

NOAA/EPA DECISIONS ON CONDITIONS OF APPROVAL TEXAS COASTAL NONPOINT PROGRAM

FOREWORD

The Coastal Nonpoint Pollution Control Program, set forth in Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA), 16 U.S.C. § 1455b, addresses nonpoint source pollution problems in coastal waters. Section 6217 directs states and territories with approved coastal zone management programs to develop and implement management measures for nonpoint pollution control to restore and protect coastal waters (coastal nonpoint programs).

This document provides the bases for the proposed determination by the National Oceanic and Atmospheric Administration (NOAA) and the United States Environmental Protection Agency (EPA) (collectively, Federal agencies) that Texas has met the conditions that the Federal agencies had identified in the earlier approval of Texas' coastal nonpoint program on March 31, 2003, pursuant to CZARA (2003 findings). In this document, the Federal agencies describe how the State program modifications since that time satisfy each of the conditions identified in the 2003 findings.

PROPOSED DECISION

The Federal agencies issued findings on March 31, 2003, approving Texas' coastal nonpoint program submission subject to conditions. Those findings are available at https://coast.noaa.gov/data/czm/pollutioncontrol/media/6217tx_fnl.pdf. Since that time, Texas has undertaken a number of actions to address each of the identified conditions. Based on those actions and the materials provided by the State that document how its program meets each condition, NOAA and EPA propose to find that Texas has satisfied all conditions on its coastal nonpoint program.

INTRODUCTION

CZARA directed EPA to develop technical guidance to assist states and tribes in designing coastal nonpoint programs. On January 19, 1993, EPA issued that guidance in the document, titled *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters*, 840-B92-002 (January 1993), which addresses five major source categories of nonpoint pollution: (1) urban runoff; (2) agriculture runoff; (3) forestry runoff; (4) marinas and recreational boating; and (5) hydromodification. The guidance also addresses nonpoint source pollution issues associated with the loss or damage to wetlands and riparian areas. The guidance is commonly referred to as the 6217(g) guidance because the statutory direction to EPA appears in CZARA Section 6217(g).

This document is organized following the same structure that was used for the Federal agencies' 2003 findings to support approval of Texas' program, with conditions, grouping together the conditions related to each major nonpoint source category or subcategory. In 2003, the Federal agencies determined Texas met the requirements of the 6217(g) guidance for agriculture runoff, forestry runoff, marinas and recreational boating, and wetlands and riparian areas. For the

remaining nonpoint sources (urban runoff and hydromodification) each original finding and condition identified in 2003 is repeated below. A list of acronyms is included at the end of this document.

For further understanding of terms in this document, please refer to the following:¹

- *Guidance Specifying Management Measures for Sources of Nonpoint Pollution in Coastal Waters* (EPA, January 1993).
- *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance* (NOAA/EPA, January 1993).
- *Flexibility for State Coastal Nonpoint Programs* (NOAA/EPA, March 1995).
- *Final Administrative Changes to the Coastal Nonpoint Pollution Control Program Guidance for Section 6217 of the Coastal Zone Act Reauthorization Amendments of 1990 (CZARA)* (NOAA/EPA, October 1998) (“Final Administrative Changes”).
- *Policy Clarification on Overlap of 6217 Coastal Nonpoint Programs with Phase I and II Storm Water Regulations* (NOAA/EPA, December 2002).

The Federal agencies rely on, but do not repeat here, except as relevant to the proposed findings, extensive information that the State included in various submittals to support its coastal nonpoint program. Further information and analysis is contained in the administrative record for this proposed approval decision and is available upon request at the following locations:

U.S. EPA Headquarters, Office of Water
Nonpoint Source Management Branch
1200 Pennsylvania Ave., NW (4503-T)
Washington, DC 20460
Contact: Don Wayne (202/566-1170)

NOAA, Office for Coastal Management
SSMC-4, N/OCM6
1305 East-West Highway
Silver Spring, MD 20910
Contact: Allison Castellan (240/533-0799)

U.S. EPA Region 6, Water Division
1201 Elm Street, Suite 500
Dallas, Texas 75270
Contact: Brian Fontenot (214/665-7286)

I. URBAN

A. NEW DEVELOPMENT AND EXISTING DEVELOPMENT

¹ All of the guidance documents for the Coastal Nonpoint Program are available online at: <https://coast.noaa.gov/czm/pollutioncontrol/>.

2003 FINDING: The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to prevent nonpoint source pollution and require implementation of management measures, but has not adequately described its voluntary or incentive-based programs the State will use to encourage implementation of the new development and site development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary.

2003 CONDITION: Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for new development and site development. Within two years, Texas will adequately strengthen its description of the voluntary or incentive-based programs the State will use to encourage implementation of the new development and site development management measures, its description of the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the enforcement authority where necessary. In the alternative, within two years, the state will finalize its Texas Pollutant Discharge Elimination System (TPDES) rules to ensure that TPDES permits are required throughout the coastal nonpoint program management area not covered by National Pollutant Discharge Elimination System (NPDES) permits.

2021 PROPOSED DECISION: Texas has satisfied its condition.

RATIONALE: To a large extent, Texas State programs satisfy this management measure through a combination of NPDES permitting in urbanized areas and through voluntary programs backed up by enforceable requirements outside of urbanized areas.

New Development

This management measure is intended to accomplish the following:

- (1) decrease the erosive potential of increased runoff volumes and velocities associated with development-induced changes in hydrology;
- (2) remove suspended solids and associated pollutants entrained in runoff that result from activities occurring during and after development;
- (3) retain hydrological conditions to closely resemble those of the pre-disturbance condition; and
- (4) preserve natural systems including in-stream habitat.

State coastal nonpoint programs are no longer required to address the new development management measure in urbanized areas subject to Phase I or Phase II NPDES municipal separate storm sewer systems (MS4) permits because these regulations are redundant with this management measure for those permitted areas. See NOAA and EPA's 2002 memorandum, *Policy Clarification on Overlap of 6217 Coastal Nonpoint Programs with Phase I and II Storm Water Regulations*.² Under that policy clarification, management measures in conformance with the 6217(g) guidance are still necessary for new developments occurring outside of NPDES permitted urbanized areas.

² NOAA and EPA. 2002. *Policy Clarification on Overlap of 6217 Coastal Nonpoint Programs with Phase I and II Storm Water Regulations*. Accessed 12/10/2019.
https://coast.noaa.gov/data/czm/pollutioncontrol/media/NPDES_CZARA_Policy_Memo.pdf

Currently, nine counties and 48 communities in the Texas coastal nonpoint management area are designated MS4s subject to NPDES permit requirements. These designated MS4s cover nearly 80 percent of the land area that is not already protected through acquisition or conservation (i.e., public protected areas, conservation easements, beaches) and contain 91 percent of the population within the coastal nonpoint management area. Texas' voluntary approach applies to 40 incorporated non-MS4 communities in the coastal nonpoint management area. These communities represent 8.6 percent of the population and 1.7 percent of the land in the coastal nonpoint management area.

Outside of MS4 communities designated for NPDES permitting under the Phase I and Phase II storm water regulations, Texas addresses its condition for the new development management measure through its strategy to encourage the voluntary adoption of the State's 2019 *Guidance for Sustainable Stormwater Drainage on the Texas Coast*³ (stormwater guidebook). This guidebook is also a core component of Texas' strategy for addressing several other Urban Management Measures such as those for existing development, watershed protection and site development discussed below. The voluntary stormwater guidebook includes planning tools, practices, performance standards, and a model ordinance that Texas coastal communities can use to improve stormwater management efforts. It provides decision makers with comprehensive guidance on conventional stormwater management systems as well as an integrated green infrastructure-based approach to natural resource protection. It also recommends practices and design procedures that encourage the use of more resilient designs that can help manage long-term stormwater management costs and promote tourism, recreation, and economic development.

The State's stormwater guidebook recommends the management of stormwater runoff from development activity through the implementation of performance standards that include structural control measures and low-impact development practices that are in conformity with the new development management measure. The guidebook provides a model ordinance for use by municipalities that would require approval of a stormwater management plan that meets these performance criteria before the municipality may approve any land disturbance permit. Violation of a permit issued under the model ordinance would be subject to civil penalties under 7.102, and criminal penalties under 7.147, 7.148 and 7.149, of the Texas Water Code.

The manual recommends that site designs include stormwater management practices to control the peak flow rates of stormwater discharges associated with specified design storms and reduce the overall generation of stormwater. At a minimum, "the peak flow rate for the post-developed condition shall not exceed the pre-developed peak flow rate for the 1.5-inch storm." In addition, "structural stormwater treatment practices shall be designed to remove 80 percent of the average annual post development total suspended solids load (TSS) from a 1.5-inch rainfall event" for all applicable new development and redevelopment projects. Analysis of this design standard with rainfall patterns along the Texas coast verifies that the 80 percent TSS load reduction would be achieved on an average annual basis, which is consistent with element 1 of this measure.

³ Texas General Land Office (GLO). 2019. *Guidance for Sustainable Stormwater Drainage on the Texas Coast*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/04/sw-manual-03302020.pdf>

The guidebook's model ordinance includes a stormwater credits system to incentivize the implementation of low impact development techniques, in lieu of more costly structural control methods, to meet performance standards required by the ordinance. Low impact development techniques include porous pavement, rainwater harvesting, soil amendments, conservation landscaping, disconnection of roof-top runoff, and natural area preservation, and are consistent with the goal of element 2 of this measure. Single family and small commercial development projects (three acres or less in size) that use low impact development techniques are assumed to comply with the performance standards so long as specific design requirements are met. For example, a single-family development is assumed to meet the performance standard if the development is designed to have a gross impervious cover of 20 percent or less and the cluster development sections (individual drainage areas) have 25 percent or less gross impervious cover; and street and drainage networks are designed to drain via sheet flow using open-roadway sections and ribbon curb practices that promote infiltration and evaporation. Under the incentive-based system modeled in the guidebook, homebuilders could accomplish the area of impervious cover limits by implementing low impact development practices, which provide a 'credit,' or reduction in the size of more costly structural stormwater controls, such as stormwater management ponds or constructed wetlands, that would otherwise meet the performance standards in the guidebook.

To help ensure that there is significant voluntary adoption of the guidebook, Texas has committed to implementing a strategic education, outreach, technical assistance, and financial assistance program over the next 15 years. This program targets community officials, landowners, land developers, engineers, financiers, local land development professionals, and interest groups. The State has distributed the guidance manual to 48 MS4 and 40 non-MS4 communities, relevant county road departments, and the Association of Water Board Directors. The State has also committed to engaging with the 11 most rapidly growing non-MS4 communities in the coastal nonpoint management area to encourage adoption of the guidebook over the next 15 years. Target communities were identified through an assessment of 1990-2010 population and housing use change data from the 40 non-MS4 municipalities in the coastal nonpoint management area. Dedicated engagement activities focus on encouraging adoption of the manual guidelines, providing technical assistance, and facilitating technical workshops. As of May 2021, the State began holding funding workshops for coastal communities to increase awareness of the various funding sources (e.g., coastal program and 319 program grants) that can help support these activities. This strategy also applies to the existing development, site development, and watershed protection management measures discussed below.

In May 2021, the Aransas County District (district) hosted the initial training for the guidebook and included participants from City of Rockport, City of Fulton, Aransas County, and the district. This training led to multiple MOUs among the four jurisdictions. The MOUs were created as an official instrument to memorialize the connectivity between water quality work and local jurisdictions over time even as leadership and staff positions turn over. The MOUs also help demonstrate the purposes of partnerships and outline roles and responsibilities of each entity for the planning and ordinance development.

Texas has demonstrated that it has enforceable policies and mechanisms in place to ensure the implementation of the new development management measure. More information on these

policies as well as the ways in which the State will track management measure implementation are summarized at the end of the watershed protection section.

Existing Development

The purpose of the existing development management measure is to protect and improve surface water quality by the development and implementation of watershed management programs. States are expected to develop and implement watershed management programs to reduce runoff pollutant concentrations and volumes from existing development. These programs should pursue the following objectives: (1) identify priority local and/or regional watershed pollutant reduction opportunities, e.g., improvements to existing urban runoff control structures; (2) contain a schedule for implementing appropriate controls; (3) limit destruction of natural conveyance systems; and (4) where appropriate, preserve, enhance, or establish buffers along surface waterbodies and their tributaries. Similar to the new development management measure, NOAA and EPA's 2002 *Policy Clarification on Overlap of 6217 Coastal Nonpoint Programs with Phase I and II Storm Water Regulations*, clarifies that coastal nonpoint programs need not address the existing development management measures in Phase I and II NPDES MS4 communities.⁴

Outside of designated MS4 communities (that are currently subject to enforceable requirements under NPDES permits), Texas addresses the first two objectives of this management measure by committing to partner with the 11 most rapidly growing communities in the coastal nonpoint management area to develop retrofit plans based on guidance outlined in the State's stormwater guidebook. The stormwater guidebook includes an eight-step retrofit planning process that calls for the identification of opportunities to retrofit existing development(s), evaluation and ranking of alternatives against predetermined criteria such as pollutant reduction requirements, best management practice (BMP) feasibility and performance, impervious cover disconnection, cost, visibility, property ownership and community support, and selection of projects that maximize pollution management per dollar spent. The guidebook also provides information on how to implement and maintain the retrofit projects that are selected. Potential retrofit practices described in this manual include upgrades to existing detention basins, as well as options for downtown redevelopment projects such as bioretention practices and pervious pavers.

The stormwater guidebook also promotes practices that address the remaining objectives of this measure (i.e., limit the destruction of natural conveyances and preserve, enhance and restore buffers along surface waters). For example, chapter 4 contains performance standards and design approaches for new development and redevelopment projects. The guidebook's performance standards provide for a minimum 25-foot buffer of undisturbed vegetation around water bodies including tidal waters, coastal marshlands, wetlands, depression storage basins and creeks that drain areas that are greater than 40 acres in size. The performance standards also recommend that developers minimize the number of crossings through these buffer zone areas. As explained in the New Development section above, the guidebook recommends implementation of a model ordinance that would require new development and redevelopment projects to meet these performance standards.

⁴ NOAA and EPA. 2002. *Policy Clarification on Overlap of 6217 Coastal Nonpoint Programs with Phase I and II Storm Water Regulations*. Accessed 12/10/2019.

https://coast.noaa.gov/czm/pollutioncontrol/media/NPDES_CZARA_Policy_Memo.pdf

In January 2021, Texas GLO launched a \$1M effort to improve nonpoint source pollution management in the coastal zone called Clean Coast Texas. One of the major focuses of this program is providing technical guidance and retrofit planning assistance. To aid with implementation, GLO partnered with Texas Sea Grant, AgriLife's Texas Community Watershed Partners, and Texas State University's Meadows Center for Water and the Environment. Clean Coast Texas initiated a monthly learning one-hour workshop, called Lunch and Learn to highlight important water quality topics in an easily accessible format. Clean Coast Texas also hosted two introductory workshops to share information about resources and invite collaboration with coastal jurisdictions.

The State's efforts to develop and implement Watershed Protection and Total Maximum Daily Load (TMDL) Implementation Plans further support the implementation of the existing development management measure. As of January 2021, there are ten Watershed Protection Plans (WPPs) and 13 TMDL Implementation Plans in effect within the coastal nonpoint management area. An additional eight WPPs and six TMDL Implementation Plans are under development. These plans apply to 1.5 million acres and cover approximately 30 percent of the coastal nonpoint management area. Where polluted runoff from urban areas has been identified as a problem within these watersheds, these plans include priority projects to reduce nonpoint source pollution from urban areas. Example retrofit projects from the 2017 Update to the Arroyo Colorado Watershed Protection Plan include the construction of a rainwater harvesting system, green roofs, pervious walking trails, pervious service road and parking surfaces, and a treatment wetland with native and riparian plantings. Texas has committed to continuing to have a leadership role in the development and implementation of Watershed Protection and TMDL Implementation Plans to help prioritize, schedule, and obtain funds to implement retrofit projects. The State will also coordinate with the responsible parties for these plans and share the *Guidance for Sustainable Stormwater Drainage on the Texas Coast*⁵ to encourage best practices when planning and implementing priority retrofit projects.

Texas has demonstrated that it has enforceable policies and mechanisms in place to ensure the implementation of the existing development management measure. More information on these policies as well as the ways in which the State will track management measure implementation are summarized at the end of the watershed protection section.

B. SITE DEVELOPMENT

2003 FINDING: The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to prevent nonpoint source pollution and require implementation of management measures, as necessary, but has not adequately described its voluntary or incentive-based programs the State will use to encourage implementation of the site development management measure, the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the existing enforcement authorities where necessary.

⁵ Texas GLO. 2019. *Guidance for Sustainable Stormwater Drainage on the Texas Coast*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/04/sw-manual-03302020.pdf>

2003 CONDITION: Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for site development. Within two years, Texas will provide an adequate description of the voluntary or incentive-based programs the State will use to encourage implementation of the site development management measure, the mechanism or process linking the implementing agency with the enforcement agency, and the commitment to use the existing enforcement authorities where necessary.

2021 PROPOSED DECISION: Texas has satisfied its condition.

RATIONALE: Texas addresses its condition for the site development management measure by developing a strategy to encourage the voluntary adoption of the State’s 2019 stormwater guidebook, *Guidance for Sustainable Stormwater Drainage on the Texas Coast*.⁶ This stormwater guidebook includes sustainable site design techniques, incentives, and a model ordinance that are in conformity with the site development management measure. As described in the new development section above, the State has developed a comprehensive strategy to encourage adoption of the guidebook in 11 targeted communities, as well as other communities across the coastal nonpoint management area. The guidebook contains a model ordinance which, if adopted by municipalities, would make compliance with performance standards required components of a development permit.

The goal of the site development management measure is to reduce the generation of nonpoint source pollution and to mitigate the impacts of urban runoff and associated pollutants from all site development. These controls and policies are necessary to ensure that development occurs so that nonpoint source concerns are incorporated during the site selection and the project design and review phases and are intended to apply to individual sites rather than watershed basins or regional drainage basins. Specifically, this management measure requires the sites be planned, designed, and developed to:

- (1) Protect areas that provide water quality benefits and/or are susceptible to erosion and sediment loss;
- (2) Limit increases of impervious areas, except where necessary;
- (3) Limit land disturbance activities such as clearing and grading and cut and fill to reduce erosion and sediment loss; and
- (4) Limit disturbance of natural drainage features and vegetation.

Elements 1, 2 and 3 of the site development management measure are addressed by Chapter 2 of the State’s stormwater guidebook. The chapter contains recommendations that development sites “be located to avoid sensitive resources such as floodplains, erodible soils, wetlands, mature forests and critical habitat areas” and that buildings, roadways, and parking areas “be located to fit the terrain and in areas that will create the least impact.” A site assessment process also is promoted to assist developers or site designers in the identification of sensitive areas for preservation. To limit erosion and sediment loss due to land disturbance, the chapter also contains recommendations that “methods to minimize disturbance should be used to limit the amount of clearing and grading that takes place on a development site.”

⁶ Texas GLO. 2019. *Guidance for Sustainable Stormwater Drainage on the Texas Coast*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/04/sw-manual-03302020.pdf>

In addition, Chapter 2 contains recommendations for the use of conservation design techniques to limit impervious surface area creation. Such practices include the elimination of dead ends and cul-de-sacs, placement of sidewalks on only one side of the street, shared driveways, and specification of maximum numbers of parking spaces vs minimum numbers. The stormwater guidebook also contains recommendations for incentives for homebuilders to minimize impervious areas in development projects. As described in the new development section of this document, if homebuilders are able to design the development to be under the specified impervious surface cover thresholds and meet other design requirements, developments are assumed to have met the requisite stormwater performance standards and the developer is therefore avoids the more costly structural onsite practices to control and treat post-construction runoff for water quality purposes, such as constructing extended detention wetponds.

Element 4 of the management measure is addressed by the buffer zone recommendations contained in the State's stormwater guidebook. The guidebook contains recommendations that a 25-foot buffer zone of undisturbed vegetation be preserved around all water bodies and includes provisions for the protection of buffer zones in the model ordinance.

Texas has demonstrated that it has enforceable policies and mechanisms in place to ensure the implementation of the site development management measure, specifically that the Texas Commission on Environmental Quality⁷ (TCEQ) has backup enforcement authorities and has committed to exercise them as necessary to ensure implementation of the voluntary, incentive-based program upon which Texas relies to meet the site development approval decision. More information on these policies as well as the ways in which the State will track management measure implementation are summarized at the end of the watershed protection section.

C. WATERSHED PROTECTION

2003 FINDING: The Texas program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to prevent nonpoint source pollution and require implementation of management measures, as necessary, but has not adequately described its voluntary or incentive-based programs the State will use to encourage implementation of the watershed protection management measure, the mechanism or process linking the implementing agency with the enforcement agency, and its commitment to use the existing enforcement authorities where necessary.

2003 CONDITION: Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for watershed protection. Within two years, Texas will provide an adequate description of the voluntary or incentive-based programs the State will use to encourage implementation of the watershed protection management measure, the mechanism or process linking the implementing agency with the enforcement agency, and the commitment to use the existing enforcement authorities where necessary.

⁷Texas provided a revised legal opinion in September 2002. That legal opinion referred to the Texas Natural Resource Conservation Commission's authority to implement and enforce the Texas Water Code. Effective January 1, 2004, the Texas Natural Resource Conservation Commission changed its name, and all the powers, duties, rights, and obligations were transferred to the Texas Commission on Environmental Quality, as required by House Bill 2912, Section 18.01(a), 77th Legislature, 2001.

2021 PROPOSED DECISION: Texas has satisfied its condition.

RATIONALE: Texas addresses elements 1 and 2 of the watershed protection management measure by protecting its most sensitive coastal lands from development through a variety of mechanisms. Texas has already protected nearly 1.6 million acres of land from development through the establishment of parks and wildlife preserves. Another 1.5 million acres are managed by WPPs and TMDL implementation plans that are either complete or under development, with more areas to be protected under these mechanisms expected over time. Texas also coordinates with public, private, and non-governmental organizations to acquire and conserve sensitive areas, such as lands susceptible to erosion and sediment loss and which are important to water quality and habitat. For example, the Powder Horn Ranch project protected 17,351 acres of marshes, grasslands, and woodlands with over 11 miles of tidal bay frontage through land acquisition. In addition, the Falcon Point Ranch Conservation and Wetland Restoration Project conserved 600 acres of habitat for a variety of shorebirds and waterfowl, including the endangered whooping crane. This project also mitigated the negative impacts of planned development and is being coordinated with the implementation of the *Texas Coastal Resiliency Master Plan*.

The purpose of the watershed protection management measure is to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants that result from new development or redevelopment, including the construction of new and relocated roads, highways, and bridges. The measure is intended to provide general goals for States and local governments to use in developing comprehensive programs for guiding future development and land use activities in a manner to prevent and mitigate the adverse effects of nonpoint source pollution. Specifically, this management measure directs states to develop a watershed protection program to:

- (1) Avoid conversion of areas that are susceptible to erosion and sediment loss;
- (2) Preserve areas that provide important water quality or habitat benefits; and
- (3) Develop sites to protect waterbodies and natural drainage systems.

Texas addresses its condition for the watershed protection management measure through a variety of voluntary plans, projects, and programs. These include the *Texas Coastal Resiliency Master Plan*,⁸ its land acquisition program, and a targeted strategy to encourage the voluntary adoption of the State's 2019 *Guidance for Sustainable Stormwater Drainage on the Texas Coast*⁹ by the 11 most rapidly developing non-MS4 communities in the coastal nonpoint management area.

The State's *Coastal Resiliency Master Plan*¹⁰ further addresses elements 1 and 2 of the watershed protection management measure. The first iteration of the *Texas Coastal Resiliency*

⁸ Texas GLO. 2019. *Texas Coastal Resiliency Master Plan*. Accessed 12/10/2019.
<https://coastalstudy.texas.gov/resources/files/2019-coastal-master-plan.pdf>

⁹ Texas GLO. 2019. *Guidance for Sustainable Stormwater Drainage on the Texas Coast*. Accessed 04/08/2020.
<https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/04/sw-manual-03302020.pdf>

¹⁰ Texas GLO. 2019. *Texas Coastal Resiliency Master Plan*. Accessed 12/10/2019.
<https://coastalstudy.texas.gov/resources/files/2019-coastal-master-plan.pdf>

Master Plan was published in 2017. It was designed to highlight the value of the Texas coast, its resources, and issues of concern that endanger coastal communities, such as storm surge, flooding, erosion, habitat loss, and water quality degradation. The 2017 Master Plan¹¹ recommended funding 63 nature-based projects to mitigate these issues of concern. Several potential projects were designed to avoid conversion of areas that are particularly susceptible to erosion and/or preserve areas that provide important water quality and habitat benefits. Seven of these projects have been implemented so far. For example, the Sweetwater Preserve Expansion project resulted in the acquisition of 275 acres on Galveston Island to preserve coastal grasslands, brackish estuarine wetlands, salt barrens and salt flats. In addition, the Pierce Marsh Living Shoreline project benefited 2,000 acres of estuarine wetlands by installing over one mile of bay shoreline protection in an area that is experiencing high rates of estuarine wetland degradation due to continued developments in the surrounding areas. This project was intended to reduce erosion of the existing wetlands and provide potential foraging habitat for migrating birds.

A second iteration of the Master Plan, updated in 2019, has a slightly broader scope to address both the natural and built environment as they pertain to resiliency for coastal communities. It recommends 123 projects that mitigate the aforementioned issues of concern and increase long-term resiliency. Approximately 20 recommended projects aim to protect or restore coastal areas that provide water quality or habitat benefits from future development. For example, the East and West Galveston Bay Watershed, Wetlands, and Habitat Conservation project would protect approximately 5,000 acres of coastal wetlands and other natural areas critical to water quality and habitat protection through conservation easements, purchase of development, and land acquisition. This project would protect some of the remaining open space in the Houston-Galveston region. In addition, the Greater Armand Bayou Preservation project would allow for land acquisition and prairie preservation in the Greater Armand Bayou, a 13-mile estuarine stream in a predominantly urban and suburban watershed. This project would improve water quality, mitigate flooding, and provide habitat protection. Finally, the Dollar Bay Wetland Creation, Restoration, and Acquisition project would construct marsh terraces, living shorelines, and acquire 100 acres of coastal prairie habitat that is in immediate threat of development. This project would protect the overall ecological health of the area by preventing wetland fragmentation and provide shoreline protection. To advance the implementation of the *Texas Coastal Resiliency Master Plan*, the State has committed to continuing to lead efforts to seek out funding for priority projects.

Texas addresses element 3 of the watershed protection management measure through its voluntary stormwater guidebook. Specifically, Chapter 2 contains descriptions of sustainable site design principles and planning tools, such as buffer zones and conservation design that can be used to protect the conservation areas identified through the site assessment process (see the site development management measure for more information). In addition, Chapter 4, which contains descriptions of performance standards and design approaches, also recommends that a minimum of a 25-foot buffer zone of undisturbed vegetation be preserved around all water bodies. This recommendation is supported by the guidebook's model ordinance that requires applicable new development and redevelopment projects to create buffer zones around all tidal waters, coastal

¹¹ Texas GLO. 2017. *Texas Coastal Resiliency Master Plan*. Accessed 12/10/2019. <http://www.glo.texas.gov/coastal-grants/projects/files/Master-Plan.pdf>

marshlands, wetlands, and depressional storage basins, as well as creeks that drain areas that are greater than 40 acres in size.

Finally, the guidebook includes a stormwater credits system, described in more detail in the new development section, that incentivizes low impact development practices such as the preservation of natural areas, by encouraging homebuilders to reduce the size of costly structural stormwater control measures when specific low impact development practices are implemented. This credit system is also in conformity with element 3 of the watershed protection management measure.

Texas has demonstrated that it has enforceable policies and mechanisms in place to ensure the implementation of the watershed protection management measure, specifically that TCEQ has backup enforcement authorities and has committed to exercise them as necessary to ensure implementation of the voluntary program upon which Texas relies to meet the watershed protection-related approval condition. More information on these policies as well as the ways in which the State will track management measure implementation are summarized at the end of this section.

Enforceable Policies and Mechanisms for New Development, Existing Development, Site Development and Watershed Protection

Texas has provided a legal opinion demonstrating that Sections 26.121, 26.177, 26.011, and 5.103, as well as chapter 7, of the Texas Water Code provides TCEQ¹² with adequate legal authority for the State to ensure the implementation of the 6217(g) urban management measures throughout the coastal nonpoint management area, as needed. This includes the management measures for new development, existing development, watershed protection, and site development. The State has described the mechanisms that link the implementing agency GLO with the enforcing agency TCEQ and is committed to using chapters 5, 7, and 26 of the Texas Water Code to implement the 6217(g) management measures, when needed.

Texas has developed a strategy to track and evaluate voluntary implementation of these urban management measures. Under the strategy, GLO coordinates with the 11 target communities annually to assess voluntary adoption of the stormwater guidebook and prepare a report every five years to document progress, identify communities that may require additional technical assistance, and track voluntary implementation of the management measures that has been supported through other programs such as the CWA Section 319 Nonpoint Source Program and the Texas Coastal Management Program. Texas will use existing systems, such as the Texas Coastal Coordination Advisory Committee's Water Resources Committee, administered by GLO's Coastal Management Program, to track and coordinate projects carried out to implement the management measures by networked agencies such as the Texas Parks and Wildlife Department (TPWD) and the Railroad Commission of Texas. The networked agencies will report projects annually which GLO will compile. Texas has an active database to further track

¹² Texas provided a revised legal opinion in September 2002. That legal opinion referred to the Texas Natural Resource Conservation Commission's authority to implement and enforce the Texas Water Code. Effective January 1, 2004, the Texas Natural Resource Conservation Commission changed its name, and all the powers, duties, rights, and obligations were transferred to the Texas Commission on Environmental Quality, as required by House Bill 2912, Section 18.01(a), 77th Legislature, 2001.

implementation of the WPPs and TMDL Plans within the coastal nonpoint management area, and is updated regularly, most recently in 2019. Although this tracking system and database are not publicly available, summaries of this information are included in the State's NPS Program Annual Reports and the State provides a more detailed reporting of implementation every five years in its Nonpoint Source Management Program Plan. In addition, TCEQ developed a new NPS project web viewer which visually shows the WPPs being implemented.¹³ A new layer to show BMP implementation is under development and is due to be completed by the end of December 2021. Texas GLO has also committed to developing a system to track implementation of the *Texas Coastal Resiliency Master Plan* and its land acquisition program within the coastal nonpoint management area. Texas GLO will also produce an annual progress report for the *Texas Coastal Resiliency Master Plan* annually and will prepare progress reports every five years to summarize land acquisition and conservation accomplishments.

E. NEW AND OPERATING ONSITE DISPOSAL SYSTEMS (OSDS)

2003 FINDING: The Texas program includes management measures in conformity with the 6217(g) guidance except it does not include a measure for 1) inspecting OSDS at a frequency adequate to ascertain whether OSDS are failing or 2) replacing or upgrading OSDS near nitrogen-limited surface waters. The State's program includes enforceable policies and mechanisms to ensure implementation throughout the management area.

2003 CONDITION: Within two years, Texas will include in its program management measures for inspection of existing OSDS and replacing or upgrading OSDS near nitrogen-limited surface waters in conformity with the 6217(g) guidance.

2021 PROPOSED DECISION: Texas has satisfied these conditions.

RATIONALE: Texas relies on a multi-pronged approach for inspecting operating OSDS at a frequency to ascertain whether OSDS are failing. The State has also developed a process for encouraging the replacement or upgrade of operating OSDS with denitrifying systems that relies on targeted outreach to priority areas where OSDS may be contributing to nitrogen loadings.

Operating OSDS

For operating OSDS, the 6217(g) guidance requires states to:

- (1) Establish and implement policies and systems to ensure that existing OSDS are operated and maintained to prevent the discharge of pollutants;
- (2) Inspect OSDS at a frequency to ascertain whether OSDS are failing; and
- (3) Where conditions indicate that nitrogen-limited surface waters may be adversely affected by groundwater nitrogen loadings from OSDS and where nitrogen loadings from OSDS are delivered to groundwater that is closely hydrologically connected to surface water, consider replacing or upgrading OSDS to treat influent so that total nitrogen loadings are reduced by 50 percent.

¹³ Texas Commission on Environmental Quality. Nonpoint Source Project Viewer. Accessed 07/14/2021. <https://tceq.maps.arcgis.com/home/item.html?id=8a9549c92da0426e828b32deb7c7d4aa>

Texas has met the first element of this measure, as documented in NOAA and EPA's 2003 findings for the Texas Coastal Nonpoint Program.¹⁴ With regard to the second element of this measure, Texas has developed a multi-pronged strategy for inspecting a significant majority of the roughly 56,000 OSDS in the coastal nonpoint management area. About an additional 7,100 OSDS in the coastal nonpoint management area are exempted from this measure because all three of the following criteria are met:

- treats wastewater from a single-family home;
- sited where density is less than or equal to one OSDS per 20 acres; and
- sited at least 1,250 feet from surface waters.

The State's multi-pronged approach to satisfying the second element relies on the following categories of OSDS inspections:

- Point-of-sale real estate inspections;
- OSDS inspections associated with watershed-based plans;
- Maintenance inspections resulting from regulations;
- Complaint-based inspections by authorized agents; and
- Section 319-funded OSDS inspections by licensed contractors in other priority areas.

The State has calculated anticipated inspection rates for operating OSDS for each category and extrapolated inspection totals over a 15-year implementation period based on the overall strategy. Texas relies on a direct enforceable authority, Title 30 of the Texas Administrative Code, Chapter 285, to provide a comprehensive regulatory program for OSDS management, as prescribed by the Texas Health and Safety Code (THSC), Chapter 366. Subchapter G of this chapter covers OSDS enforcement. The State's plan for tracking progress of these inspections by category does so with five-year milestones. For example, Texas determines the number of inspections from local authorized agents annually and works with the real estate community to obtain the number of OSDS inspections related to home sales each year. Texas employs adaptive management of the strategies to achieve the targeted total number of targeted inspections. Highlights of this strategy are provided in the paragraphs that follow.

With regard to point-of-sale real estate inspections, Texas estimates that operating OSDS are currently being inspected for at least 85 percent of all the homes being sold that are served by OSDS. The State has seen a trend among lenders to increase such requirements and greater awareness and acceptance by agents of the importance of such inspections. Importantly, the surveys revealed strong encouragement from real estate agents to have such inspections during home sales has played a key role in this success. Based on home sale and OSDS data, Texas estimates that nearly 21,000 operating OSDS in the coastal nonpoint management area will be inspected as a result of home sales over the next 15 years. This estimate is based on reasonable extrapolation from surveys of members of the Board of Realtors in four key communities across the coastal nonpoint management area (Beaumont-Port Arthur, Corpus Christi, Rockport and Brownsville-Harlingen), which were funded by TCEQ, in collaboration with the GLO. The surveys, based on 2015 home sale data, revealed that 92 percent of homes served by decentralized wastewater treatment systems in those communities had those systems inspected as part of the property transfer process. The estimate of OSDS inspections for 85 percent of OSDS-

¹⁴ NOAA and EPA. 2003. *Texas Coastal Nonpoint Program Findings and Conditions*. Accessed 2/10/2020. https://coast.noaa.gov/data/czm/pollutioncontrol/media/6217tx_fnl.pdf.

served home sales over 15 years accounts for the possibility that the surveyed communities are not fully representative of other non-sewered homes.

With regard to OSDS inspections associated with watershed-based plans, Texas has a strategy for targeting inspections of operating OSDS where they are likely contributing to water quality problems through implementation of nine-element WPPs and TMDLs for water bodies with bacteria impairments. Texas estimates that there are approximately 19,200 OSDS located within such watershed-based plan areas, which accounts for roughly a third of the non-exempt OSDS in the State's coastal nonpoint management area. As of January 2021, this area is covered by portions of 10 EPA-accepted WPPs, with eight additional plans under development, and more expected in the future. Development and implementation of these plans are eligible for Clean Water Act Section 319 grant funding. Also, there are 13 TMDL implementation plans (which TCEQ refers to as I-Plans) completed and in various stages of implementation, with 6 more being developed. Some of these I-Plans will be further developed into WPPs, and thus become eligible for Section 319 funding. As a rule, OSDS identification and remediation are included in the pollutant sources identification process in both WPP and I-Plan development. In fiscal years 2017-2020, Texas has funded nine watershed plan implementation projects to remediate OSDS in the management area with Section 319 grants. The targeting approach relies on a two-tier prioritization scheme to better direct resources; Tier 1 (higher priority) targets OSDS installed prior to 1997 and within 1,250 feet of a water body, with the remainder of systems designated as Tier 2. These targeted systems are inspected, and if needed, repaired, replaced or upgraded. Texas has developed a plan that uses Section 319 funds to incentivize OSDS inspections by registered septage haulers by offering free tank pump-outs to homeowners who allow their OSDS to be inspected. Texas has committed to implementing this plan over a 15-year period and estimates that this approach will result in inspecting at least 90 percent of non-exempted OSDS in these targeted watersheds during that period.

With regard to maintenance inspections resulting from regulations, Chapter 366 of the THSC authorizes a local government to regulate the use of OSDS in its jurisdiction and implement enforceable regulatory requirements for OSDS maintenance. These requirements obligate local governments to minimize OSDS failures under normal conditions and to ensure that nuisance conditions are identified and corrected. In addition, 13 of the 18 counties in the coastal nonpoint management area have requirements for OSDS that go beyond the state minimum in some fashion. For example, many counties require aerobic treatment units (ATUs) to be inspected by registered, certified maintenance providers or require homeowners to complete and pass a training course in ATU maintenance. Some counties require reporting of ATU maintenance for the lifetime of the system. In these counties, maintenance is currently being reported for an estimated 3,908 permitted ATUs. That number is expected to grow to approximately 5,000 ATUs over the 15-year implementation period. In all, Texas estimates that there are 21,394 ATUs in the coastal nonpoint management area, of which an estimated 54 percent are under maintenance contracts. Currently, THSC Chapter 366 Section 285.7 requires maintenance of ATUs, either through maintenance contracts or directly by homeowners. Complaint-based inspections of OSDS by authorized agents of the State (i.e., county health departments) occur, for the most part, beyond what is described in the other strategy prongs. In 2017, authorized agents performed 416 such inspections across the coastal nonpoint management area, which Texas attests is a typical pace. Therefore, over the 15-year implementation period, Texas estimates that an additional 6,240 OSDS will be inspected.

Additionally, Texas has committed to setting aside \$100,000 of its Section 319 grant funds, which will be matched locally by 40 percent of the overall funding (\$166,667), each year for 15 years to perform about another 950 OSDS inspections. These inspections are in addition to inspections covered by other prongs in the State's strategy and will prioritize inspections in sensitive areas that are critical to protecting water quality and human health.

Outreach and education are strong components of the State's strategy for addressing this management measure element, affecting all categories of inspections other than complaint-based inspections. For example, to encourage OSDS inspections associated with watershed-based plans, Texas is funding workshops on OSDS maintenance for homeowners in targeted portions of each priority watershed and, as noted above, has incentivized inspections. Texas is also designing an outreach strategy specifically to work with the real estate community to further encourage point-of-sale OSDS inspections. As part of its multifaceted outreach strategy, Texas will include special consideration for homes and businesses served by ATUs older than two years of age that are not under maintenance service agreements.

With regard to the third element of this measure, Texas has demonstrated that it has processes in place to consider the use of denitrification systems in nitrogen-limited waters. First, in the absence of having numeric criteria for water quality impairments from nutrients, Texas has applied a nitrogen-to-phosphorus ratio technique, which is supported by the scientific literature, to identify 14 waterbodies that are most likely to be nitrogen-limited. For OSDS that are closely hydrologically connected to those water bodies, Texas will consider replacing or upgrading them with technologies that reduce nitrogen loads by at least 50 percent. Among those waterbodies, Texas has a strategy for targeting the highest priority areas by applying its established watershed action planning process to determine where and how this will occur. Where nitrogen loadings from OSDS are an issue in these 14 basins, the process will provide for public forums to engage stakeholders in opportunities to upgrade their systems. Texas has identified CWA Section 319 grants and the Resources and Ecosystems Sustainability, Tourist Opportunities and Revived Economies of the Gulf Coast States Act of 2012 (RESTORE Act) as potential funding sources for such replacements and upgrades.

H. ROADS, HIGHWAYS, AND BRIDGES - MANAGEMENT MEASURES FOR PLANNING, SITING, AND DEVELOPING ROADS AND HIGHWAYS; BRIDGES; OPERATION AND MAINTENANCE; AND RUNOFF SYSTEMS

2003 FINDING: The Texas program includes management measures in conformity with the 6217(g) guidance only for roads, highways, and bridges under Texas Department of Transportation (TxDOT) jurisdiction. Texas has provided a legal opinion that the State has authority to prevent nonpoint source pollution and require implementation of management measures, as necessary; a description of the voluntary or incentive-based programs the State will use to encourage implementation of the roads, highways and bridges management measures; a description of the mechanism or process linking the implementing agency with the enforcement agency; and a commitment to use the enforcement authority where necessary. Texas is not required to include the Road, Highway, and Bridge Operation and Maintenance and Runoff Systems Management Measures for any road, highway and bridge operation and maintenance and road, highway and bridge runoff systems in urbanized areas subject to Phase I or Phase II NPDES MS4 permits.

2003 CONDITION: Within two years, Texas will include in its program management measures in conformity with the 6217(g) guidance for roads, highways and bridges outside of TxDOT jurisdiction.

2021 PROPOSED DECISION: Texas has satisfied its condition.

RATIONALE: Texas has addressed its conditions for the roads, highways, and bridges management measures by developing a strategy to encourage the voluntary adoption of the State's 2019 *Guidance for Roads, Highways, and Bridges* and *Guidance for Sustainable Drainage on the Texas Coast*, and participation in TxDOT or equivalent training.¹⁵ These resources contain descriptions of practices that are in conformity with the 6217(g) management measures for planning, siting, and developing roads and highways, bridges, operation and maintenance, and runoff systems. Regulatory requirements, such as Texas' Section 401 certification process, further support the implementation of elements of the management measure for planning, siting, and developing road and highways as well as the management measure for bridges. Texas has also committed to working with the 11 most rapidly growing non-MS4 communities to develop retrofit plans to address priority runoff problems from roadways to further support the runoff systems management measure.

In December 2002, NOAA and EPA issued a policy clarification stating that state coastal nonpoint programs need not address the road, highway and bridge operation and maintenance and runoff systems management measures within Phase I and II designated areas on the basis that these management measures are implemented by municipalities under NPDES permits for MS4s. According to Section 6217 program guidance, once a source is covered by a NPDES permit, it is excluded from 6217 requirements. Therefore, by implementing the Phase I and II programs, Texas has met the conditions for the road, highway, and bridge operation and maintenance and runoff systems measures within its Phase I and II communities.^{16,17} Within the Texas coastal nonpoint management area, 38 communities within nine counties are designated Phase I or Phase II MS4 communities. Furthermore, as stated in NOAA and EPA's 2003 conditional approval findings, Texas has satisfied the roads, highways and bridges management measures for roads and bridges under TxDOT jurisdiction. Six of the 18 counties within the coastal nonpoint management area have adopted the TxDOT standards, or their equivalents, and have satisfied the roads, highways, and bridges management measures as a result. All but 14 percent of the non-exempt roadways are under TxDOT jurisdiction or are managed locally to equivalent standards.

The 12 remaining counties contain non-exempted roadways and bridges outside of TxDOT jurisdiction (i.e., off-system) and have not adopted TxDOT or equivalent design standards.

¹⁵ Texas GLO. 2019. *Guidance for Sustainable Stormwater Drainage on the Texas Coast*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/04/sw-manual-03302020.pdf>

¹⁶ NOAA and EPA. *Coastal Nonpoint Pollution Control Program: Program Development and Approval Guidance*. January 1993 (Appendix B: National Pollutant Elimination System). Accessed 08/19/2020. <https://coast.noaa.gov/data/czm/pollutioncontrol/media/6217progguidance.pdf>

¹⁷ NOAA and EPA. 2002. *Policy Clarification on Overlap of 6217 Coastal Nonpoint Programs with Phase I and II Storm Water Regulations*. https://coast.noaa.gov/czm/pollutioncontrol/media/NPDES_CZARA_Policy_Memo.pdf

However, six of those 12 counties (Brazoria, Galveston, Harris, Kleberg, Refugio, and San Patricio) are managed by county staff who have received TxDOT, or equivalent, training. As part of the State's voluntary strategy to promote TxDOT, or equivalent, training opportunities to county road managers, Texas has targeted its voluntary implementation strategy to the remaining six counties (Aransas, Calhoun, Jackson, Jefferson, Victoria, and Willacy) whose staff have not yet attended TxDOT, or equivalent, training. The off-system roads that are outside of MS4 areas in these six counties comprise just seven percent of the roadways and approximately two percent of the bridges within the coastal nonpoint management areas.

The off-system roadways addressed via the State's voluntary strategy are almost exclusively rural, county roads. Many are unpaved and are typically narrower than TxDOT-managed roadways, so not all TxDOT-design standards are applicable. In addition, the physical characteristics of the Texas coastal nonpoint management area require that county employees incorporate some low impact development techniques into the design of off-system roadways. As a result, these roadways typically have minimal impacts on water quality. For example, Texas' coastal counties exhibit very low relief, with all but three counties having slopes less than 0.1 percent. This slope is smaller by a factor of 10 than the minimum slope recommended for the design of stormwater conveyance swales. As a result, extensive amounts of land disturbance activities, such as cut and fill, are not utilized for roadway projects in the coastal nonpoint management area. The exceedingly flat terrain of the coastal nonpoint management area also means that any runoff velocities are generally too low to develop significant erosion potential and that curb and gutter systems are rarely used. Consequently, road shoulders and channels serve as vegetated filter strips and swales and provide ample opportunities for runoff infiltration or evaporation.

Within the aforementioned six target counties, Texas addresses the management measures for planning, siting, and developing roads and highways; bridges; and operation and maintenance, primarily through its voluntary 2019 *Guidance for Roads, Highways, and Bridges*.¹⁸ This guidance manual was designed to provide communities in the coastal nonpoint management area with technical guidance on how to manage stormwater runoff from roads, highways, and bridges. Specific practices promoted through the guidebook that address the requirements of the management measures for planning, siting, and developing roads and highways, bridges, and operation and maintenance are described below. Texas further supports the implementation of these management measures by promoting training to county employees^{19,20,21,22} that is consistent with the management measures for planning, siting, and developing roads and highways, bridges, and operation and maintenance. Trainings offered by these entities are

¹⁸ Texas GLO. 2019. *Guidance for Roads, Highways, and Bridges*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/03/roads-highways-bridges-guidance-03302020.pdf>

¹⁹ University of Texas at Arlington. N.d. *TxDOT Environmental Management System*. Accessed 04/30/2020. https://www.dedtraining.com/ENV/online_courses.cfm?filter=TTS

²⁰ University of Texas at Arlington. N.d. *Course Schedule*. Accessed 04/30/2020. <https://webded.uta.edu/wconnect/SubGroup.awp?~~txd>

²¹ Texas Department of Transportation. N.d. *Local Government Project Procedures Training and Qualification - LGP 101*. Accessed 04/30/2020. <https://www.txdot.gov/government/programs/local-government-projects/training.html>

²² Texas A&M Engineering Extension Service. N.d. *Stormwater Qualified Person*. Accessed 04/30/2020. <https://teex.org/class/ENV247/>

available online and/or in-person, and address a variety of pertinent subjects, including: National Environmental Policy Act (NEPA) and transportation planning, rules and regulations protecting Texas' water resources, Section 404 compliance and construction, a non-technical overview of the highway development process, and an introduction to TxDOT's Local Government Project requirements.

To encourage voluntary adoption of the State's *Guidance for Roads, Highways, and Bridges*, Texas has developed a targeted education, outreach, and technical assistance program. Specifically, GLO has committed to distributing the guidance to its targeted coastal counties and providing technical assistance to encourage adoption. GLO has also committed to promoting TxDOT training opportunities. To broaden the reach of this voluntary guidance, GLO will also provide copies of the guidance to the county road department directors throughout the coastal nonpoint management area. In addition, GLO will contact officials from the six counties that adhere to TxDOT or equivalent standards at least once every four years to confirm that these standards are still being used. To promote training to county staff, the State has developed a webpage that consolidates information on TxDOT and Texas A&M Engineering Extension Service training opportunities.²³ Texas has committed to contacting relevant road department staff from these counties up to four times per year to promote training opportunities as well as the guidance manual.

Management Measure for Planning, Siting, and Developing Roads and Highways

The management measure for planning, siting, and developing roads and highways was written to reduce the generation of nonpoint source pollutants and to mitigate the impacts of urban runoff and associated pollutants from site development and land disturbing activities for new, relocated, and reconstructed roads and highways. To accomplish this end, the management measure requires that roads and highways be planned, sited, and developed to:

- (1) Protect areas that provide important water quality benefits or are particularly susceptible to erosion or sediment loss;
- (2) Limit land disturbance such as clearing and grading and cut and fill to reduce erosion and sediment loss; and
- (3) Limit disturbance of natural drainage features and vegetation.

Section A of the *Guidance for Roads, Highways, and Bridges*, describes practices that are consistent with this management measure.²⁴ Relevant practices include:

- Considering type and location of permanent erosion and sediment controls (e.g., vegetated filter strips, grassed swales, pond systems, infiltration systems, constructed urban runoff wetlands, and energy dissipaters and velocity controls) during the planning phase of roads, highway, and bridges.
- Assessing and establishing adequate setback distances near wetlands, waterbodies, and riparian areas to ensure protection from encroachment in the vicinity of these areas. Setback distances should be determined on a site-specific basis since several variables

²³ Texas Coastal Non-Point Source Pollution Program. N.d. *Training*. Accessed 04/30/2020. <http://txcoastalbmp.org/counties/>

²⁴ Texas GLO. 2019. *Guidance for Roads, Highways, and Bridges*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/03/roads-highways-bridges-guidance-03302020.pdf>

may be involved such as topography, soils, floodplains, cut-and-fill slopes, and design geometry.

- Avoiding locations requiring excessive cut and fill.
- Avoiding locations subject to subsidence, sink holes, landslides, rock outcroppings, and highly erodible soils.
- Sizing rights-of-way to include space for siting runoff pollution control structures as appropriate.

Management Measure for Bridges

The management measure for bridges aims to control erosion, streambed scouring, and surface runoff by requiring that runoff impacts on surface waters from bridge decks be assessed and that appropriate management and treatment measures be employed to protect critical habitats, wetlands, fisheries, shellfish beds, and domestic water supplies.

Section B of the State's *Guidance for Roads, Highways, and Bridges*, describes several practices that are in conformity with the 6217(g) management measure for bridges.²⁵ Example practices include:

- Coordinating design with Federal Highway Administration, United States Coast Guard, and other State and Federal agencies as appropriate.
- Reviewing National Environmental Policy Act requirements to ensure that environmental concerns are met.
- Avoiding highway locations requiring numerous river crossings.
- Directing pollutant loadings away from bridge decks by diverting runoff waters to land for treatment.
- Restricting the use of scupper drains on bridges less than 400 feet in length and on bridges crossing very sensitive ecosystems.
- Siting and designing new bridges to avoid sensitive ecosystems.
- On bridges with scupper drains, providing equivalent urban runoff treatment in terms of pollutant load reduction elsewhere on the project to compensate for the loading discharged off the bridge.

Further supporting the implementation of the planning, siting, and developing roads and highways management measure, as well as the management measure for bridges, is Texas' Section 401 certification process. When off-system road and bridge projects will result in the discharge of dredge material or fill to waters of the U.S., including wetlands, a Section 404 permit must be obtained from the U.S. Army Corps of Engineers (USACE). These Section 404 permits may not be issued unless TCEQ issues a Section 401 water quality certification verifying compliance with water quality requirements (or waives certification). For projects impacting less than three acres of waters of the U.S. or 1,500 linear feet of streams, TCEQ issues Tier 1 Certifications, which assume project compliance with State water quality requirements as long as pre-approved BMPs, such as constructed wetlands, extended retention basis, vegetative filter strips, grass swales, and vegetation-lined drainage ditches are included in the project.²⁶ Large

²⁵ Texas GLO. 2019. *Guidance for Roads, Highways, and Bridges*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/03/roads-highways-bridges-guidance-03302020.pdf>

²⁶ TCEQ. N.d. *Tier 1 401 Certification* (Website). Accessed 11/16/2020. https://www.tceq.texas.gov/permitting/401certification/401certification_tier1.html

projects or those that impact rare or ecologically significant wetland habitats are subject to additional scrutiny.²⁷ As a result of the Section 401 certification process, the State has the ability to ensure that road and bridge projects that impact waters of the U.S., including wetlands, do not have adverse impacts on water quality and protect rare and ecologically significant habitats.

Management Measure for Operation and Maintenance

The management measure for operation and maintenance is intended to ensure that pollutant loadings from roads, highways, and bridges are minimized by the development and implementation of a program and associated practices to ensure that sediment and toxic substance loadings from operation and maintenance activities do not impair coastal surface waters.

Section E of the State guidance for roads, highways, and bridges, describes several practices that are in conformity with the operation and maintenance management measure. Example practices include:

- Seeding and fertilizing, seeding and mulching, and/or sodding damaged vegetated areas and slopes.
- Establishing pesticide/herbicide use and nutrient management programs.
- Sweeping, vacuuming, and washing residential/urban streets and parking lots.
- Collecting and removing road debris.
- Regulating the application of deicing salts to prevent over-salting of pavement.
- Developing an inspection program to ensure that general maintenance is performed on urban runoff and NPS pollution control facilities.
- Ensuring that energy dissipaters and velocity controls to minimize runoff velocity and erosion are maintained.
- Using techniques such as suspended tarps, vacuums, or booms to reduce, to the extent practicable, the delivery to surface waters of pollutants used or generated during bridge maintenance (e.g., paint, solvents, scrapings).

Management Measure for Road, Highway, and Bridge Runoff Systems

This management measure requires that runoff systems include the development of retrofit projects, where needed, to collect nonpoint source pollutant loadings from existing, reconstructed, and rehabilitated roads, highways, and bridges. To address the requirements of the runoff systems management measure, Texas has committed to partnering with the 11 most rapidly growing non-MS4 communities in the coastal nonpoint management area to develop retrofit plans that will address water quality issues from existing development, including roads. More information on this targeted retrofit strategy is found in the existing development management measure section above. The State has outlined a voluntary retrofit planning process in its *Guidance for Sustainable Drainage on the Texas Coast*.²⁸ Related practices that are specific to the roads, highways, and bridges runoff systems management measure are described

²⁷ TCEQ. N.d. *401 Certification Reviews* (Website). Accessed 11/16/2020.
<https://www.tceq.texas.gov/permitting/401certification>

²⁸ Texas GLO. 2019. *Guidance for Sustainable Stormwater Drainage on the Texas Coast*. Accessed 04/08/2020.
<https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/04/sw-manual-03302020.pdf>

in Texas' *Guidance for Roads, Highways, and Bridges*.²⁹ Both the State's voluntary retrofit planning guidance and related practices are consistent with the runoff systems management measure.

The State has provided multiple examples of retrofit projects in the coastal nonpoint management area that are consistent with the management measure. For example, funding was obtained to enlarge two culverts under road FM-136 to improve the hydrological connectivity from Copano Bay and the Aransas river mouth to Egery Flats. This project will mitigate hypersaline conditions resulting from poor circulation and enhance marsh growth by enhancing circulation. In addition, funding was allocated to replace two pipe culverts with blocked/highly restricted flow, with four box culverts to improve circulation to Goose Lake.

Enforceable Policies and Mechanisms: Roads, Highways and Bridges

Texas has provided a legal opinion demonstrating that Sections 26.121, 26.177, 26.011, and 5.103, as well as chapter 7 of the Texas Water Code provide adequate legal authority for the State to ensure the implementation of the 6217(g) roads, highways, and bridges management measures throughout the coastal nonpoint management area, as needed. The State has described the mechanisms that link the implementing agencies (TxDOT and GLO) with the enforcing agency (TCEQ) and is committed to using chapters 5, 7, and 26 of the Texas Water Code to implement the 6217(g) management measures, including the roads, highways, and bridges management measures, when needed.

Texas has developed a strategy to track and evaluate voluntary implementation of these roads, highways, and bridges management measures. Texas will track voluntary adoption of its *Guidance for Roads, Highways, and Bridges* through existing agency tracking mechanisms. For example, TCEQ efforts will be tracked through the CWA Section 319 Nonpoint Source Program. Other networked agency activities that support implementation of the roads, highways and bridges management measures, including those of TxDOT, will be reported annually through the Texas Coastal Coordination Advisory Committee's Water Resources Committee, administered by GLO's Coastal Management Program. To track and evaluate voluntary participation in TxDOT training by employees of target counties, the State obtains participant data from TxDOT routinely.

II. HYDROMODIFICATION

2003 FINDING: Texas's program does not include management measures in conformity with the 6217(g) guidance. Texas has provided a legal opinion that the State has authority to prevent nonpoint source pollution and require implementation of management measures, as necessary; a description of the voluntary or incentive-based programs the State will use to encourage implementation of the hydromodification management measures;³⁰ a description of the mechanism or process linking the implementing agency with the enforcement agency; and a commitment to use the enforcement authority where necessary.

²⁹ Texas GLO. 2019. *Guidance for Roads, Highways, and Bridges*. Accessed 04/08/2020. <https://cpb-us-e1.wpmucdn.com/wp.txstate.edu/dist/4/2239/files/2020/03/roads-highways-bridges-guidance-03302020.pdf>

³⁰ Note: The original language of the 2003 Finding contained an error in referring to "agricultural management measures" instead of "hydromodification management measures". We have corrected the language in this document.

State coastal nonpoint pollution control programs are not required to include Erosion and Sediment Control and Chemical and Pollutant Control at Dams Management Measures because the NPDES storm water regulations for industrial activities on construction sites of one acre or greater apply nationwide and therefore throughout the coastal management areas of states and territories.

2003 CONDITION: Within two years, Texas will include in its program management measures that are in conformity with the 6217(g) guidance for hydromodification, other than the two dam management measures (see finding above).

2021 PROPOSED DECISION: Texas has satisfied its condition.

RATIONALE: For the management measures for channelization and channel modification and the measure for eroding streambanks and shorelines, Texas addresses its condition primarily through its strategy to encourage the voluntary adoption of hydromodification practices in conformity with the 6217 (g) guidance. The *Guidance for Sustainable Stormwater Drainage on the Texas Coast*³¹ (stormwater guidebook) includes a chapter on hydromodification that provides guidance consistent with the 6217(g) management measures for hydromodification. Other voluntary initiatives such as the *Texas Coastal Resiliency Master Plan* and Watershed Protection and TMDL Implementation Plans, as well as the State's land acquisition efforts and the Coastal Erosion Planning Response Act (CEPRA) program, further support the implementation of these management measures. For the management measure for protection of surface water quality and instream and riparian habitat (dams), the State addresses that condition through its water rights permitting process, as well as through voluntary adoption of its stormwater guidebook and implementation of watershed-based plans such as WPPs and TMDL Implementation Plans. Supporting details follow.

A. Management Measures for Channelization and Channel Modification (1. Physical and Chemical Characteristics of Surface Waters and 2. Instream and Riparian Habitat)

The purpose of the management measures for channelization and channel modification is to ensure that the planning process for new hydromodification projects addresses changes to physical and chemical characteristics of surface waters and instream and riparian habitat that may occur as a result of the proposed work. The channelization and channel modification management measures require states to:

- (1) Evaluate the potential effects of proposed channelization and channel modification on surface water quality and instream and riparian habitat;
- (2) Plan and design channelization and channel modification to reduce undesirable impacts; and
- (3) Develop an operation and maintenance program with specific timetables for existing modified channels that includes identification and implementation of opportunities to improve surface water quality and restore instream and riparian habitat.

³¹ See the new development section of this document for more information on the *Guidance for Sustainable Stormwater Drainage to the Texas Coast* and the State's technical assistance efforts surrounding the guidebook..

Texas addresses all three elements of the management measures for channelization and channel modification by encouraging the adoption of the State's stormwater guidebook. The hydromodification chapter in this guidebook describes several practices that are consistent with the management measures for channelization and channel modification. For example, the manual encourages users to:

- Use models/methodologies as one means to evaluate the effects of proposed channelization and channel modification projects on the physical and chemical characteristics of surface waters. Evaluate these effects as part of watershed plans, land use plans, and new development plans.
- Use models/methodologies (e.g., expert judgement and checklists, biological models/methods, habitat evaluation procedures, rapid bioassessment protocols, temperature predictions, index of biological integrity, and more) to evaluate the effects of proposed channelization and channel modification projects on instream and riparian habitat and to determine the effects after such projects are implemented.
- Identify and evaluate appropriate BMPs (e.g., streambed protection, levee protection, channel stabilization and flow restrictors, check dams, vegetative cover, instream sediment load control, non-eroding roadways, and setback levees and floodwalls) for use in the design of proposed channelization or channel modification projects or in the operation and maintenance program of existing projects. Identify and evaluate positive and negative impacts of selected BMPs and include costs.

Updates in the 2021 guidebook include performance standards and design approaches for riparian buffer zones around modified channels including: information on natural channel design, channel restoration, and dam removal and habitat protection; and guidance on preventing streambank and shoreline erosion and providing for operation and maintenance of modified channels and dams. It recommends routine maintenance of channelization structures including the preparation of a maintenance plan, annual inspections, and maintenance when necessary. The guidebook also identifies that evaluations of channelization and channel modification are to be conducted that consider the following:

- Existing conditions: Evaluate new and existing channelization and channel modification projects for potential impacts, both positive and negative, on existing stream and watershed conditions. The manual recommends evaluating site-specific conditions (e.g., flow rate, channel dimensions, surface water quality, slope) in conjunction with streamside conditions (e.g., vegetation type, slopes, riparian land use), as well as the existing characteristics of the watershed to establish baseline conditions.
- Potential conditions: Evaluate anticipated changes to baseline in-stream and riparian conditions so that potential changes caused by the project can be factored into its design and management.
- Watershed management: Evaluate changes in watershed conditions to ensure that channel modification and channelization projects are properly designed.

To encourage the voluntary adoption of these practices and recommendations, Texas distributes the guidebook with the added hydromodification guidance³³ to 48 MS4 and 40 non-MS4 communities in the coastal nonpoint management area (as noted in the Urban section of this document), relevant county road departments, and the Association of Water Board Directors. The State will also partner with 11 non-MS4 communities in the coastal nonpoint management

area that are expected to experience significant growth over the next 15 years to encourage voluntary adoption of the guidebook's recommendations, including those for hydromodification. This strategy will also be leveraged to support the voluntary implementation of the management measure for the protection of water quality and instream and riparian habitat (dams) as well as the management measure for eroding streambanks and shorelines. Lastly, Texas will work with the 11 targeted communities to identify restoration opportunities for existing modified channels, as needed, when they develop retrofit plans based on the stormwater manual.

Texas further addresses element three of the management measures for channelization and channel modification through its 2019 *Coastal Resiliency Master Plan*.³² Although this plan does not explicitly mention hydromodification, three of the eight coastal issues of concern addressed through this plan align with the objectives of the management measures for channelization and channel modification. Specifically, the plan seeks to address altered, degraded or lost habitat; impacts on water quality and quantity; and impacts on coastal resources. Projects recommended for implementation through this plan were screened and prioritized through parallel processes conducted by a technical advisory committee, which included local, state, and federal experts, and the GLO planning team.³³ This process resulted in the selection of 123 high priority projects.

Multiple priority projects included in the plan will improve water quality and/or instream and riparian habitat in existing modified channels, if implemented. One example is the Salt Bayou Siphons project which restores wetlands that have been degraded by the Gulf Intracoastal Waterway (GIWW). Through this project, siphons will be installed in the Salt Bayou system to restore a hydrologic connection between the freshwater wetland systems on the north and south sides of the GIWW, thereby revitalizing the wetlands south of the GIWW. Another example is the Brazos and San Bernard River Restoration Strategy and Management Plan project. This project will support the development of a management plan and restoration strategy for these rivers to address disrupted hydrology and sedimentation regimes caused by floodgates and the GIWW.

The State's ongoing development and implementation of WPPs and TMDL Implementation Plans also address element three of the channelization and channel modification management measures.³⁴ Where nonpoint source pollution from hydromodification activities has been identified as a problem, these plans may include priority projects to reduce pollution from these areas. For example, the Arroyo Colorado Watershed Protection Plan describes several approaches to improving water quality and instream and riparian habitat conditions in the Arroyo Colorado River.³⁵ This river has been extensively modified as a result of dredging and channelization activities, which has limited its natural ability to assimilate pollutants and has led to streambank instability and low dissolved oxygen levels. As a result, the plan calls for placing several instream aeration features in critical locations along the Arroyo Colorado River to

³² See the watershed protection section of this document for more information on this effort.

³³ Texas GLO. 2019. *Texas Coastal Resiliency Master Plan Technical Report*. Accessed 02/06/2020. <https://coastalstudy.texas.gov/resources/files/crmp-technical-report-05-21-2019.pdf>

³⁴ For more information, reference the Existing Development section of this document.

³⁵ Flores, J., Wagner, K., Lucas, G., Benavides, J. A., and Cawthon, T. 2017. *Update to the Arroyo Colorado Watershed Protection Plan*. Accessed 02/21/2020. <http://arroyocolorado.org/media/671263/arroyo-colorado-wppfinaloptimized.pdf>

increase dissolved oxygen. The plan also identifies creation of a constructed wetland where dredge spoils are relocated to the bank of the Arroyo Colorado. This constructed wetland would help to improve water quality and expand riparian habitat. Another example is the Highland and Marchand Bayous Watershed Protection Plan.³⁶ In the 1970s, a canal was constructed to reduce flooding in Highland Bayou which diverted 50 percent of the Bayou's headwaters to another watershed, leading to decreased water flows. The resulting changes in the Bayou's flow regime, and increased sedimentation from urbanization are likely responsible for shallower and more stagnant conditions over time. To improve flow conditions in the Bayou, this plan proposes a study to identify specific causes of flow reduction and sediment sources and selectively removing sediment, clearing vegetation, and removing woody debris from the channel.

Texas further addresses element three of these management measures through its CEPR program. The CEPR program provides funding to investigate the effects of coastal erosion and implement projects to mitigate such erosion.³⁷ Shoreline stabilization, habitat restoration and protection, and dune restoration projects are some of the many types of coastal erosion response projects funded through this program. The State has identified multiple CEPR-funded projects which have helped to improve water quality and/or instream and riparian habitat in hydromodified areas. One example is the Keith Lake Fish Pass Baffle Marsh Restoration project, which was completed in 2015. This project modified an existing man-made fish pass through the construction of a rock baffle. This rock baffle was designed to slow the velocity of saltwater flowing through the fish pass and into Keith Lake and the surrounding marsh complex.^{38,39} This project helped to reduce the salinity of Keith Lake, restore the pre-development hydrology of the marsh system, and prevent further marsh deterioration.

Texas has demonstrated that it has enforceable policies and mechanisms in place to ensure the implementation of the channelization and channel modification management measure, specifically that TCEQ has backup enforcement authorities and has committed to exercise them as necessary to ensure implementation of the voluntary program upon which Texas relies to meet the hydromodification-related approval condition, in conjunction with its direct authorities. More information on these policies as well as the ways in which the State will track management measure implementation are summarized at the end of the streambank and shoreline erosion section.

B. Management Measure for Protection of Surface Water Quality and Instream and Riparian Habitat (Dams)

The purpose of this management measure is to protect the quality of surface waters and habitat in reservoirs as well as in the downstream portions of rivers and streams that are influenced by

³⁶ Texas Community Watershed Partners and Texas A&M University. 2019. *Watershed Protection Plan for Highland Bayou, Highland Bayou Diversion Canal, Marchand Bayou, Moses Bayou, and Unnamed Tributary or Moses Lake*. November 2019. Accessed 02/21/2020. <https://agrillife.org/highlandbayou/files/2020/01/WPP-Draft-11.6.2019-for-web.pdf>

³⁷ Texas GLO. n.d. *Coastal Erosion Planning & Response Act*. Accessed 02/13/2020. <https://glo.texas.gov/coast/grant-projects/cepra/index.html>

³⁸ Besson, E. 2014. *Rocks will try to ward off salt water at Keith Lake*. Accessed 03/03/2020. <https://www.beaumontenterprise.com/news/article/Rocks-will-try-to-ward-off-salt-water-at-Keith-5806347.php>

³⁹ Texas GLO. n.d. *Keith Lake Fish Pass Baffle Marsh Restoration*. Accessed 03/03/2020. <https://glo.texas.gov/coastal-grants/projects/1577-keith-lake-fish-pass-baffle-marsh-restoration.html>

releases from impoundments. The management measure requires states to develop and implement a program to manage the operation of dams in coastal areas that includes an assessment of:

- (1) Surface water quality and instream and riparian habitat and potential for improvement and
- (2) Significant nonpoint source pollution problems that result from excessive surface water withdrawals.

This management measure is intended to apply to all dams that are either:

- (1) 25 feet or more in height and greater than 15 acre-feet in capacity; or
- (2) 6 feet or more in height and greater than 50 acre-feet in capacity, unless they are subject to NPDES permits.

Texas addresses both elements of the management measure for protection of surface water quality and instream and riparian habitat (dams) through its TCEQ-administered water rights allocation and use permitting process. In accordance with Section §297.11 of the Texas Administrative Code (TAC), no person may divert, store, impound, take or use water or begin construction of any work designed for the storage, taking, or diversion of water without first obtaining a water right. Some of the few relevant exempted uses are for domestic and livestock and/or fish and wildlife purposes, for which, a person may construct a dam or reservoir with normal storage of 200 acre-feet or less of state water for use on their property, so long as the dam is not located on a navigable stream (TAC §297.21). However, as discussed below, Texas has voluntary-based programs to address these types of dams.

Pursuant to Section §11.147 of the Texas Water Code (TWC), TCEQ has the authority to apply flow restrictions based on environmental flow standards and set-asides, where needed, to water rights permits for new or increases to existing appropriations of water as of September 2007.⁴⁰ “Environmental flow standards” are a schedule of flow quantities, reflecting seasonal and yearly fluctuations that may vary geographically by specific location in a river basin and bay system (TAC §298.5). They describe the minimum amount of water that should remain in a stream or river for the benefit of bay, river, and estuary ecosystems, while balancing human needs. A “set-aside” is an amount of unappropriated water, if available, to be set aside to satisfy the environmental flow standards to the maximum extent reasonable when considering human water needs (TAC §298.1(8)). Adopted environmental flow standards for each river basin and bay system are adequate to support a sound ecological environment to the maximum extent reasonable considering other public interests (TAC §298.5). TCEQ may not issue a permit for a new appropriation or an amendment to an existing water right that increases the amount of water authorized to be stored, taken, or diverted if the issuance of the permit or amendment would impair an established environmental flow set-aside (TWC §11.147(d)). Environmental flow standards, related analyses, and recommendations for each river and bay system are reviewed at least once every ten years to allow for adaptive management (TWC §11.02362(p)).

⁴⁰ Detailed discussion and analysis of significant changes to Texas’ water rights allocation permitting process can be found in: Barron Bardsby, C. 2009. *The Environmental Flows Allocation Process*. Accessed 03/02/2020. https://www.tceq.texas.gov/assets/public/permitting/watersupply/water_rights/eflows/barron_eflowsarticle2009nove mber.pdf

As of March 2020, Texas has adopted environmental flow standards for the Trinity and San Jacinto Rivers, and Galveston Bay; the Sabine and Neches Rivers, and Sabine Lake Bay; the Colorado and Lavaca Rivers, and Matagorda and Lavaca Bays; the Guadalupe, San Antonio, Mission, and Aransas Rivers, and Mission, Copano, Aransas, and San Antonio Bays; the Nueces River and Corpus Christi and Baffin Bays; the Brazos River and its associated bay and estuary system; and the Rio Grande, Rio Grande Estuary, and Lower Laguna Madre (TAC §298, Subchapters B-H). These regulations are consistent with the management measure in that they essentially ensure that new dams or expansions to existing dams will be permitted only if their operation will not impair water quality and instream and riparian habitat.

Texas' strategy to encourage the voluntary adoption of the State's stormwater guidebook further addresses elements one and two of the management measure for protection of surface water quality and instream and riparian habitat (dams). This guidebook describes several practices that are consistent with the management measure. Specifically, the guidebook encourages implementation of the following practices:

- Providing artificial destratification and hypolimnetic aeration of reservoirs with deep withdrawal points.
- Aerating reservoir releases through turbine venting, injecting air into turbine releases, installation of reregulation weirs, using selective withdrawal structures, or modifying other turbine start-up or pulsing procedures.
- Providing for both minimum flows (to enhance the establishment of desirable instream habitat) and maximum flows (as necessary to avoid scouring of instream habitat).
- Establishing adequate fish passage or alternative spawning ground and instream and riparian habitat for fish species.
- Improving watershed protection by installing and maintaining BMPs in the drainage area above the dam to remove phosphorus, suspended sediment, and organic matter and otherwise improve the quality of surface waters flowing into the impoundment.

This guidebook also notes that pursuant to Texas Administrative Code (30 T.A.C. §299.51) the dam owner needs to have an approved dam removal and management plan from the TCEQ Dam and Safety Program before removing the dam. The plan must consider fluctuating water levels due to floods and droughts and restore riparian vegetation that is resilient to these fluctuating water levels to minimize polluted runoff. Management plans should also consider downstream habitat improvements such minimum instream flows, scouring flows, alternative spawning areas, streambank erosion and maintenance of riparian and wetland areas, TCEQ's *Design and Construction Guidelines for Dams in Texas*, also includes voluntary guidelines that support the implementation of the management measure for protection of surface water quality and instream and riparian habitat (dams).⁴¹ Specifically, the guidelines maintain that dam operations may have to include the following environmental provisions to prevent adverse environmental impacts: periodic downstream discharges during periods of low flow; avoiding (or limiting) significant downstream discharges when seasonal migratory routes would be affected downstream; periodic lowering of the reservoir to control vegetation or repair upstream slopes; and routine inspections of specialized dam components (fish ladders, screens, etc.) to make sure they are working correctly and not in need of repair.

⁴¹ TCEQ. 2009. *Design and Construction Guidelines for Dams in Texas*. Accessed 02/28/2020. https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg-473.pdf

In addition, to specifically address agricultural dams, Texas employs the *Natural Resource Conservation Services' Field Operation Technical Guides* that relate to dams. These guides provide technical guidance regarding how to construct and maintain dams in agricultural settings that are consistent with the 6217(g) guidance. For example, *Field Operating Technical Guide* (FOTG) 348 (diversion dams) and FOTG 402 (dams) both call for assessing the environmental impact of dams on water quality, fish and wildlife habitat, including considering the dam's impact on fish migration, downstream water temperature, downstream stream flow, and water quality.^{42,43}

The State's efforts to develop and implement Watershed Protection and TMDL Implementation Plans further address the elements of the management measure for protection of surface water quality and instream and riparian habitat (dams).⁴⁴ Where nonpoint source pollution from dams has been identified as a problem, WPPs may serve as a means to prioritize, plan, and implement projects that improve water quality and instream and riparian habitat around them.

Texas has demonstrated that it has enforceable policies and mechanisms in place to ensure the implementation of the management measure for protection of surface water quality and instream and riparian habitat, specifically that TCEQ has backup enforcement authorities and has committed to exercise them as necessary to ensure implementation of the voluntary program upon which Texas relies to meet the dams-related approval condition. More information on these policies as well as the ways in which the State will track management measure implementation are summarized at the end of the streambank and shoreline erosion section.

C. Management Measure for Eroding Streambanks and Shorelines

The management measure for eroding streambanks and shorelines requires states to:

- (1) Stabilize streambanks and shorelines where streambank or shoreline erosion is a nonpoint source pollution problem;
- (2) Protect streambank and shoreline features with potential to reduce NPS pollution; and
- (3) Protect streambanks and shorelines from erosion due to uses of either the shorelands or adjacent surface waters.

Texas addresses all elements of the management measure for eroding streambanks and shorelines through its strategy to encourage voluntary adoption of the State's stormwater guidebook. The guidebook describes several practices that are consistent with the management measures. For example, the guidebook encourages projects to:

- Use soil bioengineering (e.g., live staking, live fascines, brush layering, brush matting, branchpacking, joint planting, and live cribwalls) and other vegetative techniques to restore damaged habitat along shorelines and streambanks wherever conditions allow.

⁴² Natural Resource Conservation Service. Field Operating Technical Guide. Conservation Practice Standard 348. <https://efotg.sc.egov.usda.gov/api/CPSFile/16582/>. Accessed: 08/20/2020.

⁴³ Natural Resource Conservation Service. Field Operating Technical Guide. Conservation Practice Standard 402. <https://efotg.sc.egov.usda.gov/api/CPSFile/26/> Accessed: 08/20/2020.

⁴⁴ For more information, reference the existing development section of this document.

- Use properly designed and constructed engineering practices (e.g., bulkheads and seawalls, revetments, gabions, groins, and breakwaters) for shoreline erosion control in areas where practices involving marsh creation and soil bioengineering are ineffective. The manual recommends that foundation conditions, level of exposure to wave action, availability of materials, initial costs and repair costs, and past performance be considered when selecting a structural stabilization technique.
- Implement properly designed and constructed erosion control methods such as returns or return walls, toe protection, and proper maintenance or total replacement, where existing protection methods are being flanked or are failing.
- Plan and design all streambank, shoreline, and navigation structures so that they do not transfer erosion energy or otherwise cause visible loss of surrounding streambanks or shorelines.
- Establish setbacks to minimize disturbance of land adjacent to streambanks and shorelines to reduce other impacts. Upland drainage from development should be directed away from bluffs and banks so as to avoid accelerating slope erosion.

Additionally, the *Texas Coastal Resiliency Master Plan* supports the implementation of all elements of the management measure for eroding streambanks and shorelines.⁴⁵ Although the plan does not explicitly mention hydromodification, three of the eight coastal issues of concern addressed by the plan align with the objectives of this management measure. Specifically, the plan seeks to address bay shoreline erosion, impacts on water quality and quantity, and impacts on coastal resources. Several of the priority projects described in this plan aim to stabilize eroding streambanks and shorelines, protect streambanks and shoreline features with the potential to reduce nonpoint source pollution, and/or protect streambanks and shorelines from erosion. For example, the Port Aransas Nature Preserve Stabilization and Restoration Project will repair breaches in the ship channel revetment on northern Mustang Island, construct a living shoreline to protect mangrove habitat, rebuild marsh and wetland habitat, and repair a bulkhead that was damaged during Hurricane Harvey. Another example is the Packery Channel Nature Park Habitat Restoration project. Packery Channel Nature Park has experienced steady shoreline erosion as a result of wakes from boat traffic and an adjacent hardened shoreline, this project will construct a living shoreline using a revetment matting design along the natural slope of the shoreline at the park and extend the 'No Wake Zone' to protect ecologically sensitive habitats. A third example is the Guadalupe Delta Estuary Restoration Project. The Guadalupe River delta is slowly losing its wetland habitats and eroding rapidly due to a man-made diversion, so this project will restore river flows to the terminal end of the delta and create a living shoreline to protect it from sediment depletion and erosion.

The State's efforts to develop and implement Watershed Protection and TMDL Implementation Plans further address the elements of the management measure for eroding streambanks and shorelines.⁴⁶ For example, the previously mentioned Arroyo Colorado Watershed Protection Plan recommends that stakeholders work with drainage districts to modify drainage ditches and maintenance practices to reduce channel and streambank erosion; develop partnerships with the International Boundary and Water Commission, drainage districts and private landowners to implement blank/slope stabilization projects along the Arroyo Colorado river or in drainages

⁴⁵ See the watershed protection section of this document for more information on this effort.

⁴⁶ For more information, reference the Existing Development section of this document.

within the watershed; and participate in the development of Arroyo Colorado maintenance and new work projects to assist in the development of pilot channel configurations with less steep banks so they can support vegetation such as riparian woodland plants or native prairie grasses. A final example is the Double Bayou Watershed Protection Plan.⁴⁷ Within the Double Bayou watershed, unauthorized ATV use in and near waterways has resulted in loss of vegetation and subsequent streambank erosion. As a result, the plan calls for conducting education and outreach to raise awareness of how to reduce the amount of sedimentation resulting from this activity.

Texas further supports the implementation of elements two and three of the management measure for eroding streambanks and shorelines by protecting its most sensitive coastal lands from development. The State coordinates with public, private, and non-governmental organizations to acquire and conserve sensitive areas, such as lands susceptible to erosion as well as those that have the potential to reduce nonpoint source pollution, and has already protected nearly 1.6 million acres of land from development through a variety of means.⁴⁸ For example, funding from the NFWF Gulf Environmental Benefit Fund was leveraged to acquire and conserve 600 acres of coastal wetland habitat on the East Matagorda Peninsula near the mouth of the Colorado River, along East Matagorda Bay. This property was at risk of being developed and contains dunes, coastal prairie, tidal flats, and tidal marshes— features with the capacity to reduce nonpoint source pollution.⁴⁹ Another example is the GLO-supported Nueces Bay Marsh Restoration Project. In the late 1940s, approximately 180 acres of marsh habitat were lost due to dredging and construction of the Nueces Bay causeway and approximately 160 acres of marshlands has been lost to subsequent erosion. This project restored more than 45 acres of wetlands.

Enforceable Policies and Mechanisms: Hydromodification

Texas has developed a strategy to track and evaluate voluntary implementation of these hydromodification management measures. GLO monitors adoption of the hydromodification and stormwater guidebook with the 11 target communities annually to assess progress toward implementation and preparation of five-year reports to document progress, identify communities that may require additional technical assistance, and track implementation of the management measures that have been supported through other programs such as the CWA Section 319 Nonpoint Source Program and the Texas Coastal Management Program. Texas uses existing systems, such as the Texas Coastal Coordination Advisory Committee's Water Resources Committee, administered by GLO's Coastal Management Program, to track and coordinate projects carried out to implement the management measures by networked agencies such as the TPWD. The networked agencies report projects annually which GLO will compile. Although NOAA and the EPA find that the State has suitable tracking mechanisms in place now, Texas has noted new tracking systems may be developed, as needed. To further support the tracking of these management measures (though not required under the approval condition), Texas has

⁴⁷ Double Bayou Watershed Partnership. 2016. *Double Bayou Watershed Protection Plan*. Accessed 03/03/2020. <https://www.doublebayou.org/wp-content/uploads/2016/07/EntireWPPFinal6-7-16modB.pdf>

⁴⁸ For more information on the State's various land acquisition efforts, reference the Watershed Protection section of this document.

⁴⁹ NFWF. n.d. *Matagorda Wetlands Acquisition and Conservation*. Accessed 02/07/2020. <https://www.nfwf.org/sites/default/files/gulf/Documents/tx-matagorda-wetlands-16.pdf>

committed to developing a system to track implementation of the *Texas Coastal Resiliency Master Plan* and its land acquisition program within the coastal nonpoint management area.

Texas has provided a legal opinion demonstrating that Chapter 51 of the Texas Natural Resources Code; Section 86 of the Texas Parks and Wildlife Code; and Chapters 11, 12 and 26 of the Texas Water Code, provide adequate legal authority for the State to ensure the implementation of the 6217(g) hydromodification management measures throughout the coastal nonpoint management area, as needed. This includes the management measures for channelization and channel modification, protection of surface water quality and instream and riparian habitat (dams), and the management measure for eroding streambanks and shorelines. The State has described the mechanisms that link the implementing agencies (GLO, School Land Board, TPWD, and TCEQ) with the enforcing agencies (GLO, TPWD, and TCEQ) and each has committed to using the previously mentioned sections of the Texas Natural Resources Code, Texas Parks and Wildlife Code, and Texas Water Code to implement the components of the 6217(g) management measures upon which the State relies to implement the relevant approval condition, including hydromodification, when needed.

LIST OF ACRONYMS

6217(g)	Section 6217(g) of the Coastal Zone Act Reauthorization Amendments
ATU	aerobic treatment units
BMP	best management practices
CEPRA	Coastal Erosion Planning Response Act
CWA	Clean Water Act
CZARA	Coastal Zone Act Reauthorization Amendments
EPA	U.S. Environmental Protection Agency
FOTG	Field Operating Technical Guides
GIWW	Gulf Intracoastal Waterway
GLO	Texas General Land Office
MS4	municipal separate storm sewer system
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPS	nonpoint source pollution
OSDS	onsite disposal systems
RESTORE Act	Revived Economies of the Gulf Coast States Act of 2012
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
THSC	Texas Health and Safety Code
TMDL	Total Maximum Daily Load
TPWD	Texas Parks and Wildlife Department
TSS	total suspended solids
TWC	Texas Water Code
TxDOT	Texas Department of Transportation
USACE	U.S. Army Corps of Engineers
WPP	watershed protection plan