

CHAPTER 7: MITIGATION AND PERMITTING TABLE OF CONTENTS

7.1	INTRODUCTION	7-1
	7.1.1 Land Use	7-2
7.2	SOCIAL IMPACTS	7-2
	7.2.1 Community Cohesion and Quality of Life.....	7-2
	7.2.2 Relocation.....	7-3
7.3	SOILS AND FARMLANDS	7-3
	7.3.1 Soils.....	7-3
	7.3.2 Farmlands.....	7-5
7.4	AIR QUALITY	7-5
7.5	NOISE	7-6
7.6	WATER QUALITY	7-7
	7.6.1 Surface Water Quality Mitigation	7-7
	7.6.2 Groundwater Mitigation.....	7-8
7.7	WETLANDS AND VEGETATIVE COMMUNITIES	7-9
	7.7.1 Waters of the U.S., Including Wetlands Permitting/Regulation	7-9
	7.7.2 Navigable Waters of the U.S.....	7-10
	7.7.3 Waters of the U.S., Including Wetlands Mitigation.	7-10
	7.7.4 Habitat Mitigation - Regulatory.....	7-13
	7.7.5 Habitat Mitigation – Non-Regulatory	7-14
7.8	WILDLIFE	7-15
	7.8.1 Migratory Bird Treaty Act (MBTA).....	7-16
7.9	THREATENED AND ENDANGERED SPECIES	7-17
7.10	FLOODPLAINS	7-18
7.11	ARCHEOLOGICAL RESOURCES	7-19
7.12	SECTION 4(f)	7-20
7.13	HAZARDOUS MATERIALS	7-20
7.14	VISUAL AND AESTHETIC	7-21
7.15	CONSTRUCTION IMPACTS	7-22

LIST OF TABLES

Table 7-1: Measures Required to Avoid or Minimize Construction Impacts.....	7-23
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CHAPTER 7 MITIGATION AND PERMITTING

7.1 INTRODUCTION

Practicable efforts have been made in the planning process to avoid adverse impacts to the human and natural environment. When impacts are unavoidable, steps would be taken to minimize impacts and mitigate for impacts, as required under National Environmental Policy Act (NEPA), Federal Highway Administration (FHWA), and Texas Department of Transportation (TxDOT) guidelines. According to the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [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; and
- Replacing or providing substitutes to the impacted 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 jurisdictional agency.

As discussed in **Chapters 3 and 4**, several resources either do not occur within the study area or adverse impacts to the resources would not occur as the result of the proposed project. In these cases, permitting or mitigation is not proposed for these resources. The following is a list of the resources that would not be adversely impacted based on information available at the time the document was prepared:

- Minority or low-income populations;
- Limited English Proficiency populations;
- Economics;
- Pedestrian and Bicycle Accommodations;
- Unique or Prime Farmlands;

- 1 • Noise;
- 2 • Navigable Waters of the U.S.;
- 3 • Wild and Scenic Rivers;
- 4 • Coastal Barriers;
- 5 • Coastal Zone Management;
- 6 • Essential Fish Habitat;
- 7 • Non-archeological historic resources; and
- 8 • Energy.

9
10 No permitting or mitigation for the above listed issues is proposed as a result of the proposed project.

11
12 **7.1.1 Land Use**

13 The proposed project is on new location and would convert developed and undeveloped, forested, and
14 agricultural land to transportation use. The Preferred Alternative would have controlled access and no
15 frontage roads, except where required along Farm-to-Market Road (FM) 1485. Grade separations would
16 be provided for all major arterial roadways and railroad crossings. Final right-of-way (ROW) and access
17 determinations would be evaluated during the design phase. No mitigation is proposed for changes in land
18 use associated with the proposed project.

19
20 **7.2 SOCIAL IMPACTS**

21 **7.2.1 Community Cohesion and Quality of Life**

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

1 **7.2.2 Relocation**

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

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

14
15 In the case of the Segments H and I-1 study area, property values are rising rapidly. Newly constructed
16 housing in the area is considerably more expensive than the assessed valuations of the older housing
17 stock. Market values for older housing stock in the Houston Realtors Association Multiple Listings are also
18 higher than the assessed valuations for these properties (HAR, 2012). Depending on the difference in
19 prices of properties that are comparable in all other criteria, financial assistance in the form of a purchase
20 supplement, rental assistance payments, or a mortgage down payment may be offered to the relocatee. In
21 any case, a potentially displaced person would not be required to move until comparable replacement
22 dwellings are presented.

23
24 In addition to residential relocation assistance, TxDOT also provides assistance to businesses, farms, and
25 nonprofit organizations required to relocate. These benefits may be in the form of reimbursements for
26 reasonable moving expenses and reestablishment expenses.

27
28
29 **7.3 SOILS AND FARMLANDS**

30 **7.3.1 Soils**

31 Potential impacts presented in **Chapter 4 (Environmental Consequences)** were calculated for the entire
32 proposed ROW. The actual acreage of proposed impacts would be less since vegetation within the ROW

1 would remain in place to the extent feasible and practicable in order to minimize impacts to soils and
2 reduce erosion. The use of silt fences and other erosion control measures during construction would
3 prevent erosion of native soils and reduce the runoff of soil particles into area streams. Furthermore,
4 implementing revegetation of native species along constructed corridors would help prevent future erosion
5 after construction and thereby increase the success rate of any revegetation.

6
7 To the maximum extent possible and where required, material excavated from the road cuts would be used
8 as fill material. If suitable soils are not found within the ROW, they would be obtained from other sites
9 within a reasonable haul distance of the project. Detailed investigation of soils for construction would be
10 conducted during the final design phase of development of the Preferred Alternative.

11
12 Soil erosion and sedimentation would be minimized by the use, where practicable and feasible, of a
13 combination of any of the following generally recommended methods. Other best management practices
14 (BMP) not specifically identified below may be appropriate to address unanticipated site conditions:

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

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

14
15 Temporary and permanent erosion control measures would be coordinated to ensure the best possible
16 control during the construction and post-construction period. Permanent erosion control features would be
17 installed at the earliest practicable time.

18 19 **7.3.2 Farmlands**

20 The Preferred Alternative includes areas containing prime farmland soils. While these impacts (i.e.,
21 removal of topsoil, compaction, and removal of vegetation) do cause temporary or permanent loss to these
22 resources, they are considered minor as rated and scored on the Natural Resources Conservation Service
23 (NRCS) Form Conservation Planning Assistance (CPA)-106. Therefore, mitigation measures for
24 permanent loss of farmlands are not required. Mitigation measures to be implemented during and after
25 construction for temporary soils impacts, including erosion control measures, are considered prudent and
26 positive in helping to restore a portion of these same resources. As noted in **Section 7.2.2 Relocation**,
27 TxDOT also provides assistance to businesses and farms.

28 29 **7.4 AIR QUALITY**

30 The proposed project is located within Montgomery, Harris, Liberty, and Chambers counties, which are
31 within the Houston area's financially constrained 2035 Regional Transportation Plan (RTP) Update and
32 fiscal year 2013-2016 Transportation Improvement Program (TIP) adopted by the Houston-Galveston Area
33 Council (H-GAC) on April 27, 2012 and found to conform to the Strategic Implementation Plan (SIP) by
34 FHWA/Federal Transit Administration (FTA).

1 The proposed Transportation Control Measures (TCM) in the vicinity of this project, included in H-GAC's
2 2035 RTP Update, that are anticipated to have an effect on the Level of Mobility (LOM) are listed in
3 **Table 2-3**. The proposed project is not anticipated to have any long term impacts on air quality in the
4 region. During the construction phase of the project, temporary impacts on air quality include additional
5 dust generated from construction activities. Efforts would be made to mitigate for temporary air quality
6 impacts during construction, including minimizing or eliminating unnecessary idling of construction vehicles
7 and employing a combination of watering, chemical stabilization, and vehicle speed reduction techniques.

8
9 The contractor would be required to adhere strictly to dust control measures as outlined in the current
10 TxDOT specifications, which would help minimize air quality impacts. Following the standard procedures,
11 efficient dust control measures would be implemented in areas where fugitive dust control is a problem.
12 Any debris material not disposed of in a landfill would be mulched. Open burning of waste such as
13 vegetative material would not be allowed.

14 15 **7.5 NOISE**

16 The Preferred Alternative would result in traffic noise impacts to 38 residential structures and 1 commercial
17 structure. The following noise abatement measures were analyzed: traffic management, alteration of
18 horizontal and/or vertical alignments, acquisition of undeveloped property to act as a buffer zone, and
19 construction of traffic noise barriers. However, none of the aforementioned noise abatement measures
20 would be both feasible and reasonable; therefore, no abatement measures are proposed for the Preferred
21 Alternative.

22
23 Noise levels during all phases of the project, such as site preparation and roadway construction, are
24 essentially non-predictable. One reason is that heavy machinery, the major source of construction related
25 noise, operates in unpredictable patterns. However, construction activities normally occur during the
26 daylight hours when high noise levels are more tolerable. Receivers are not expected to be exposed to
27 construction noise for extended periods. Therefore, any disruption of normal activities as a result of
28 construction noise is not anticipated. Provisions would be incorporated in the construction plans and
29 specifications that require the contractor to make reasonable efforts on noise abatement measures such as
30 work hour adjustments and proper equipment maintenance.

1 **7.6 WATER QUALITY**

2 **7.6.1 Surface Water Quality Mitigation**

3 Long-term operation of the facility would likely produce changes in the quantity and quality of the runoff
4 from the paved roadway. Grass swales have been shown to be an effective and low-maintenance
5 mitigation measure to cleanse highway runoff. In combination with stormwater management ponds, the
6 grass swales would collect and treat the runoff from the highway. Therefore, grass-lined swales and
7 stormwater management ponds would be used to minimize the adverse effect of highway runoff to surface
8 water quality.

9
10 Since project construction would impact greater than five acres (ac), a Notice of Intent (NOI) would be
11 prepared and filed with the Texas Commission on Environmental Quality (TCEQ) and Environmental
12 Protection Agency (EPA) per 40 CFR 122 prior to the issuance of a Texas Pollutant Discharge Elimination
13 System (TPDES) construction stormwater discharge permit, as per Section 402 of the Clean Water Act
14 (CWA). The TPDES permit requires completion of a Stormwater Pollution Prevention Plan (SWPPP) in
15 order to avoid adverse impacts potentially resulting from construction stormwater runoff discharges.
16 TxDOT has its own stormwater management guidelines and BMPs for construction activities that would be
17 used in the development of the SWPPP. The project SWPPP would be prepared pursuant to the TxDOT
18 manual, *Storm Water Management Guidelines for Construction Activities* (TxDOT, 2002). A SWPPP would
19 be prepared prior to construction and followed throughout the construction phases to minimize the
20 discharge of sediment laden stormwater to study area streams. The SWPPP may include, but is not limited
21 to, the use of silt fences, inlet protection barriers, hay bales, and seeding or sodding. As part of the
22 SWPPP, TxDOT staff or a designee would be required to inspect both stabilized and unstable areas of the
23 construction site for evidence of, or the potential for, pollutants entering Waters of the United States (U.S.)
24 via stormwater runoff through a drainage system. Summary reports of these inspections would be written
25 and retained as part of the SWPPP. Once construction has been completed and the disturbed areas
26 achieve 70 percent stabilizing vegetative cover, a Notice of Termination would be filed per permit
27 requirements. No other point source discharges that may require additional authorizations under Section
28 402 of the CWA are anticipated at this time.

29
30 Mitigation for impacts listed previously would incorporate the following BMPs at appropriate stages during
31 construction. To the extent feasible, temporary erosion control measures would be installed prior to ground
32 disturbing activities and maintained regularly throughout the various phases of construction. The erosion

1 control plan would be phased to coincide with construction activities to ensure maximum protection
2 throughout the construction process. At the completion of construction, the TxDOT specifications, *Seeding*
3 *for Erosion Control*, would be followed to restore and reseed all disturbed areas. For erosion control, sod
4 would be utilized and remain in place until the area has been stabilized. For sedimentation, a combination
5 of silt fencing and hay bale dikes would be utilized and would remain in place until project completion. The
6 existing ditches would be used for retention storage during construction. For post-construction BMPs, a
7 combination of retention and vegetative filter strips would be utilized to control total suspended solids after
8 construction. Vegetation within the existing ditches would be reestablished after construction and would act
9 as vegetative filter strips. Other areas of ROW would be seeded with native species of grasses, shrubs, or
10 trees as needed.

11 **7.6.2 Groundwater Mitigation**

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

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

26 An emergency spill control pollution prevention plan would be developed and coordinated with local officials
27 prior to construction. Special stormwater management measures would be designed to isolate potentially
28 hazardous spills, for treatment and removal, before entering groundwater. The BMPs listed in the previous
29 section would be considered and incorporated into the plans during the preliminary and final design of the
30 project.

7.7 WETLANDS AND VEGETATIVE COMMUNITIES

7.7.1 Waters of the U.S., Including Wetlands Permitting/Regulation

Implementation of the Preferred Alternative 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 stormwater discharge permit, completion of a SWPPP, and a NOI. Impacts to jurisdictional Waters of the U.S., including wetlands, associated with construction of Segments H and I-1 are anticipated with the Preferred Alternative. Refer to **Chapter 4** for the discussion and locations of potential impacts to Waters of the U.S., including wetlands.

Currently, the United States Army Corps of Engineers (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 would be submitted to the USACE following the Final Environmental Impact Statement (FEIS) or the Record of Decision (ROD) for this project, during the design phase of the proposed project. The application and mitigation plan would take into account recommendations and suggestions made during the agency coordination meetings. Prior to issuance of the 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 **Chapter 4, Waters of the U.S., Including Wetlands** for preliminary wetland mitigation recommendations.

Water quality certification from the TCEQ would also be necessary prior to construction. The USACE would initiate the Water Quality Certification through the permit process. However, TxDOT may negotiate directly with the TCEQ staff to address issues regarding Section 401 Water Quality Certification. A CWA

1 Section 404 permit that disturbs more than three acres of Waters of the U.S. is subject to individual review
2 by the TCEQ as Tier II project impacts. Tier II projects affect more than three acres of Waters of the U.S.
3 and/or 1,500 linear feet of stream. They include projects that would not qualify for a Tier I review or for
4 which the applicant elects not to incorporate Tier I BMPs, including the applicant choosing to use
5 alternative BMPs.

6 7 **7.7.2 Navigable Waters of the U.S.**

8 No navigable Waters of the U.S. occur within the Grand Parkway Segments H and I-1 study area.
9 Therefore, neither a Section 9 permit from the United States Coast Guard (USCG) nor a Section 10 permit
10 from the USACE would be required. The proposed project does not include a bridge in or over a navigable
11 Water of the U.S.; therefore, the General Bridge Act and Section 9 of the Rivers and Harbors Act does not
12 apply.

13 14 **7.7.3 Waters of the U.S., Including Wetlands Mitigation**

15 Every effort has been made to avoid and minimize Waters of the U.S. impacts to the extent practicable
16 during the planning process. This effort would continue through the design phase of the proposed Grand
17 Parkway Segments H and I-1. Avoidance measures would also likely include spanning major drainages
18 along the selected Preferred Alternative.

19
20 Preliminary mitigation options include both on-site and off-site mitigation. On-site mitigation (i.e.,
21 immediately adjacent to the new highway) may include stabilization of disturbed stream banks, re-
22 vegetation, and creation or enhancement of wetlands within the final Grand Parkway Segments H and I-1
23 ROW. Creation or enhancement of wetlands would primarily involve development of shallow forested
24 wetlands similar in function and value to the forested wetlands impacted during roadway construction.

25
26 On-site mitigation for highway projects may not be considered adequate for replacement of all lost Waters
27 of the U.S. functions and values. On-site mitigation would not be considered as the only source of Waters
28 of the U.S. mitigation for impacts associated with this project. On-site mitigation may be considered as a
29 supplement to additional off-site mitigation. Further coordination with United States Fish and Wildlife
30 Service (USFWS), Texas Parks and Wildlife Department (TPWD), and the USACE may determine the
31 likelihood of on-site mitigation as an option for this project.

32
33 Off-site mitigation for wetlands must be designed to reestablish, to the extent reasonable, similar wetland

1 functions, values, and types as the pre-existing site. Off-site mitigation would be conducted in the same
2 geographic vicinity or in proximity, and most likely within the same watershed as the project, particularly for
3 wetlands. Waters of the U.S. mitigation may include expanding existing wetlands, restoration with
4 hydrophytic species, or regulating water levels in impoundments or streams.

5
6 Natural resource agencies (including TPWD, USFWS, USACE, EPA, and TCEQ) would be involved in
7 decisions regarding the appropriate type of mitigation, mitigation ratios, and the location, size, and
8 character of the mitigation. A compensatory mitigation plan would be submitted to the USACE as part of
9 the Section 404 permit review process. The mitigation plan would include a discussion of the avoidance
10 and minimization measures used in the routing and design of the roadway. In addition, the plan would
11 include specifications for accomplishing the proposed compensatory mitigation measures. The approved
12 mitigation plan would be a condition of the USACE Section 404 permit for the Grand Parkway Segments H
13 and I-1 project. The approved mitigation plan would provide a detailed discussion of mitigation
14 commitments, including those that must be implemented during construction.

15
16 A search for previously permitted potential mitigation sites was conducted in June and July 2007, at the
17 USACE Galveston District Headquarters located in Galveston, Texas. This search was conducted to both
18 identify any potential impacts to existing mitigation sites along the project corridor and to determine which, if
19 any, mitigation sites may be appropriate for use with the proposed project. The search involved designating
20 seven points along the Grand Parkway Segments H and I-1 study area. Once these points were
21 designated and the Global Positioning System (GPS) coordinates were determined, the coordinates were
22 entered into Terra Term USACE software, with a 5-mile radii search constraint. Terra Term compiled lists
23 for each search that included any incident or permit that involved a documented USACE action within the
24 radii. The combined area of these searches encompassed the entire Grand Parkway Segments H and I-1
25 study area.

26
27 During the file search for appropriate mitigation sites, the USACE actions found sites within the study area
28 that were designated as: individual permits, nationwide permits, general permits, or investigations. The
29 investigations were disregarded because no mitigation would have been associated with those actions.
30 The remaining actions were researched in the file room located at the USACE Galveston District
31 Headquarters. These files were either original hard copies or archived microfiche. In February 2013, the
32 designated points along the Grand Parkway Segments H and I-1 study area were entered into the

1 Regulatory In-lieu Fee and Bank Information Tracking System (RIBITS) sponsored by the USACE, EPA,
2 USFWS, and FHWA (USACE 2013). The RIBITS search results provide information on approved service
3 areas with the USACE Galveston District. The February 2013 RIBITS results were used in conjunction with
4 the 2007 file search conducted at the USACE Galveston District Headquarters.

5
6 The USACE file and RIBITS review determined that no mitigation sites are located along the Preferred
7 Alternative alignment. The majority of mitigation that occurred in the study area was done with the
8 following mitigation banks, which are all outside the proposed study area for the Preferred Alternative:

- 9 • Greens Bayou Wetland Mitigation Bank;
- 10 • Trinity River Habitat Fund;
- 11 • Blue Elbow Swamp Mitigation Bank;
- 12 • Daisetta Swamp Mitigation Site;
- 13 • Spellbottom Mitigation Site; and
- 14 • Gin City Mitigation Bank.

15
16 The USACE would make the final determination of mitigation required for the proposed project. In
17 summary, several viable wetland mitigation alternatives would be investigated and evaluated in the
18 mitigation plan. Of the mitigation banks found in the 2007 USACE file and 2013 RIBITS searches, only the
19 Blue Elbow Swamp Mitigation Bank would be appropriate for the proposed project, due to ownership and
20 previous credit commitment issues with the other banks. However, additional mitigation banks such as the
21 Daisetta Swamp Mitigation Site and Spellbottom Mitigation Site may be considered for the proposed project
22 (USACE 2013). In the event that an appropriate mitigation bank is not found, an in lieu fee or permittee-
23 responsible mitigation may be considered by TxDOT and the USACE. The technical and regulatory merit
24 of these mitigation recommendations would be evaluated and further discussed with resource agency staff
25 and ultimately presented via the USACE's public notice process under Section 404 of the CWA.

26
27 As an example mitigation process, if mitigation were provided within the Blue Elbow Swamp Mitigation
28 Bank, low quality wetlands are typically mitigated at a 3:1 ratio; moderate quality wetlands are typically
29 mitigated at a 5:1 ratio; and high quality wetlands are typically mitigated at a 7:1 ratio. The Preferred
30 Alternative 10R would potentially impact 217.28 ac of adjacent agricultural wetlands, 2.71 ac of adjacent
31 non-forested wetlands, 2.52 ac of adjacent forested wetlands, and up to 22.9 ac of potential Waters of the
32 U.S., not including wetlands. Segments H and I-1 of the Grand Parkway could have up to 222.51 ac of

1 wetland impacts that would require permitting and mitigation. Additionally, mitigation for stream impacts
2 would be evaluated and provided separately from wetland mitigation and may not be available at all
3 mitigation banks. If mitigation were provided through the Blue Elbow Swamp Mitigation Bank, mitigation for
4 wetland impacts could range from 661.98 to 1,544.62 ac; however, this is a planning level estimate and
5 final mitigation requirements would be determined through coordination with the USACE through the
6 permitting process. TxDOT has begun discussions with the City of Houston Parks and Recreation
7 Department regarding mitigation opportunities in and around the Lake Houston Wilderness Park. If
8 applicable at the time of permitting, this is an off-site option TxDOT would pursue.

9 10 **7.7.4 Habitat Mitigation - Regulatory**

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

18
19 Initial mitigation measures in the planning or alignment of highway projects minimize the probable
20 occurrence of habitat (vegetation communities) and wetland impacts (both adjacent and isolated) through
21 route location (avoidance) and construction practices. Activities to minimize the impacts to habitats from
22 highway construction include: minimizing disturbance of vegetation within the construction areas wherever
23 safety allows, decreasing the amount of fill placement, and implementation of BMPs, including an erosion
24 and sedimentation control plan. Specific impact minimization to wetland areas may include: the roadway
25 design (use of bridge crossings instead of filling embankment); the use of retention basins and revegetated
26 swales to minimize runoff, sedimentation, turbidity, leaching of soil nutrients, and leaching of chemicals
27 from petroleum products, pavement, and waste material; and maintaining flow patterns to ensure wetland
28 hydrology in spite of roadway design requirements.

29
30 The fact that some degree of impact is often unavoidable, regardless of the care applied during the
31 planning, design, and construction of a highway, requires a plan for compensatory mitigation to replace
32 functions, values, and features or habitats that may be disturbed. On occasion, on-site restoration of

1 degraded wetland habitat or creation of wetland habitat within the highway ROW through creative use of
2 detention basins, borrow pit areas, or drainage runoff channels may be appropriate. Where such measures
3 may not effectively restore resource functions and values, off-site mitigation measures may be considered.

4 5 **7.7.5 Habitat Mitigation - Non-Regulatory**

6 Non-regulated, non-wetland resources (e.g., remnant prairie topography, riparian habitat, etc.) identified as
7 environmentally sensitive, socially desirable, or ecologically valuable have been avoided to the extent
8 practicable. In accordance with Provision (4)(A)(ii) of TxDOT's Memorandum of Understanding (MOU) with
9 TPWD signed in 1998 and at the TxDOT district's discretion, habitats given consideration for non-regulatory
10 mitigation during project planning include:

- 11 • Habitat for federal candidate species (impacted by the project) if mitigation would assist in the
12 prevention of the listing of the species;
- 13 • Rare vegetation series (S1, S2, or S3 TPWD designations) that also locally provide habitat for
14 a state-listed species;
- 15 • All vegetation communities listed as S1 or S2, regardless of whether or not the series in
16 question provides habitat for a state-listed species;
- 17 • Bottomland hardwoods, native prairies, and riparian sites; and
- 18 • Any other habitat feature considered to be locally important that the TxDOT district chooses to
19 consider.

20
21 In accordance with the Executive Memorandum of August 10, 1995, all agencies shall comply with NEPA
22 as it relates to vegetation management and landscape practices for all federally-assisted projects. The
23 Executive Memorandum directs that where cost-effective and to the extent practicable, agencies would
24 1) use regionally native plants for landscaping; 2) design, use, or promote construction practices that
25 minimize adverse effects on the natural habitat; 3) seed to prevent pollution by, among other things,
26 reducing fertilizer and pesticide use; 4) implement water-efficient and runoff reduction practices; and
27 5) create demonstration projects employing these practices. Landscaping included with this project would
28 comply with the Executive Memorandum and the guidelines for environmentally and economically
29 beneficial landscape practices. In accordance with Executive Order (EO) 13112 on Invasive Species and
30 the Executive Memorandum on Beneficial Landscaping, landscaping would be limited to seeding and
31 replanting the ROW with native species of plants where possible. A mix of native grasses and native forbs
32 would be used to revegetate the ROW, as available.

1 Mitigation alternatives associated with on-site mitigation and off-site mitigation would continue to be
2 investigated and evaluated by the Grand Parkway Association (GPA), TxDOT, TPWD, USFWS, and the
3 USACE. Replacement of values for unregulated habitat (habitat not under USACE jurisdiction where
4 compensation can be required) within transportation corridors and highway ROW may not always be
5 practical, feasible, or safe. TxDOT and the GPA would continue to coordinate with the federal and state
6 natural resource agencies and project stakeholders to develop a final compensatory mitigation plan that
7 protects, enhances, and preserves the integrity of the natural environment.

8 9 **7.8 WILDLIFE**

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

23
24 Impacts to wildlife and habitat resources can be minimized through the use of a combination of any of the
25 following generally recommended methods or other BMPs not specifically identified below, but that may be
26 appropriate to address unanticipated site conditions:

- 27 • Minimize the crossing of flowing streams and utilize bridge spans to the greatest extent (as
28 opposed to fill) to minimize impacts on riparian and aquatic communities.
- 29 • Have the ROW surveyed to identify significant wildlife areas, high quality vegetation, and
30 sensitive features such as caves, springs, and colonial nesting areas.
- 31 • Particularly dangerous wildlife crossings (i.e., where culverts, bridge spans, etc., are not
32 practicable) can be fenced to divert wildlife through wooded areas along the ROW to culverts
33 or bridge spans where crossings can be more safely made.

- 1 • Limit the use of herbicides and other chemicals for ROW maintenance.
- 2 • In accordance with EO 13112 on Invasive Species and Executive Memorandum on Beneficial
3 Landscaping, landscaping would be limited to seeding and or planting of the ROW with native
4 species of grasses, shrubs, or trees. Soil disturbance would be minimized to ensure that
5 invasive species would not establish in the ROW.
- 6 • Schedule mowing for ROW maintenance to facilitate the natural reseeding of indigenous spring
7 and autumnal herbaceous communities.
- 8 • Thoroughly clear areas identified as harboring oak wilt infestation and properly dispose of all
9 plant material. All working surfaces (blades, buckets, etc.) of equipment used in clearing and
10 grading such areas should be cleaned with a strong bleach or chlorine (hypochlorite) solution
11 prior to use in other areas.
- 12 • Minimize the use of construction haul work roads and minimize construction traffic impact
13 areas. Work road areas would be restored following construction to as good as or better than
14 conditions that existed prior to construction.
- 15 • Because of safety requirements, no trees can be left within 30 feet of the roadway without
16 roadside protection. Trees outside this safety zone, which are not affected by construction,
17 would be preserved.
- 18 • If nesting or wintering migratory bird species or rookeries are identified on or along the route,
19 deferring especially loud or noisy activities in the adjacent areas until after the birds have left
20 the area would reduce negative impacts to these species.

21
22 Coordination with the appropriate resource agency would ensue should wildlife and habitat or sensitive
23 natural resource areas as per the TPWD MOU be encountered during construction.

24 25 **7.8.1 Migratory Bird Treaty Act (MBTA)**

26 The MBTA of 1918 states it is unlawful to kill, capture, collect, possess, buy, sell, trade, or transport any
27 migratory bird, nest, or egg in part or in whole, without a federal permit issued in accordance with the Act's
28 policies and regulations. A cursory nest survey would be conducted once right of entry is obtained by
29 qualified personnel prior to construction. To avoid impacts to migratory birds, any active breeding areas
30 found during the cursory survey would be avoided entirely during the breeding season of any migratory
31 birds identified within the project area. In accordance with the MBTA, no vegetation would be removed
32 containing nests, eggs, or young should clearing occur during the nesting and breeding season. If a nest,
33 eggs, or young of a ground-dwelling bird is observed before or during construction, the participating
34 agencies would be notified and the steps would be taken to avoid impacts to the bird and the nest. Every
35 effort will be made to prevent migratory birds from nesting in the project area during the breeding season.

7.9 THREATENED AND ENDANGERED SPECIES

According to a check of the TPWD's "mimic" version of the Texas National Diversity Database (TxNDD) obtained February 2013, two state-listed threatened species, three state-listed species of concern, 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*), bald eagle (*Haliaeetus leucocephalus*), Correll's false dragon-head (*Physostegia correllii*), threeflower broomweed (*Thurovia triflora*), Texas windmill-grass (*Chloris texensis*), 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 American peregrine falcon (*Falco peregrinus anatum*), arctic peregrine falcon (*Falco peregrinus tundrius*), Bachman's sparrow (*Aimophila aestivalis*), bald eagle, black rail (*Laterallus jamaicensis*), Henslow's sparrow (*Ammodramus henslowii*), red-cockaded woodpecker (*Picoides borealis*), snowy plover (*Charadrius alexandrinus*), Western snowy plover (*Charadrius alexandrinus nivosus*), swallow-tailed kite (*Elanoides forficatus*), white-faced ibis (*Plegadis chihi*), white-tailed hawk (*Buteo albicaudatus*), wood stork (*Mycteria americana*), American eel (*Anguilla rostrata*), creek chubsucker (*Erimyzon oblongus*), paddlefish (*Polydon spathula*), two mayfly species (*Tricorythodes curvatus* and *Plauditus gloveri*), gulf coast clubtail (*Gomphus modestus*), Texas emerald dragonfly (*Somatochloa margarita*), plains spotted skunk (*Spilogale putorius interrupta*), Rafinesque's big eared bat, Southeastern myotis bat (*Myotis austroriparius*), creeper squawfoot (*Strophitus undulates*), fawnsfoot (*Truncilla donacformis*), little spectaclecase (*Villosa lienosa*), Louisiana pigtoe (*Pleurobema riddellii*), sandbank pocketbook (*Lampsilis satura*), Texas heelsplitter (*Potamilus amphichaenus*), Texas pigtoe (*Fusconaia askewi*), Wabash pigtoe (*Fusconaia flava*), alligator snapping turtle (*Macrochelys temminckii*), Louisiana pine snake (*Pituophis ruthveni*), Northern scarlet snake (*Cemophora coccinea copei*), smooth green snake (*Liochlorophis vernalis*), timber/canebrake rattlesnake (*Crotalus horridus*), coastal gay-feather (*Liatris bracteata*), Texas meadow-rue (*Thalictrum texanum*), Texas prairie dawn (*Hymenoxys texana*), Correll's false dragon-head, threeflower broomweed, and Texas windmill-grass may occur within the study area. Surveys for these species and their preferred habitat would be conducted for the Preferred Alternative prior to construction activities to ensure the proposed project would have no effect on the listed species.

There have been no other recorded sightings of any federal- 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

1 been involved in the planning process. TPWD would be coordinated with and species specific mitigation
2 strategies would be developed to avoid, minimize, and/or compensate for any potential impact to a
3 threatened or endangered species.

4
5 The February 2013 TxNDD documented two loblolly pine-white oak-southern red oak series within the
6 study area. The rare water oak-willow oak series is known to occur within the Lake Houston Wilderness
7 Park and surrounding areas. Compensation for bottomland hardwood forest impacts described in
8 **Chapter 4 (Environmental Consequences)** would be considered and addressed in the compensatory
9 mitigation plan. If required, such compensation may include a contribution to the acquisition of flood
10 easements containing riparian forest remnants within Segments H and I-1 watersheds. No other rare
11 vegetation series are known or expected to occur within the Segments H and I-1 project area (TPWD,
12 2013).

13 14 **7.10 FLOODPLAINS**

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

26
27 The Preferred Alternative was designed to avoid impacts to floodplains to the maximum extent feasible and
28 practicable. All Build Alternatives were located to minimize encroachment on regulatory floodways and
29 floodplains and maintain transverse encroachments to the extent possible. Each of the alternatives was
30 shifted to avoid and minimize wetlands and longitudinal encroachments. All floodways would be bridged or
31 culverted by the Preferred Alternative where possible. Further avoidance and minimization of floodplain
32 encroachments would be considered during preliminary and final design of the Preferred Alternative.

1 Access points to the Grand Parkway Segments H and I-1 would be located outside of the floodplains to the
2 greatest extent practicable to minimize the potential for future floodplain development.

3
4 Mitigation measures may include cross drainage structures or long bridge structures to allow sheet flow to
5 be unchanged relative to existing conditions. Hydraulic structures would be designed pursuant to TxDOT
6 and FHWA standards to accommodate periods of high flows without impacting downstream areas.
7 Adverse impacts to the watershed are expected to be negligible. Mitigation of impacts would include BMPs
8 during construction and detention facilities to offset increased flows.

9 The BMPs listed in **Chapter 4 (Environmental Consequences)** would be considered and incorporated
10 into the plans during the preliminary and final design of the highway. Cross drainage and mitigation
11 facilities associated with the proposed roadway and drainage improvements would be designed to handle a
12 100-year flood event. The hydraulic design practices on this proposed project would be in accordance with
13 current TxDOT and FHWA design policies and standards. The proposed project would not increase the
14 base flood elevation to a level that would violate applicable floodplain regulations or ordinances.

15 16 **7.11 ARCHEOLOGICAL RESOURCES**

17 No impacts to archeological resources are anticipated with the proposed project and no further
18 archeological work is recommended. An MOU has been executed among FHWA, TxDOT, Texas Historic
19 Commission (THC), and the Advisory Council on Historic Preservation (ACHP) to ensure that any
20 archeological materials associated with the construction of this project would be properly evaluated,
21 including any accidental discovery situations that arise. If archeological materials or human remains are
22 identified within the ROW during construction, or a department-designated material source, all construction
23 and related activities must cease. The discovery is to be reported to the TxDOT project inspector or the
24 area engineer in accordance with TxDOT's Emergency Discovery Guidelines. If archeological materials or
25 human remains are introduced into the ROW or easements in materials obtained from a material source
26 under option to the contractor, all use of materials from this source must cease and the discovery reported
27 to the TxDOT project inspector or the area engineer in accordance with TxDOT's Emergency Discovery
28 Guidelines.

29
30 The archeological survey report was reviewed and coordinated with the State Historic Preservation Officer
31 (SHPO) and the Texas Historical Commission (THC). The coordination was submitted on August 19, 2013
32 and THC concurred with the findings and recommendations as shown in **Appendix N**. TxDOT further

1 asked for THC's concurrence to allow the remainder of the survey to be deferred and to allow the NEPA
2 process to continue and for property to be acquired. TxDOT will be obligated to complete the survey and
3 coordinate the results with THC once the remainder of proposed ROW has been acquired

4 5 **7.12 SECTION 4(f)**

6 Construction of the Preferred Alternative would impact the Lake Houston Wilderness Park through the
7 acquisition of 11 ac. The Section 4(f) mitigation would include improvements to the park entrance.
8 Mitigation and commitments outlined in the *de minimis* Section 4(f) Evaluation for the park would be
9 followed during the design phase of the project (**Appendix J**).

10 11 **7.13 HAZARDOUS MATERIALS**

12 Construction of the Preferred Alternative could have additional impacts on potential hazardous materials
13 sites. However, risks can be minimized by conducting Phase I and II Environmental Site Assessments
14 (ESA) according to American Society for Testing and Materials (ASTM) standards to identify, avoid, and
15 mitigate hazardous materials sites. If hazardous materials are found during the construction phase, then
16 TxDOT standard guidelines would be followed.

17
18 Asbestos and lead-based paint investigations for all structures impacted by the proposed project would be
19 addressed during the ROW acquisition process prior to construction. If suspect material is encountered, a
20 mitigation plan for the removal and disposal of materials containing hazardous materials would be
21 developed according to federal, state, and local regulations. The project's plans, specifications, and
22 estimates would disclose areas of asbestos and lead-based paint which would be disturbed. Special
23 provisions would be developed for asbestos-related activities, notifications, required licenses, and
24 monitoring.

25
26 Numerous documented federal- or state-regulated hazardous materials sites, as defined by the ASTM,
27 were identified within the proposed ROW of the Preferred Alternative. The hazardous materials sources
28 identified reflect the results of regulatory database queries provided by EDR (2012). The regulatory
29 databases are maintained in electronic storage formats by federal and state agencies and contain geo-
30 coded (geographic information system capable) information pertaining to a variety of hazardous materials
31 releases or potential releases. The databases include EPA, TCEQ, and Railroad Commission of Texas
32 listings of sites where hazardous materials are suspected to have been stored, used, and/or released to the

1 environment. The federal and state databases that were reviewed are described in **Chapter 3**. If an
2 undocumented site is encountered during construction, a detailed evaluation would need to occur.
3 Mitigation, if warranted, would depend on the type, size, and location of the encountered hazardous
4 materials.

5 **7.14 VISUAL AND AESTHETIC**

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

18
19 The design of the facility would follow TxDOT's Green Ribbon Project (43 TAC 11). The Green Ribbon
20 Project provides TxDOT with guidelines to integrate environmental and aesthetics issues with roadway
21 functionality and is applicable to all TxDOT roadways within the Houston District. Five primary design
22 principles guide the Green Ribbon Project enhancement concepts:

- 23 • Green First: When considering enhancements, planting would be Priority Number 1.
- 24 • Integration: Consider all improvements in context with each other. Solutions should emphasize
25 the visual, as well as physical, integration of all components.
- 26 • Continuity: Improvements should create a continuous appearance.
- 27 • Freeways are Public Space: The freeway ROW belongs to the public and should provide a
28 visually pleasing experience.
- 29 • Maintenance: All enhancements should consider ease of long-term maintenance.

30
31 In an effort to create regional identity and interest within the TxDOT Houston District, three regional zones
32 are identified for structural elements, each receiving a specific design scheme. These schemes are:

1 vertical, horizontal, and wave. Each scheme establishes a design continuity and consistency of elements
2 that share a common aesthetic characteristic reflecting the regional character of that corridor. These
3 schemes provide guidelines and produce the preferred aesthetic form, function, and appearance of each
4 new baseline highway element. While the different schemes each specifically reflect their corresponding
5 regional corridor zone in their detailed appearance, all the schemes share a commonality in form and
6 character to create a continuity and consistency on a distinct level. The Grand Parkway Segments H and I-
7 1 would be located within the vertical scheme region. As the name implies, the vertical scheme, which is
8 applied to the northern regional corridor zone, consists of predominantly vertical articulations and tree-like
9 forms that reflect the character of the dominant pine forested landscape.

10 11 **7.15 CONSTRUCTION IMPACTS**

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

24
25 Storage and use of hazardous materials would be necessary during the construction of the project.
26 Temporary above ground storage tanks (AST) containing oil and diesel are typically used to provide fuels
27 for the equipment and vehicles used in roadway construction. These ASTs would be regulated and would
28 require control measures for spills and leaks. Potential impacts could occur from small spills and leaks
29 from fueling and maintenance of equipment and vehicles. These impacts should be minimal and would not
30 pose a substantial impact to the environment. Every effort would be taken to reduce these types of impacts
31 during the construction activities. Activities dealing with the use and storage of hazardous materials during

1 roadway construction would be required to conform to TxDOT standards for spill containment and control
 2 strategies.

3
 4

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, and crushed stone. An emergency spill control pollution prevention plan would be developed and coordinated with local officials prior to construction. Avoidance measures would include spanning major drainages along the Preferred Alternative. A Section 404 individual permit application would be submitted to the USACE following the FEIS or ROD for this project, during the design phase of the proposed project. A Section 401 Water Quality Certification would be coordinated with the TCEQ as a part of the USACE permit process. The Contractor would be required to follow the permit conditions.
Noise	Shifting construction timings to daylight hours or any other “noise tolerant” periods 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 Occupational Safety and Health Administration regulations governing safety, health and sanitation of construction personnel and general public.
Hazardous materials	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, 2012

5
 6