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December 2008  
SFR-087/08

# The John Graves Scenic Riverway: A Report to the 81st Legislature

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Water Quality Division

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TEXAS COMMISSION ON ENVIRONMENTAL QUALITY



# **The John Graves Scenic Riverway**

A Report to the 81st Legislature

Prepared by  
Water Quality Division

SFR-087/08  
December 2008



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# Contents

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<b>Purpose .....</b>	<b>iv</b>
<b>Introduction .....</b>	<b>1</b>
Background .....	1
Legislative Solution .....	2
<b>The John Graves Scenic Riverway—A Pilot Program .....</b>	<b>3</b>
Scope of the Pilot Program .....	3
Rulemaking .....	3
Definitions .....	4
Applicability .....	5
Prohibitions .....	5
Authorization .....	5
Permit Application Requirements .....	6
Restoration Plan .....	6
Technical Demonstration .....	6
Reclamation Plan .....	7
Performance Criteria .....	7
Additional Performance Criteria .....	7
Financial Responsibility .....	7
Existing Quarries .....	8
General Permit .....	8
Technical Guidance and Assistance .....	8
Programs for Existing Quarries .....	9
<b>Interagency Coordination, Monitoring, and Sampling .....</b>	<b>10</b>
Interagency Coordination .....	10
Visual Inspections under Subchapter M .....	10
Additional Investigations .....	11
Other Monitoring Activities .....	11
<b>Enforcement .....</b>	<b>12</b>
<b>Cost Recovery .....</b>	<b>13</b>
<b>Looking Forward .....</b>	<b>14</b>
John Graves Scenic Riverway as a Pilot Program .....	14
Ongoing Interagency Coordination—Inspections and Sampling .....	14
<b>Appendix A. Map: John Graves Scenic Riverway and Water Quality Protection Area .....</b>	<b>16</b>

## Purpose

The 79<sup>th</sup> Texas Legislature enacted Senate Bill 1354, legislation creating the John Graves Scenic Riverway and established a pilot program to enhance water quality protection by establishing specific regulations for quarries within the watershed. In keeping with the nature of the pilot program, the Texas Commission on Environmental Quality (TCEQ) has prepared this biennial report summarizing the implementation of this legislation. This is the second biennial report and focuses on the implementation of regulations adopted under SB 1354 and the effects of these new rules on regulated quarry activities in the John Graves Scenic Riverway.

# Introduction

## Background

As demand for building and construction material has increased throughout Texas, the mining operations that supply these materials have developed and expanded in response to that demand. With the development and/or expansion of these operations, citizens have increasingly expressed concerns regarding the environmental impacts from these operations. The John Graves Scenic Riverway and its associated pilot program were developed in an effort to address water quality related environmental impacts from rock, and sand and gravel mining (quarry) operations.

The TCEQ is the Texas state agency responsible for regulating and authorizing discharges from quarry operations under the National Pollutant Discharge Elimination System (NPDES) program, a comprehensive national program developed to protect water quality through regulation of wastewater and storm water discharges. Most quarry operations are authorized to discharge storm water under the Multisector General Storm Water Permit (MSGP) for industrial activities. The MSGP establishes requirements for best management practices, inspections, effluent limitations, and monitoring requirements designed to minimize or prevent the discharge of pollutants in storm water discharges from industrial activities, including quarry operations.

Following delegation of the storm water component of the NPDES program to Texas in 2001, the TCEQ conducted outreach seminars and began conducting investigations in an effort to educate the regulated community about the requirements of the MSGP. Despite these efforts, the TCEQ discovered a lack of awareness or compliance with the MSGP following the Clear Streams Initiative. The TCEQ's Clear Streams Initiative was a concentrated effort by a team of field investigators that examined 316 quarries in 62 counties over a four-week period beginning in April 2004. Although the Clear Streams Initiative did reveal that non-compliance with the MSGP was a statewide issue and problem, it also revealed that the instances of noncompliance rarely resulted in significant detrimental effects to water quality.

Within Parker and Palo Pinto Counties, however, the TCEQ did discover that the type and nature of mining activities and the local topographical, geological, and geographical conditions resulted in impacts to water quality within the area now designated as the John Graves Scenic Riverway where storm water permit conditions and best management

practices were not being followed. As the TCEQ and other state agencies attempted to address and respond to citizen concerns regarding these water quality impacts, it became apparent that several state agencies possessed regulatory authority; however, none was positioned to address the water quality impacts from these operations comprehensively. The John Graves Scenic Riverway pilot program focuses on addressing the water quality concerns associated with discharges of wastewater and storm water from rock and sand and gravel mining operations.

## Legislative Solution

The concerns of local citizens and legislators about the authority to address the activities of quarries operating in sensitive areas led to the introduction and passage by the 79th Texas Legislature of Senate Bill 1354, authored by Senator Craig Estes of Wichita Falls and sponsored by Representative Jim Keffer of Eastland. The legislation established a new Subchapter M under Chapter 26 of the Water Code to protect the river and regulate quarries in the newly designated John Graves Scenic Riverway. This legislation:

- Designates a portion of the Brazos River basin as the John Graves Scenic Riverway.
- Establishes a pilot program for the protection of water quality through regulation of wastewater and storm water discharges from quarries; including requirements for financial assurance.
- Requires interagency coordination of inspections and sampling within the John Graves Scenic Riverway.
- Establishes enhanced enforcement authority and penalties.
- Provides for cost recovery if the state is required to take action to correct problems resulting from improper operation of quarries.

## The John Graves Scenic Riverway—A Pilot Program

### Scope of the Pilot Program

The pilot program established by Water Code, Chapter 26, Subchapter M, expires September 1, 2025. Until that time, TCEQ is charged with developing and continually evaluating a wastewater and storm water permitting program for quarries within the John Graves Scenic Riverway. The development and implementation of this program includes rulemaking activities, the development of a general permit, and issuing individual permits. Consistent with SB 1354, the rules, general permit, and individual permits establish regulatory requirements for quarry operations in proximity to rivers and streams which are tailored to the individual site and the risks associated with site-specific conditions.

The specific requirements of the legislation are as follows:

- Quarries located in a designated water quality protection area more than one mile from a water body must obtain a general permit.
- Quarries within one mile of a water body, or within the 100-year floodplain of a water body, must obtain an individual permit.
- New quarry operations or the expansion of existing operations between 200 feet and 1,500 feet of a water body are prohibited, unless an applicant for an individual permit can demonstrate, and the TCEQ can substantiate, that certain specific requirements are satisfied. These include specific performance criteria established by the TCEQ; plans for control of erosion and protection of fish and wildlife habitat and public and private property; plans for reclamation of a quarry; and the use of best available technology.
- Unless otherwise exempted by the legislation, new quarry operations or the expansion of existing operations are prohibited within 200 feet of a water body within a water quality protection area designated by the TCEQ;
- Any permit issued under SB 1354, whether an individual permit or general permit, shall satisfy effluent limits established by the TCEQ, requirements for financial assurance, and include a plan for restoration of receiving waters in the event of an unauthorized discharge.

### Rulemaking

The TCEQ implemented the permitting and financial responsibility components of this statute through rules found at 30 Texas

Administrative Code Chapter 311, Subchapter H and 30 TAC Chapter 37, Subchapter W. The final rules, reflecting the changes made in response to public comment and adopted by the Commission, were effective August 3, 2006.

Chapter 311, Subchapter H primarily implements the permitting components of the statute. The subchapter also establishes the financial assurance requirements for restoration and reclamation. Generally, the structure of Subchapter H follows that of the statute so that the organization and requirements of each relate better when compared side by side. The major requirements of the rule are grouped into sections, titled as follows:

- Definitions
- Applicability
- Prohibitions
- Authorization
- Permit Application Requirements
- Restoration Plan
- Technical Demonstration
- Reclamation Plan
- Performance Criteria for Quarries Located Within a Water Quality Protection Area in the John Graves Scenic Riverway
- Additional Performance Criteria for Quarries Located Between 200 Feet and 1,500 Feet of a Water Body Located Within a Water Quality Protection Area in the John Graves Scenic Riverway
- Financial Responsibility for Quarries Located Within a Water Quality Protection Area in the John Graves Scenic Riverway
- Existing Quarries

Chapter 37, Subchapter W, implements the financial assurance components of the statute. The subchapter outlines administrative procedures and requirements related to the types of available financial assurance.

## ***Definitions***

The specialized terms used within the subchapter are incorporated into this section of Chapter 311, Subchapter H. With the exception of “navigable” and “water quality protection area,” definitions are consistent with new Water Code, Chapter 26, Subchapter M; other subchapters of 30 Texas Administrative Code; or 40 Code of Federal Regulation. Definitions for “navigable” and “water quality protection area” determine the applicability of specific provisions within the statute, and are discussed separately below.

The jurisdiction of SB 1354 is defined first as the John Graves Scenic Riverway and then as a water quality protection area within the riverway, designated by the TCEQ based on whether a contributing watershed is threatened by quarry activities. As part of rulemaking, the TCEQ established a definition for “water quality protection area” as that portion of the John Graves Scenic Riverway located within Parker and Palo Pinto Counties, consistent with the focus of legislative concerns on these counties. The John Graves Scenic Riverway and the designated water quality protection area are represented in Appendix A to this report.

### ***Applicability***

This section identifies those facilities subject to, and exempt from, the requirements of the Chapter 311, Subchapter H, as specified by the statute. This section also requires exempt facilities to provide documentation of their exemption and identifies acceptable forms of documentation. Requirements for documentation allow for a readily available, definitive interpretation on applicability; while resting the burden of proof with the quarry operation. Additionally, requirements for exemption documentation make the applicable portion of the rule more clearly enforceable where documentation is unavailable.

### ***Prohibitions***

This section outlines prohibited activities as specified by SB 1354. Prohibited activities include the operation of any quarry within 1,500 feet of a navigable water body, subject to specific exceptions. Exceptions include those facilities that are exempt and facilities that obtain an individual permit based on an application that includes the Technical Demonstration showing they are able to comply with the Additional Performance Criteria outlined in Subchapter H, a Reclamation Plan, and financial assurance for reclamation.

### ***Authorization***

Sections of this subchapter are applicable based upon the location of the quarry relative to a perennial water body. This section of Chapter 311, Subchapter H, outlines the applicability of sections according to location, as shown in Table 1 on the following page.

During the rulemaking process, it became apparent that some quarries did not fall discretely into one geographic area of regulation, but spanned the boundaries of the different zones established. The rule addresses this situation by applying the most stringent requirements to the entire quarry. The rule also provides for waiver or adjustment of the more stringent requirements where an operator demonstrates that storm water is managed effectively and separately within each of the applicability zones.

**Table 1. Applicability of Rule Requirements Based on Quarry Location**

Location of a Quarry Relative to a Perennial Waterbody	Type of Permit Required	Requirements
200–1,500 feet	Individual	Additional performance criteria Technical Demonstration Reclamation Plan Financial assurance for reclamation Performance criteria Restoration Plan Financial assurance for restoration
1,500 feet – 1 mile	Individual	Performance criteria Restoration Plan Financial assurance for restoration
> 1 mile	General	Performance criteria Restoration Plan Financial assurance for restoration

***Permit Application Requirements***

This section of Subchapter H outlines the additional permit application requirements for quarries located in a water quality protection area in the John Graves Scenic Riverway according to the location of the quarry:

**Table 2. Additional Permit Application Requirements Based on Quarry Location**

<i>Application Requirement</i>	Location of the Quarry Relative to a Perennial Water Body		
	<b>200–1,500 feet</b>	<b>1,500 feet – 1 mile</b>	<b>&gt; 1 mile</b>
Restoration Plan	Required	Required	Required
Financial Assurance for Restoration	Required	Required	Required
Technical Demonstration	Required	—	—
Reclamation Plan	Required	—	—
<b>Financial Assurance for Reclamation</b>	Required	—	—

***Restoration Plan***

The Restoration Plan provides a proposed plan of action for how the responsible party will restore a water body to background conditions following an unauthorized discharge. This section of Subchapter H outlines the minimum elements of a Restoration Plan, including the cost estimate that provides the basis for financial assurance.

***Technical Demonstration***

SB 1354 prohibits the construction or operation of any new quarry, or the expansion of an existing quarry, located within 1,500 feet of a water body as defined. The statute then creates an exception to this prohibition for

quarries located between 200 feet and 1,500 feet. This exception is subject to the TCEQ finding that the additional performance criteria established at Subchapter H are met. In order to determine that the application will meet these additional performance criteria, the Technical Demonstration was incorporated as a permit application requirement.

This section of Subchapter H outlines the minimum elements of the Technical Demonstration, including the Surface Water Drainage and Water Accumulation Plan and best available technology evaluation required by statute.

### ***Reclamation Plan***

This section of Subchapter H outlines the minimum elements of a Reclamation Plan, including the cost estimate that provides the basis for financial assurance.

### ***Performance Criteria***

This section establishes performance criteria for all quarries located within a water quality protection area in the John Graves Scenic Riverway. Effluent limitations for total suspended solids at a daily average of 45 milligrams per liter are established to address sediment loading to the Brazos River and tributaries in the John Graves Scenic Riverway.

Additional performance criteria established for all quarries include effluent limitations for pH.

### ***Additional Performance Criteria***

This section establishes those additional performance criteria that quarries located within 200 to 1,500 feet of a water body must meet in order to operate. These additional performance criteria include: requirements for and design criteria associated with control structures, vegetative buffers, pond freeboard requirements, depth markers, buffer zones for water supply wells, and secondary containment; compliance with the Texas Antiquities Code; requirements for the protection of endangered/ threatened aquatic/aquatic dependent species; and prohibitions regarding natural hazard lands. These additional performance criteria must be evaluated in the Technical Demonstration.

### ***Financial Responsibility***

This section establishes requirements for securing and maintaining financial assurance for Restoration and Reclamation, as required by the statute. The amount of financial assurance required is determined by cost estimates developed in the Restoration Plan and Reclamation Plan.

## ***Existing Quarries***

This section of Subchapter H addresses the expiration date of the pilot program. It also addresses interim operation requirements and permit application deadlines for existing quarries. Quarries located greater than 1,500 feet from a perennial water body may continue to operate under an existing TCEQ authorization provided that compliance with that authorization is maintained and a permit application under the new rules is submitted prior to the specified deadline.

## **General Permit**

Prior to the passage and implementation of SB 1354, quarries statewide were subject to authorization of storm water discharges under the MSGP. The legislation requires quarries located more than one mile from a navigable waterbody in a water quality protection area within the John Graves Scenic Riverway to obtain coverage under a general permit. This general permit must contain provisions from the statute that are not part of the MSGP.

The TCEQ has completed the technical development of a new general permit that includes all applicable requirements from the statute and Chapter 311, Subchapter H. Public notice of the draft general permit was published and a public meeting was held in Weatherford, Texas on September 23, 2008 to receive public comment on the proposed authorization.

TCEQ has evaluated public comment and is positioned to issue this general permit in the spring of 2009. Eligible operators will continue to operate under the MSGP until such time as the new general permit is adopted and applicable.

## **Technical Guidance and Assistance**

The TCEQ sponsored programs in conjunction with the Texas Mining and Reclamation Association to educate quarry operators, engineers, and the general public on best management practices for storm water controls and quarry reclamation. At the Vulcan Material Weatherford Training Facility in Millsap, Texas, demonstration projects were conducted to evaluate the use of compost in the stabilization and revegetation of quarry operations. This program was intended to demonstrate the feasibility of using reclaimed materials in the restoration of disturbed areas or reclamation of quarries and to address large sediment loads exported from quarry sites.

Some highlights of the project-include the following:

- Test plots for this project were constructed on the Vulcan property, and treated with either compost/mulch blends, or hydromulch. One plot was bare, untreated soil.
- The compost/mulch blends provided a 98 percent reduction in sediment transport compared to untreated plots and 78 percent compared to hydro mulch plots.
- The compost treated plots established vegetation three times faster than hydromulch and four times faster than bare soil.
- Measured and estimated nutrient and sediment loadings were calculated for the study period (June 2006–May 2008) for measured and unmeasured rainfall events.

## **Programs for Existing Quarries**

The TCEQ sponsored programs in conjunction with the Texas Mining and Reclamation Association to educate quarry operators, engineers, and the general public on best management practices for storm water controls and quarry reclamation. At the Vulcan Material Weatherford Training Facility in Millsap, Texas, demonstration projects were conducted to evaluate the use of compost in the stabilization and revegetation of quarry operations. This program was intended to demonstrate the feasibility of using reclaimed materials in the restoration of disturbed areas or reclamation of quarries and to address large sediment loads exported from quarry sites.

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# Interagency Coordination, Monitoring, and Sampling

## Interagency Coordination

SB 1354 establishes TCEQ as the principal authority in the state for implementation of Water Code, Chapter 26, Subchapter M. In order to better coordinate the responsibilities of other agencies that are also involved, increase the opportunities for discovery of violations, and document water quality conditions in the John Graves Scenic Riverway, the statute requires the TCEQ, Texas Parks and Wildlife Department (TPWD), and Brazos River Authority (BRA) to conduct inspections of the John Graves Scenic Riverway as follows:

- Visual inspections of the John Graves Scenic Riverway must be conducted twice per year, once in a summer month and once in a winter month
- Visual inspections must be conducted from both the river surface and by aerial reconnaissance.

## Visual Inspections under Subchapter M

In fulfilling the inspection requirements of TWC §26.555, the TCEQ, the TPWD, and the BRA coordinated efforts to conduct the following visual inspections during the 2007 and 2008 biennium (September 2006 through August 2008):

- Visual inspections from an aircraft flying over the Riverway on February 26, 2007, August 14, 2007, March 24, 2008, and August 25, 2008.
- Visual inspections from the surface of the Riverway: February 22, 2007, June 7, 2007, December 3, 2007, and July 7, 2008.

The main stem of the Brazos River is evaluated during aerial reconnaissance flight; however the major tributaries (Spring Creek, Three Mile Creek, Sanchez Creek, Patrick Creek, Kickapoo Creek, Grindstone Creek, Palo Pinto Creek, and Keechi Creek) are observed less frequently. The amount of time it takes to view these areas limits the frequency of assessment. Observation of the tributaries are noted on a site map and re-evaluated on a rotating basis.

Visual inspections are also conducted from the surface of the Riverway, with the primary objective of locating and identifying new and/or expanded industrial activity along the river. No new quarries have been

identified as the result of the surface reconnaissance. If activity is observed, the resulting impact on the river will also be documented. Visibility at the river level is limited because of the surrounding geology and topography (the river is the lowest point).

Neither the visual inspections from the surface of the Riverway or aerial reconnaissance have resulted in the detection of any potential violations of Subchapter M. Several instances of land clearing have been identified during the aerial reconnaissance, but follow up field investigations revealed no activity requiring TCEQ storm water authorization.

## **Additional Investigations**

During FY07/08, TCEQ staff also conducted 22 compliance investigations within the Riverway. Two of these investigations resulted in Notices of Enforcement (NOEs), and the rest of the sites received General Compliance letters, meaning no violations were found. Two of the 22 investigations were scheduled as the result of the fly-overs.

## **Other Monitoring Activities**

Seven monitoring stations have been sampled in the John Graves Scenic Waterway. Three of those stations (11864, 16408, and 13543) are long-term monitoring stations sampled by the BRA in conjunction with the Texas Clean Rivers Program. Four sites were added in response to citizen concerns regarding the impact of quarry activities in the watershed. Sites 11864 and 13543 continue to be monitored monthly as part of the Texas Clean Rivers Program. The remaining five sites are monitored twice a year in compliance with Senate Bill 1354.

Data analysis of total suspended solids (TSS) on the Brazos River reveals no statistically significant difference between the sites. TSS concentrations from the John Graves Scenic Riverway are some of the lowest observed in the entire basin.

Among the seven monitoring stations on the Brazos River and Palo Pinto Creek, significant changes over time were observed at only two monitoring locations. Stations 11863 and 18745 do exhibit a statistically significant increase in TSS over time. These two sites may be impacted by runoff from quarries, agricultural lands and the runoff from the Palo Pinto Creek, Pollard Creek and Keechi Creek microwatersheds. While data from these sites are experiencing increased suspended solids concentrations over time that increase is not sufficient enough to make the sites statistically different from the other sites on the river.

## Enforcement

Generally, under Chapter 7 of the Water Code, the TCEQ may assess an administrative penalty up to \$10,000 for each violation of a law or rule under the agency's jurisdiction. Water Code, Chapter 26, Subchapter M, enhances penalties for violations from quarries in the John Graves Scenic Riverway.

Unauthorized discharges are subject to administrative penalties of not less than \$2,500 or more than \$25,000 for each day the violation continues. Other violations of provisions of the statute are subject to enhanced penalties of not less than \$100 per day. The legislation also specifically authorizes the TCEQ to seek an injunction in the district courts of Travis County to force corrective action to address an unauthorized discharge, or force the temporary or permanent closure of any quarry operating without authorization, operating without required financial assurance, or discharging without authorization.

As discussed previously, the visual inspections from the surface and aerial reconnaissance did not detect any potential violations. Of the 22 compliance investigations conducted by TCEQ field staff, two of those investigations resulted in Notices of Enforcement. The low number of NOEs can be attributed to the extensive outreach efforts by TCEQ investigators and the permitting section. The Water Quality Permitting Division sent a letter out to each known operator detailing the rule changes and possible impact to each facility. Additionally, the DFW Region conducted on-site investigations to provide a copy of 30 TAC Chapter 311 to each operation and answer any questions the entities had related to their operation. The investigations and letters raised awareness of the new requirements, and as a result, compliance with the rules was increased.

## Cost Recovery

SB 1354 authorizes the TCEQ to recover costs incurred by the agency in undertaking reclamation or restoration corrective/enforcement actions related to an unauthorized discharge under Water Code Chapter 26, Subchapter M. Costs eligible to be recovered include any applicable court costs, attorney fees or punitive damages that a court may award. To date, there have been no unauthorized discharges under Subchapter M requiring reclamation or restoration corrective/enforcement actions. Therefore, the agency has not collected any costs under this provision of the statute.

The legislation also established the Reclamation and Restoration Fund Account which is authorized to receive any penalties and other money collected by the TCEQ as a result of enforcement actions or any gifts, grants or donations received in support of the activities or programs under Subchapter M. Money in the fund is to be used only for restoration and reclamation of waters affected by unauthorized discharges subject to the legislation. Although SB 1354 established the Reclamation and Restoration Fund Account, subsequent action by the same 79<sup>th</sup> Legislature effectively repealed that provision. The rules adopted by the TCEQ do not include provisions for use of the fund, however, the agency has identified alternate mechanisms or authority under which certain funds from cost recovery actions could be managed and applied to restoration or reclamation projects, although perhaps on a more limited scope than envisioned in SB 1354.

## Looking Forward

As the TCEQ completes implementation of the various elements of SB 1354 and continues the administration of this pilot program, opportunities to evaluate each of the program's objectives have been and will continue to be presented. Although the rules for individual permits have been adopted, the general permit is still under consideration for final approval, therefore observations of the effects of the program and its implementation may still be preliminary and more general. Certainly as the affected industry gains more experience in obtaining the appropriate authorizations and operating facilities under the new regulations, long term trends will become more apparent.

### John Graves Scenic Riverway as a Pilot Program

Senate Bill 1354 was enacted in response to mining activities that resulted in impacts to water quality within the John Graves Scenic Riverway. The rules adopted at 30 TAC Chapter 311, Subchapter H and the proposed general permit establish specific criteria based on the type and nature of the mining activity and the topographical, geological, and geographical conditions in the John Graves Scenic Riverway. Other groups have expressed interest publicly about the needs for similar regulatory efforts in other parts of the state to address potential water quality effects of different mining activities. To the extent that the pilot program authorized by SB 1354 may be expanded or used as a model for other geographical areas, it is important that such initiatives carefully consider differences in local hydrology, topography, geology, and specific mining activities.

### Ongoing Interagency Coordination—Inspections and Sampling

Future circumstances may make compliance with the surveillance and monitoring requirements of SB 1354 more difficult. Low water conditions and the nature of the streambed have made watercraft surveillance most problematic. The water conditions and distances to be covered essentially require the use of a shallow-draft airboat, if access is possible at all. Unfortunately, conditions have not been favorable in most cases due to low water. In at least two instances when trips were attempted, the reconnaissance was interrupted by mechanical failure. In one case the failure resulted in injury to a passenger. Safety and cost considerations may suggest that more flexibility in complying with these requirements is appropriate.

Aerial surveillance has proven to be more effective than water-level reconnaissance in locating possible new quarry sites or other activities that justify investigation by field personnel. Even here, however, some additional flexibility may be appropriate as budget issues, availability of aircraft and the success of other types of surveillance efforts may justify using aerial reconnaissance at those times and under those conditions where it is most effective, rather than on a fixed schedule.

Although no changes to the requirements for ongoing water quality monitoring are suggested, it is important to note that the routine water quality monitoring may not serve as an indicator for the water quality problems previously observed from improper mining practices. Sediment is the primary pollutant expected from quarry operations; in most cases in this part of the Brazos basin sediment settles quickly to the bottom and is not often captured in water quality samples that may be collected at some distance from the immediate source of discharge. Additionally, even where increased levels of sediment in samples might point to upstream discharges, it is not generally practicable to differentiate one specific source of the suspended sediments through an assessment of total suspended solids from other potential sources identified in the watershed. Other potential sources include: agricultural runoff, runoff from urban development and natural erosion of unstable substrates during rain events.

## **Appendix A. Map: John Graves Scenic Riverway and Water Quality Protection Area**

# SB1354 Rule Development



Texas Commission on Environmental Quality  
 Information Resources Division  
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 P.O. Box 13087  
 Austin, Texas 78711-3087

July 19, 2006

Scale: 1:240,884  
 Texas Statewide Mapping System (TSM) Projection

**Special Flood Hazard Areas Inundated by 100-Year Flood**

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) data depicted on this map was georeferenced using 1998 RF3 river line data (1:100,000) at a 1:24,000 scale denominator from scanned FIRM maps. The FIRM data on the georeferenced maps were also heads-up digitized at a scale denominator of 1:24,000. This data is not complete (Palo Pinto and Parker Co.) in the areas furthest from the Brazos River.

The FIRM data does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for possible updated flood hazard information. This map should not be used for property purchase or construction purposes.

Zone A No base flood elevations determined  
 Zone AE Base flood elevations determined  
 Zone X Areas determined to be outside 500-year flood plain (all other areas not depicted as Zones A or AE)

- Legend**
- Interstate Highway
  - US Highway
  - State Highway
  - FM Road
  - Lake / Water Body
  - Perennial Stream
  - Minor Stream
  - River Basin
  - County Boundary
  - City Boundary
  - Watershed
  - 200 Feet Buffer
  - 1500 Feet Buffer
  - 5280 Feet Buffer
- Special Flood Hazard Areas Inundated by 100-Year Flood**
- Zone A - No base flood elevation determined
  - Zone AE - Base flood elevation determined

Source: The counties and major streams are U.S. Census Bureau 1992 TIGER/Line data (1:100,000). The minor streams are 1998 USEPA/OW River Reach File (RF3 - unvalidated alpha version) from the U.S. EPA/Office of Water (1:100,000). The highways were purchased from GDT (Geographic Data Technology, Inc.) with data ranging from 1990-1998 from the U.S. Census Bureau (1:100,000). The FM roads are 1996 TxDot data (1:30,000). The city jurisdictions are TxDOT 2003 data. The watersheds are 1:24,000 data based on the USGS topographic maps. The basins are USGS data (1:500,000).



This map was generated by the Information Resources Division of the Texas Commission on Environmental Quality. This map was not generated by a licensed surveyor, and is intended for illustrative purposes only. No claims are made to the accuracy or completeness of the data or to its suitability for a particular use. For more information concerning this map, contact the Information Resources Division at (512) 239-0800.

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