San Francisco County
Transportation Authority

Doyle Drive
Replacement Project

Sustainability Program
Gap Analysis Report

July 2009

This report takes into account the particular instructions and requirements of our client. It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.
# Contents

1 Executive Summary .................................................. 1
2 Introduction ........................................................... 4
3 Gap Analysis ........................................................... 4
   3.1 Purpose .................................................................. 4
   3.2 Methodology ....................................................... 4
4 Sustainability Performance and Opportunities ............ 7
   4.1 Water .................................................................. 7
   4.2 Energy ................................................................ 16
   4.3 Habitat .................................................................. 20
   4.4 Landscape .......................................................... 27
   4.5 Materials and Waste ............................................. 30
   4.6 Community .......................................................... 35
   4.7 Other Strategies (Management) ......................... 45
5 Summary Of Findings .................................................. 46
   5.1 Sustainability Performance ................................. 46
   5.2 Sustainability Priority Areas ............................... 47
   5.3 Next Steps .......................................................... 49

## Appendices

Appendix A
Sustainability Goals and Strategies identified in Phase I of the Sustainability Program

Appendix B
Best Management Practices to Consider
1 Executive Summary

Arup North Americas Ltd (Arup) in joint venture with Parsons Brinckerhoff (PB) has been commissioned to undertake Phase II of the Sustainability Program for the Doyle Drive Replacement Project by San Francisco County Transportation Authority (the Authority).

Phase I of the Sustainability Program was completed in December 2007, and included the development of a vision statement, guiding principles, sustainability goals and a list of potential sustainability strategies for the project. Phase II of the Sustainability Program involves undertaking a gap analysis to assess the current sustainability performance of the project and identify priority areas. Those strategies that are identified as high priority will be included within an Outline Implementation Plan that will set out the activities and responsibilities associated with taking this strategy forward.

The purpose of this report is to present the findings of the gap analysis. The findings from the gap analysis provide an insight into the current and potential sustainability performance of the project and indicate the priority strategies to be progressed. The performance of the project has been based on the current progress against the sustainability goals set in Phase I. Priority areas have been identified through the prioritization of the sustainability strategies from Phase I based on their current status.

For each sustainability goal the current performance of the project has been rated between 1 and 5 using the following scale:

1- achieving regulatory compliance or minimum required
2- currently considering doing more than minimum
3- achieving over minimum (i.e. good practice)
4 -considering best practice measures
5- committed to achieving best practice

Based on this scale, the findings of the current sustainability performance of the project have been illustrated for each sustainability goal in the following diagram.
Potential sustainability strategies have been organized based on their current status as high, medium or low priority. High priority strategies are those that have not been considered but have the potential to improve the sustainability performance of the project moving forward and are consistent with the Environmental Impact Statement/Report (EIS/R). It is these strategies that will be addressed within the Outline Implementation Plan. Medium priority strategies are those that have not yet been considered but will likely be integrated with the detailed design phase. Finally, those strategies considered as a low priority are those that have already been reviewed by the project team and are either incorporated into the design of the project or deemed unfeasible. For the purposes of this stage of the Project’s Sustainability Program, a strategy may be categorized low priority because it is on track to being fully integrated with the project.

It should be noted that those strategies that are not identified as high priority areas for this phase of work may be important to the sustainability of the whole project but not to this phase of work. The Doyle Drive Replacement Project has already committed to a broad range of measures to reduce its adverse effect on the environment and increase its opportunities for sustainable design and construction. Many of these are committed to in the Environmental Impact Statement/Report (EIS/R). For the purposes of this phase of the Sustainability Program, however, those strategies that have not yet been considered but have potential have been identified as priority areas moving forward.
Phase II of the Sustainability Program seeks to further refine the strategies and concepts that the project has already committed to and to identify additional areas for improving the overall sustainability performance of the project. The focus of this report is therefore those areas with scope for improvement rather than

The sustainability priority areas that have been identified based on the status of the sustainability strategies are generally in the areas of Energy, Materials and Waste, and Management (those strategies within the ‘Other’ category).

The strategies listed below have been identified as high priority and will be explored in further detail in the Outline Implementation Plan:

**Energy:**
- Use cool pavement and reflective materials to reduce heat island effect
- Purchase green tags (renewable energy certificates) to offset carbon emissions associated with electricity use
- Evaluate construction emissions standards or require construction equipment to be electric drive or use alternative fuels

**Waste and Materials:**
- Use regionally-sourced materials to minimize energy use associated with transportation
- Maximize use of recycled content in construction materials
- Consider embodied energy emissions in material selection
- Use materials from sources that are rapidly renewable when possible
- Evaluate on life cycle basis materials that use energy or require regular repair, replacement and maintenance
- Apply latest research on the lifecycle costs of different construction materials
- Use paints, solvents and other materials that generate less volatile organic compounds over their lifetime
- Develop construction waste management plan and establish target for diversion from landfill
- Use the material on-site as much as possible to reduce off-haul
- Develop plan for on-site reuse of materials

**Other Strategies (Management):**
- Design and implement an Environmental Management Plan during both the construction and operational phases
- Develop Environmental Management System (accredited to ISO 14001)
- Develop indicators and targets for monitoring performance measurement
- Seek nomination for “Green Highways Reward” from Green Highways Partnership or similar programs
- Use construction bidding process with early termination reward
- Require contractor to have experience in sustainable construction practices
2 Introduction

Arup North Americas Ltd (Arup) in joint venture with Parsons Brinckerhoff (PB) have been commissioned to undertake Phase II of the Sustainability Program for the Doyle Drive Replacement Project by San Francisco County Transportation Authority.

Doyle Drive is a portion of Route 101 and provides the existing south access road to the Golden Gate Bridge. The Doyle Drive replacement project is a redesign on the existing roadway that when constructed will improve the seismic, structural and traffic safety of Doyle Drive, within the setting and context of the Presidio of San Francisco and its purpose as a National Park. Due to its importance within the regional transportation system, the Federal Highway Administration, the California Department of Transportation and the San Francisco County Transportation Authority are collaborating to replace the 1.5 mile Doyle Drive to bring it up to current design and safety standards. The Doyle Drive Final Environmental Impact Statement / Report (FEIS/R) has been certified by the San Francisco County Transportation Authority Board of Commissioners on December 16th, 2008, marking the end of the project’s environmental assessment phase and the beginning of final design.

A Sustainability Program is being developed to incorporate sustainable principles throughout the design and implementation of the Doyle Drive project. Phase I of the Sustainability Program was completed in December 2007, and included the development of a vision statement, guiding principles, sustainability goals and a list of potential sustainability strategies. Phase II of the Sustainability Program involves undertaking a gap analysis to assess the current sustainability performance of the project and identify priority areas. Those strategies that are identified as high priority will be included within an Outline Implementation Plan that will set out the activities and responsibilities associated with taking each strategy forward.

3 Gap Analysis

3.1 Purpose

The purpose of this report is to present the findings of the gap analysis. This gap analysis has been undertaken to assess the current sustainability performance of the project and to highlight the priority areas for the Sustainability Program moving forward. In addition, the analysis will identify sustainability strategies to be considered within the Outline Implementation Plan, and will assist in developing initial sustainability targets for the Sustainability Program.

3.2 Methodology

3.2.1 Sustainability Goals and Strategies

Phase I of the Sustainability Program identified 23 sustainability goals for the project to apply during design, construction and operation/maintenance. In addition, a list of sustainability strategies was compiled which cover all 23 sustainability goals. These strategies are specific measures that could be implemented to assist in achieving the goals, and were developed using input from stakeholders, checklists, best practices and lessons learnt from other projects. Some of the strategies may have already been considered, or may not be feasible or desirable; the objective of the gap analysis is to identify those that should be taken forward into the next phase of the Sustainability
Program. The sustainability goals are detailed below and the list of sustainability strategies can be found in Appendix A.

### Sustainability Goals Identified in Phase I

<table>
<thead>
<tr>
<th>Water</th>
<th>Energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize surface water runoff</td>
<td>Maximize energy efficiency</td>
</tr>
<tr>
<td>Improve water quality</td>
<td>Reduce heat island effect</td>
</tr>
<tr>
<td>Minimize water use</td>
<td>Minimize greenhouse gas emissions</td>
</tr>
<tr>
<td>Minimize construction dewatering to preserve groundwater</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Landscape</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protect existing habitat</td>
<td>Foster restoration of native species</td>
</tr>
<tr>
<td>Promote creation of new habitat</td>
<td>Minimize construction footprint</td>
</tr>
<tr>
<td>Support wildlife corridors</td>
<td></td>
</tr>
<tr>
<td>Minimize light pollution</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials and Waste</th>
<th>Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seek local material sources</td>
<td>Minimize noise</td>
</tr>
<tr>
<td>Maximize use of recycled, sustainable materials with low-embodied energy</td>
<td>Support healthy air quality</td>
</tr>
<tr>
<td>Apply life-cycle approach to material selection</td>
<td>Enhance aesthetics and user experience</td>
</tr>
<tr>
<td>Maximize recycling and reuse of construction waste</td>
<td>Minimize use of parkland acreage</td>
</tr>
<tr>
<td></td>
<td>Minimize impacts of traffic on neighborhoods</td>
</tr>
<tr>
<td></td>
<td>Improve access to and accommodation of transit</td>
</tr>
</tbody>
</table>

#### 3.2.1 Current Status

For each sustainability goal a status report has been provided on the extent to which these have been achieved to date. This includes reporting on the status of sustainability strategies associated with each goal, and categorization of each strategy into one of the following:

- Considered but not feasible
- Considered but not consistent with regulations / objectives
- Similar measures have already been committed to
- Currently being considered
- Not considered but has potential
- To be considered at a later stage in the development process

#### 3.2.1.1 Approach to Prioritization of Sustainability Strategies

The categorization of sustainability strategies has been used to identify priority areas for Phase II of the Sustainability Program. Sustainability strategies have been prioritized as
high, medium or low based on the categories above. High priority strategies are those that have been categorized as ‘not considered but has potential’, since it is these that require further investigation as the project moves forward. Medium priority strategies are those that have not yet been considered but should be taken forward at a later stage of the development process (usually during detailed design). Finally, those strategies considered as a low priority are those that have already been considered by the project and the outcome decided or those that are currently being considered. Further details on the prioritization criteria are provided in Table 1 below. The color-coding for each strategy has been used throughout the report to denote the priority levels attributed to strategies.

Table 1: Prioritization Criteria

<table>
<thead>
<tr>
<th>Prioritization</th>
<th>Current Status Categorization</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>Not considered but has potential</td>
<td>These strategies have not been considered on the project to date and represent potential sustainability opportunities that could be investigated further.</td>
</tr>
<tr>
<td>Medium</td>
<td>To be considered at a later stage of the development process</td>
<td>These strategies have not yet been considered. They will become a priority area as the development design moves forward.</td>
</tr>
<tr>
<td>Low</td>
<td>Considered but not feasible</td>
<td>These strategies have either already been considered (and an outcome decided) or are currently being considered.</td>
</tr>
<tr>
<td></td>
<td>Considered but not consistent with regulations / objectives</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Similar measures have already been committed to Currently being considered</td>
<td></td>
</tr>
</tbody>
</table>

Those strategies identified as high priority will be considered within an Outline Implementation Plan. This Plan will identify the actions and responsibilities required to take each strategy forward. It should be noted that those strategies that are not identified as high priority areas for this phase of work may be important to the sustainability of the whole project but not to this phase of work. The Doyle Drive project has already committed to a number of measures to reduce its sustainability impacts, for example those committed to in the Environmental Impact Statement/Report (EIS/R). For the purposes of this gap analysis, however, those strategies that have not yet been considered but have potential are identified as priorities for this phase of the Sustainability Program.

3.2.1.2 Approach to Sustainability Performance Ratings

The performance of the project has been based on the current progress against the sustainability goals set in Phase I. For each sustainability goal the current performance of the project has been informed by the categorization of the relevant sustainability strategies, and has been rated between 1 and 5 using the following scale:

1- achieving regulatory compliance or minimum required
2- currently considering doing more than minimum  
3- achieving over minimum (i.e. good practice)  
4- considering best practice measures  
5- committed to achieving best practice  

In some cases it has been difficult to assign a single performance rating to each goal, particularly where the status of sustainability strategies for that goal vary. However, based on the information available professional judgment has been used and the most appropriate scoring has been allocated to each goal.

3.2.2 Initial Sustainability Targets  
Finally, information has been provided as to whether there are existing targets or performance monitoring requirements associated with each sustainability goal that have already been committed to by the project (e.g. as part of permitting conditions or mitigation requirements). This information will inform the development of initial sustainability targets for the project that will allow tracking and reporting of the project’s performance in a wide range of areas as the project progresses.

It is envisaged that new targets will be developed for the priority areas in consultation with the relevant stakeholders. For the remaining sustainability goals, existing targets will be used where possible or targets will be developed based on existing commitments.

4 Sustainability Performance and Opportunities  
4.1 Water  
The existing Doyle Drive alignment crosses the Tennessee Hollow sub-watershed of the larger San Francisco Bay watershed. Most of the drainage within the urban portions of the Presidio occurs through the Presidio storm drain system in underground pipes and open channels along roads. There are no open channel creeks or streams that cross the current Doyle Drive alignment.

The existing Doyle Drive alignment crosses the Marina groundwater basin. Groundwater occurs in both the bedrock and overlying unconsolidated sediments and fill. The majority of the water in the bedrock probably occurs within fractures rather than in the interstitial pore spaces (since the primary porosity of the types of rocks that make up the Franciscan is very low). In general, Franciscan bedrock “aquifers” are of low yield. Groundwater also occurs in the overlying unconsolidated sediments, at depths ranging from near the surface (at El Polin spring) to greater than 15 meters (50 feet) below the surface in the hilly uplands. Depth to groundwater in the Crissy Field area (near Mason Street) is typically about 1.5 meters (five feet) below the ground surface (bgs).

Current surface water quality indicates a wide range of values and the character of the surface water is influenced by the quantity of flow in the Tennessee Hollow corridor. Preliminary water samples have detected various contaminants in the groundwater at localized areas within the Presidio, although the groundwater is generally adequate for discharge without pre-treatment, other than settling suspended sediments.

The planning process by the Presidio Trust for the expansion of Tennessee Hollow is ongoing and includes preliminary site design plans. There has been ongoing coordination with the Tennessee Hollow efforts and the design of the Doyle Drive facility.
Phase I of the Sustainability Program identified four relevant sustainability goals in regards to the resource of water, which are:

- Minimize storm water runoff
- Improve water quality
- Minimize potable water use
- Minimize construction dewatering to preserve groundwater

Progress for each of these goals is provided below, including the status of the sustainability strategies associated with each goal.

### 4.1.1 Goal: Minimize Storm Water Runoff

#### 4.1.1.1 Current Status

The goal to minimize stormwater runoff is being actively pursued. Approximately 25 percent of the planned roadway would be in tunnel segments which reduces the total area of impervious surface subject to stormwater runoff. The two tunnel segments would be covered with an adequate soil depth to provide infiltration of precipitation (areas over the tunnels would not be considered impervious). The current Doyle Drive facility discharges stormwater runoff into the existing drainage facilities without treatment. The environmental document included two stormwater treatment options for the new facility. The first option is to collect all stormwater runoff from Doyle Drive, including wash down water and incidental runoff from within the tunnels, and discharge to the existing San Francisco Public Utilities Commission (SFPUC) combined sewer system for treatment at the City and County of San Francisco wastewater treatment facility. The second option is to treat runoff from the new roadway prior to discharge to water surfaces, to the fullest extent feasible, at or near the new structure. It has been determined that the first option to discharge stormwater to the SFPUC combined sewer system is no longer feasible. The first flush of stormwater runoff will be treated via best management practices (BMPs) and then sent to the Bay.

The BMPs will be designed, constructed, and maintained to treat stormwater runoff from the new roadway facility. Currently several treatment options are being considered, including biofiltration swales, Austin sand filters, and Contech storm vaults. A Conceptual Storm Water Pollution Prevention Plan has been developed for the project and it outlines the control measures that can be considered for use during construction.

The current status for the sustainability strategies associated with this sustainability goal are provided below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use permeable pavement for shoulders of the road.</td>
<td>To be considered at a later stage of the development process (Medium Priority)</td>
<td>There have been preliminary discussions regarding the use of permeable pavement on the shoulders but a decision has not been made at this time. There may be a potential barrier to implementation of this strategy as there is a project commitment for full treatment of roadway surface runoff to the extent practicable. It has been noted that this strategy could potentially</td>
</tr>
<tr>
<td>Strategy</td>
<td>Priority</td>
<td>Implementation Details</td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td>-------------------</td>
<td>--------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Use permeable paving for surface parking</td>
<td>Medium Priority</td>
<td>The location, amount, and possible type of both temporary and permanent parking have not yet been determined. As above there may be a barrier to implementation as there is a Project commitment for full treatment of roadway surface runoff to the extent practicable.</td>
</tr>
<tr>
<td>Restore and stabilize soil (soil amendments) to increase infiltration and subsurface storage.</td>
<td>Low Priority</td>
<td>Where feasible soil embankments will be used. The inclusion of two tunnel segments will increase the land area along the facility for infiltration of rainfall. There is however a barrier to extensive implementation in that there is a Project commitment for full treatment of roadway surface runoff to the extent practicable. Measures such as aligning swales and filter strips, will be taken to prevent any infiltration.</td>
</tr>
<tr>
<td>Map natural flow of water and minimize disruption to natural drainage patterns</td>
<td>Low Priority</td>
<td>The Tennessee Hollow restoration already includes to mapping natural flow of water to the extent possible. Elsewhere, a larger project objective is conserving existing/historical land mass/flow – however natural flow must be disrupted to some extent to eliminate drainage into the marsh (as pre project requirements).</td>
</tr>
<tr>
<td>Re-establish historic water flow patterns</td>
<td>Low Priority</td>
<td>Water flow patterns are largely governed by regulatory requirements. Outside the realm of the Doyle Drive Project, the Presidio land managers are undertaking efforts to re-establish historic water flow patterns throughout the park.</td>
</tr>
<tr>
<td>Design tunnels to allow for subsurface water flows to be re-established downstream</td>
<td>Low Priority</td>
<td>Geotechnical analyses are being undertaken to investigate the existing hydrological conductivity in the area of the tunnels. Implementation of high-permeability strip drains around the tunnel box will depend on the outcome of these findings.</td>
</tr>
</tbody>
</table>

### 4.1.1.2 Prioritization of Sustainability Strategies

There is the potential that permeable paving and roads and surface parking could be considered in further detail during the final design for the roadway and parking structures. Possible use of permeable surfaces for roadway shoulders and parking surfaces would contribute to a reduction in stormwater runoff and reduction in the
potential for containments to reach the Bay. Permeable paving will, however, carry a maintenance requirement beyond requirements for a standard paved roadway.

4.1.1.3 Sustainability Performance
In terms of current performance against the goal to minimize surface runoff the project is currently considering implementing more measures than the minimum (scoring 2 out of 5). Should it be determined that permeable shoulders along the roadway and permeable surfaces be used for parking surfaces at a later stage in the project, the sustainability performance rating could improve. It should be noted that there are a number of regulations and project commitments surrounding surface water runoff which limit the extent to which this goal can be achieved.

4.1.1.4 Targets and Monitoring Requirements
The National Pollutant Discharge Elimination System (NPDES) permit program, established through the Clean Water Act, is designed to regulate discharges to surface waters. NPDES permits regulate stormwater runoff both during and after construction. The main objective is to minimize the amount of pollutants in stormwater runoff and non-stormwater discharges (e.g., truck wash water) in order to improve the quality of receiving waters. The NPDES program is largely implemented by state and local agencies.

In addition, the SFPUC is pursuing a policy to require that new and redevelopment projects in San Francisco take advantage of Best Management Practices and Low Impact Development (LID) technologies for managing stormwater runoff. LID directs runoff to natural vegetated systems, such as landscaped strips and swales that reduce, filter or slow stormwater runoff, to help mitigate the impacts of impervious surfaces.

The monitoring requirements for the goal of reducing stormwater runoff are based on the requirements of the NPDES. Following the procedures outlined in the NPDES permit would help reduce the amount of runoff that would need to be treated and would help the project meet the requirements for water quality. Part of these procedures includes the development of a stormwater pollution prevention plan (SWPPP) prior to construction to reduce pollutants in stormwater discharges and the potential for erosion and sedimentation. Targets related to the goal of reducing stormwater runoff can come forward from the SFPUC policies which require projects to implement BMPs and LIDs for management of stormwater runoff.

In accordance with SFPUC policies, the project is currently exploring various options for the treatment and management of stormwater runoff. A Conceptual Storm Water Pollution Prevention Plan has been developed for the project and it outlines the control measures that can be considered for use during construction.

4.1.2 Goal: Improve Water Quality

4.1.2.1 Current Status
The project will incorporate numerous measures with the purpose of protecting and improving water quality within the Presidio and San Francisco Bay. These measures will be further detailed and implemented during later stages in the project development and will include the management of construction dewatering effluent through the requirements of the NPDES permit, managing construction stormwater runoff through the implementation of appropriate BMPs outlined in the Stormwater Pollution Prevention Plan, and the long-term treatment and disposal of stormwater runoff from the new facility.
A status report on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use bio-retention, swales and ponding to filter and remove toxins from roadway stormwater, particularly first flush.</td>
<td>Currently being considered (Low Priority)</td>
<td>The use of passive stormwater treatment is currently being explored. However Project commitments may be a barrier to implementation.</td>
</tr>
<tr>
<td>Consider sending first flush to wastewater treatment facility.</td>
<td>Considered but not consistent with regulations / objectives (Low Priority)</td>
<td>Due to SFPUC regulations which prohibit new developments from contributing to an increase in capacity, sending an untreated first flush to the SFPUC system would not be feasible.</td>
</tr>
<tr>
<td>Use bio-retention systems for surface parking lots.</td>
<td>To be considered at a later stage of the development process (Medium Priority)</td>
<td>The location, amount, and possible type of both temporary and permanent parking have not yet been determined.</td>
</tr>
<tr>
<td>Use wetlands for stormwater treatment.</td>
<td>Considered but not consistent with regulations / objectives (Low Priority)</td>
<td>The option of using existing wetlands for stormwater treatment is not feasible due to water quality requirements. In addition there is no area available for the construction of new wetlands to treat stormwater</td>
</tr>
<tr>
<td>Apply Best Management Practices (BMPs) for highway maintenance activities.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The project is committed to the application of BMPs. The specific details of the maintenance BMPs are currently being developed. See Appendix B for a list of potential BMP measures.</td>
</tr>
<tr>
<td>Evaluate response plan for handling spills / accidents and strengthen plan as needed.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>Prior to the start of construction a Site Management Program/Contingency Plan (SMP/CP) will be developed. The SMP/CP will include measures to address the management of various hazardous material accidents. BMPs including silt fences, fiber rolls, gravel bag berms, hydraulic mulch, and geotextiles and mats will be part of the project construction documents and implemented during construction. See Appendix B for a list of potential BMP measures.</td>
</tr>
<tr>
<td>Use best practices for erosion and sedimentation management and control.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>Vegetation management will be done in accordance with Presidio Trust Vegetation Management Plan (VMP), which includes environmentally sensitive approach to pest / vegetation management.</td>
</tr>
<tr>
<td>Develop environmentally-sensitive approach to pest/vegetation management.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td></td>
</tr>
</tbody>
</table>
Use pollutant filters to improve the quality of discharged water.  

Similar measures have already been committed to  

Discharge to the storm sewer system (and eventually to the Bay) or directly to the Bay will be addressed by the Caltrans Statewide Permit, which incorporates the performance requirements and other technical provisions of the Construction General Permit and will be subject to the quantitative water quality objectives included in the SFRWQCB Basin Plan. The NPS and Trust will be included in the process of determining acceptable water quality thresholds for discharge.

4.1.2.2 Prioritization of Sustainability Strategies
The majority of sustainability strategies outlined above have already been considered, with the exception of the bio-retention systems which would be considered at a later stage of the development process.

4.1.2.3 Current Sustainability Performance
The project is currently achieving good practice (scoring 3 out of 5) with respect to the goal to improve water quality. Implementation of the new facility will include numerous measures designed to improve the overall water quality found within the project corridor. Currently, stormwater drains directly off the roadway and travels overland to the receiving waters. The new facility will collect and treat the runoff, will implement the best practices for erosion control, and will follow Presidio Trust and National Park Service guidelines for pest/vegetation management to ensure the quality of surrounding waters is protected and improved over existing conditions.

4.1.2.4 Targets and Monitoring Requirements
Federal and state programs regulate and monitor water quality. The Clean Water Act (33 U.S.C. 1344) (CWA) is the primary law regulating waters of the United States. CWA Section 404 regulates the discharge of dredged or fill material into waters of the United States. The USACE has primary federal responsibility for administering regulations that concern waters of the United States and wetlands within project sites. The San Francisco Regional Water Quality Control Board (SFRWQCB), North Coast Region, regulates waters of the State under the Porter-Cologne Act. Under Section 401 of the CWA, the RWQCB has review authority of Section 404 permits.

During construction any discharge of groundwater to the sanitary sewer system will be required to comply with the San Francisco Public Utilities Commission (SFPUC) pretreatment standards and other requirements for discharge to the City’s sewer system. Discharge to the storm sewer system (and eventually to the Bay) or directly to the Bay will be addressed by the Caltrans Statewide Permit, which incorporates the performance requirements and other technical provisions of the Construction General Permit and will be subject to the quantitative water quality objectives included in the SFRWQCB Basin Plan. The NPS and Trust will be included in the process of determining acceptable water quality thresholds for discharge.

Following all appropriate regulations, the project design team is currently working on the specific plans for the treatment of groundwater disposal and stormwater runoff which will improve the overall water quality within the project area. A Conceptual Storm Water Pollution Prevention Plan has been developed for the project and it outlines the control measures that can be considered for use during construction.
4.1.3  **Goal: Minimize Potable Water Use**

4.1.3.1  **Current Status**

Current efforts to minimize potable water use include water recycling by the Presidio Trust. Wastewater from the Presidio is treated at the SFPUC Southeast Water Pollution Control Plan and the Oceanside Water Pollution control Plant and is reused for landscape irrigation while also reducing Presidio wastewater flows entering the City and County of San Francisco combined sewer system. Additionally, the Presidio Trust is working towards the creation of an on-site water recycling system at the Presidio to provide high-quality recycled water for landscape irrigation and other non-potable uses. SFPUC is actively pursuing other venues to improve its wastewater treatment to enhance environmental quality and reduce pollutants to the Bay. Recent efforts include a policy, which is currently under development, requiring new and redevelopment projects in San Francisco to utilize BMPs and Low Impact Development (LID) technologies for managing stormwater runoff. LID directs runoff to natural vegetated systems such as landscaped strips and swales that reduce, filter or slow stormwater runoff, to help mitigate the impacts of impervious surfaces.

The potential for recycling stormwater from the roadway for use as irrigation is currently being explored, although it is likely that the necessary irrigation water would come from the existing water supply in the Presidio due to feasibility issues.

A status report on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycle storm water from roadway for irrigation purposes.</td>
<td>To be considered at a later stage of the development process (Medium Priority)</td>
<td>Recycling stormwater from the roadway for use as irrigation is an option that will be explored with the Presidio Trust.</td>
</tr>
<tr>
<td>Use water from the planned Presidio Grey Water plant for irrigation</td>
<td>Considered but not feasible (Low Priority)</td>
<td>The use of water from the planned Presidio Grey Water plant has yet to be determined as the plant is still in the planning phases. The ultimate use of water from the plant is at the discretion of the Presidio Trust and unknown at this time. Use of the water for irrigation of landscape associated with Doyle Drive is an option but beyond the scope of this immediate project.</td>
</tr>
<tr>
<td>Landscape with drought-resistant, native or adaptive plants (as at Crissy field).</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>Following completion of construction activities, re-vegetation and landscaping, including plant species selection, will be done in accordance with the Presidio Trust Vegetation Management Plan (VMP). A proposed list of plants has been provided to the Presidio Trust for their approval.</td>
</tr>
</tbody>
</table>
4.1.3.2 Prioritization of Sustainability Strategies

There are two areas that are a medium priority and could be considered at a later stage in the development process; recycling storm water from roadway for irrigation purposes and installation of irrigation systems. In terms of irrigation systems, there are a number of irrigation technologies with higher efficiency rates and advanced irrigation controls have the potential to significantly reduce potable water use. Salco, for example, has produced drip irrigation systems for 40 years, including systems for roadside landscaping. Similarly, AquaConserve has several types of advanced irrigation controls, such as weather-sensitive controls, designed to save water. These measures should be considered at the final design stage and during operation.

4.1.3.3 Sustainability Performance

The project is currently considering doing more than the minimum required (scoring 2 out of 5) with respect to the goal to minimize potable water use.

4.1.3.4 Targets and Monitoring Requirements

There are no specific targets or monitoring requirements for the goal of minimizing potable water use. There is the potential to develop specific water usage targets as the overall landscape plan and irrigation system are developed.

4.1.4 Goal: Minimize Construction Dewatering to Preserve Groundwater

4.1.4.1 Current Status

The project will incorporate several strategies to preserve groundwater and minimize construction dewatering. Groundwater management during construction of the tunnel through the east bluff area north of the cemetery will utilize temporary shoring systems. Since the excavation for the tunnel will be 2 to 3 meters below the existing water table, a temporary shoring system will minimize groundwater intrusion in the below ground work area, and strip drains which will be installed during excavation will permanently convey groundwater around the tunnel.

Water quality management from construction dewatering will also be executed in compliance with the Caltrans permit and SWMP or any separate dewatering permit issued by the San Francisco Regional Board. Acceptable thresholds for discharge to the sanitary sewer system are to be developed by the Trust, SFPUC, San Francisco Regional Water Quality Control Board (SFRWQCB), Caltrans and the project proponent.

A status report on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

| Use high-efficiency irrigation system. | To be considered at all later stage of the development process (Medium Priority) | Development and design of any irrigation system is to be determined at a later phase of the development process. The use of high-efficiency irrigation systems for those landscaped areas associated with Doyle Drive is a consideration. |
| Use irrigation system with advanced irrigation controls (e.g., weather-sensitive). | To be considered at all later stage of the development process (Medium Priority) | Similar to the strategy above, the use of advanced control irrigation systems is a consideration to be investigated during the design of the system associated with the facility. |
### Sustainability Strategy

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use horizontal well system for dewatering.</td>
<td>To be considered at a later stage of the development process (Medium Priority)</td>
<td>Determination of dewatering methods to occur at later stages in the process when construction methods and details are decided.</td>
</tr>
<tr>
<td>Minimize depth of Girard extension to minimize dewatering and avoid damage to pilings.</td>
<td>Currently being considered (Low Priority)</td>
<td>The design of the Girard Road extension is currently being refined. Efforts are being made to raise the roadway as much as possible in a cost savings effort but this also needs to consider the effect on the viaduct over Tennessee Hollow.</td>
</tr>
<tr>
<td>Use driven piles (steel or concrete - where appropriate) to minimize groundwater drawdown and contamination.</td>
<td>To be considered at a later stage of the development process (Medium Priority)</td>
<td>Project has committed to not using driven piles within 200 feet of historic structures. With regards to pile placement in other areas, future vibration testing will assist in determining the appropriate pile placement method. As an alternative to driven piles, several methods of pile placement are available to the construction contractor that will reduce noise and vibration impacts, including cast in drilled hole (CIDH) pile placement, screw piles or press-in piles. A determination of the pile placement method will be made later in the project development process.</td>
</tr>
</tbody>
</table>

#### 4.1.4.2 Prioritization of Sustainability Strategies

Determination of piling and construction dewatering methods are sustainable strategies with potential to be carried forward at a later stage in the development process. Confirmation of these methods upon final design of the project could increase the sustainability performance rating of the project.

#### 4.1.4.3 Sustainability Performance

The project is currently considering doing more than the minimum required (scoring 2 out of 5) with respect to the goal to minimize construction dewatering. The project achieves regulatory compliance, and is currently considering minimizing the depth of the Girard extension in efforts to minimize dewatering and avoid damage to pilings. Another effort currently under consideration is the use of a shoring system that will minimize groundwater intrusion into the below-ground work area. The shoring system will support management of groundwater during construction and will help minimize or eliminate impacts on hydrology, water quality and stormwater run-off resulting from the project.

#### 4.1.4.4 Targets and Monitoring Requirements

Acceptable threshold levels for discharge to the sanitary sewer system will be determined by representatives from the Trust, SFPUC and the SFRWQCB in coordination with the project proponent and Caltrans. Some form of pretreatment to remove pollutants in the dewatering effluent down to an acceptable threshold may be
required prior to discharge. If the dewatering effluent does not meet the requirements for sewer discharge, provisions for other off-site treatment and disposal will be made. Due to the potential project related effects to the lagoon at the Palace of Fine Arts, the project proponent will need to demonstrate through detailed hydraulic calculation that the project-related dewatering effects will not be substantial. Should these calculations show that the potential effects to the lagoon would be substantial, the project proponent will need to enter into an agreement with the SFPUC to contribute to cost of monitoring and replenishment of lagoon levels during the dewatering operation period.

### 4.2 Energy

Energy represents an area of the project that has not been explored in depth at this stage and this is reflected in the findings presented below. While many of the strategies associated with this topic have been identified as priorities at a later stage in the development process, there are a number that are high priority strategies which will be addressed in the Outline Implementation Plan.

The sustainability goals for this topic area are listed below and a status report has been provided for each:

- Maximize energy efficiency
- Reduce heat island effect
- Minimize carbon emissions

Progress for each of these goals is provided below, including the status of the sustainability strategies associated with each goal.

#### 4.2.1 Goal: Maximize Energy Efficiency

A few isolated studies are currently being undertaken to explore ways in which energy efficiency gains could be achieved on the project. These studies include the use of natural ventilation in tunnels and using daylight sensors which respond to levels of natural daylight in order to light tunnels. Further investigations into the feasibility of other energy efficient measures will be progressed at the detailed design stage.

#### 4.2.1.1 Current Status

A status report on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use natural ventilation in tunnels</td>
<td>Currently being considered (Low Priority)</td>
<td>A study investigating the feasibility of this strategy is being progressed independently of the Sustainability Program. The outcome has not yet been decided.</td>
</tr>
<tr>
<td>Use solar panels integrated into berms, light posts, sound barriers, and other constructed elements to light tunnels at night</td>
<td>To be considered at a later stage in the development process (Medium Priority)</td>
<td>This strategy has not been considered to date and should be addressed at detailed design.</td>
</tr>
<tr>
<td>Strategy</td>
<td>Stage of Development</td>
<td>Notes</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------------------------------------------------------------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>Use skylights to provide natural daylight to tunnels</td>
<td>To be considered at a later stage in the development process</td>
<td>This strategy has not been considered to date and should be addressed at detailed design.</td>
</tr>
<tr>
<td>(Medium Priority)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use solar-powered lighting</td>
<td>To be considered at a later stage in the development process</td>
<td>This strategy has not been considered to date and should be addressed at detailed design.</td>
</tr>
<tr>
<td>(Medium Priority)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use high efficiency fixtures for roadway lighting, such as LEDs or high-output fluorescents</td>
<td>To be considered at a later stage in the development process</td>
<td>This strategy has not been considered to date and should be addressed at detailed design.</td>
</tr>
<tr>
<td>(Medium Priority)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use day light sensors for lighting of tunnels based on amount of daylight penetration</td>
<td>Currently being considered (Low Priority)</td>
<td>A study investigating the use of day light sensors is being progressed. The study is investigating whether it is feasible to install tunnel lighting that adjusts to an ambient level according to the amount of daylight.</td>
</tr>
<tr>
<td>Identify area at higher elevation where water can be pumped efficiently for storage and then gravity-fed for irrigation</td>
<td>To be considered at a later stage in the development process</td>
<td>This strategy has not been considered to date and should be addressed at detailed design.</td>
</tr>
<tr>
<td>(Medium Priority)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Use high efficiency sump pump for tunnels and seek to minimize areas requiring sump pumps</td>
<td>To be considered at a later stage in the development process</td>
<td>This strategy will be considered at a later stage in the development process.</td>
</tr>
<tr>
<td>(Medium Priority)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.2.1.2 Prioritization of Sustainability Strategies

The majority of strategies outlined above are associated with integrating renewable energy or energy efficiency technologies within the detailed design. Integration of sustainability features such as those mentioned above could influence the overall energy consumption of the operation of the roadway and should be considered at the relevant stage of the development process.

The majority of the strategies associated with this goal are a medium priority, to be considered at a later stage in the project. A process to ensure that these strategies are considered at the appropriate stage of the development process will be detailed within the Outline Implementation Plan.

4.2.1.3 Sustainability Performance

From the information available the sustainability performance of this goal is viewed as achieving the minimum required (scoring one out of five). However, it is worth noting that many of these strategies have been highlighted for consideration at a later stage in the project. Future consideration of these issues would assist in improving the sustainability performance of the project.
4.2.1.4 Targets and Monitoring Requirements
There are currently no targets or monitoring requirements associated with energy efficiency on this project. It is recommended that targets and monitoring requirements are considered at the same time as these sustainability strategies are investigated.

4.2.2 Goal: Reduce Heat Island Effect

4.2.2.1 Current Status
Measures to reduce heat island effect have been explored as part of the landscaping strategy with varying degrees of success. Heat island effect has been reduced by vegetating the tunnel roofs but has been limited from the perspective of shading by trees due to Caltrans standard distance requirements. Heat island effect has not been considered in terms of material selection and this has been highlighted as a priority.

Further details on the progress made for the sustainability strategies associated with this goal are provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use trees in median with high shading potential</td>
<td>Considered but not feasible</td>
<td>After much investigation it was found that the implementation of this strategy is not possible because large trees next to the road would go against Caltrans standard distance requirements. Distance requirements are developed to prevent trees from impairing traffic sight lines, and from posing a danger if branches fell into the roadway. Also, extensive planting of large trees in the median will block views to the bay and Golden Gate Bridge, which is not compatible with the Presidio Architectural Criteria. The current solution is to plant trees in the median where we have enough space to meet Caltrans standard distance requirements. Also, they will only be placed where they will not impair scenic views. So, while there will be occasional tree groupings in the median, it will not significantly shade the road.</td>
</tr>
<tr>
<td>Use cool pavement and reflective materials to reduce heat island effect</td>
<td>Not considered but has potential (High Priority)</td>
<td>This strategy has not been considered to date.</td>
</tr>
<tr>
<td>Landscape the roofs of tunnels and parking sites (green roofs)</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The current roadway (and parking garages where feasible) will be turned into a permeable landscaped open space. With the increased ratio of landscape to hardscape, the heat island effect is proportionally reduced. It has other, less direct benefits, such as allowing for</td>
</tr>
</tbody>
</table>
natural hydrological cycles to occur which increase the overall functionality of the whole site, wildlife corridors may be re-established and increase the overall functionality of the whole site, other natural cycles can take place such as bee pollination where there is new landscape, and most of all the landscape produces additional oxygen.

4.2.2.2 Prioritization of Sustainability Strategies
The use of cool pavement and reflective material has not been considered at this stage of the project and has been highlighted as a priority area. The activities and responsibilities associated with exploring this strategy further will be included within the Outline Implementation Plan. All other strategies have been considered and are therefore a low priority.

4.2.2.3 Sustainability Performance
Since the current status of sustainability strategies varies it is difficult to assign a single performance rating. From the information available it has been viewed that the project is currently achieving good practice (scoring 3 out of 5). However the performance rating of this goal could be increased by considering heat island effect within the material selection process. The feasibility of this strategy will be addressed in the Outline Implementation Plan.

4.2.2.4 Targets and Monitoring Requirements
From the information available there are currently no targets or monitoring requirements associated with this goal. Targets and monitoring requirements associated with material selection will be explored in the next phase of the Sustainability Program.

4.2.3 Goal: Minimize Carbon Emissions
4.2.3.1 Current Status
The carbon emissions associated with the project have not been considered in great depth to date. Although the landscape strategy has investigated selecting species with the potential to absorb carbon, broader considerations such as carbon emissions associated with the construction and operational phase have not yet been addressed. A number of strategies associated with this goal have been highlighted as high priority and will be addressed within the Outline Implementation Plan.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate landscape species based on potential for carbon capture</td>
<td>Currently being considered (Low Priority)</td>
<td>Investigations have found that rapid growing trees or vegetation and plants with larger leaves capture carbon more quickly and release more oxygen. However the amounts are considered negligible. Since the benefit isn’t large, it was felt that it is a higher priority to choose plants that are native and drought resistant, as that provides more benefit</td>
</tr>
</tbody>
</table>
than leaf size. However, when selecting the final plant palette, carbon capture will be considered as a component, and large leaved plants will be included where appropriate.

<table>
<thead>
<tr>
<th>Purchase green tags (renewable energy certificates) to offset carbon emissions associated with electricity use</th>
<th>Not considered but has potential (High Priority)</th>
<th>Carbon emissions associated with the project have not been considered to date. There are currently no Caltrans requirements for contractors to offset carbon emissions associated with electricity use.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluate construction emissions standards or require construction equipment to be electric drive or use alternative fuels</td>
<td>Not considered but has potential (High Priority)</td>
<td>Carbon emissions associated with the project have not been considered to date. There are currently no Caltrans requirements for contractors to utilize electric drive or alternative fuels.</td>
</tr>
<tr>
<td>Be responsive to congestion to reduce idling</td>
<td>To be considered at a later stage of the development process (Medium Priority)</td>
<td>This strategy will be considered at a later stage in the development process.</td>
</tr>
</tbody>
</table>

**4.2.3.2 Prioritization of Sustainability Strategies**

A number of sustainability strategies have not been addressed to date and are highlighted as priority areas. The activities and responsibilities for exploring these strategies in further detail will be detailed in the Outline Implementation Plan.

**4.2.3.3 Sustainability Performance**

From the information available the sustainability performance of this goal is viewed as achieving the minimum required (one out of five). It should be noted that a number of strategies have been highlighted as a high priority and if these are considered by the project team then the sustainability performance of the project would be improved.

**4.2.3.4 Targets and Monitoring Requirements**

From the information available this sustainability goal has areas that will be taken forward into the Outline Implementation Plan; this will include identifying appropriate sustainability targets if required.

**4.3 Habitat**

The majority of the project study area is composed of ornamental landscape (lawn, isolated trees and shrubs), buildings, paved areas, and roadways. Many of the plant communities that are in the remainder of the project study area, such as northern coastal bluff scrub, are affected by human activities and natural environmental disturbances (e.g., salt spray, wind, and sun exposure). A number of the plant communities found in the Presidio are remnant populations of native communities that were once extensive along the coast of California.

The majority of the understory of the non-native introduced forest (understory scrub) and riparian scrub (including central coast arroyo willow scrub and blackberry) within the
project study area is highly disturbed, as indicated by the presence of certain invasive plant species (e.g., cape ivy (*Delaria odorata*), English ivy (*Hedera helix*), and cotoneaster (*Cotoneaster sp.*)).

Phase I of the sustainability program identified four relevant sustainability goals in regards to the natural habitat, which are:

- Protect existing habitat
- Promote creation of new habitat
- Support wildlife corridors
- Minimize light pollution

Progress for each of these goals is provided below, including the status of the sustainability strategies associated with each goal.

### 4.3.1 Goal: Protect Existing Habitat

#### 4.3.1.1 Current Status

The goal to protect existing habitat is being actively pursued. The overall design process of the new facility has worked to minimize impacts to the surrounding natural environment. Additional measures will be implemented during construction to avoid and minimize potential impacts to the natural environment including, re-vegetation of disturbed areas, implementation of a biological resource monitoring plan and wetland restoration.

A status report on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
</table>
| Remove trees/vegetation prior to the nesting / breeding season. | Similar measures have already been committed to (Low Priority) | As part of the mitigation adopted by the project, vegetation will be removed (to the least extent practicable) during the non-nesting season (September 1 through December 31) to reduce the possibility that nests will occur within the construction corridor.

Additional measures such as pre-construction surveys for breeding or roosting special-status bat species will also be implemented in the event of building or structure occupation prior to demolition and construction.

| Remove invasive weed species.     | Similar measures have already been committed to (Low Priority) | As part of the avoidance and minimization measures adopted by the project, best management practices will be implemented to limit the spread of invasive species, and should an invasion occur, eradication strategies will be implemented as soon as they occur. Additionally, $10,000 will be made available for up to five years to fund |
4.3.1.2 Prioritization of Sustainability Strategies
The sustainability goal to protect existing habitat has been integrated into the design of the new facility to the extent feasible. The project will follow all regulatory procedures such as removing vegetation prior to nesting and following best management practices for the control and removal invasive species. Since aspects associated with this goal have already been considered this will not be a priority area for the project moving forward.

4.3.1.3 Sustainability Performance
From the information available the sustainability performance of this goal is viewed as achieving good practice (scoring three out of five). The project has integrated a range of regulatory requirements and complies with those standards set out by the Presidio Trust to ensure the protection of existing habitat.

4.3.1.4 Targets and Monitoring Requirements
The project will comply with all necessary environmental protection regulations, such as the Federal Endangered Species Act, California Endangered Species Act Migratory Bird Treaty Act, and Executive Order 13112, which provide the basis for the protection of natural resources. A Biological Resource Monitoring Program will also be developed that will outline the specific details and performance targets for the protection and monitoring of natural resources during and after construction.

4.3.2 Goal: Promote Creation of New Habitat

4.3.2.1 Current Status
Measures to support the goal of creating new habitat are currently being considered. Within the construction corridor, all temporarily disturbed natural areas will be re-vegetated and restored to its appropriate native vegetation type and natural area, or appropriate ornamental vegetation type in landscaped areas. Additional restoration efforts include the approximate 1.2 hectares (2.99 acres) of wetlands that the project will restore and the open space created over the tunnel segments.

A status report on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participate in restoring and improving habitat, including Crissy Marsh and Tennessee Hollow.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The project will accommodate the restoration efforts of Tennessee Hollow. The design of the facility in the area between Halleck Street and Girard Road has been revised to the extent feasible in order to accommodate the planned restoration of the Tennessee Hollow corridor and marsh expansion. As part of the construction efforts the area of marsh expansion will be rough graded.</td>
</tr>
</tbody>
</table>
project will not include any restoration or improvements at Crissy Marsh as this area is outside the limits of the project and would require additional environmental analysis and clearance.

Maximize growth of vegetation in Tennessee Hollow by using glass blocks in elevated roadway.

Considered but not feasible (Low Priority)

In order to maximize light in the Tennessee Hollow restoration area, the area between northbound and southbound roadways has been separated to the maximum extent possible. The use of glass blocks was considered but was determined to be infeasible.

Use sand dune and plants below Main Post bluff.

Considered but not feasible (with the landscape objectives of the project) (Low Priority)

The restoration of those areas disturbed by the project will be undertaken in accordance with the VMP. The actual habitat and plant types will be determined at a later stage in the project but it is unlikely that the sand dune habitat would be considered for the area below the Main Post bluff.

4.3.2.2 Prioritization of Sustainability Strategies
The sustainability goal to promote the creation of new habitat has been integrated into the design of the new facility to the extent feasible. Within the limited project footprint, the design of the new facility does allow for new habitat creation in the areas above the tunnels and underneath the low causeway. Since aspects associated with this goal have already been considered this will not be a priority area for the project moving forward.

4.3.2.3 Current Sustainability Performance
From the information available the sustainability performance of this goal is viewed as achieving good practice (scoring three out of five). The focus of the project is to replace the existing roadway with a new facility along the same corridor and therefore there is limited opportunity for the creation of new habitat. The design of the new facility does allow for new habitat creation in the areas above the tunnels and underneath the low causeway.

4.3.2.4 Targets and Monitoring Requirements
The targets and monitoring requirements are primarily focused on the wetland mitigation efforts. Six sites have been chosen as potential mitigation sites for impacts on permanent and indirect wetland impacts with a total of 1.2 hectares (2.99 acres) of wetlands to be created/restored. There will be a monitoring program associated with wetland habitat creation, and the details of this are currently being finalized.

4.3.3 Goal: Support Wildlife Corridors
4.3.3.1 Current Status
There is an existing wildlife corridor in the northern portion of the Presidio between the Pacific Ocean and coastal bluffs in the west and the non-native introduced forest in the
east. Smaller animals such as small mammals, reptiles, invertebrates, and primarily birds use this habitat corridor mainly for foraging and movement purposes. This corridor will be temporarily disrupted during construction. The project is being designed to accommodate a potential wildlife corridor along the restored Tennessee Hollow. In addition, the placement of roadway segments in tunnels will provide open space over the tunnels which may eventually be used by wildlife to cross the corridor.

A status report on the sustainability strategies relevant to this goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimize disruption / segregation of wildlife corridors.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The existing wildlife corridor in the northern portion of the Presidio will be temporarily disrupted during construction. Efforts to minimize the overall effects of constructed have been committed to including the use of staged construction, providing protection for environmentally sensitive areas, and minimizing the construction footprint.</td>
</tr>
<tr>
<td>Use roof of tunnels and underside of bridges to provide wildlife corridors.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The new facility will accommodate the restoration of Tennessee Hollow in the area between Halleck Street and Girard Road. Through this area the facility will be placed on an elevated causeway which will allow for the development of a wildlife corridor underneath along Tennessee Hollow. Additionally, the open spaces created over the tunnel segments could potentially be used by wildlife as a means to cross the Doyle Drive corridor.</td>
</tr>
<tr>
<td>Provide wildlife crossings (e.g., bridges, culverts, eco-ducts) and erect barriers to protect wildlife as needed.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>No specific wildlife corridors are being specifically designed but as mentioned above, the area under the low causeway and over the tunnel segments could be used as wildlife crossings. All potential wildlife access points to Doyle Drive will be appropriately barricaded to prevent wildlife from entering roadway.</td>
</tr>
<tr>
<td>Incorporate landscape species that attract or provide refuge to wildlife</td>
<td>To be considered at a later stage in the development process (Medium Priority)</td>
<td>The restoration of those areas disturbed by the project will be done in accordance with the VMP. The actual habitat and plant types will be determined at a later stage in the project. Attempts will be made to incorporate landscape species that attract wildlife where appropriate.</td>
</tr>
<tr>
<td>Create a vegetated berm/buffer or other light shield between the</td>
<td>Similar measures have already been committed to</td>
<td>The new roadway alignment has been designed to include a landscaped medium and landscaped berms between the</td>
</tr>
</tbody>
</table>
4.3.3.2 Prioritization of Sustainability Strategies

The sustainability goal of supporting wildlife corridors has been integrated into the design of the new facility to the extent feasible. Since the project is located in an area that is surrounded by an urban setting with limited wildlife and only one wildlife corridor has been identified, no further actions are needed in regards to this sustainability goal. The design of the new facility accommodates the wildlife corridor needs in the area. Since aspects associated with this goal have already been considered this will not be a priority area for the project moving forward.

4.3.3.3 Sustainability Performance

From the information available the sustainability performance of this goal is viewed as achieving good practice (three out of five). The design of the new facility will include several corridors across the facility which can potentially be used by wildlife within the Presidio. Both the areas over the tunnels and corridor beneath the viaduct over the Tennessee Hollow area can serve as passageways across Doyle Drive. The existing wildlife corridor in the northern portion of the Presidio would be maintained with implementation of the new roadway.

4.3.3.4 Targets and Monitoring Requirements

There are no specific targets or monitoring requirements associated with goal of supporting wildlife corridors. The actions to achieve the goal are integrated into the roadway design, particularly the in the area of low causeway over the Tennessee Hollow corridor, where a substantial effort has been made to provide the maximum amount of space beneath the causeway to development of the Tennessee Hollow corridor.

4.3.4 Goal: Minimize Light Pollution

4.3.4.1 Current Status

The new roadway alignment has been designed to include a landscaped medium and landscaped berms between the tunnels which will help reduce the amount of fugitive light. In addition, the reduction of upward light radiation by the best available and feasible means (for example, downward-pointing lights, side shields and visors), as agreed upon by the NPS and Trust, will be used along Doyle Drive. In order to insure the use of the best available current data, a guidelines for night lighting will be developed as part of final mitigation design. Other methods of impact reduction (large screens, for example) will have their own impact on night flying birds and bats and will not be used.
A status report on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use highly directional roadway lighting to reduce light pollution.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The use of the best available and feasible means of directional roadway lighting is a commitment of the project and will be incorporated into the new facility.</td>
</tr>
<tr>
<td>Restrict lighting in areas where it could impact biodiversity</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>Highway lighting standards likely require lighting along the length of the facility. In addition, the use of directional lighting and will the output of the lighting to the roadway surface to the greatest extent feasible, thereby limiting the potential light impacts to nearby biodiversity.</td>
</tr>
<tr>
<td>Utilize full cutoff fixtures to direct light and reduce light trespass.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>As described above, the use of the best available and feasible means of directional roadway lighting is a commitment of the project and will be incorporated into the new facility.</td>
</tr>
<tr>
<td>Install improved reflector systems and vertical lamps to direct light more effectively</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>Shield upwards-facing light fixtures for dark-sky benefits and utilize 100% of lumens for roadway illumination. As described above, the use of directional roadway lighting by the best available and feasible means is a commitment of the project and will be incorporated into the new facility.</td>
</tr>
<tr>
<td>Space roadway lighting appropriately with uniform height and suitable pole heights.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>As described above, the use of directional roadway lighting by the best available and feasible means is a commitment of the project and will be incorporated into the new facility.</td>
</tr>
<tr>
<td>Use lowest acceptable level of lighting and provide light/glare shields.</td>
<td>To be considered at a later stage in the development process (Medium Priority)</td>
<td>A determination of the appropriate lighting level will be made during later stages of the design process. As described above, the use of directional roadway lighting by the best available and feasible means, such as downward-pointing lights, side shields and visors, is a commitment of the project and will be incorporated into the new facility.</td>
</tr>
<tr>
<td>Develop uniform lighting approach that avoids light spots.</td>
<td>To be considered at a later stage in the development process (Medium Priority)</td>
<td>The detailed lighting approach for the facility will be developed during later stages of the design process.</td>
</tr>
</tbody>
</table>
4.3.4.2 Prioritization of Sustainability Strategies
The sustainability goal of minimizing light pollution is an integral part of the Doyle Drive project. Commitments have been made to use the best available means to light any potential light pollution. Many aspects associated with this goal have already been considered these will not be a priority area for the project moving forward. There are other aspects that have been identified for consideration at the detailed design stage and it is recommended that a process will be put in place to ensure consideration of these measures at the appropriate project stage.

4.3.4.3 Sustainability Performance
From the information available the sustainability performance of this goal is viewed as achieving good practice (three out of five). The project has committed to using the best available means to ensure the lighting of the new roadway is done in a manner fitting for the location of a National Park. Efforts will be made to limit the light to just the roadway surface to the greatest extent feasible. Through the incorporation of appropriate lighting, the potential for light pollution to affect the surrounding area will be diminished.

4.3.4.4 Targets and Monitoring Requirements
There are no specific monitoring requirements for the goal of limiting light pollution. The strategies for this goal are part of the commitments in the EIS/R and will be monitored in the project plans to ensure the best available lighting measures have been incorporated into the project design.

4.4 Landscape
The Presidio is an amalgamation of natural, cultural, historical and designed landscapes. As the approach to a landmark bridge, the new Doyle Drive roadway and tunnel top landscapes will cut through and rise above the rich context of the Presidio. The function of the landscape is to mitigate the effects of the new Doyle Drive Roadway by preserving the historic, natural and recreational resources in a way that is aesthetically pleasing, sustainable, compatible with the existing character of the Presidio, and economical. As the landscape design develops, opportunities arise to put the landscape to work by cleaning the water, providing native plant species, recycling materials, and considering long term requirements. The landscape design also looks to restore ecological processes with an emphasis on practicality and sustainability. The design shall employ a holistic approach to landscaping that works in harmony with the natural conditions of the San Francisco Bay watershed.

The Vegetation Management Plan (VMP), Architectural Criteria, National Park Service Plant List, and the Crissy Field Monitoring Report are taken into consideration by adopting many of the concepts for vegetation management. The landscape design follows the VMP designation of vegetation zones and seeks to create buffer zones and enhance wildlife diversity.
The following goals associated with landscape were identified from Phase I of the Sustainability Program and a status report for each is provided below:

- Foster restoration of native species
- Minimize construction footprint

### 4.4.1 Goal: Foster Restoration of Native Species

#### 4.4.1.1 Current Status

The sustainability goal to foster restoration of native species has been addressed comprehensively within the landscape strategy. The current progress for each of the sustainability strategies is provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use a high percentage of California native plants where possible including plants that are native to the Presidio or which are important components of adjacent existing Presidio landscapes</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>A proposed list of plants to be used in landscaping has been provided to the Presidio Trust. A high proportion of these are native plants. The project team is currently liaising with the Presidio in order to ensure that a high proportion of plants are native but that where native plants are not used, other plants which are appropriate to the local environment are used (e.g. coastal drought resistant plants).</td>
</tr>
<tr>
<td>Ensure all plantings will be compatible with Presidio standards and coastal drought resistant plants</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The Presidio Trust will be approving the plant list for landscaping, and therefore all plants will be approved in terms of their compatibility with Presidio standards. An arrangement has been put in place where plants will be seeded on site and grown before hand on Presidio Trust land, or Presidio approved locations. This is to ensure the existing gene pool of species is preserved.</td>
</tr>
<tr>
<td>Consider minimal or no use of non-native or turf grass</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>There are currently a few options that have been developed for landscaping and only one of these uses minimal turf grass. Hence the use of non-native or turf draft will be kept to a minimum, if included at all.</td>
</tr>
<tr>
<td>Use landscape species appropriate to various ecosystems, microclimate, riparian corridors across the site</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>See comments above, all landscape species are appropriate to local conditions and will be agreed with the Presidio Trust in advance. Species will be varied depending on the local conditions and will include a percentage of native, drought resistant, and riparian plants depending</td>
</tr>
</tbody>
</table>
4.4.1.2 Prioritization of Sustainability Strategies
The strategies outlined above have been considered and measures are being implemented to the extent practicable as part of the landscape strategy. Since aspects associated with this goal have already been considered this will not be a priority area for the Sustainability Program moving forward.

4.4.1.3 Sustainability Performance
From the information available the sustainability performance of this goal is viewed as achieving best practice (scoring five out of five) as the project is committed to achieving the sustainability strategies to the maximum extent practicable.

4.4.1.4 Targets and Monitoring Requirements
Formal targets have not yet been agreed for this goal. However, all landscape drawings will be approved by the Presidio Trust before being implemented on-site as part of the implementation of the landscape strategy, therefore a target could be set to achieve 100 percent approval of landscape drawings by the Presidio Trust.

4.4.2 Goal: Minimize Construction Footprint

4.4.2.1 Current Status
The factors determining the progress in achieving this goal are varied and cut across many disciplines; as a result final decisions have not been taken to determine the final construction footprint. The progress for each sustainability strategy associated with this goal is provided in the Table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use systems such as Giken to minimize area of disturbance</td>
<td>Currently being considered (Low Priority)</td>
<td>The system for using Giken is currently under consideration since it is a specialized pile driving system that has not been used widely in the U.S. Caltrans are currently testing this system and it is not yet clear whether the results will be available before construction works commence.</td>
</tr>
<tr>
<td>Limit construction and staging areas to extent possible</td>
<td>Currently being considered (Low Priority)</td>
<td>Efforts are ongoing to minimize the construction and staging areas to the extent possible. However there are many issues (such as transport and construction logistics) that need to be considered and final details have not been agreed.</td>
</tr>
<tr>
<td>Use or remove existing top soil, depending on proximity to native soil</td>
<td>Currently being considered (Low Priority)</td>
<td>The extent to which this measure can be implemented is dependent on the nature of the top soil that is found on site. If top soil is tested to be hazardous then this</td>
</tr>
</tbody>
</table>
4.4.2.2 Prioritization of Sustainability Strategies
The strategies associated with this goal are all currently being considered and therefore are not a priority area for the Sustainability Program moving forward.

4.4.2.3 Current Sustainability Performance
The performance against this sustainability goal is difficult to assess since many of the issues are currently still under consideration with no final decision being made. Hence, the project’s performance at this point in time has been viewed as ‘considering best practice’ (scoring 4 out of 5).

4.4.2.4 Targets and Monitoring Requirements
The JV team is working towards ensuring that the most efficient allocation of land is achieved for the construction phase. It is a requirement that SFCTA will review and approve drawings for the construction footprint with an overarching aim to minimize the footprint and disturbance as far as practicable. Providing that 100 percent of construction drawings are approved by SFCTA, it can be assumed that the most efficient allocation of land will be achieved for construction.

4.5 Materials and Waste
Materials and waste are areas of the project that have not been explored in depth at this stage and this is reflected in the findings presented below. From undertaking a review of the current status of the project it is clear that materials and waste is a priority area moving forward. A number of strategies associated with this topic area have been highlighted as high priority and these will be addressed within the Outline Implementation Plan.

The sustainability goals associated with materials and waste that were identified in Phase I are:

- Seek local material sources
- Maximize use of recycled, sustainable materials with low embodied energy
- Apply life-cycle approach to material selection
- Maximize recycling and reuse of construction waste

Progress for each of these goals is provided below, including the status of the sustainability strategies associated with each goal.

4.5.1 Goal: Seek Local Material Sources

4.5.1.1 Current Status
From the information available it appears that sourcing local materials has not been considered and should be a priority area for the Sustainability Program moving forward. The current status of the sustainability strategy associated with this goal is provided below.
**Sustainability Strategy** | **Current Status** | **Explanation**
---|---|---
Use regionally-sourced materials to minimize energy use associated with transportation | Not considered but has potential (High Priority) | From the information available this strategy has not yet been considered by the project. There may be specific Caltrans policies and requirements that influence the extent to which this can be implemented and these should be investigated as the project moves forward.

### 4.5.1.2 Prioritization of Sustainability Strategies

The above strategy has not been considered by the project to date and therefore is a high priority for the Sustainability Program. The activities and responsibilities associated with moving this strategy forward will be addressed in the Outline Implementation Plan.

### 4.5.1.3 Sustainability Performance

From the information available the project is currently achieving minimum required with respect to this goal (scoring 1 out of 5).

### 4.5.1.4 Targets and Monitoring Requirements

The Outline Implementation Plan will include the development of an appropriate sustainability target if required.

### 4.5.2 Goal: Maximize Use of Recycled, Sustainable Materials With Low-Embodied Energy

#### 4.5.2.1 Current Status

From the information available it appears that maximizing use of recycled, sustainable materials with low embodied energy has not been considered and should be a priority area for the Sustainability Program moving forward. A progress update for the relevant sustainability strategies is provided in the Table below.

**Sustainability Strategy** | **Current Status** | **Explanation**
---|---|---
Maximize use of recycled content (such as slag, fly ash, foundry sand, concrete/asphalt waste, glass cullet, scrap tires, plastic, etc.) in construction materials (fill, sub-base, drainage, concrete aggregate, etc.) | Not considered but has potential (High Priority) | Some consideration has been given to re-using concrete from existing structures to use as a road base or fill material. However the full range of opportunities for maximising recycled content has not been explored. There are some Caltrans specifications regarding reuse of recycled materials and these will be explored as part of the development of this strategy.

Consider embodied energy emissions in material selection | Not considered but has potential (High Priority) | From the information available carbon emissions and energy has not been considered by the project to date.

Use materials from | Not considered but has potential (High Priority) | From the information available using
4.5.2.2 Prioritization of Sustainability Strategies
The strategies outlined above have not been considered to date and are high priority areas for the Sustainability Program moving forward. These will be considered within the Outline Implementation Plan and relevant activities and responsibilities will be identified to move these strategies forward.

4.5.2.3 Current Sustainability Performance
From the information available the project is currently achieving the minimum required with respect to this goal (scoring 1 out of 5). However the consideration (and possible implementation) of these strategies as the Sustainability Program moves forward will assist in improving the sustainability performance of the project in this area.

4.5.2.4 Targets and Monitoring Requirements
The Outline Implementation Plan will include the development of appropriate sustainability targets for these strategies if required.

4.5.3 Goal: Apply Life-Cycle Approach to Material Selection

4.5.3.1 Current Status
From the information available applying a life-cycle approach to material selection has not been fully considered to date and should be a priority area for the Sustainability Program moving forward. Certain aspects such as cost and long life time have been considered but aspects such as environmental and carbon impacts of materials have not been considered.

A progress update for the relevant sustainability strategies is provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design structure for long life time</td>
<td>Currently being considered</td>
<td>Seismic considerations have been integrated into the design of structures.</td>
</tr>
<tr>
<td></td>
<td>(Low Priority)</td>
<td>Structures will meet AASHTO requirements and will have a life span of</td>
</tr>
<tr>
<td></td>
<td></td>
<td>at least 75 years.</td>
</tr>
<tr>
<td>Use energy efficient mechanical ventilation systems that minimize lifetime energy use (if natural ventilation is not feasible)</td>
<td>Currently being considered</td>
<td>Mechanical ventilation systems will be used as natural ventilation in the tunnels was found to be infeasible due to safety standards.</td>
</tr>
<tr>
<td></td>
<td>(Low Priority)</td>
<td></td>
</tr>
<tr>
<td>Evaluate on life cycle basis materials that use energy or require regular repair, replacement and</td>
<td>Not considered but has potential</td>
<td>This strategy has only been considered from the perspective of cost to date and not from the consideration of environmental impacts and carbon</td>
</tr>
<tr>
<td></td>
<td>(High Priority)</td>
<td></td>
</tr>
</tbody>
</table>
Apply latest research on the lifecycle costs of different construction materials. Not considered but has potential (High Priority) This strategy has only been considered from the perspective of cost to date and not from the consideration of environmental impacts and carbon emissions.

Use paints, solvents and other materials that generate less volatile organic compounds over their lifetime. Not considered but has potential (High Priority) From the information available this strategy has not yet been considered.

4.5.3.2 Prioritization of Sustainability Strategies
There are a number of high priority strategies that will be addressed within the Outline Implementation Plan. For example, the evaluation of materials from a life cycle perspective, including the consideration of environmental and climate change impacts should be a priority for the project. Other aspects such as designing for a long life and using natural ventilation for the tunnels are currently being considered and are therefore not a priority.

4.5.3.3 Sustainability Performance
From the information available the project is currently achieving the minimum required with respect to applying a life-cycle approach to material selection goal (scoring 1 out of 5). However the consideration (and possible implementation) of these strategies as the Sustainability Program moves forward will assist in improving the sustainability performance of the project in this area.

4.5.3.4 Targets and Monitoring Requirements
The Outline Implementation Plan will address the high priority strategies and will include the development of sustainability targets if required.

4.5.4 Goal: Maximize Recycling and Reuse of Construction Waste
From the information available maximizing recycling and reuse of construction waste has not fully been considered by the project to date and should be a priority area for the Sustainability Program moving forward. It has been noted that some efforts have been made to investigate the reuse of certain materials, such as demolished concrete from the low viaduct and shred/chip as mulch, however there is scope for reuse to be considered for a range of other materials.

A progress update for the relevant sustainability strategies is provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Develop construction waste management plan and establish target for diversion from landfill</td>
<td>Not considered but has potential (High Priority)</td>
<td>Soil excavation and management has been considered to date (and it is thought that the project will reuse a third of all spoil on site). Additional waste streams relevant to construction phase have not yet been considered.</td>
</tr>
</tbody>
</table>
4.5.4.2 Prioritization of Sustainability Strategies

The majority of strategies detailed above have been identified as high priority and will be addressed within the Outline Implementation Plan. The consideration (and possible implementation) of these strategies as the Sustainability Program moves forward will assist in improving the sustainability performance of the project in this area.

4.5.4.3 Sustainability Performance

From the information available the project is currently achieving the minimum required with respect to maximizing recycling and reuse of construction waste (scoring 1 out of 5). The strategies that will be addressed within the Outline Implementation Plan have the potential to improve the future sustainability performance of the project. It is recognized that any strategies would need to take Caltrans policies and requirements into consideration.

4.5.4.4 Targets and Monitoring Requirements

The preparation of an Outline Implementation Plan for the high priority strategies will include the development of appropriate sustainability targets if required.
4.6 Community

Doyle Drive crosses the northern portion of the Presidio; this area is a military-post converted into a National Park and has a unique scenic character with much of the former military post transformed into open space or woodlands, with a number of community facilities and schools. To the east of Doyle Drive is the city of San Francisco, and the surrounding waters of the Bay and the Pacific Ocean which are almost always active as they contain major shipping routes for the transportation of goods in and out of the Ports of Oakland and San Francisco. Each of these elements plays a part in the regional aesthetic character of the Bay Area.

Phase I of the Doyle Drive Sustainability Program identified five relevant sustainability goals related to community resources. These goals are to:

- Minimize noise
- Support healthy air quality
- Enhance aesthetics and user experience
- Minimize use of parkland acreage
- Minimize impacts of traffic on neighborhoods

Progress for each of these goals is provided below, including the status of the sustainability strategies associated with each goal.

4.6.1 Goal: Minimize Noise

4.6.1.1 Current Status

The primary source of most existing noise within the surrounding project area is vehicle traffic. Other sources include high winds and human activity, especially at locations like the Crissy Field Marsh Recreational Area and along Baker Street.

Several noise abatement measures were considered as part of the environmental process including alteration of the horizontal and vertical roadway alignment, temporary and permanent noise barriers, building insulation, and temporary relocation of facilities. Abatement measures to be implemented by the project include the relocation of the Crissy Field Center operations from Building 603 during the course of construction and creation and implementation of a Construction Noise Plan which will include noise control measures found in the Caltrans Standard Specifications and Caltrans Standard Special Provisions. The Noise Plan will also include procedures for noise field monitoring of construction impacts, including monitoring for changes in wildlife behavior.

A status update on the sustainability strategies relevant to this sustainability goal has been provided in the table below.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design tunnel surfaces and sections to reduce noise.</td>
<td>Currently being considered</td>
<td>Placement of portions of the roadway within tunnel segments will reduce traffic noise in portions of the Presidio, specifically sensitive areas such as the National Cemetery and Crissy Marsh.</td>
</tr>
<tr>
<td></td>
<td>(Low Priority)</td>
<td></td>
</tr>
<tr>
<td>Use quiet pavement.</td>
<td>Currently being considered (Low Priority)</td>
<td>FHWA has identified three main types of quiet pavement technologies being used in Europe to reduce highway noise: thin-surfaced, negatively textured gap-graded asphalt mixes; single- and double-layer highly porous asphalt mixes; and exposed aggregate concrete pavements. Design and type of roadway surface has yet to be decided.</td>
</tr>
<tr>
<td>Design roadway perimeters and barriers to reduce noise.</td>
<td>Considered but not feasible to implement in a majority of the locations (Low Priority)</td>
<td>Analysis in the final environmental document determined that sound barriers were infeasible except for one location along Armistead at the northern end of the alignment near the Toll Plaza. The Presidio Trust as land managers have indicated that the benefits from building this soundwall would be outweighed by the negative effects on the cultural landscape and therefore a soundwall adjacent Armistead is not included as part of the project.</td>
</tr>
<tr>
<td>Locate solar panels to serve as noise barriers</td>
<td>Considered but not feasible (Low Priority)</td>
<td>It has been determined that no noise barriers will be included with the new facility.</td>
</tr>
<tr>
<td>Use silent pilers by to reduce noise during construction.</td>
<td>To be addressed at a later stage of the development process (Medium Priority)</td>
<td>As an alternative to driven piles, several methods of pile placement are available to the construction contractor that will reduce noise and vibration impacts, including cast in drilled hole (CIDH) pile placement, screw piles or press-in piles. Future vibration testing will assist in determining the appropriate pile placement method.</td>
</tr>
<tr>
<td>Use trees, berms, and green areas as noise barriers.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The new roadway alignment has been designed to include a landscaped medium and landscaped berms between the tunnels to help reduce the noise.</td>
</tr>
<tr>
<td>Document current sound levels and use this as a baseline to reduce noise in future.</td>
<td>Similar measures have been committed to (Low Priority)</td>
<td>Baseline sound levels were documented in the environmental document. The analysis also predicted future sound levels with implementation of the new roadway and determined that no perceptible noise impacts would occur throughout the Presidio with the exception of the residences along Armistead Road and Storey Avenue which would experience a moderate increase in noise levels.</td>
</tr>
</tbody>
</table>
4.6.1.2  Prioritization of Sustainability Strategies
The sustainability goal of minimizing noise in the project area includes one strategy with the potential to be carried forward when considering sustainable alternatives in the construction phase of the project. Several methods of pile placement are available to the construction contractor that will reduce noise and vibration impacts. Using silent pilers have been found to produce 20-30 percent of the noise than traditional pilers. Other pile placement methods to explore include cast in drilled hole (CIDH) pile placement, screw piles or press-in piles.

4.6.1.3  Sustainability Performance
From the information available the project is currently considering doing more than the minimum for reducing noise (scoring 2 out of 5). There are some strategies that are currently being considered which have the potential to improve the sustainability performance of the project in this area e.g. use of quiet pavement. In addition, consideration of the use of silent pilers at a later stage in the project has the potential to improve the sustainability performance of the project.

4.6.1.4  Targets and Monitoring Requirements
As part of the environmental commitments included in the final environmental document, a detailed Construction Noise Plan will be developed for inclusion in construction contract documents. Additionally, the project will adhere to the noise-related specifications found in the Caltrans Standard and Special Specifications. The Construction Noise Plan, developed in concert with the Trust and NPS staff, will include noise field monitoring of construction impacts. Targets will be set as part of the Construction Noise Plan to determine an acceptable noise threshold for the areas adjacent to the construction zone.

4.6.2  Goal: Support Healthy Air Quality

4.6.2.1  Current Status
Healthy air quality measures are supported within the project area by National Park Service (NPS) and Presidio Trust policies. Emphasis of promoting cleaner air quality has been set y a number of Executive and Director’s Orders. Consistent with the NPS Director’s and Executive Orders for promoting cleaner air quality, contractors will implement Bay Area Air Quality Management District (BAAQMD) dust control procedures during construction. Additional PM and NOx emissions reductions are also anticipated as a result of the May 11, 2004 EPA final ruling introducing Tier 4 emission standards (requiring a 90 percent reduction in PM and NOx), applicable to future construction equipment.

In addition to the above commitments as outlined in the final environmental document, the following strategies are also being considered to support healthy air quality objectives in the Sustainability Program.

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use landscape species that absorb air pollutants.</td>
<td>To be considered at a later stage in the development process</td>
<td>Following completion of construction activities, re-vegetation and landscaping, including plant species selection, will be done in accordance with the Presidio</td>
</tr>
</tbody>
</table>
4.6.2.2 Prioritization of Sustainability Strategies
The sustainability goal to support healthy air quality includes two strategies that are to be considered in a later stage of the development process. These include the use of landscape species to absorb air pollutants and limiting idle times for diesel engines. The actual plant species used for the project landscaping will depend on the species included within the VMP palette although it is unlikely that there would be the enough volume of plants to have a significant affect on local air pollutant levels. The strategy for limiting engine idle times should be further considered during the development of the project construction documents.

4.6.2.3 Current Sustainability Performance
From the information available the project is currently considering doing more than the minimum for supporting healthy air quality (scoring 2 out of 5). The project is not currently exceeding regulatory compliance but does have the potential to go beyond what is required by considering the implementation of construction equipment idling restrictions, use of specific landscape species that sequester air pollutants, encouraging or enabling non-vehicular modes of travel, etc. Should the project move forward with some of the strategies that have been highlighted as priorities the performance rating could be improved.

4.6.2.4 Targets and Monitoring Requirements
There are existing regulatory requirements designed to protect air quality which the project has committed to. During construction, the contractor will be required to implement BAAQMD’s basic dust control procedures, and to maintain project construction-related impacts at acceptable levels. In addition, the project will adhere to the Environmental Protection Agency Tier 4 standards. The Tier 4 standards require

<table>
<thead>
<tr>
<th>Priority</th>
<th>Strategy Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>Trust Vegetation Management Plan (VMP). Based on the plants available in the VMP palette, air pollutant absorbing species may be used although it is doubtful that the large volume of plants needed to make a real impact would be incorporated. The type and placement of vegetation will be decided at a later stage in the project development.</td>
</tr>
<tr>
<td>Low</td>
<td>Provide bike lanes and sidewalks / pedestrian paths on local streets.</td>
</tr>
<tr>
<td>Medium</td>
<td>Similar measures have already been committed to</td>
</tr>
<tr>
<td>Low</td>
<td>Limit idle time for diesel engines when not in operation.</td>
</tr>
<tr>
<td>Medium</td>
<td>Similar measures have already been committed to</td>
</tr>
<tr>
<td>Low</td>
<td>Limits on construction vehicle idle time can be incorporated into the project specifications.</td>
</tr>
</tbody>
</table>

Provide bike lanes and sidewalks / pedestrian paths on local streets.

To be considered at a later stage in the development process.
that emissions of PM and Nitrogen Oxides (NOx) be further reduced by about 90 percent. Such emission reductions are to be achieved through the use of control technologies similar to those required by the 2007 to 2010 standards for highway engines.

4.6.3 Goal: Enhance Aesthetics and User Experience

4.6.3.1 Current Status

The existing Doyle Drive is noticeable along Crissy Field and Mason Street because of its elevated position along the bluffs, heavy support columns of the low-viaduct and steel truss sections of the high-viaduct. The steel elements, painted orange, against the light gray color of the concrete columns, stand out against the green-forested background of the Presidio. When viewed from a distance, however, the high-viaduct forms a linear feature visually connecting Doyle Drive to the Golden Gate Bridge.

The new facility is being designed in the parkway concept with the intent to replace Doyle Drive within the context and setting as a unit of the National Park system. The new facility follows the natural contours of the land, includes tunnel segments, landscaped medians, and is sensitive to Park resources. It will place portions of the low-viaduct structure below grade and/or underground, thus removing portions of it from the existing landscape and improve views within the Presidio. It would recreate the bluff north of the Main Post tunnels in order to retain the cultural relationship between the upper and lower portions of the Presidio and maintain the historic landscape. All temporarily affected areas will be restored to their appropriate native vegetation in natural areas, or appropriate ornamental vegetation type in landscaped areas.

Design guidelines for restoration of temporarily affected areas will be developed by the project proponent in conjunction with the Presidio Trust, the National Park Service, Caltrans, and State Office of Historic Preservation. Development of the design guidelines will be a collaborative effort and will incorporate the Secretary of Interior’s Standards for Treatment of Historic Properties with Guidelines for the Treatment of Cultural Landscapes and the Presidio Vegetation Management Plan, ensuring aesthetic compatibility with the Golden Gate Bridge historic district and the Presidio of San Francisco National Historic Landmark District.

In addition to the above, further sustainability strategies under consideration include:

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Allow light through roadway as much as possible, for instance with glass blocks in roadway shoulders.</td>
<td>Not consistent with project objectives (Caltrans design standards) (Low Priority)</td>
<td>Current standard Caltrans design standards do not allow for the use of glass blocks in roadway shoulders.</td>
</tr>
<tr>
<td>Use green (planted) coverings for retaining walls and exposed surfaces.</td>
<td>Currently being considered (Low Priority)</td>
<td>Use of such green (planted) coverings could provide benefits for biodiversity and help reduce heat island effects. This is an area that is currently being explored in the development of the landscape plans and structure design.</td>
</tr>
<tr>
<td>Minimize mass in tunnels</td>
<td>Currently being</td>
<td>Inclusion of natural ventilation via</td>
</tr>
</tbody>
</table>
4.6.3.2 Prioritization of Sustainability Strategies
The sustainability goal of enhancing the aesthetics and user experience within the Presidio includes some strategies that are currently being considered as well as those to be considered at a later stage in the development process.

4.6.3.3 Sustainability Performance
The project is rated as considering doing more than the minimum from the perspective of aesthetics and user experience (scoring 2 out of 5). The overall parkway design of the facility and inclusion of tunnels and landscaped mediums does improve the aesthetics over the existing facility. Should the project move forward with the sustainable strategies of planted wall coverings, natural ventilation for tunnels, public art and anti-graffiti surfaces, the project could move into the area of best practices for this goal and improve the performance rating.

4.6.3.4 Targets and Monitoring Requirements
There are no specific targets or monitoring requirements for the goal enhancing aesthetics and user experience. The overall design aesthetics of the new facility are
being developed in a collaborative effort with all the project partners. The design targets for the new facility will strive to incorporate the facility into the existing cultural landscape and aesthetic setting of the Presidio.

4.6.4  Goal: Minimize Use of Parkland Space

4.6.4.1  Current Status
The new facility for Doyle Drive has been designed to minimize the overall roadway footprint to the greatest extent possible. While improving roadway safety with slightly wider lanes and shoulders, the roadway incorporates the parkway concept with a landscaped median, includes tunnel segments over which parkland can be restored, and accommodates the restoration of the Tennessee Hollow corridor and Crissy Marsh expansion.

An update on the sustainable strategy, designed to minimize the use of parkland space, is detailed below:

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refine balance between width of median and overall width of roadway.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The width of the median varies along the alignment in order to present the least intrusion on the land, preserve resources and at the location of Tennessee Hollow, allow more light to penetrate between the roadway structures.</td>
</tr>
</tbody>
</table>

4.6.4.2  Prioritization of Sustainability Strategies
The sustainability goal of minimizing use of the parkland was a long standing goal of the Doyle Drive project. The new facility has been designed to minimize the overall footprint to the greatest extent possible while maintaining the parkway character and achieving other aesthetic and resource preservation goals. Since this measure has already been committed it is not a priority area for the Sustainability Program moving forward.

4.6.4.3  Sustainability Performance
The current design of the new Doyle Drive facility will increase the roadway right of way by 2.6 hectares (6.4 acres) although some parkland space will be created on the areas over the tunnels. Based on the overall increased footprint as a result of increase in parkland use associated with the project, the sustainability performance in terms of minimizing parkland use is rated as achieving the minimum required (rating 1 out of 5).

4.6.4.4  Targets and Monitoring Requirements
There are no targets or monitoring requirements associated with the sustainability goal of minimizing impact to parkland. The efforts to minimize the use of parkland have been incorporated into the design of the new facility.

4.6.5  Goal: Minimize Impacts of Traffic on Neighborhoods

4.6.5.1  Current Status
The existing Doyle Drive is about 1.5 miles long with six traffic lanes and three San Francisco approach ramps. One approach begins at the intersection of Marina
Boulevard and Lyon Street; a second approach begins at the intersection of Richardson Avenue and Lyon Street; and a third approach is located where Veterans Boulevard (State Route 1) merges into Doyle Drive (about 1 mile west of the Marina Boulevard approach).

Traffic performance along these approaches and neighboring roadways is defined in terms of level of service (LOS). There are six levels of service, ranging from LOS A, the best operating conditions where capacity meets demand, to LOS F, where demand exceeds roadway capacity and thereby resulting in congestion. Congested intersections on Marina Boulevard at Broderick and Divisadero Streets, for example, are currently an LOS F, due to the heavy volumes travelling through these unsignalized intersections.

The traffic analysis shows that the intersections in the study area operate with acceptable level of service except the two unsignalized intersections along Marina Boulevard (Marina Boulevard at Divisadero Street and Marina Boulevard at Broderick Street) and would continue to do so with implementation of the new Doyle Drive. With implementation of the new facility these intersections would continue to experience extensive delays except during the AM and weekend peak periods. A large increase in traffic along Doyle Drive is projected by 2030, as a result of increased traffic demand expected to occur in the non-peak direction although the highway is expected to operate at acceptable levels. All mainline roadways are forecast to operate with acceptable performance except for northbound Richardson Avenue during the PM peak hour.

To improve the level of service and minimize potential traffic impacts on neighborhoods during construction, a formal Transportation Management Plan (TMP) will be developed during final design. The TMP will include strategies to address construction equipment, signage, and general area-wide traffic reduction and management. Measures will include, but are not limited to:

- Encouraging alternatives, such as use of local San Francisco arterial streets (for local San Francisco traffic), shifting travel to other time periods, or use of transit;
- Coordinating an overall trip reduction strategy; and
- Interactive traffic monitoring, as appropriate, would be implemented to determine the best strategies for alleviating possible bottlenecks.

Additional sustainable strategies designed to minimize traffic impacts on neighboring areas under consideration include:

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
</table>

Draft  May 2009
Arup North America Ltd
<table>
<thead>
<tr>
<th>Improve access to and accommodation of public transit.</th>
<th>Similar measures have already been committed to (Low Priority)</th>
<th>The new facility will include extended bus bays on both sides of Richardson Avenue which will accommodate up to four buses each and improved crosswalks to provide safer and enhanced pedestrian circulation in the area. The extended bus bays will keep the buses out of the main flow of traffic during stops, provide safer merging capability for the buses, and will facilitate transfers between Golden Gate Transit, Muni and PresidiGo vehicles.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve pedestrian and bicycle connections on local streets.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>As part of the design of the new facility, there will be improved bicycle and pedestrian movement and safety on the southern end of the alignment. Halleck Street will be reconstructed to include a sidewalk on the west side of the street and the extension of Girard Road will include sidewalks and bike lanes while providing a connection from the Main Post Area to Marina Boulevard and Palace of Fine Arts. In addition, there will be pathways over the tops of the tunnels providing connections between the upper and lower post areas.</td>
</tr>
<tr>
<td>Design to accommodate (or not preclude) potential use of BRT/HOV lanes in the future.</td>
<td>Considered but not feasible (Low Priority)</td>
<td>The design of the new Doyle Drive does not preclude the implementation of BRT/HOV although implementation of such elements would require extensive multi-agency coordination and is beyond the scope of the existing replacement project.</td>
</tr>
<tr>
<td>Develop transportation demand management program (e.g., tolls, carpool lanes).</td>
<td>To be considered at a later stage in the development process (Medium Priority)</td>
<td>Use of some form of transportation demand management programs is under consideration. Decisions about and implementation of any such program would occur at later stages in the project development or after completion of the new facility.</td>
</tr>
<tr>
<td>Maintain existing accesses (e.g. access to recreation, side streets etc). The new roadway will maintain the same access that currently exists and will create a new access to the Presidio with the on and off-ramps to Girard Road.</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>Overall access of the project will be enhanced with maintenance of existing access and the addition of a new access road to the Presidio.</td>
</tr>
<tr>
<td>Use traffic calming</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>The design of the new roadway has</td>
</tr>
</tbody>
</table>
4.6.5.2 Prioritization of Sustainability Strategies

The sustainability goal of minimizing impacts of traffic on neighborhoods is an established part of the Doyle Drive project. Measures to minimize the impact of vehicular traffic on the surrounding streets have been incorporated into the design and planning of the project. These measures include improved access to the Presidio via the on and off-ramps to/from the extension of Girard Road; the increased curvature of the roadway alignment to slow traffic entering the City of San Francisco street grid; improved transit stops and connections along Richardson Avenue; enhanced and safer bicycle and pedestrian access between the Main Post area and Crissy Marsh and Palace of Fine Arts; and the development of a transportation management plan (TMP) to address potential traffic issues during the course of construction. Since a range of measures to achieve this goal have already been committed to this is not a priority area for the Sustainability Program moving forward.

4.6.5.3 Sustainability Performance

The project is currently achieving good practice in terms of minimizing impacts of traffic on neighborhoods (scoring 3 out of 5). While the project is not completely attaining best practices status to minimize traffic impacts, it does go beyond standard regulatory compliance. The design of the new facility includes several measures to help traffic flow while being sensitive to the local neighborhoods. The extended bus bays to be included on Richardson Avenue will help the flow of traffic through this area while providing an easy transit connection point for the local residents and visitors to the Presidio. The new facility will also include direct access to the Presidio from Doyle Drive and eliminate the need to enter the local neighborhoods in order to gain access to the park. Increased curvature of Doyle Drive as it approaches the eastern end of the alignment will work to slow and calm traffic as it enters the local street network. Other measures to assist traffic flow during the construction period will be addressed in the TMP. While not part of the current project, the facility maintains the possibility for inclusion of some form of HOV lanes, tolling or managed lanes. In addition a transportation demand management program (e.g., tolls, carpool lanes) has been highlighted for consideration in the later stages of the development process, and if considered (and implemented, if appropriate) will assist in improving the sustainability performance of the project.

4.6.5.4 Targets and Monitoring Requirements

The project is committed to monitor traffic operations on the local streets and adjust signal timing to optimize traffic operations. The primary elements to minimize traffic
impacts are incorporated into the design of the new facility. Other measures, such as haul routes, detours and public noticing will be incorporated into the TMP.

### 4.7 Other Strategies (Management)

The sustainability strategies categorized as ‘Other’ from Phase I of the Sustainability Program are listed below and an update for each is provided. These strategies mainly fall into the category of ‘Management’, and so this section has been renamed to reflect this.

#### 4.7.1 Current Status on Other Strategies

<table>
<thead>
<tr>
<th>Sustainability Strategy</th>
<th>Current Status</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Design and implement an Environmental Management Plan during both the construction and operational phases</td>
<td>Not considered but has potential (High Priority)</td>
<td>For the construction phase there are multiple documents which refer to mitigation and monitoring measures that are required to be undertaken during construction (see mitigation monitoring plan from EIR). However there is no cohesive document or management system that integrates these requirements and allocates responsibilities to the client and contractor.</td>
</tr>
<tr>
<td>Develop Environmental Management System (accredited to ISO 14001)</td>
<td>Not considered but has potential (High Priority)</td>
<td>As above</td>
</tr>
<tr>
<td>Develop Emergency Response Plan</td>
<td>Similar measures have already been committed to (Low Priority)</td>
<td>Emergency response plans would be developed to handle emergencies during the construction phase and for the long term operation of the tunnels.</td>
</tr>
<tr>
<td>Develop indicators and targets for monitoring performance measurement</td>
<td>Not considered but has potential (High Priority)</td>
<td>There are some monitoring requirements that have already been committed to in order to fulfil permitting or legislative requirements e.g. water monitoring during construction. However, there is no project-wide performance monitoring system in place.</td>
</tr>
<tr>
<td>Seek nomination for “Green Highways Reward” from Green Highways Partnership or similar programs</td>
<td>Not considered but has potential (High Priority)</td>
<td>This has not been considered to date.</td>
</tr>
<tr>
<td>Use construction bidding process with early termination reward</td>
<td>Not considered but has potential (High Priority)</td>
<td>This has not been considered to date.</td>
</tr>
<tr>
<td>Develop plan for communicating and</td>
<td>Similar measures have already been committed to</td>
<td>This is one of the aims of the Sustainability Program.</td>
</tr>
</tbody>
</table>


4.7.1.1 Prioritization of Sustainability Strategies

There are a number of sustainability strategies detailed above that have been highlighted as high priority. These will be addressed within the Outline Implementation Plan where activities and responsibilities associated with moving these strategies forward will be identified.

4.7.1.2 Sustainability Performance

In terms of current performance, the project is currently achieving the minimum (scoring one out of five). A number of strategies have been highlighted for further consideration in the next phase of the Sustainability Program, which could assist in improving the sustainability performance of the project in this area.

4.7.1.3 Targets and Monitoring Requirements

The Outline Implementation Plan will include the development of appropriate sustainability targets to monitor the performance of the project in these areas if required.

5 Summary Of Findings

5.1 Sustainability Performance

For each of the sustainability goals the current performance of the project has been rated between 1 to 5 using the following scale:

1- achieving regulatory compliance or minimum required
2- currently considering doing more than minimum
3- achieving over minimum (i.e. good practice)
4 -considering best practice measures
5- committed to achieving best practice

The sustainability performance of the project has been summarized in the illustration below:
5.2 **Sustainability Priority Areas**

The priority areas that have been identified for the project are generally in the areas of Energy, Materials and Waste and Management (those strategies within the ‘Other’ category).

The strategies listed below have been identified as high priority and will be explored in further detail in the Outline Implementation Plan:

**Energy:**
- Use cool pavement and reflective materials to reduce heat island effect
- Purchase green tags (renewable energy certificates) to offset carbon emissions associated with electricity use
- Evaluate construction emissions standards or require construction equipment to be electric drive or use alternative fuels

**Waste and Materials:**
- Use regionally-sourced materials to minimize energy use associated with transportation
- Maximize use of recycled content in construction materials
- Consider embodied energy emissions in material selection
- Use materials from sources that are rapidly renewable when possible
- Evaluate on life cycle basis materials that use energy or require regular repair, replacement and maintenance
- Apply latest research on the lifecycle costs of different construction materials
- Use paints, solvents and other materials that generate less volatile organic compounds over their lifetime
- Develop construction waste management plan and establish target for diversion from landfill
- Use the material on site as much as possible to reduce off-haul
- Develop plan for on-site reuse of materials

Other Strategies (Management):
- Design and implement an Environmental Management Plan during both the construction and operational phases
- Develop Environmental Management System (accredited to ISO 14001)
- Develop indicators and targets for monitoring performance measurement
- Seek nomination for “Green Highways Reward” from Green Highways Partnership or similar programs
- Use construction bidding process with early termination reward
- Require contractor to have experience in sustainable construction practices

In addition, the strategies listed below have been identified as medium priority and will be followed up at a later stage in the development process.

Water
- Use permeable pavement for shoulders of the road.
- Use permeable paving for surface parking
- Use bio-retention systems for surface parking lots.
- Recycle storm water from roadway for irrigation purposes.
- Use high-efficiency irrigation system.
- Use irrigation system with advanced irrigation controls (e.g., weather-sensitive).
- Use horizontal well system for dewatering.
- Use driven piles (steel or concrete - where appropriate) to minimize groundwater drawdown and contamination.
Energy

- Use solar panels integrated into berms, light posts, sound barriers, and other constructed elements to light tunnels at night
- Use skylights to provide natural daylight to tunnels
- Use solar-powered lighting
- Use high efficiency fixtures for roadway lighting, such as LEDs or high-output fluorescents
- Identify area at higher elevation where water can be pumped efficiently for storage and then gravity-fed for irrigation
- Use high efficiency sump pump for tunnels and seek to minimize areas requiring sump pumps
- Be responsive to congestion to reduce idling

Habitat

- Incorporate landscape species that attract or provide refuge to wildlife
- Use lowest acceptable level of lighting and provide light/glare shields.
- Develop uniform lighting approach that avoids light spots.

Community

- Use silent pilers by to reduce noise during construction.
- Limit idle time for diesel engines when not in operation.
- Identify potential locations for public art.
- Use appropriate coatings in areas susceptible to vandalism, graffiti.
- Develop transportation demand management program

5.3 Next Steps

The next step is to develop an Outline Implementation Plan which will include the sustainability strategies that have been identified as a high priority. This plan will provide details on the activities are required to progress each sustainability strategy, for example, feasibility studies, project team workshops etc. In addition a timeline for implementation will be set out that identifies the activities (and estimated duration of activities) associated with the each strategy. Finally the responsibilities for undertaking the activities will also be provided.

It should be noted that although the Outline Implementation Plan will not address the medium priority strategies specifically, it will set out the process by which they will be taken forward at the relevant stage of the project.
Appendix A

Sustainability Goals and Strategies identified in Phase I of the Sustainability Program
### Sustainability Goals and Strategies

#### Water

**Goal: Minimize storm water runoff**
- Use permeable pavement for shoulders of the road
- Use permeable paving for surface parking
- Restore and stabilize soil (soil amendments) to increase infiltration and subsurface storage
- Map natural flow of water and minimize disruption to natural drainage patterns
- Re-establish historic water flow patterns
- Design tunnels to allow for subsurface water flows to be re-established downstream

**Goal: Improve water quality**
- Use bio-retention, swales and ponding to filter and remove toxins from roadway storm water, particularly first flush
- Consider sending first flush to wastewater treatment facility
- Use bio-retention systems for surface parking lots
- Use wetlands for storm water treatment
- Apply Best Management Practices (BMPs) for highway maintenance activities
- Evaluate response plan for handling spills / accidents and strengthen plan as needed
- Use best practices for erosion and sedimentation management and control
- Develop environmentally-sensitive approach to pest/vegetation management

**Goal: Minimize potable water use**
- Recycle storm water from roadway for irrigation purposes
- Use water from the planned Presidio Grey Water plant for irrigation
- Landscape with drought-resistant, native or adaptive plants (as at Crissy field)
- Use high-efficiency irrigation system
- Use irrigation system with advanced irrigation controls (e.g., weather-sensitive)

#### Energy

**Goal: Maximize energy efficiency**
- Use natural ventilation in tunnels
- Use solar panels integrated into berms, light posts, sound barriers, and other constructed elements to light tunnels at night
- Use skylights to provide natural daylight to tunnels
- Use solar-powered lighting
- Use high efficiency fixtures for roadway lighting, such as LEDs or high-output fluorescents
| **Use day light sensors for lighting of tunnels based on amount of daylight penetration** |
| **Identify area at higher elevation where water can be pumped efficiently for storage and then gravity-fed for irrigation** |
| **Use high efficiency sump pump for tunnels and seek to minimize areas requiring sump pumps** |

**Goal: Reduce heat island effect**
- **Use trees in median with high shading potential**
- **Use cool pavement and reflective materials to reduce heat island effect**
- **Landscape the roofs of tunnels and parking sites (green roofs)**

**Goal: Minimize carbon emissions**
- **Evaluate landscape species based on potential for carbon capture**
- **Purchase green tags (renewable energy certificates) to offset carbon emissions associated with electricity use**
- **Evaluate construction emissions standards or require construction equipment to be electric drive or use alternative fuels**
- **Be responsive to congestion to reduce idling**

**Habitat**
**Goal: Protect existing habitat**
- **Remove trees/vegetation prior to the nesting / breeding season**
- **Remove invasive weed species**

**Goal: Promote creation of new habitat**
- **Participate in restoring and improving habitat, including Crissy Marsh & Tennessee Hollows**
- **Maximize growth of vegetation in Tennessee Hollow by using glass blocks in elevated roadway**
- **Use sand dune and plants below Main Post bluff**

**Goal: Support wildlife corridors**
- **Minimize disruption / segregation of wildlife corridors**
- **Use roof of tunnels and underside of bridges to provide wildlife corridors**
- **Provide wildlife crossings (e.g., bridges, culverts, eco-ducts) and erect barriers to protect wildlife as needed**
- **Incorporate landscape species that attract or provide refuge to wildlife**
- **Create a vegetated berm/buffer or other light shield between the roadway and wildlife habitat**
- **Restrict lighting in areas where it could impact wildlife - design to minimize light spill**

**Goal: Minimize light pollution**
- **Use highly directional roadway lighting to reduce light pollution**
- **Restrict lighting in areas where it could impact biodiversity**
- **Utilize full cutoff fixtures to direct light and reduce light trespass**
- **Install improved reflector systems and vertical lamps to direct light more effectively**
- **Shield upwards-facing light fixtures for dark-sky benefits and utilize 100% of lumens for roadway illumination**
- **Space roadway lighting appropriately with uniform height and suitable pole heights**
| **Use lowest acceptable level of lighting and provide light/glare shields** |
| **Develop uniform lighting approach that avoids light spots** |
| **Screen oncoming headlights** |

### Landscape

**Goal: Foster restoration of native species**

Use a high percentage of California native plants where possible including plants that are native to the Presidio or which are important components of adjacent existing Presidio.

Ensure all plantings will be compatible with Presidio standards and coastal drought resistant plants.

Consider minimal or no use of non-native or turf grass.

Use landscape species appropriate to various ecosystems, microclimate, riparian corridors across the site.

### Materials and Waste

**Goal: Seek local material sources**

Use regionally-sourced materials to minimize energy use associated with transportation.

**Goal: Maximize use of recycled, sustainable materials with low-embodied energy**

Maximize use of recycled content (such as slag, fly ash, foundry sand, concrete/asphalt waste, glass cullet, scrap tires, plastic, etc.) in construction materials (fill, sub-base, drainage, concrete aggregate, etc.).

Consider embodied energy emissions in material selection.

Use materials from sources that are rapidly renewable when possible.

**Goal: Apply life-cycle approach to material selection**

Design structure for long life time.

Use energy efficient mechanical ventilation systems that minimize lifetime energy use (if natural ventilation is not feasible).

Evaluate on life cycle basis materials that use energy or require regular repair, replacement and maintenance.

Apply latest research on the lifecycle costs of different construction materials.

Use paints, solvents and other materials that generate less volatile organic compounds over their lifetime.

**Goal: Maximize recycling and reuse of construction waste**

Develop construction waste management plan and establish target for diversion from landfill.

Use the material on site as much as possible to reduce off-haul.

Shred/chip non-invasive vegetation that is removed as part of construction and use on site for mulch.

Develop plan for on-site reuse of materials.

### Community

**Goal: Minimize noise**

Design tunnel surfaces and sections to reduce noise.

Use quiet pavement.
Design roadway perimeters and barriers to reduce noise

Locate solar panels to serve as noise barriers

Use silent pilers by to reduce noise during construction

Use trees, berms, and green areas as noise barriers

Document current sound levels and use this as a baseline to reduce noise in future

**Goal: Support healthy air quality**

Use landscape species that absorb air pollutants

Provide bike lanes and sidewalks / pedestrian paths on local streets

Limit idle time for diesel engines when not in operation

**Goal: Enhance aesthetics and user experience**

Allow light through roadway as much as possible, for instance with glass blocks in roadway shoulders

Use green (planted) coverings for retaining walls and exposed surfaces

Minimize mass in tunnels so structure exudes feeling of lightness

Maintain low growing vegetation or line up trees to retain desirable views

Identify potential locations for public art

Use appropriate coatings in areas susceptible to vandalism, graffiti

**Goal: Minimize use of parkland acreage**

Refine balance between width of median and overall width of roadway

**Goal: Minimize impacts of traffic on neighborhoods**

Improve access to and accommodation of public transit

Improve pedestrian and bicycle connections on local streets

Design to accommodate (or not preclude) potential use of BRT/HOV lanes in the future

Develop transportation demand management program (e.g., tolls, carpool lanes)

Maintain existing accesses (e.g. access to recreation, side streets etc)

Use traffic calming measures

Use video monitoring of entire roadway to speed emergency response and reduce cost

Minimize disruption to neighborhoods from 18 wheelers accessing site

**Other Strategies**

Design and implement an Environmental Management Plan during both the construction and operational phases

Develop Environmental Management System (accredited to ISO 14001)

Develop Emergency Response Plan

Develop indicators and targets for monitoring performance measurement

Seek nomination for “Green Highways Reward” from Green Highways Partnership or similar programs
<table>
<thead>
<tr>
<th>Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use construction bidding process with early termination reward</td>
</tr>
<tr>
<td>Develop plan for communicating and encouraging sustainable practices from</td>
</tr>
<tr>
<td>design team and contractor</td>
</tr>
<tr>
<td>Require contractor to have experience in sustainable construction practices</td>
</tr>
</tbody>
</table>
Appendix B

Best Management Practices to Consider
## Construction Site Best Management Practices (BMPs) Consideration Checklist

The following list of BMPs are those measures that should be considered for every project. The list of BMPs comes for the California Storm Water Quality Handbook – Construction (January 2003).

<table>
<thead>
<tr>
<th>Erosion Control BMPs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>BMP No.</strong></td>
<td><strong>BMP</strong></td>
</tr>
<tr>
<td>EC-1</td>
<td>Scheduling</td>
</tr>
<tr>
<td>EC-2</td>
<td>Preservation of Existing Vegetation</td>
</tr>
<tr>
<td>EC-3</td>
<td>Hydraulic Mulch</td>
</tr>
<tr>
<td>EC-4</td>
<td>Hydroseeding</td>
</tr>
<tr>
<td>EC-5</td>
<td>Soil Binders</td>
</tr>
<tr>
<td>EC-6</td>
<td>Straw Mulch</td>
</tr>
<tr>
<td>EC-7</td>
<td>Geotextiles and Mats</td>
</tr>
<tr>
<td>EC-8</td>
<td>Wood Mulching</td>
</tr>
<tr>
<td>EC-9</td>
<td>Earth Dikes and Drainage Swales</td>
</tr>
<tr>
<td>EC-10</td>
<td>Velocity Dissipation</td>
</tr>
<tr>
<td>EC-11</td>
<td>Slope Drains</td>
</tr>
<tr>
<td>EC-12</td>
<td>Streambank Stabilization</td>
</tr>
<tr>
<td>EC-13</td>
<td>Polyacrylamide</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sediment Control BMPs</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SE-1</strong></td>
<td>Silt Fence</td>
</tr>
<tr>
<td><strong>SE-2</strong></td>
<td>Sediment Basin</td>
</tr>
<tr>
<td><strong>SE-3</strong></td>
<td>Sediment Trap</td>
</tr>
<tr>
<td><strong>SE-4</strong></td>
<td>Check Dam</td>
</tr>
<tr>
<td><strong>SE-5</strong></td>
<td>Fiber Rolls</td>
</tr>
<tr>
<td><strong>SE-6</strong></td>
<td>Gravel Bag Berm</td>
</tr>
<tr>
<td><strong>SE-7</strong></td>
<td>Street Sweeping and Vacuuming</td>
</tr>
<tr>
<td><strong>SE-8</strong></td>
<td>Sand Bag Barrier</td>
</tr>
<tr>
<td><strong>SE-9</strong></td>
<td>Straw Bale Barrier</td>
</tr>
<tr>
<td><strong>SE-10</strong></td>
<td>Storm Drain Inlet Protection</td>
</tr>
<tr>
<td>Category</td>
<td>BMPs</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>SE-11 Chemical Treatment</td>
<td></td>
</tr>
<tr>
<td><strong>Wind Erosion Control BMPs</strong></td>
<td>WE-1 Wind Erosion Control</td>
</tr>
<tr>
<td><strong>Tracking Control BMPs</strong></td>
<td>TR-1 Stabilized Construction Entrance/Exit</td>
</tr>
<tr>
<td></td>
<td>TR-2 Stabilized Construction Roadway</td>
</tr>
<tr>
<td></td>
<td>TR-3 Entrance/Outlet Tire Wash</td>
</tr>
<tr>
<td><strong>Non-Storm Water Management BMPs</strong></td>
<td>NS-1 Water Conservation Practices</td>
</tr>
<tr>
<td></td>
<td>NS-2 Dewatering Operations</td>
</tr>
<tr>
<td></td>
<td>NS-3 Paving and Grinding Operations</td>
</tr>
<tr>
<td></td>
<td>NS-4 Temporary Stream Crossing</td>
</tr>
<tr>
<td></td>
<td>NS-5 Clear Water Diversion</td>
</tr>
<tr>
<td></td>
<td>NS-6 Illicit Connection/Discharge</td>
</tr>
<tr>
<td></td>
<td>NS-7 Potable Water/Irrigation</td>
</tr>
<tr>
<td></td>
<td>NS-8 Vehicle and Equipment Cleaning</td>
</tr>
<tr>
<td></td>
<td>NS-9 Vehicle and Equipment Fueling</td>
</tr>
<tr>
<td></td>
<td>NS-10 Vehicle and Equipment Maintenance</td>
</tr>
<tr>
<td></td>
<td>NS-11 Pile Driving Operations</td>
</tr>
<tr>
<td></td>
<td>NS-12 Concrete Curing</td>
</tr>
<tr>
<td></td>
<td>NS-13 Concrete Finishing</td>
</tr>
<tr>
<td></td>
<td>NS-14 Material and Equipment Use Over Water</td>
</tr>
<tr>
<td></td>
<td>NS-15 Demolition Adjacent to Water</td>
</tr>
<tr>
<td></td>
<td>NS-16 Temporary Batch Plants</td>
</tr>
<tr>
<td><strong>Waste Management and Materials Pollution Control BMPs</strong></td>
<td>WM-1 Material Delivery and Storage</td>
</tr>
<tr>
<td></td>
<td>WM-2 Material Use</td>
</tr>
<tr>
<td></td>
<td>WM-3 Stockpile Management</td>
</tr>
<tr>
<td></td>
<td>WM-4 Spill Prevention and Control</td>
</tr>
<tr>
<td></td>
<td>WM-5 Solid Waste Management</td>
</tr>
<tr>
<td></td>
<td>WM-6 Hazardous Waste Management</td>
</tr>
<tr>
<td></td>
<td>WM-7 Contaminated Soil Management</td>
</tr>
<tr>
<td></td>
<td>Waste Management</td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>WM-8</td>
<td>Concrete Waste Management</td>
</tr>
<tr>
<td>WM-9</td>
<td>Sanitary/Septic Waste Management</td>
</tr>
<tr>
<td>WM-10</td>
<td>Liquid Waste Management</td>
</tr>
</tbody>
</table>