Boulevard, both alternatives would result in a similar number of property effects, but in different locations. Alternative 4 would affect parcels along Redondo Beach Boulevard due to the proposed track alignment, while Alternative 3 would affect parcels along Hawthorne Boulevard due to the proposed track alignment and road widening to maintain existing lane configurations south of Artesia Boulevard while accommodating new LRT service in the median.
4.3.7. Ecosystems and Biological Resources

Overview
This section looks at the potential short-term and long-term negative effects to ecosystems and biological resources, such as species identified as a candidate, sensitive, or special status species, riparian habitats or any effects to wetlands protected by Section 404 of the Clean Water Act. An ecosystem is defined as the interaction between plants, animals, microorganisms (i.e., biological resources) and the physical environment in which they live, all of which function together as a unit.

Potential Effects
All the Build Alternatives would be located within a highly developed and urbanized area, and potential biological resources are limited to a few small parks and vacant parcels. The potential for occurrences of sensitive plant and wildlife species is relatively small because the Project Area is so urbanized. However, the Proposed Project could affect biological resources during construction if any vegetation clearing is required, especially during the breeding season for sensitive wildlife and native birds.

Previous CEQA-related documentation along the corridor has identified the vacant parcels for the planned Torrance TC as the most likely location for potential negative effects on biological resources. However, this transit center is a separate project, with its own CEQA clearance and construction schedule. Construction preparation activities, including site grading, took place at this location in 2017. Metro has coordinated with the City of Torrance to provide land to Metro to jointly mitigate potential biological effects identified in previous environmental analysis at the Torrance TC site, thus reducing the Proposed Project’s potential for negative effects on biological resources.

Given the highly urbanized character of the Project Area, short-term and long-term negative effects to the ecosystem and biological resources are anticipated to be low for all Build Alternatives, and would be able to be addressed with best management practices if needed.

4.3.8. Energy

Overview
Energy use for each alternative is made up of a number of components, including stations, vehicle operations, vertical profile changes, and the number of at-grade crossings that could cause stop-and-go scenarios. Determining the effects of transportation energy consumption focuses on conserving energy with particular emphasis on avoiding or reducing inefficient, wasteful, and unnecessary energy consumption. Build Alternatives that would potentially result in wasteful, inefficient or unnecessary use of energy; substantially increase the consumption of electricity, natural gas, gasoline, diesel or other non-renewable energy types; place a significant demand on local or regional energy supply; or require substantial additional energy, would result in the greatest potential effects to transportation energy consumption.

Potential Effects
Alternative 3 would have the most at-grade crossings and vertical profile transitions. These conditions could result in greater energy usage to operate LRT vehicles along this alignment, and more energy consumption effects compared to the other alternatives.

**Potential Benefits**
The operation of electric LRT vehicles could incrementally add to the regional electricity demand, but the Build Alternatives would also remove motor vehicle miles from the region through increased transit ridership compared to the No Build Alternative. This could result in a net savings in operational energy consumption, thus benefitting the region. Section 4.2.4 describes the change in daily VMT per Build Alternative.

### 4.3.9. Geology, Soils, and Seismicity

**Overview**
Geology, soils, and seismicity are factors that often determine design criteria for the development of transit improvements, particularly when grade separation structures are involved. Alternatives would have effects if they expose people or structures to negative effects including the risk of loss, injury or death involving the rupture of a known earthquake fault, seismic ground shaking, and seismic-related ground failure including liquefaction and landslides.

**Potential Effects**
Within the Project Area, there are no known fault zones; there are a number of faults within a few miles away, with the closest, the Newport-Inglewood Fault Zone, located approximately four miles away. An earthquake along this fault zone could cause strong ground shaking and associated seismic effects in the Project Area, which could disrupt operations; effects would be equal across all Build Alternatives.

Regarding liquefaction, there is a relatively shallow historical water table near the Manhattan Beach/Inglewood Station area that could potentially affect all Build Alternatives. However, it is important to note that liquefaction is not known to have occurred in this area, and the soils consist of sands that do not appear to be susceptible; nevertheless, potential negative effects per liquefaction and ground failure (such as lateral spreading) are possible.

Negative effects during construction are also possible across all Build Alternatives in terms of subsidence and setline, notably if soil settlement of earth materials is disturbed or relocated during construction. Additionally, negative effects related to expansive soils during both construction and operation are possible for all Build Alternatives, as the north end of the Project Area is underlain by soils of the Placentia Association, which may contain montmorillonite clay which has a significant expansion potential. Other soil units in the area include clayey or silty horizons that may also have expansive characteristics.

### 4.3.10. Growth-Inducing Considerations

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2 Distances measured from proposed Manhattan Beach/Inglewood Station.
3 California Geological Survey (CGS), 2011.
Overview
Growth-inducing considerations include changes in demographic characteristics within the Project Area as a result of the Proposed Project. This includes examining the indirect consequences, or secondary effects, which may occur in areas beyond the immediate influence of a proposed action and at some time in the future. Secondary effects may include changes in land use, economic vitality, and population density.

Potential Effects
As the Project Area is heavily developed and urbanized, the Build Alternatives would potentially have few growth-inducing effects along their respective corridors. LRT service would not extend into undeveloped areas that could be subject to substantial growth directly as a result of the new LRT service. The existing demographic characteristics would likely not change substantially as the Build Alternatives would not directly or indirectly influence the rate, location, amount, or type of growth within the Project Area.

While the Proposed Project is not anticipated to induce growth on its own, it would be compatible with, and complement, the existing growth plans of local jurisdictions.

4.3.11. Hazardous Waste and Materials

Overview
Hazardous waste and materials considerations include current and historical land uses and known or potential hazardous materials release sites. If stations or structures are located within or directly adjacent to areas that are contaminated by hazardous materials, there would be a potential for a negative effect. Potential effects would be analyzed as part of the environmental review phase, and related mitigations would be included in that analysis.

Potential Effects
Negative effects are most likely to occur during construction of the Proposed Project, as opposed to operation. All Build Alternatives have the potential to encounter hazardous waste and materials issues during construction. There are numerous historical and current land uses within the Project Area with the potential to create hazards to the public or environment during construction. These land uses include treated wood waste from the existing freight line within the Metro ROW, underground storage tanks from gas stations along Hawthorne Boulevard, underground pipelines that run parallel to and cross the Metro ROW, and various oil and chemical refineries located east of the ROW between 190th Street and the Torrance TC.

Alternative 2 may result in the most potential for encountering hazardous waste and materials due to its excavation requirements to construct the trench segment in the Manhattan Beach/Inglewood Station area. This land is in an existing freight corridor, which could have contaminants in the soil. For all Build Alternatives, project-related effects would be analyzed as part of the environmental document to be prepared in the next phase of project development.

4.3.12. Historical, Archeological, and Paleontological Resources

Overview
This section assesses the potential for negative effects on cultural resources, defined below:

- **Historic Resources:** Buildings, structures, improvements, and remnants associated with a significant historic event or person(s) and/or have a historically significant style, design, or achievement. Generally any resource more than 50 years old has the potential to be considered a historic resource.

- **Archaeological Resources:** Remnants of human activity from an earlier time.

- **Paleontological Resources:** Remnants of prehistoric plants and animals (e.g. fossils).

Various federal, state, and local regulations establish criteria to determine a proposed project’s potential for adverse effects, which include physical destruction, relocation, or alteration of the resource, as well as changes in the resources significance or integrity.

### Potential Effects

The significance evaluation was based on the National Register of Historic Places (NRHP) and California Register of Historical Resources (CRHR) eligibility criteria. A half-mile buffer of each Build Alternative was analyzed, shown in Figure 4.6, which determined that there are no eligible historic built environment resources listed under the NRHP or CRHR within this buffer area. Ground-disturbing construction activities have the potential to encounter previously unknown subsurface archeological and paleontological resources and human remains. Operation of the Proposed Project would likely not affect archaeological or paleontological resources.

#### 4.3.13. Noise and Vibration

**Overview**

Noise and vibration considerations are subject to criteria set forth by federal, state, and local regulations and are assessed based on their potential effects on nearby sensitive receptors, such as single-family residences, apartments, and condominiums where people normally sleep. Construction activities could generate short-term temporary noise and vibration effects on sensitive receptors. Long-term negative effects on sensitive receptors are most closely tied to train noise and grade crossing devices. Ground-borne vibration associated with vehicle movements is usually the result of uneven interactions between wheels and tracks, such as train wheels running over a joined rail. Alternatives with at-grade crossings may likely be subject to noise and vibration effects related to railroad crossing warning devices.

**Potential Effects**

The No Build Alternative would not result in any new construction or operations of LRT trains within the South Bay, and therefore would not result in new noise and vibration effects in the Project Area. All Build Alternatives could cause short-term negative noise and vibration effects during construction for activities such as guideway track-laying and station construction, particularly for those locations near sensitive land uses such as residential and recreational uses.

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4. https://www.nps.gov/nr/
5. http://ohp.parks.ca.gov/
During operations, Alternatives 1 and 2 may cause negative noise and vibration effects along the alignment through the City of Lawndale south of Inglewood Avenue, with is surrounded by single-family residences. Additionally, several sensitive receptors (Pacific Crest Cemetery, El Nido Park, and two senior housing developments between Artesia Boulevard and 190th Street) are located immediately adjacent to the Metro ROW, and are potentially subject to effects associated with Alternatives 1, 2, and 4.

While Alternative 3 has the most at-grade crossings and associated railroad crossing warning devices, these crossings are along Hawthorne Boulevard and are generally not located adjacent to sensitive land uses. Although there are approximately 5 blocks of low-density residential housing in Torrance directly fronting the east side of Hawthorne Boulevard, this is significantly less residential housing fronting a proposed alignment than under Alternatives 1, 2, or 4. Therefore, during operation, Alternative 3 would likely have the lowest potential for noise and vibration effects on sensitive receptors.

**Potential Benefits**
Under Alternatives 1 and 2, the existing freight track in the Metro ROW would be shifted to accommodate LRT service. As part of this process, the freight track would be replaced with new tracks. As technology has improved since the installation of the existing freight tracks, the new freight tracks could result in fewer noise effects from the passage of freight trains.
4.3.14. Parklands and Community Facilities

Overview
Transit improvements typically have the potential to enhance accessibility to parklands and community facilities, particularly for those individuals who are transit-dependent. However, the physical features associated with the operation of the transit improvements can also have adverse effects from the acquisition of physical property or the disruption to users of parklands and other community facilities and services. The analysis focuses on the Proposed Project’s potential for negative effects related to a need to add to, physically alter, or provide new parklands or community facilities. Potential effects related to other environmental resources, such as visual quality, air quality, noise and vibration, etc., are addressed in their respective sections.

Potential Effects
A quarter-mile buffer of each Build Alternative was analyzed, shown in Figure 4.6. The educational, parks, and other community facilities within this study area are shown in Table 4.5, Table 4.6, and Table 4.7, respectively. However, only resources immediately adjacent to the alignments were evaluated for effects. The No Build Alternative would not result in any new construction or LRT operations activities in the South Bay, and therefore would not affect the parklands and community facilities identified.

Table 4.5. Educational Facilities within 1/4 Miles of the Alternatives

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. K. Lloyde High School</td>
<td>4951 Marine Ave, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Lawndale High School</td>
<td>14901 Inglewood Ave, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Jane Addams Middle School</td>
<td>4535 W. 153rd Pl, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finley Family Home Care</td>
<td>4560 W. 156th St, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Salpie’s Day Care</td>
<td>4578 W. 160th St, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Vicky’s Child Care</td>
<td>4626 W. 164th St, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Environmental Charter High School</td>
<td>16315 Grevillea Ave, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>William Green Elementary School</td>
<td>4520 168th St, Lawndale</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>South Bay Adult School Edison Center</td>
<td>3401 Inglewood Ave, Redondo Beach</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Washington Elementary School</td>
<td>1100 Lilienthal Ln., Redondo Beach</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adams Middle School</td>
<td>2600 Ripley Ave, Redondo Beach</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Beach Cities Child Development Center</td>
<td>850 S. Inglewood Ave, Redondo Beach</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total Educational Facilities</strong></td>
<td></td>
<td>11</td>
<td>11</td>
<td>8</td>
<td>11</td>
</tr>
</tbody>
</table>

Source: AECOM, 2018; Google Earth, 2016
Table 4.6. Parks and Recreational Facilities within 1/4 Miles of the Alternatives

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Charles B. Hopper Park</td>
<td>4418 W. 162&lt;sup&gt;nd&lt;/sup&gt; St., Lawndale</td>
<td>✔</td>
</tr>
<tr>
<td>Columbia Park</td>
<td>4045 190&lt;sup&gt;th&lt;/sup&gt; St., Torrance</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Dan McKenzie Community Garden</td>
<td>4324 160&lt;sup&gt;th&lt;/sup&gt; St, Lawndale</td>
<td>✔ ✔</td>
</tr>
<tr>
<td>El Nido Park</td>
<td>18301 Kingsdale Ave., Torrance</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Franklin Community Center</td>
<td>850 Inglewood Ave., Redondo Beach</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Franklin Park</td>
<td>807 Inglewood Ave., Redondo Beach</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Pequeno Park</td>
<td>180&lt;sup&gt;th&lt;/sup&gt; St &amp; Regina Ave, Torrance</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>William Green Park</td>
<td>4558 W. 168&lt;sup&gt;th&lt;/sup&gt; St., Lawndale</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td><strong>Total Parks and Recreational Facilities</strong></td>
<td></td>
<td>5 5 8 7</td>
</tr>
</tbody>
</table>

Source: AECOM, 2018; Google Earth, 2016

There are only two resources located immediately adjacent to Alternatives 1, 2, and 4: El Nido Park and Pacific Crest Cemetery in Redondo Beach. Construction and operation of Alternatives 1, 2, or 4 would likely take place fully within the Metro ROW at these locations, and no acquisition of these resources is anticipated. Additionally, the Proposed Project would not significantly increase the use of these resources to the point of necessitating alteration or expansion. There are no resources located immediately adjacent to Alternative 3. Therefore, negative effects are not anticipated for any of the Build Alternatives.

Table 4.7. Other Community Facilities within 1/4 Miles of the Alternatives

<table>
<thead>
<tr>
<th>Name</th>
<th>Location</th>
<th>Alternative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centinela Baptist Church</td>
<td>4724 W. 152&lt;sup&gt;nd&lt;/sup&gt; St, Lawndale</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Lawndale Foursquare Church</td>
<td>4560 W. 154&lt;sup&gt;th&lt;/sup&gt; St, Lawndale</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Lawndale Wesleyan Church</td>
<td>4455 W. 168&lt;sup&gt;th&lt;/sup&gt; St, Lawndale</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Pacific Crest Cemetery</td>
<td>2701 182&lt;sup&gt;nd&lt;/sup&gt; St, Redondo Beach</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Journey Covenant Church</td>
<td>2761 W. 190&lt;sup&gt;th&lt;/sup&gt; St, Redondo Beach</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Good Community Church of Torrance</td>
<td>19950 Mariner Ave, Torrance</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td>Life Covenant Church</td>
<td>312 Maple Ave, Torrance</td>
<td>✔ ✔ ✔ ✔</td>
</tr>
<tr>
<td><strong>Total Other Community Facilities</strong></td>
<td></td>
<td>7 7 5 7</td>
</tr>
</tbody>
</table>

Source: AECOM, 2018; Google Earth, 2016
4.3.15. Safety and Security

Overview
This section analyzes the relative safety and security of each Build Alternative, focusing on potential for increased pedestrian and/or bicycle safety risks, adverse safety conditions, and emergency response times. Build Alternatives that minimize risk of vehicular collisions, pedestrian incidents, and conflicts with train service would likely have fewer potential safety and security effects. At-grade crossings would likely present safety and security concerns due to increased interactions of trains with autos, bicyclists, and pedestrians.

Potential Effects
The No Build Alternative would not result in any change in collision risks or emergency service response times from existing conditions. Alternatives 1, 2, and 3 may contribute to increased response times for emergency service providers. Under Alternatives 1 and 2, potential increased response times from emergency service providers could occur as a result of lowered gates at the two at-grade crossings at 170th Street and at 182nd Street. These streets are currently crossed at-grade by the existing freight rail service within the Metro ROW. Under Alternative 3, there would be six LRT at-grade crossings along Hawthorne Boulevard, which would be signalized, but emergency response times could increase due to uncertainty when emergency vehicles pass through intersections with LRT tracks or an approaching train.

Alternative 4 has one at-grade crossing at 182nd Street at-grade, and therefore the lowest potential to cause adverse safety conditions or increase emergency response times. Figure 4.7 displays the location of at-grade crossings by alternative.

Potential Benefits
Due to the presence of law enforcement on the Metro rail system, law enforcement presence could increase in areas of service by the Proposed Project. This would particularly be a contrast to existing conditions under Alternatives 1 and 2, as the Metro ROW is currently less accessible to law enforcement patrol compared to Hawthorne Boulevard.
Figure 4.7. Potential LRT At-Grade Crossings

Source: STV, 2018
4.3.16. Section 4(f) and Section 6(f)

Overview
Section 4(f) of the United States Department of Transportation Act of 1966 focuses on the preservation of publically owned parks and recreation lands, wildlife and waterfowl refuges, and historic sites, and includes the preservation of their aesthetic integrity. Section 6(f) of the United States Land and Water Conservation Fund Act of 1965 provides protection to parklands, recreation areas, historic areas and wildlife and waterfowl refuges that were acquired or developed with grants provided by the Act.

Potential Effects
For this analysis, an Area of Potential Effects (APE) was defined as a quarter-mile radius around the alignments and stations. There are multiple Section 4(f) and Section 6(f) parks and public lands located within the APE of each Build Alternative. As stated in Section 4.3.12, there were no historic or archeological resources identified within a half-mile of the alternatives. This SAA-level analysis focuses on resources that are immediately adjacent or within close proximity to the alternative alignments and stations.

There is one Section 4(f) resource, El Nido Park, in Redondo Beach, which would be located immediately adjacent to Alternatives 1, 2, and 4. Construction and operation of Alternatives 1, 2, and 4 would likely take place fully within the Metro ROW near this resource, and no direct temporary or permanent use of this resource is anticipated. However, there would be potential negative effects during construction related to noise and aesthetics. Two other Section 4(f) resources, Charles B. Hopper Park and Dan McKenzie Community Garden (also a Section 6(f) resource), are located within the vicinities of Alternatives 3 and 4. These resources are roughly 200-feet and 500-feet away, respectively, from the alignments, and there would likely not be a temporary or permanent use of the resource. However, additional analysis would be needed in future environmental documents to determine the indirect proximity impacts and Section 4(f) and 6(f) findings.

4.3.17. Transportation

Overview
This section includes a discussion of potential effects on transit services based on ridership estimates, traffic considerations based on at-grade crossings and estimated VMT changes, street closures, potential turning restrictions, on- and off-street parking effects, and potential conflicts with pedestrians or cyclists at at-grade crossings.

Potential Effects
The No Build Alternative would not result in any new at-grade crossings, changes in projected regional VMT, street closures, turning restrictions, or effects on parking. There may be changes in transit services under the No Build Alternative, as the separate Redondo Beach TC and Torrance TC projects would still be constructed and may result in changes in bus routes and ridership in the Project Area.

As discussed in Section 4.2.3, ridership estimates vary only slightly between Build Alternatives. There is not a significant difference between the alternatives, and, therefore, ridership effects on transit services would be similar among the Build Alternatives.
Alternatives 1, 2, and 4 would have a greater opportunity to connect to the proposed Redondo Beach TC, as a station is proposed at the TC. Alternative 3 would not directly connect to the Redondo Beach TC, but it would provide a new station adjacent to the South Bay Galleria near Hawthorne Boulevard/176th Street, which could provide new transit access to residents and businesses located along Hawthorne Boulevard.

Crossing closures may result in negative effects on circulation for pedestrians, bicyclists, and motor vehicles. Alternatives 1, 2, or 4 do not propose any crossing closures, but propose one left-hand turning restriction out of a private commercial driveway. Alternative 3 may include up to four crossing closures along Hawthorne Boulevard.

At-grade LRT crossings may result in delays to pedestrians, bicyclists, and motorists. As discussed in earlier sections, Alternative 3 would have the most at-grade crossings (six) as well as the lowest reduction in VMT. As shown in Figure 4.4, Alternative 3 would have a smaller reduction in VMT because its ridership is estimated to draw from existing transit users of buses along Hawthorne Boulevard, resulting in fewer new riders shifting from private vehicle use to transit use. Therefore, Alternative 3 could potentially result in the largest negative effects on traffic conditions, bus services, and conflicts with pedestrians or cyclists. Alternative 4 would potentially have the fewest traffic effects compared to all other Build Alternatives due to a large portion of the alignment operating on an aerial structure and only having one at-grade crossing.

Alternatives 1 and 2, which would operate within the Metro ROW, would have the fewest effects to on- and off-street parking. In contrast, Alternative 3 would operate at-grade along Hawthorne Boulevard, likely removing the existing center median parking stalls between the I-405 freeway and Redondo Beach Boulevard. The amount of median parking removed under Alternative 3 is estimated at approximately 85 spaces. Curbside parking conditions along Hawthorne Boulevard are not expected to be affected under Alternative 3.

Alternative 4 is anticipated to allow a certain amount of median parking to remain under the proposed aerial structure in the median of Hawthorne Boulevard. However, the Alternative 4 alignment may affect curbside parking conditions along Redondo Beach and Artesia Boulevards. The amount of median parking removed under Alternative 4 is estimated at approximately 100 spaces.

Metro parking would be provided adjacent to the Torrance TC. However, no park-and-ride facilities would be provided at the other stations for all alternatives. Therefore, parking effects related to stations would be similar for all Build Alternatives, and further analysis would be required in future environmental documents to determine effects on available, nearby on-street parking.

**Potential Benefits**
Ambient population growth would result in an increase in traffic congestion under the No Build Alternative. The Proposed Project would provide a benefit compared to the No Build Alternative, by introducing an alternative to driving; it would help to reduce future increases in automobile traffic.
4.3.18. Visual Resources and Aesthetics

Overview
This section considers potential changes to the visual character, and effects related to the degradation of the existing visual character or quality of surrounding communities during construction and operation. The largest visual and aesthetic issues would likely be encountered where aerial structures are required and where the alignment transitions between an aerial profile and at-grade. The degree of visual and aesthetic effects is also based on adjacent land uses, with residential areas or parklands more likely to experience a degradation in visual quality compared to industrial land uses.

Potential Effects
Under the No Build Alternative, there would be no extension of LRT service into the South Bay so there would not be the potential for changes to visual or aesthetic conditions. During construction, all Build Alternatives would have the potential to degrade the visual quality within the Project area, as a result of temporary lighting and construction materials. For Alternatives 1 and 2, mature trees currently located within the Metro ROW in the city of Lawndale would potentially be removed during construction; however the greenway is not a designated visual resource.6

During operation, all alternatives would have the potential to contrast with the existing environment by adding new visual elements. Potential aesthetic effects would be the same where the four Build Alternative alignments are identical, which is immediately south of the existing aerial Redondo Beach (Marine) Station and between 190th Street and the Torrance TC. In these areas, there are no unique or protected visual resources, and the primary land uses are industrial, commercial, and vacant. The addition of the Proposed Project in these areas would likely not contrast with the existing environment. However, for all alternatives, the addition of the electrically powered LRT mode may have negative aesthetic effects due to the need to include an overhead contact system (OCS) and TPSSs for propulsion. OCS poles are generally 25 feet tall, typically located between the two LRT tracks, and spaced 90 to 170 feet apart. In some locations, poles may be located on both sides of the tracks. The TPSSs, which are enclosed structures, are spaced along the alignment, typically integrated into the station footprints with access via the station parking lot or additional maintenance roadways.

Alternative 1 would be an aerial alignment from the Redondo Beach (Marine) Station to 166th Street, where it would transition to at-grade. Adjacent properties may have a view of the elevated structure, including the structure on retained fill which supports the alignment’s transition from an aerial to an at-grade configuration. These adjacent properties include the following land uses: transportation/utilities, industrial, commercial, and vacant parcels north of Manhattan Beach Boulevard; and sensitive uses, including low and medium/high density residential to the south to Artesia Boulevard. While the aerial structure and OCS system are unlikely to contrast with the existing environment north of Manhattan Beach Boulevard, they

6 This greenway is not specifically protected by any applicable local general plans, planning and zoning codes, or other regulations.
may contrast with and potentially degrade the existing environment south of Manhattan Beach Boulevard, where land uses are residential.

Alternative 2 may have potential visual and aesthetic effects where the alignment transitions from an aerial configuration to a below-grade configuration at the proposed Manhattan Beach/Inglewood Station. The same areas described above for Alternative 1 in this station area may experience visual and aesthetic effects.

Alternative 3 would be an aerial alignment from the Redondo Beach (Marine) Station to before 166th Street, where it would transition to at-grade within Hawthorne Boulevard. Land uses along this segment include low and medium/high density residential along I-405, and commercial uses abutting Hawthorne Boulevard. The aerial structure traveling between residential areas and I-405 would parallel a major highway, but still may create a visual environment which contrasts to the existing views in that area. Between approximately 166th Street and 182nd Street, the at-grade LRT tracks would replace existing parking and landscaping in the median of Hawthorne Boulevard, which would also be a contrast to the existing conditions.

The aerial structure proposed south of 182nd Street, where the alignment transitions back to an aerial alignment in the median of Hawthorne Boulevard, is also likely to contrast with the existing commercial environment. Land uses in this area include commercial, low density residential, public facilities/institutions (Philip Magruder Middle School), and open space/recreation (Torrance Community Gardens and Columbia Regional Park), which may be affected by temporary lighting and materials related to construction activities.

Alternative 4 would have similar effects as Alternative 3 from Redondo Beach (Marine) Station to 166th Street. However, the alignment would remain aerial along Hawthorne Boulevard and Artesia Boulevard, and transition to at-grade between Artesia Boulevard and Grant Avenue. As the adjacent land uses along Hawthorne Boulevard and Artesia Boulevard are primarily commercial and low density residential, an aerial structure is likely to contrast with the existing visual environment in those areas.

Potential Benefits
Although some existing landscaping may be removed during construction, Alternatives 1 and 2 would establish a landscape buffer in the Metro ROW between adjacent housing and rail structures. This buffer could include newly planted trees, bushes or other flora which would contribute to the aesthetic of the area.

4.3.19. Water Resources

Overview
Water resources include municipal water supply, flood zones (i.e., geographic limits anticipated to be inundated by surface water during certain intensity storm events), surface water and drainage patterns, and groundwater and drainage basins that act as runoff management systems to contain surface runoff and flood events. These parameters include both the water as a resource and the engineering features that direct, detain, or otherwise affect water drainage.
Potential Effects
The Project Area is urbanized and consists of mostly impervious surfaces with drainage structures, allowing little percolation of surface water. No Waters of the United States cross the alignments or station areas. Project design and construction would incorporate best management practices with regard to water runoff quality during construction and operation. Water use for any of the Build Alternatives is anticipated to be minimal and there would be no substantial effects to municipal water supply or treatment facilities.

The area is adjacent to the western boundary of the Metro ROW at the Torrance TC has a one percent annual chance for flooding (100-year floodplain) according to the Federal Emergency Management Agency Flood Map database. However, tracks for the Proposed Project would be constructed at approximately the same elevation or in certain locations raised above the existing freight track, which is already above the 100-year floodplain. Therefore, the new track alignments would be above the 100-year floodplain.

The Project Area is outside of current seiche and tsunami potential inundation areas, according to the State of California Department of Conservation. The land in the Project Area is generally of low relief, and therefore is not susceptible to mudflows.

Potential Benefits
Under Alternatives 1 and 2, construction in the Metro ROW would result in upgraded water filtration and stormwater management systems. Recent upgrades to these systems would be an improvement compared to existing conditions, which do not process potentially contaminated water for treatment as well as a new system would.
4.3.20. Summary of Environmental Considerations

While this SAA includes a high-level environmental analysis that is largely qualitative, it identified several environmental topics that show that each alternative would have various effects, mainly differentiated by location of the proposed alignment and surrounding land uses. The effects of Alternatives 1 and 2 would primarily occur in residential areas along the Metro ROW. The effects of Alternative 3 would primarily occur in commercial areas along Hawthorne Boulevard. The effects of Alternative 4 would occur partially in commercial areas along Hawthorne Boulevard and partially in residential areas along the Metro ROW.

Some of the key differentiating environmental topics include the following: Community and Neighborhoods, which would depend on the introduction of potential physical barriers; Displacement and Relocations, the potential magnitude of which would depend on whether the alignment would be located within the Metro ROW or on Hawthorne Boulevard; Safety and Security, which would depend on the locations of at-grade crossings; and Construction, Noise and Vibration, Transportation, and Visual Resources and Aesthetics, which would all have varying effects on different communities, depending on the location and configuration of the alignment.

In terms of potential benefits, key differentiating environmental topics include Air Quality, Communities and Neighborhoods, Safety and Security, and Transportation. Regarding Air Quality, all Build Alternatives would result in a reduction of GHG emissions compared to the No Build Alternative. Regarding Communities and Neighborhoods, Alternatives 1 and 2 would accommodate a pathway in the Metro ROW for public use. Regarding Safety and Security, Alternatives 1 and 2 would introduce a law enforcement presence along the Metro ROW, which is currently not as accessible to law enforcement as existing roadways such as Hawthorne Boulevard. Regarding Transportation, all Build Alternatives would contribute to reducing traffic congestion in the Project Area compared to the No Build Alternative.
4.4. GOAL 3: ENSURE COST EFFECTIVENESS AND FINANCIAL FEASIBILITY

This section describes the alternatives based on the evaluation criteria identified for Goal 3: Ensure Cost Effectiveness and Financial Feasibility.

4.4.1. Capital Costs

Capital costs include labor and goods required for one-time construction such as LRT tracks, aerial structures, trenches, additional train vehicles, utility relocation, electrical power facilities, safety features, and other structures which support LRT service. The capital costs of each Build Alternative vary based on major elements such as length of track, additional vehicles required, aerial or trench structures, and other facilities. Capital costs were calculated for each alternative in 2017 dollars. Figure 4.8 compares the capital costs of each Build Alternative.

Figure 4.8. Capital Costs (2017 $ Millions) by Alternative

<table>
<thead>
<tr>
<th>Measure</th>
<th>Capital Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>M+R Funds</td>
<td>$890</td>
</tr>
<tr>
<td>Alt. 1 ROW Overcrossing</td>
<td>$1,090</td>
</tr>
<tr>
<td>Alt. 2 ROW Undercrossing</td>
<td>$1,220</td>
</tr>
<tr>
<td>Alt. 3 Hawthorne to 190th</td>
<td>$1,000</td>
</tr>
<tr>
<td>Alt. 4 Hawthorne to Artesia</td>
<td>$1,120</td>
</tr>
</tbody>
</table>

Additional cost of grade separation at Redondo Beach Blvd and Artesia Blvd (further analysis required)

Source: STV, 2018

Alternative 1 would have the lowest projected capital costs, as a result of it being located within Metro ROW and being mostly at-grade, with the exception of the aerial overcrossing at Manhattan Beach Boulevard/Inglewood Boulevard. Alternative 2 would be nearly identical to Alternative 1, but the trench undercrossing and below-grade station at Manhattan Beach Boulevard/Inglewood Avenue would have higher construction costs, compared to the aerial option in Alternative 1. Alternative 3 is expected to cost more than Alternative 1, because of the longer length of aerial guideway needed, as well as greater potential ROW acquisition costs. While the majority of Alternative 3 is proposed to be at-grade, additional analysis would be required for the Hawthorne Boulevard and Artesia Boulevard crossings to determine if they
would need to be grade separated, which could then raise the cost by $220M. Finally, Alternative 4 is expected to cost the most, because a large portion of the alignment would be on an aerial guideway, and it would have high potential ROW acquisition costs.

4.4.2. Operations & Maintenance Costs

O&M costs include costs incurred annually to continue providing LRT service after construction is complete. These costs include items like operator salaries, materials for vehicle maintenance, monitoring and maintenance of tracks, fare collection equipment, communications and electric facilities, administrative costs, and other similar requirements. Developing reliable O&M cost estimates is a key requirement for any major transit investment. Reliable cost estimates contribute to an accurate and useful cost effectiveness evaluation and can establish a baseline for budgeting. Operation and maintenance costs vary based on factors such as:

- **Vehicle Operations**: Activities including transportation administration and support, revenue vehicle movement control, scheduling of operations, revenue vehicle operations, ticketing and fare collection, and system security.
- **Vehicle Maintenance**: Activities including inspection, maintenance, vehicle servicing and repairs, and related materials and supplies.
- **Facility Maintenance**: Activities including administration, repair of buildings, grounds, and equipment, operation of electric and communications systems, maintenance of structures, roadway, track, station buildings, and similar facilities.
- **General Administration**: Activities related to transit service development, injuries and damages, safety, personnel administration, legal services, finance and accounting, planning, customer services, and other similar services.

Differentiating factors which may determine variations in O&M costs in the above categories generally include the length of the proposed alternative, the travel times, and the vehicle fleet requirements. For example, longer route lengths may result in additional vehicles required to maintain consistent headways, as well as higher costs related to infrastructure maintenance.
Figure 4.9 displays the annual O&M costs of each Build Alternative compared to projections of 2040 Metro Green Line operations requirements under the No Build Alternative.

**Figure 4.9. O&M Costs (2017 $ Millions) by Alternative**

Alternatives 1 and 2 would have the lowest O&M costs because they would have the lowest vehicle requirements and the shortest travel times. Alternative 3 would require more vehicles than Alternatives 1 and 2, and would have a longer travel time, which would result in a higher vehicle fleet requirement and O&M cost. Alternative 4 would have similar vehicle requirements and travel time as in Alternative 3, but has a higher overall O&M cost due to its longer route length. Alternative 3 could require grade separations along Hawthorne Boulevard after further traffic and operations analysis. If so, O&M costs for Alternative 3 would likely be lower due to the shorter running times of a grade separated alignment.

4.4.3. Cost Per Rider

Cost per rider is a measure of cost effectiveness that relates project costs to ridership. By comparing costs to ridership, this evaluation criteria creates a broader picture of the cost/benefit comparison. Cost per rider metrics are also key data used in funding efforts such as grant applications. This SAA examines cost per rider in two ways. The first method utilizes FTA’s formula for annualized cost per rider and divides annualized capital costs and annual O&M costs by total anticipated annual riders on the Proposed Project. This includes total ridership on the proposed extension only, but includes riders who may already use Metro Rail or public transit. The results of this cost per rider calculation method are shown in Figure 4.10.
4. Evaluation of Alternatives

By this method of examining cost per rider, Alternative 1 would have the lowest cost per rider due to lower capital and O&M costs. Alternative 2 would have a higher cost per rider compared to Alternative 1, because of the higher capital costs of constructing the trench segment in the Manhattan Beach Boulevard/Inglewood Avenue area. While Alternative 3 would have the highest ridership, its higher capital and O&M cost results in a cost per rider that is higher than in Alternative 2. Finally, Alternative 4 would have the highest cost per rider, because of its high combined capital and O&M costs.

The second method of comparing costs and ridership examines total capital costs and new riders. This method compares the utility of the up-front investment of capital costs for construction against the benefit of encouraging new riders of public transit, which are defined as future riders of the Proposed Project projected to shift from trips by private automobile use to trips by Metro Rail via the Proposed Project. If only considering capital costs and new riders on the project, Alternative 1 would still have the lowest cost per rider, but Alternative 3 would perform slightly better than Alternative 2 as shown in Table 4.8.

<table>
<thead>
<tr>
<th>Table 4.8. Annual Capital Cost per New Rider (2017 $)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alternative 1</strong></td>
</tr>
<tr>
<td>Capital Cost (million)</td>
</tr>
<tr>
<td>Annual New Riders (million)</td>
</tr>
<tr>
<td>Capital Cost per New Rider</td>
</tr>
</tbody>
</table>

Source: STV, AECOM, 2018

4.4.4. Financial Feasibility
Funding for the Proposed Project is currently based on Metro expenditure plans from sources such as Measure R and Measure M. The funding assumptions in Measure M for the Proposed Project were based on an alignment utilizing the Metro ROW. All Alternatives, except for Alternative 1, exceed the $891 million (2015 $) allocated to the Proposed Project in Measures R and M, and they would require additional funding.

In 2018, the California State Transportation Agency (CalSTA) released grant awards which included a set-aside for the Proposed Project for schedule acceleration. Consequently, these funds will help fill the funding gap associated with the Year of Expenditure (2026 $) escalation associated with the Project Cost. The existing and potential funding sources of the Proposed Project are described in Table 4.9.

Table 4.9. Funding Sources

<table>
<thead>
<tr>
<th>Funding Source</th>
<th>Description</th>
<th>Funds Allocated to Proposed Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measure R</td>
<td>Measure R is an incremental half-cent sales tax passed by LA County voters in 2008. Measure R funding is collected over thirty years and dedicated to a variety of countywide transportation investments including rail expansion, local street improvements, etc.</td>
<td>$272 million (2015 dollars)</td>
</tr>
<tr>
<td>Measure M</td>
<td>Measure M is an incremental half-cent sales tax passed by LA County voters in 2016. Measure M funding is collected over forty years and dedicated to a variety of countywide transportation investments including rail and rapid transit expansion, local street improvements, and other infrastructure and mobility improvements.</td>
<td>$619 million (2015 dollars)</td>
</tr>
<tr>
<td>TIRCP</td>
<td>The Transit and Intercity Rail Capital Program (TIRCP) is a CalSTA grant program funded by gas tax revenues under Senate Bill 1, as well as cap-and-trade funds. In 2018, TIRCP released a series of grant decisions, including over $1 billion assigned to Metro for various projects between 2018 and 2028, including the Proposed Project.</td>
<td>$231 million (2018 dollars)</td>
</tr>
<tr>
<td>SB 1 LPP Formula Funds</td>
<td>Another new program created by SB 1 is the Local Partnership Program (LPP). The purpose of this program is to provide local and regional transportation agencies that have passed sales tax measures, developer fees, or other imposed transportation fees with a continuous appropriation of $200 million annually to fund road maintenance and rehabilitation, sound walls, and other transportation improvement projects.</td>
<td>$19.7 million (2018 dollars)</td>
</tr>
</tbody>
</table>

Source: Metro, 2016; CalSTA, 2018
4.5. **GOAL 4: SUPPORT LOCAL AND REGIONAL LAND USE PLANS AND POLICIES**

This section describes the alternatives based on the evaluation criteria identified for Goal 4: Support Local and Regional Land Use Plans and Policies.

4.5.1. **Accessibility**

Accessibility refers to the number of residents served by proposed stations of the Proposed Project. This evaluation criteria is defined and evaluated under Goal 1: Improve Mobility in Section 4.2.5, but contributes to the evaluation of Goal 4.

4.5.2. **Land Use Consistency**

**Overview**

The land use assessment considers consistency with existing land use plans and policies, and whether the Proposed Project would physically divide an established community. The relevant plans include the 2016 SCAG RTP/SCS, and the general plans for the cities of Redondo Beach, Lawndale, and Torrance.

**Potential Effects**

The Proposed Project is included within the 2016 SCAG RTP/SCS, and the cities' general plans include policies that include transit-supportive land uses and promote transit and multimodal transportation. However, Alternatives 3 and 4 would likely be inconsistent with the land use plans in all cities, as the general plans do not take into account a LRT line on Hawthorne, Redondo Beach, or Artesia Boulevards. Additionally, Alternative 3 would not be consistent with Redondo Beach’s plan for the proposed Redondo Beach TC, as it would not serve that corridor.

All Build Alternatives have the potential to change existing community circulation and access, as discussed in Section 4.3.3. Alternatives 1 and 2 would increase the number of trains that currently pass through the existing Metro ROW, while Alternative 3 would be located within the median of Hawthorne Boulevard, with several crossing closures and at-grade crossings. Alternative 4 would have relatively the least negative effect related to physical division of existing communities, as the alignment would be aerial and grade-separated where it is located within public ROW, with no crossing closures on Hawthorne Boulevard.

4.5.3. **Economic and Fiscal Effects**

**Overview**

The section examines the potential economic effects and benefits due to construction and operation of the Proposed Project. Construction activities could have negative effects on local businesses, because of changes in access or decreased visibility. As a result, longer construction timelines are assumed to have greater potential effects on nearby businesses.

However, in the long-run, transit investments can spur economic development or redevelopment of the surrounding community under certain conditions. Generally, those
alternatives that provide many stations and points of access in areas suitable for redevelopment (such as corridor-adjacent industrial or commercial land uses) present the greatest opportunities for economic development.

**Economic Effects of Construction**

Under the No Build Alternative, there would be no new construction activities for an extension of LRT service into the South Bay that could have an effect on local businesses. For Alternatives 3 and 4, during construction, there would likely be short-term, temporary negative effects on local businesses, as the alignments are located within the medians of public roadways and existing commercial corridors. Alternative 3 would take approximately four and a half years to construct, while Alternative 4 would take approximately five years to construct. Alternatives 1 and 2 would likely have fewer temporary construction-related negative economic effects than Alternatives 3 and 4, as they are located within the Metro ROW and adjacent to fewer businesses than Alternatives 3 and 4. Additionally, Alternative 1 would have the shortest construction schedule, estimated at four years, while Alternative 2 is estimated to be constructed over four and a half years.

**Long-Term Economic Development**

Under the No Build Alternative, there would be no extension of LRT service into the South Bay that would create economic development potential or new access to transit via LRT. Alternatives 3 and 4 would serve the existing commercial corridor along Hawthorne Boulevard. Alternative 3 would include a station directly adjacent to the South Bay Galleria, which was approved by the Redondo Beach Planning Commission in the spring of 2018 for review by the City Council. The project would add a hotel with up to 150 rooms, up to 300 residential apartment homes, and up to 50,000 square feet of office space. The project would include retail, dining, and entertainment square footage as well. Alternatives 1 and 2 would likely have fewer long-term benefits and less potential for economic development compared to Alternatives 3 and 4. The land uses adjacent to Alternatives 1 and 2 are likely not conducive for redevelopment; throughout Lawndale, land uses primarily consist of single-family residential housing, while Redondo Beach generally contains residential, commercial, and open space land uses along the proposed alignment.

Alternatives 1, 2, and 4 would potentially serve a site adjacent to the planned Redondo Beach TC along the Metro ROW which is planned for redevelopment, and would be a separate project from the South Bay Galleria redevelopment project. Generally, Alternative 3 would directly serve the greatest area with potential for economic development, while Alternatives 1 and 2 would directly serve the smallest area with potential for economic development. Alternative 4 would serve an area with potential for economic development along Hawthorne Boulevard north of Artesia Boulevard, but would serve an area with little potential for economic development after rejoining the Metro ROW at Artesia Boulevard.

Under all Build Alternatives, construction activities are likely to result in the creation of jobs in the region as a result of spending throughout the construction supply chain. Indirect benefits

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may also occur to nearby businesses due to spending by workers at establishments directly or indirectly connected to construction the Proposed Project.

4.6. **GOAL 5: ENSURE EQUITY**

**Overview**
Goal 5: Ensure Equity is measured based on an EJ analysis which follows guidance from the US Department of Transportation and Caltrans to comply with Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations; and Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency. Additionally, Title VI of the Civil Rights Act provides that no person in the United States shall, on the grounds of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving federal financial assistance. Caltrans guidance ensures that the goals of Title VI are carried out by transportation agencies implementing public participation programs in California, regardless of the availability of federal funding. The Proposed Project would also be consistent with the Metro Equity Platform Framework.

An EJ community is defined as an area consisting of a population at least 50 percent minority, low-income, or LEP. The first step in an EJ analysis is to determine if an EJ community is located within the Project Area, which was completed for this SAA. The next step, which would occur in the next phase of the project, would be to determine if potential negative effects would adversely affect an EJ population at a disproportionately high and adverse rate when compared to the general population or other appropriate comparison group. The Metro Equity Platform Framework would guide this evaluation in the next phase of the project. Potential effects on EJ populations may include ecological, cultural or historic resources, human health, economic or social.

**Environmental Justice Communities in the Project Area**
EJ communities within the Project Area were estimated using Census tract data within a half-mile buffer from alignment centerlines. An EJ community was defined as if at least 50 percent of the population within a census tract consists of minority populations, populations below the poverty level, or LEP populations. Under all Build Alternatives, the surrounding communities include census tracts with populations that exceed the 50 percent threshold for minority or poverty level, qualifying them as EJ communities, even though there were no census tracts with LEP populations above the 50 percent threshold. Figure 4.11 shows the census tracts with EJ populations. Future environmental clearance documents would need to conduct a more detailed analysis to determine if these EJ communities would bear disproportionately high and adverse effects of the Proposed Project.
Potential Environmental Justice Benefits
All new proposed stations under all Build Alternatives would be located in an EJ community. As a result, all Build Alternatives would provide new benefits of enhanced mobility and regional access to minority and/or low-income populations.

Figure 4.11. Census Tracts with EJ Populations

Source: STV, 2018, American Community Survey, 2016
### 4.7. SUMMARY OF COMPARATIVE ANALYSIS

Table 4.10 summarizes key project elements compared across the four Build Alternatives.

<table>
<thead>
<tr>
<th>Table 4.10. Summary of Build Alternative Elements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternative 1: ROW Overcrossing</td>
</tr>
<tr>
<td>Travel Time</td>
</tr>
<tr>
<td>Connections to Destinations</td>
</tr>
<tr>
<td>Potential Bike/ Ped Paths</td>
</tr>
<tr>
<td>Capital Cost</td>
</tr>
<tr>
<td>New Annual Riders</td>
</tr>
<tr>
<td>Capital Cost/New Rider&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Fully Funded</td>
</tr>
<tr>
<td>At-Grade Crossings</td>
</tr>
<tr>
<td>Crossing Closures</td>
</tr>
<tr>
<td>Parking Removed</td>
</tr>
</tbody>
</table>

<sup>1</sup> $1,220M is the capital cost estimate for Alternative 3 if grade separation analysis in the next phase of project development determines grade separations are required at Redondo Beach Blvd and Artesia Blvd.

<sup>2</sup> Capital Cost/New Rider was calculated by dividing the total capital cost of each Build Alternative by the projected annual new riders of each Build Alternative. New riders are defined as how many new riders are expected to use the Proposed Project instead of a private automobile.

Source: STV, 2018
Based on the analysis and evaluation as described previously in this chapter, each Build Alternative received a Harvey Ball score for each project goal, as well as an overall rating, as shown below in Table 4.11. The overall ratings only apply to the evaluation criteria described in this chapter. Community input is considered in addition to these ratings for selection of an alternative(s) to advance to the next phase of project development.

**Table 4.11. Evaluation Criteria Comparison**

<table>
<thead>
<tr>
<th>Project Goals</th>
<th>Alternative 1: ROW Overcrossing</th>
<th>Alternative 2: ROW Undercrossing</th>
<th>Alternative 3: Hawthorne to 190th</th>
<th>Alternative 4: Hawthorne to Artesia</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improve Mobility</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
<td>○</td>
</tr>
<tr>
<td>2. Minimize Environmental Impacts</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
</tr>
<tr>
<td>3. Ensure Cost Effectiveness and Financial Feasibility</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
<td>○</td>
</tr>
<tr>
<td>4. Support Local and Regional Land Use Plans and Policies</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
</tr>
<tr>
<td>5. Ensure Equity</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
<td>◇</td>
</tr>
<tr>
<td>Overall Ratings</td>
<td>High</td>
<td>Medium</td>
<td>Medium</td>
<td>Medium/Low</td>
</tr>
</tbody>
</table>

Source: STV, 2018

The Build Alternatives’ performance in regards to achieving the project goals are summarized below:

1. **Goal 1: Improve Mobility**: Alternatives 1 and 2 scored high due to their travel times, system connectivity, reductions in VMT, and ability to accommodate a potential pathway in the Metro ROW. Alternatives 3 and 4 received medium scores due to their longer travel times, but greater accessibility to nearby residents.

2. **Goal 2: Minimize Environmental Impacts**: Each alternative received a medium score due to varying potential effects under different environmental topics. While certain alternatives performed better under certain environmental topics, the opposite was true for other topics examined. In some cases, all alternatives would likely result in environmental effects, but they would affect different areas, such as residential or commercial land uses. For example, Alternatives 1 and 2 would have fewer anticipated effects from construction and operations, as they would operate within the Metro ROW, but greater potential noise and vibration effects in areas with sensitive receptors. Each Build Alternative would result in visual effects, but Alternatives 1 and 2 would affect primarily residential areas, Alternative 3 would affect primarily commercial areas, and Alternative 4 would affect both.
As another example, Alternative 3 would result in the smallest VMT reduction, but would also result in the greatest economic development potential.

3. **Goal 3: Ensure Cost Effectiveness and Financial Feasibility**: Alternative 1 scored high due to its lowest capital cost and the current availability of funding. Alternative 2 received a medium score due to its high capital cost, but low O&M cost. Alternative 3 received a medium score due to its high O&M cost but medium cost per rider performance. Alternative 4 scored lowest due to its high capital cost, high O&M cost, and high cost per rider performance. Alternatives 2, 3, and 4 would all require additional funding.

4. **Goal 4: Support Local and Regional Land Use Plans and Policies**: Alternatives 1 and 2 received a medium score, as they would utilize existing Metro ROW and are consistent with existing local land use and zoning plans.

   Alternative 3 received a high score due to its ability to provide greater long-term economic development potential and accessibility, as it would serve the existing Hawthorne Boulevard commercial corridor for a longer distance (to 190th Street) than the other Build Alternatives, thereby providing greater access to existing and future commercial opportunities. However, Alternative 3 does not align with existing land use and zoning plans as well as Alternatives 1 and 2 and creates a new barrier along Hawthorne Boulevard due to proposed crossing closures.

   Alternative 4 received a medium score due to similar, but lower, economic development potential and accessibility benefits as Alternative 3. Also, similar to Alternative 3, it is inconsistent with local land use and zoning plans, as it would require additional public ROW, and it would be grade-separated along Hawthorne Boulevard.

5. **Goal 5: Ensure Equity**: Each alternative received a medium score, as the presence of EJ communities is approximately the same. Complete analysis of any disproportionately high and adverse effects would occur in the next phase of project development.

As previously discussed, community input was not scored based on evaluation criteria, but will inform the selection of alternatives for consideration in the environmental review phase of the Proposed Project. Community input is described in Chapter 5.