

## CHAPTER 7

### Mitigation and Permitting

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## **CHAPTER 7 MITIGATION AND PERMITTING**

### **7.1 INTRODUCTION**

Practicable efforts have been made in the planning process to avoid impacts to the human and natural environments. When impacts are unavoidable, steps would be taken to minimize impacts and mitigate for impacts, as required under NEPA, FHWA, and TxDOT guidelines. According to the CEQ regulations (40 CFR 1508.20), mitigation efforts may be defined as:

- Avoiding an impact altogether
- Minimizing the impact
- Limiting the degree or magnitude of the action
- Rectifying the impact
- Repairing, rehabilitating, restoring the resource
- Reducing or eliminating the impact over time
- Preservation and maintenance activities
- Compensating for the impact
- Replacing or providing substitutes to the impacts resource

Every effort has been made in the selection of alternatives and the identification of the Preferred Alternative to avoid or minimize adverse effects. Where impacts to resources require coordination and permitting, required processes would be followed with the appropriate agency with resource jurisdiction.

#### **7.1.1 Land Use**

The proposed roadway would have controlled access and no frontage roads, except where required along FM 1485, to minimize adjacent development and sprawl. Grade separations would be provided for all major arterial roadways that cross each Build Alternative to avoid termination of through-lanes. Final ROW determinations would be evaluated during the final design phase. No mitigation is proposed for changes in land use associated with indirect or cumulative changes to land uses associated with the proposed project.

## **7.2 SOCIAL IMPACTS**

### **7.2.1 Community Cohesion and Quality of Life**

Efforts have been made in the planning stages to avoid or minimize adverse effects to sensitive resources, including farmlands, community cohesion and quality of life standards. Grade separations would be incorporated into the design of the selected Preferred Alternative, allowing for adequate movement of school buses and emergency vehicles across the proposed facility. Where possible, the Preferred Alternative alignment would be placed along and close to existing property lines to minimize the splitting or fragmentation of farms. Bisection of farms would convert existing farmland or prime farmland soils to transportation land use. Existing roads used for property access that may be split by the Preferred Alternative would be re-aligned in accordance with TxDOT policies to accommodate the property owner's access needs. Furthermore, public meetings have been held, and additional public meetings would be held, as needed, during the environmental process to discuss specific community and landowner concerns prior to construction of the Preferred Alternative.

### **7.2.2 Relocation**

TxDOT offers relocation counseling and financial assistance to residents and business owners that are displaced by the acquisition of highway ROW in accordance with the Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970. Once it has been determined that a structure must be acquired in order to construct the highway, the property owner and/or tenant is contacted by a relocation counselor who provides information on exactly what benefits for which the owner/tenant is eligible and who assists the owner/tenant in applying for those benefits. In general, the relocation counselor would provide listings of comparable housing, transportation to inspect the housing (especially for elderly and handicapped persons), and referrals to other agencies that provide assistance for relocated persons.

Properties presented as comparable would be of similar size in terms of number of rooms, living space, location, and square footage. The properties would be available for purchase and within the financial means of the relocatee. The replacement housing must meet all minimum standards established by FHWA and TxDOT (decent, safe, and sanitary) and conform to all local building codes.

In the case of the Segments H and I-1 study area, property values are rising rapidly. Newly constructed

housing in the area is considerably more expensive than the assessed valuations of the older housing stock. Market values for older housing stock in the Houston Realtors Association Combined Listings are also higher than the assessed valuations for these properties. Depending on the difference in prices of properties that are comparable in all other criteria, financial assistance in the form of a purchase supplement, rental assistance payments, or a mortgage down payment may be offered to the relocatee. In any case, a potentially displaced person would not be required to move until comparable replacement dwellings are presented.

In addition to residential relocation assistance, TxDOT also provides assistance to businesses, farms, and nonprofit organizations required to relocate. These benefits may be in the form of reimbursements for reasonable moving expenses and reestablishment expenses.

### **7.2.3 Environmental Justice**

EO 12898 was intended to ensure that federal departments and agencies identify and address disproportionately high and adverse human health and environmental effects of their policies, programs, and activities on minority populations and low-income populations. It reinforced Title VI of the Civil Rights Act of 1964. It reminded all government agencies receiving federal funding that they are required to address discrimination as well as the consequences of their decisions or actions that might result in disproportionately high and adverse environmental and health impacts on minority and low-income communities.

Subsequent to EO 12898, USDOT Order 5610.2 was published in the *Federal Register* in 1997. It describes the process for incorporating environmental justice principles into all Department of Transportation programs, policies, and activities. The following year, FHWA Order 6640.23 was issued, establishing policies and procedures for FHWA to use in complying with EO 12898 and US DOT Order 5610.2.

Alternative 10 is comprised of 107 census blocks; 5 of the 107 census blocks (4.67%) contain a significant minority population (i.e. minority populations exceed 50% of the census block). Therefore, the Recommended Alternative associated with the proposed Grand Parkway Segments H and I-1 project would not result in disproportionately high and adverse effects on minority and low-income populations;

therefore, according to EO 12898 regulation, mitigation associated with environmental justice is not currently proposed. The construction of the Preferred Alternative would provide an evacuation route, from which all users, including environmental justice populations, would benefit in terms of waived tolls during times of evacuation.

#### **7.2.4 Limited English Proficiency (LEP)**

There would be no potential within the Segments H and I-1 project areas (associated with any of the Build Alternatives) for impacts to substantial populations of persons with LEP; therefore, no mitigation related to LEP is proposed.

#### **7.2.5 Economic Impacts**

Economic impacts related to the proposed project are considered to be beneficial to the local and regional economies as presented in **Chapter 3 (Affected Environment)** and **Chapter 5 (Indirect Impacts)**. Therefore, no mitigation would be necessary.

### **7.3 PEDESTRIANS AND BICYCLISTS**

Pedestrians and bicyclists could benefit from the development of residential and commercial streets, in conjunction with this project due to the increased availability of community resources such as shopping. This benefit would only be realized if pedestrian walkways and bicycle facilities are incorporated into transportation plans within the study area. The proposed project would minimize adverse effects to bicyclists and pedestrians by providing crosswalks, walk signals, and appropriate signage at-grade separated intersections (entrance/exit ramp access points). Additionally, the proposed project would decrease congestion on numerous local roads and highways, thereby improving safety for both bicyclists and pedestrians within the study area.

### **7.4 SOILS AND FARMLANDS**

#### **7.4.1 Soils**

Potential impacts presented in **Chapter 4 (Environmental Consequences)** were calculated for the entire proposed ROWs. The actual acreage of proposed impacts would be less since vegetation within the ROW would remain in place to the extent feasible and practicable in order to minimize impacts to soils and reduce erosion. The use of silt fences and other erosion control measures during construction would prevent erosion of native soils and reduce the runoff of soil particles into area streams. Furthermore,

implementing revegetation of native species along constructed corridors would help prevent future erosion after construction and thereby increase the success rate of any and all revegetation.

To the maximum extent possible and where required, material excavated from the road cuts would be used as fill material. If suitable soils are not found within the ROW, they would be obtained from other sites within a reasonable haul distance of the project. Detailed investigation of soils for construction would be conducted during final design of the Preferred Alternative.

Soil erosion and sedimentation would be minimized by the use, where practicable and feasible, of a combination of any of the following generally recommended methods. Other best management practices not specifically identified below may be appropriate to address unanticipated site conditions:

1. Limit the surface area of unprotected, erodible soil exposed to erosion at any one time during construction activities. Stage clearing of vegetation as needed to keep pace with construction, rather than clearing far in advance.
2. Upgrade unstable ground underlying the proposed action by means of various engineering activities: the addition of extra sub-base materials to buffer the paved roadway from effects of shrinking and swelling ground, lime-stabilization, and avoidance of cut or fill slopes greater than ten degrees. Where such slopes are unavoidable, other means of protection may be required such as geotechnical fabrics, reduction of top-slope loads, and/or shoring of the toe of the slopes.
3. Revegetate disturbed areas as soon as possible using nature's seasonal cycles to an advantage.
4. Use native plant species, particularly long-lived, rapid growing species requiring a minimum of maintenance. An excellent grass mixture consists of little bluestem, hairy grama, sideoats grama, and various annual wildflowers. Weedy species, such as King Ranch bluestem, should not be used as they become invasive to natural areas outside the ROW.
5. Limit duration of exposure of soils to erosion to the shortest possible time.
6. Stage mulching and seeding to closely follow the progression of construction operations, particularly on high cuts and fills.
7. Protect native vegetative cover (where active construction is not required) from equipment traffic and personnel parking. Natural vegetative areas not destined for active construction should be clearly marked as equipment-free areas. All construction personnel should be clearly instructed in the identification and restricted use of equipment-free areas.

8. Coordinate construction activities to provide the least interference with agricultural operations.
9. Reduce the volume and velocity of construction runoff.
10. Utilize temporary measures such as berms, dikes, dams, sediment basins, and slope drains to control surface drainage.
11. Construct earth or brush berms along the top and/or bottom edges of embankments to intercept runoff during construction.
12. Utilize temporary slope drains to carry runoff from cuts and embankments to the bottom of slopes.
13. Complete permanent drains and slope protection at the earliest practical time.
14. Stabilize permanent soil berms by placing rock rubble on the downslope side, further reducing loss of soil moisture.
15. Mulch and/or chipped vegetation may be used to reduce soil erosion on slopes, newly constructed embankments, and revegetated areas.

Temporary and permanent erosion control measures would be coordinated to ensure the best possible control during the construction and post-construction period. Permanent erosion control features would be installed at the earliest practicable time.

#### **7.4.2 Farmlands**

All reasonable alternatives cross soils and geology similar in nature, including some portions of prime farmland soils. While these impacts (i.e., removal of topsoil, compaction, and removal of vegetation) do cause temporary to permanent loss to these resources, they are considered minor as rated and scored by on NRCS Form CPA-106. Therefore, mitigation measures for permanent loss of farmlands are not required. Mitigation measures to be implemented during and after construction for temporary soils impacts, including erosion control measures, are considered prudent and positive in helping to restore a portion of these same resources. As noted in **Section 7.2.2 Relocation**, TxDOT also provides assistance to businesses and farms.

### **7.5 AIR QUALITY**

The proposed project is located within Montgomery, Harris, Liberty, and Chambers counties, which are within the Houston area's financially constrained 2035 RTP and fiscal year 2008-2011 TIP adopted by the H-GAC on August 24, 2007 and found to conform to the SIP by FHWA/FTA on November 9, 2007.



The proposed Transportation Control Measures (TCMs) in the vicinity of this project, included in H-GAC's 2035 RTP, that are anticipated to have an effect on the LOM are:

- Liberty County Park and Ride Facility located southwest of Dayton along US 90 (*Project ID 4071*);
- Construct Grade Separation on US 90 at UPRR in Dayton (*Project ID 9709*);
- Construct Railroad Grade Separation Structure and Approaches on FM 2100 at SPRR in Crosby (*Project ID 6095*); and,
- Install CMTS-including surveillance system, communication system, satellite computer facility, and monitoring control on US 90 from IH 10 to Liberty County Line (*Project ID 1102*).

A list of projects in the Grand Parkway Segments H and I-1 traffic study area is included in the 2035 RTP. These include projects that are currently LET (under contract), in the TIP (Years 2008 – 2011), short-range program (Years 2012 – 2017), and the long range plan (Years 2018 – 2035).

During the construction phase of the project, temporary impacts on air quality include additional dust generated from construction activities. Efforts would be made to mitigate for temporary air quality impacts during construction, including minimizing or eliminating unnecessary idling of construction vehicles and employing a combination of watering, chemical stabilization, and vehicle speed reduction techniques.

## **7.6 NOISE**

A detailed traffic noise analysis, including associated noise abatement measures for the Preferred Alternative, would be included in the FEIS. Noise associated with the construction of the project is difficult to predict. Heavy machinery (a major source of noise in construction) is constantly moving in unpredictable patterns. Provisions would be included in the plans and specifications that require the contractor to make every reasonable effort to minimize construction noise where warranted, through abatement measures such as work-hour controls and proper maintenance of muffler systems.

## **7.7 WATER QUALITY**

### **7.7.1 Surface Water Quality Mitigation**

Long-term operation of the facility would likely produce changes in the quantity and quality of the runoff from the paved roadway. Grass swales have been shown to be an effective and low-maintenance

mitigation measure to cleanse highway runoff. In combination with storm water management ponds, the grass swales would collect and treat the runoff from the highway. Therefore, grass-lined swales and storm water management ponds would be used to minimize the adverse effect of highway runoff to surface water quality.

Since the project would impact greater than five acres, an NOI would be prepared and filed with the TCEQ and EPA (40 CFR 122) prior to the issuance of a TPDES construction storm water discharge permit as per Section 402 of the CWA. The TPDES permit requires completion of a SWPPP in order to avoid adverse impacts potentially resulting from construction storm water runoff discharges. TxDOT has its own storm water management guidelines and BMPs for construction activities that would be used in the development of the SWPPP. The project SWPPP would be prepared pursuant to the TxDOT manual, *Storm Water Management Guidelines for Construction Activities* (TxDOT, 2000). A SWPPP would be prepared prior to construction and followed throughout the construction phases to minimize the discharge of sediment laden storm water to the Grand Parkway Segments H and I-1 study area streams. The SWPPP may include, but is not limited to the use of, silt fences, inlet protection barriers, hay bales, and seeding or sodding of integrity. As part of the SWPPP, TxDOT staff or a designee would be required to inspect both stabilized and unstable areas of the construction site for evidence of, or the potential for, pollutants entering waters of the U.S. via storm water runoff through a drainage system. Summary reports of these inspections would be written and retained as part of the SWPPP. Once construction has been completed and the disturbed areas achieve 70% stabilizing vegetative cover, a Notice of Termination would be filed per permit requirements. No other point source discharges that may require additional authorizations under Section 402 of the CWA are anticipated at this time.

Mitigation for impacts listed previously would incorporate the following BMPs at appropriate stages during construction. To the extent feasible, temporary erosion control measures would be installed prior to ground disturbing activities and maintained regularly throughout the various phases of construction. The erosion control plan would be phased to coincide with construction activities to ensure maximum protection throughout the construction process. At the completion of construction, the TxDOT specifications, *Seeding for Erosion Control* would be followed to restore and reseed all disturbed areas. For erosion control, sod would be utilized and remain in place until the area has been stabilized. For sedimentation, a combination of silt fencing and hay bale dikes would be utilized and would remain in place until project completion. The

existing ditches would be used for retention storage during construction. For post-construction BMPs, a combination of retention and vegetative filter strips would be utilized to control total suspended solids after construction. Vegetation within the existing ditches would be reestablished after construction and would act as vegetative filter strips. Other areas of ROW would be seeded with native species of grasses, shrubs, or trees as needed.

### **7.7.2 Groundwater Mitigation**

Avoidance and minimization of impacts to the public and private water supply wells would be performed during preliminary and final design of the project. Measures would include minor alignment shifts to minimize the impact to source water protection areas and/or avoid direct impacts to the public and private water supply wells. Any water supply wells affected by construction would be mitigated using measures such as providing a new well or connection to the public water system, if feasible. Wells taken out of service would be sealed in accordance with the specifications outlined by the Water Well Drillers Advisory Council (TDLR, 2007).

A storm water management plan would be developed according to FHWA and TxDOT criteria to reduce the risk of contaminating local aquifers. The storm water management basins would collect and control spills of hazardous materials, sediments, and others particulates found in highway runoff. The use of established BMPs would be employed to prevent highway storm water runoff from entering the aquifer at wellheads.

An emergency spill control pollution prevention plan would be developed and coordinated with local officials for the selected alternative. Special storm water management measures would be designed to isolate potentially hazardous spills, for treatment and removal, before entering an aquifer. The BMPs listed in the previous section would be considered and incorporated into the plans during the preliminary and final design of the project.

## **7.8 WETLANDS AND VEGETATIVE COMMUNITIES**

### **7.8.1 Waters of the U.S., Including Wetlands Permitting/Regulation**

Implementation of any of the Build Alternatives would require a Section 404 permit, Section 401 water quality certification, and an appropriate mitigation plan. The proposed project would also require a TPDES construction storm water discharge permit and completion of a SWPPP and NOI.

Impacts to jurisdictional waters of the U.S., including wetlands, associated with construction of Segments H and I-1 appear unavoidable with each of the Build Alternatives. Each of the alternatives would result in some level of impact to waters of the U.S. (refer to **Chapter 4, Section 4.8** for discussion and locations of potential adverse impacts).

Currently, the USACE Galveston District provides jurisdictional determination guidance on whether an area is adjacent or isolated in the context of the USACE Regulatory Program. The USACE Galveston District interprets “isolated waters” to be any waterbody not located within the 100-year floodplain or otherwise connected to the surface tributary system, surface water connections, continuous wetland system, ditch, or water course that carries water from a waterbody to navigable waters, or waters that are part of a surface tributary system during normal expected flows. Based on this approach, the USACE Galveston District would make permit decisions on direct impacts to jurisdictional wetlands based on their Section 404 authority, the regulatory definitions of a wetland, with consideration given to indirect impacts, and to other natural resources.

A Section 404 permit application may be submitted to the USACE with the FEIS or the ROD for this project. The application and mitigation plan would take into account recommendations and suggestions made during the agency coordination meetings. Prior to issuance of the FEIS and Section 404 permit, all practicable measures would be taken to avoid and minimize wetland and waterbody impacts as appropriate. Those impacts that cannot be avoided or further minimized would be appropriately mitigated per coordination with the USACE and other appropriate state and federal agencies and in accordance with the Section 404 permit requirements. Please refer to **Section 7.8.3 (Waters of the U.S., Including Wetlands)** for preliminary wetland mitigation recommendations.

Water quality certification from the TCEQ would also be necessary prior to filling wetlands. The USACE would initiate the Water Quality Certification for permit applicants. However, applicants may negotiate directly with the TCEQ staff to address issues regarding Section 401 Water Quality Certification. A CWA Section 404 permit that disturbs more than three acres of Waters of the U.S. is subject to individual review by the TCEQ as Tier II project impacts.

### **7.8.2 Navigable Waters of the U.S.**

No navigable waters of the U.S. occur within the Grand Parkway Segments H and I-1 study area. Therefore, neither a Section 9 permit from the USCG nor a Section 10 permit from the USACE would be required.

### **7.8.3 Waters of the U.S., Including Wetlands Mitigation**

Every effort has been made to avoid and minimize wetland impacts, both adjacent and isolated, to the extent practicable during the planning process. This effort would continue up to construction of the proposed Grand Parkway Segments H and I-1. Avoidance measures would also likely include spanning major drainages along the selected Preferred Alternative.

Preliminary mitigation options include on-site mitigation and off-site mitigation. On-site mitigation (i.e., immediately adjacent to the new highway) may include creation or enhancement of wetlands within the final Grand Parkway Segments H and I-1 ROW, which would primarily involve development of shallow forested wetlands very similar in function and value to the forested wetlands impacted during roadway construction.

Please note that on-site mitigation is being considered only as an option at this time. On-site mitigation for highway projects may not be considered adequate for replacement of all lost wetland functions and values. On-site mitigation would not be considered as the only source of wetland mitigation for impacts associated with this project. On-site mitigation may be considered as a supplement to additional off-site mitigation. Further coordination with USFWS, TPWD, and the USACE may completely discard the use of on-site mitigation as an option for this project, especially in light of better off-site mitigation options that adequately compensate for impacts to wetland functions and values.

Off-site mitigation projects for wetlands must be designed to reestablish, to the extent reasonable, similar wetland functions, values, and types as the pre-existing site. Off-site mitigation would be conducted in the same geographic vicinity or in proximity, and most likely within the same watershed as the project, particularly for wetlands. Wetland mitigation may include expanding existing wetlands, restoration with hydrophytic species, or regulating water levels in impoundments or streams.

Natural resource agencies (including TPWD, USFWS, USACE, EPA, and TCEQ) would be involved in decisions regarding appropriate mitigation ratios and the location, size, and character of the mitigation. A compensatory mitigation plan would be submitted to the USACE as part of the Section 404 permit review process. The mitigation plan would include a discussion of the avoidance and minimization measures used in the routing and design of the roadway. In addition, the plan would include specifications for accomplishing the proposed compensatory mitigation measures. It is anticipated that a monitoring program would be included in the mitigation plan to ensure the successful implementation of the compensatory mitigation measures. The approved mitigation plan would be a condition of the USACE Section 404 permit for the Grand Parkway Segments H and I-1 project. The approved mitigation plan would provide a detailed discussion of mitigation commitments, including those that must be implemented during construction. Mitigation measures for site-specific activities would be identified, to the extent practicable, throughout project development as additional information becomes available.

A search for previously permitted potential mitigation sites was conducted in June and July 2007, at the USACE Galveston District Headquarters located in Galveston, Texas. This search was conducted to both identify any potential impacts to existing mitigation sites along the project corridor and to determine which, if any, mitigation sites may be appropriate for use with this proposed project. The search involved designating seven points along the Grand Parkway Segments H and I-1 study area. Once these points were designated and the GPS coordinates were determined, the coordinates were entered into Terra Term USACE software, with a 5-mi radii search constraint. Terra Term compiled lists for each search that included any incident or permit that involved a documented USACE action within the radii. The combined area of these searches encompassed the entire Grand Parkway Segments H and I-1 study area.

During the file search for appropriate mitigation sites, the USACE actions found within the study area were designated as either: individual permits, nationwide permits, general permits, or investigations. The investigations were disregarded since no mitigation would have been associated with those actions. The remaining actions were researched in the file room located at the USACE Galveston District Headquarters. These files were either original hard copies or archived microfiche.

The USACE file review determined that no mitigation sites are located along any of the proposed Build Alternatives. The majority of mitigation that occurred in the study area was done with the following mitigation banks, which are all outside the proposed ROW for any of the Build Alternatives:

- Greens Bayou Wetland Mitigation Bank
- Trinity River Habitat Fund
- Blue Elbow Mitigation Site

Overall wetland impacts ranged from 246.53 ac (Alternative 4) to 431.35 ac (Alternative 8). Alternative 4 was determined to have the least amount of overall impacts; as well as the least amount of forested (2.79 ac) and non-forested adjacent (9.31 ac) wetlands. Alternatives 2 and 7 would have the least amount of agricultural adjacent (113.53 ac) wetlands. Alternative 8 was determined to have the highest amount of overall impacts, as well as the highest amount of non-forested adjacent (38.39) wetlands. Alternatives 6 and 7 would have the highest amount of agricultural adjacent (201.10 ac) wetlands. Wetland impacts would be mitigated at a ratio determined by the quality of wetlands to be impacted. The USACE would make the final determination of mitigation required for the proposed project, once a Preferred Alternative is selected. In summary, several viable wetland mitigation alternatives would be investigated and evaluated in the mitigation plan. Of the mitigation banks found in the USACE search, only the Blue Elbow Mitigation Site would be appropriate for the proposed project, due to ownership and previous credit commitments issues with the other two banks. However, additional mitigation banks may be considered for the proposed project. The technical and regulatory merit of these mitigation recommendations would be evaluated and further discussed with resource agency staff and ultimately presented to the public throughout development of the FEIS and prior to issuance of a ROD. Additionally, a conceptual mitigation plan would be developed for wetland and stream impacts associated with the Preferred Alternative and included as a part of the FEIS.

#### **7.8.4 Habitat Mitigation - Regulatory**

Mitigation includes measures which avoid, minimize, and/or compensate for unavoidable losses to resources that cannot be further minimized. The assessment of mitigation measures (avoidance, minimization, and compensation) is an integral part of the NEPA process. The preferred means of mitigation is avoidance, which is inherent in impact evaluation analysis and alternative development/assessment. For those adverse impacts that cannot be avoided, other mitigation efforts must be considered. These efforts include minimization of potentially adverse impacts and compensation for those remaining adverse impacts that cannot be further reduced.

Initial mitigation measures in the planning or alignment of highway projects minimize the probable occurrence of habitat (vegetation communities) and wetland impacts (both adjacent and isolated) through route location (avoidance) and construction practices. Activities to minimize the impacts to habitats from highway construction include: minimizing disturbance of vegetation within the construction areas wherever safety allows, decreasing the amount of fill placement, and implementation of BMPs, including an erosion and sedimentation control plan. Specific impact minimization to wetland areas may include: the roadway design (use of bridge crossings instead of filling embankment); the use of retention basins and revegetated swales to minimize runoff, sedimentation, turbidity, leaching of soil nutrients, and leaching of chemicals from petroleum products, pavement, and waste material; and maintaining flow patterns to ensure wetland hydrology in spite of roadway design requirements.

The fact that some degree of impact is often unavoidable, regardless of the care applied during the planning, design, and construction of a highway, requires a plan for compensatory mitigation to replace functions, values, and features or habitat that may be disturbed. On occasion, on-site restoration of degraded wetland habitat or creation of wetland habitat within the highway ROW through creative use of detention basins, borrow pit areas, or drainage runoff channels may be appropriate. Where such measures may not effectively restore resource functions and values, off-site mitigation measures may be considered.

#### **7.8.5 Habitat Mitigation – Non-Regulatory**

Non-regulated, non-wetland resources (e.g., remnant prairie topography, riparian habitat, etc.) identified as environmentally sensitive, socially desirable, or ecologically valuable have been avoided to the extent practicable. Non-regulated resources are often included as part of a wetland mitigation plan, on a case-by-case basis.

In accordance with Provision (4) (A) (ii) of TxDOT's MOU with TPWD signed in 1998 and at the TxDOT district's discretion, habitats given consideration for non-regulatory mitigation during project planning include:

1. Habitat for federal candidate species (impacted by the project) if mitigation would assist in the prevention of the listing of the species.
2. Rare vegetation series (S1, S2, or S3 TPWD designations) that also locally provide habitat for a state-listed species.



3. All vegetation communities listed as S1 or S2, regardless of whether or not the series in question provides habitat for a state-listed species.
4. Bottomland hardwoods, native prairies, and riparian sites.
5. Any other habitat feature considered to be locally important that the TxDOT district chooses to consider.

In accordance with the Executive Memorandum of August 10, 1995, all agencies shall comply with NEPA as it relates to vegetation management and landscape practices for all federally assisted projects. The Executive Memorandum directs that where cost-effective and to the extent practicable, agencies would 1) use regionally native plants for landscaping; 2) design, use, or promote construction practices that minimize adverse effects on the natural habitat; 3) seed to prevent pollution by, among other things, reducing fertilizer and pesticide use; 4) implement water-efficient and runoff reduction practices; and 5) create demonstration projects employing these practices. Landscaping included with this project would comply with the Executive Memorandum and the guidelines for environmentally and economically beneficial landscape practices.

In accordance with EO 13112 on Invasive Species and the Executive Memorandum on Beneficial Landscaping, landscaping would be limited to seeding and replanting the ROW with native species of plants where possible. A mix of native grasses and native forbs would be used to revegetate the ROW, as available.

Mitigation alternatives associated with on-site mitigation and off-site mitigation would continue to be investigated and evaluated by the Grand Parkway Association, TxDOT, TPWD, USFWS, and the USACE. Replacement of values for unregulated habitat (habitat not under USACE jurisdiction where compensation can be required) within transportation corridors and highway ROW may not always be practical, feasible, or safe. A compensatory mitigation plan would be submitted to the USACE as part of the Section 404 permit review process. It is anticipated that a non-wetland component would be incorporated, at the discretion of the TxDOT Houston District, into the mitigation plan to compensate for unavoidable impacts to non-regulated natural resources (agricultural land, riparian habitat, upland forests, etc.) as appropriate. The GPA would continue to coordinate with the federal and state natural resource agencies and project

stakeholders to develop a final compensatory mitigation plan that protects, enhances, and preserves the integrity of the natural environment.

## **7.9 WILDLIFE**

Wildlife relocating from within the study area because of the loss of habitat would move into established territories of other wildlife that are theoretically maintaining population numbers at carrying capacity. The stressors and impacts to wildlife associated with the emigration of individuals from the project area would be greater during times of drought or when the carrying capacity of the population within the area is already exceeded. The increased stressors would lead to an increase in mortality and/or a decrease in recruitment due to the limited resources available within adjacent habitats. Depending on the longevity and fecundity of the species, the effects of the relocated wildlife would be temporary as the carrying capacity equilibrium is established. Initial mitigation measures in the planning process of the project minimized the probable occurrence of prime habitat (vegetation communities) and wetland impacts through careful consideration of the routes (avoidance). However, construction of the project would impact vegetative communities that provide wildlife habitats. It is anticipated that a non-wetland component would be included in the mitigation plan to compensate for impacts to non-regulated natural resources (**Section 7.7.5 Habitat Mitigation - Non-Regulatory**).

Impacts to wildlife and habitat resources can be minimized through the use of a combination of any of the following generally recommended methods or other best management practices not specifically identified below, but that may be appropriate to address unanticipated site conditions:

1. Minimize the crossing of flowing streams and utilize bridge spans to the greatest extent (as opposed to fill) to minimize impacts on riparian and aquatic communities.
2. Have the ROW surveyed to identify significant wildlife areas, high quality vegetation, and sensitive features such as caves, springs, and colonial nesting areas.
3. Particularly dangerous wildlife crossings (i.e., where culverts, bridge spans, etc., are not practicable) can be fenced to divert wildlife through wooded areas along the ROW to culverts or bridge spans where crossings can be more safely made.
4. Limit the use of herbicides and other chemicals for ROW maintenance.
5. In accordance with EO 13112 on Invasive Species and Executive Memorandum on Beneficial Landscaping, landscaping would be limited to seeding and or planting of the ROW with native species

of grasses, shrubs, or trees. Soil disturbance would be minimized to ensure that invasive species would not establish in the ROW.

6. Schedule mowing for ROW maintenance to facilitate the natural reseeding of indigenous spring and autumnal herbaceous communities.
7. Thoroughly clear areas identified as harboring oak wilt infestation and properly dispose of all plant material. All working surfaces (blades, buckets, etc.) of equipment used in clearing and grading such areas should be cleaned with a strong bleach or chlorine (hypochlorite) solution prior to use in other areas.
8. Minimize the use of construction haul work roads and minimize construction traffic impact areas. Work road areas would be restored following construction to as good as or better than conditions that existed prior to construction.
9. Because of safety requirements, no trees can be left within 30 feet of the roadway without roadside protection. Trees outside this safety zone, which are not affected by construction, would be preserved.
10. If nesting or wintering migratory bird species or rookeries are identified on or along the route, deferring especially loud or noisy activities in the adjacent areas until after the birds have left the area would reduce negative impacts to these species.
11. In accordance with the MBTA, no vegetation would be removed containing nests, eggs, or young should clearing occur during the nesting season (March 1 through August 31). Additionally to avoid impacts to migratory birds, any active breeding areas found during the cursory survey would be avoided entirely during the breeding season of any migratory birds identified within the project area.

Coordination with the appropriate resource agency would ensue should wildlife and habitat or sensitive natural resource areas as per the TPWD MOU be encountered during construction.

## **7.10 THREATENED AND ENDANGERED SPECIES**

According to a check of the TPWD's "mimic" version of the TxNDDD obtained on July 17, 2009, two state-listed species and two rare plant communities have been documented within a 1.5-mile radius of the study area. These include Rafinesque's big eared bat (*Corynorhinus rafinesquii*), threeflower broomweed (*Thurovia triflora*), loblolly pine-white oak-southern red oak series (*Pinus taeda-Quercus alba-Quercus falcata* series), and water oak-willow oak series (*Quercus nigra-Quercus phellos* series) as referenced in **Chapter 4 (Environmental Consequences)**. Potential habitat for the threeflower broomweed is not

anticipated to occur within the project area; therefore, the project would have no effect on threeflower broomweed. Rafinesque's big eared bat may occur within the study area, surveys for Rafinesque's big eared bat habitat would be conducted for the Preferred Alternative prior to construction activities to ensure that the proposed project would have no effect on the Rafinesque's big eared bat.

There have been no other recorded sightings of any federally- or state-listed species within close proximity of the study area. At this time, no impacts to threatened or endangered species are anticipated. TPWD has been involved in the planning process. TPWD would be coordinated with and species specific mitigation strategies would be developed to avoid, minimize, and/or compensate for any potential impact to a threatened or endangered species.

While loblolly pine was identified within the study area, the loblolly pine-white oak-southern red oak series (*Pinus taeda-Quercus alba-Quercus falcata*) was not. Therefore, it is anticipated that the project would have no effect on this plant series. The rare water oak-willow oak series (*Quercus nigra-Quercus phellos*) vegetation series is known to occur within Lake Houston Park and surrounding areas. Compensation for bottomland hardwood forest impacts described in **Chapter 4 (Environmental Consequences)** would be considered and addressed in the FEIS. If required, such compensation may include a contribution to the acquisition of flood easements containing riparian forest remnants within Segments H and I-1 watersheds. No other rare vegetation series are known or expected to occur within the Segments H and I-1 project area (TPWD, 2006).

## **7.11 FLOODPLAINS**

A location hydraulic study would be performed during the final design of the highway. The study would provide detailed hydraulic information necessary to determine the use of culverts or a bridge at each stream crossing. The structures would be designed according to FHWA and TxDOT standards. These studies would be reviewed by local, state, and federal regulatory agencies to confirm that adequate measures have been taken to ensure that floodplain encroachment does not increase the risk of flooding to adjacent property. Areas sensitive to local flooding would be identified during the final design phase of the project. If areas of severe flooding are identified, design criteria may be more restrictive than those specified in county orders. The project would comply with the Montgomery, Harris, Chambers, and Liberty counties "floodplain program." Any proposed construction or development in a Special Flood Hazard Area

would be coordinated with one or more of the Montgomery, Harris, Liberty, and Chambers County floodplain administrators to receive a development permit.

The reasonable alternatives were designed to avoid impacts to floodplains to the maximum extent feasible and practicable. All Build Alternatives were located to minimize encroachment on regulatory floodways and floodplains and maintain transverse encroachments to the extent possible. Each of the alternatives was shifted to avoid and minimize wetlands and longitudinal encroachments. All floodways would be bridged or culverted by the selected Preferred Alternative, and further avoidance and minimization of floodplain encroachments would be considered during preliminary and final design of the Preferred Alternative. Access points to the Grand Parkway Segments H and I-1 would be located outside of the floodplains to the greatest extent practicable to minimize the potential for future floodplain development.

Mitigation measures may include cross drainage structures or long bridge structures to allow sheet flow to be unchanged relative to existing conditions. Hydraulic structures would be designed pursuant to TxDOT and FHWA standards to accommodate periods of high flows without impacting downstream areas. Adverse impacts to the watershed are expected to be negligible. Mitigation of impacts would include BMPs during construction and detention facilities to offset increased flows.

The BMPs listed in **Chapter 4 (Environmental Consequences)** would be considered and incorporated into the plans during the preliminary and final design of the highway. Cross drainage and mitigation facilities associated with the proposed roadway and drainage improvements would be designed to handle a 100-yr flood event without affecting the 100-year floodways. The hydraulic design practices on this proposed project would be in accordance with current TxDOT and FHWA design policies and standards. The proposed project would not increase the base flood elevation to a level that would violate applicable floodplain regulations or ordinances.

## **7.12 WILD AND SCENIC RIVERS**

The proposed project is not located near any river segment listed on the Nationwide Inventory of Rivers or identified as a National Wild and Scenic River; therefore, no mitigation is proposed.

### **7.13 COASTAL BARRIERS**

The proposed project is located outside any coastal barrier system; the proposed project would not have any impacts to coastal barrier resources. Therefore, no mitigation is proposed.

### **7.14 COASTAL ZONE MANAGEMENT (CZM)**

The southern limit of the proposed project abuts the CZM boundary; however, project activities for alternatives would occur outside of the CZM area. Coordination with the Coastal Coordination Council under the Texas Coastal Management Program is not required and no mitigation is proposed.

### **7.15 ESSENTIAL FISH HABITAT (EFH)**

The Recommended Alternative does not intersect tidally influenced coastal waters and would have no impact on EFH. However, tidally influenced waters are present within the study area and coordination with the National Marine Fisheries Service may be required during the FEIS stage.

### **7.16 ARCHEOLOGICAL RESOURCES**

If any archaeological sites are determined to be eligible for listing in the NRHP and are to be affected by the proposed project, appropriate consultation would occur to resolve potential adverse effects. A MOU has been executed among FHWA, TxDOT, THC, and the ACHP to ensure that any archeological materials associated with the construction of this project would be properly evaluated, including any accidental discovery situations that arise following the archeological field survey.

### **7.17 NON-ARCHEOLOGICAL HISTORIC RESOURCES**

In 2006, the Dayton Canal was determined eligible for listing in the NRHP under criterion A because of its historic association with rice production in Liberty County for much of the twentieth century. Because of this, every crossing of the Dayton Canal would have to be evaluated by TxDOT in consultation with the SHPO. Because of the precedent set with other canal systems, including an earlier highway project involving SH 146 and the Dayton Canal, it is likely that any crossings of NRHP eligible canals at points already crossed by highways would not be considered to have an adverse effect on the system (as long as the flow of water does not change) and could be approved as having a de minimus effect on the resource under Section 4(f) for the DOT Act.

The programmatic agreement authorized among FHWA, ACHP, SHPO, and TxDOT outlines a streamlined approach for conducting Section 106 consultation and review with the SHPO. A Section 106 consultation and review for all properties recommended eligible for the NRHP would occur once a design for the Preferred Alternative is selected. Final approval of the preferred route by FHWA under Section 4(f) of the DOT Act will occur once TxDOT and SHPO have reached agreement that the project will have no adverse effect on any historic (NRHP-listed or eligible) property.

## **7.18 HAZARDOUS MATERIALS**

Mitigation of hazardous waste sites impacted by the proposed Preferred Alternative would vary depending on the type, size, and location of hazardous material sites. Each site would be assessed and, if necessary, mitigation would be determined according to the issues associated with each site. A Phase I Environmental Site Assessment (ESA) would be completed for the Preferred Alternative prior to ROW acquisition.

## **7.19 VISUAL AND AESTHETIC**

It is likely that visual and aesthetic changes resulting from the Grand Parkway Segments H and I-1 would occur near intersections where access to the new roadway has been provided. These developments would likely include streetlights and/or security lighting that would be expected to result in incremental and localized increases in ambient light levels, glare, and nightglow. Where practicable, visual mitigation measures could include naturally vegetated medians, minimized ROW clearing, incorporation of design specifications to blend into the landscape, and promotion of roadside native wildflower planting programs. Native plants would be considered for roadside vegetation, where practicable, to improve the visual aesthetics and to control the introduction and growth of invasive species, landscape planting, and revegetation of natural areas impacted by construction. Wherever practicable, existing trees within the proposed ROW could be retained to block the view of the roadway from adjacent properties. As currently proposed, the roadway lighting system would be restricted to those areas where entrance/exit ramps and a main lane toll facility or toll gantries are located and would consist of low impact, downward directional lighting.

The design of the facility would follow TxDOT's Green Ribbon Project. The Green Ribbon Project provides TxDOT with guidelines to integrate environmental and aesthetics issues with roadway functionality and is

applicable to all TxDOT roadways within the Houston District. Five primary design principles guide the Green Ribbon Project enhancement concepts:

1. Green First: When considering enhancements, planting would be Priority Number 1.
2. Integration: Consider all improvements in context with each other. Solutions should emphasize the visual, as well as physical, integration of all components.
3. Continuity: Improvements should create a continuous appearance.
4. Freeways are Public Space: The freeway rights of way belong to the public and should provide a visually pleasing experience.
5. Maintenance: All enhancements should consider ease of long-term maintenance.

In an effort to create regional identity and interest within the Houston District, three regional zones are identified for structural elements, each receiving a specific design scheme. These schemes are: vertical, horizontal, and wave. Each scheme establishes a design continuity and consistency of elements that share a common aesthetic characteristic reflecting the regional character of that corridor. These schemes provide guidelines and produce the preferred aesthetic form, function and appearance of each new baseline highway element. While the different schemes each specifically reflect their corresponding regional corridor zone in their detailed appearance, all the schemes share a commonality in form and character to create a continuity and consistency on a distinct level. The Grand Parkway Segments H and I-1 would be located within the vertical scheme region. As the name implies, the vertical scheme, which is applied to the northern regional corridor zone, consists of predominantly vertical articulations and tree-like forms that reflect the character of the dominant pine forested landscape.

## **7.20 ENERGY**

Energy impacts are a function of several variables including average running speed, vehicle-miles of travel, and the mix of vehicle types in the system. The reasonable alternatives could improve fuel efficiencies as traffic moves from the existing roadway network to the new facility, thereby improving traffic mobility (uniform speeds, less congestion) across the study area. No mitigation is proposed for energy uses within the project corridor; however, steps to increase the energy efficiency of the project's construction and operation would be taken whenever applicable.



## 7.21 CONSTRUCTION IMPACTS

The contractor would be required to take every possible reasonable step and follow mitigation procedures in accordance with state and local governing regulations to avoid or minimize construction impacts (Table 7-1). During the construction phase, short-term effects related to noise and dust would be minimized (Chapter 4 (Environmental Consequences)). Traffic delays would be minimized through coordination between TxDOT, contractors, and affected neighborhoods or landowners (in the areas immediately adjacent to the proposed ROW) and by developing a construction schedule that would allow for a minimum delay for movement across the proposed ROW. Also, efforts would be made to provide appropriate construction detours, informative signage, and maintenance of access to residences, farms, businesses, and community facilities where practicable. Potential development associated with the construction of the Build Alternatives could have additional impacts on potential hazardous material sites. However, risks can be minimized by conducting Phase I Environmental Site Assessments (ESAs) according to American Society for Testing and Materials (ASTM) standards to identify, avoid, and mitigate hazardous material sites. If hazardous materials are found in the construction phase, TxDOT standard guidelines would be followed.

**Table 7-1: Measures Required to Avoid or Minimize Construction Impacts**

Construction Related Impact	Contractor Mitigation Measure(s)
Air quality	Implementing dust control measures such as the use of water sprinklers and prohibiting open burning except in accordance with applicable laws and regulations would minimize impacts to air quality
Water quality	Preparation of Storm Water Pollution Prevention Plan (SWPPP) pursuant to TxDOT guidelines (TxDOT, 2000) including but not limited to berms, dikes, temporary seeding, sodding, sediment traps, geotextile fiber mats, silt fences, hay bales, slope drains, mulches, crushed stone.
Noise	Shifting construction timings to daylight hours or any other “noise tolerant” period depending on the neighboring properties. Use of mufflers on construction equipment near residential areas.
Maintenance and control of traffic	Construction in a single geographic area would be limited to avoid inundating the adjacent communities with construction zones.
Health and safety	Contractor would comply with all federal, state, and local laws including OSHA regulations governing safety, health and sanitation of construction personnel and general public.
Hazardous materials	Phase I ESAs would be conducted prior to construction. If hazardous materials are discovered during the construction phase, TxDOT standard guidelines would be followed.
Pollution control on haul roads, borrow/material pits, waste material disposal areas	Contractor to exercise combination of erosion and pollution control measures listed under air and water quality control.

Source: Study Team, 2007