LOUISIANA NATURAL AND SCENIC RIVERS SYSTEM

PERMIT APPLICATION

Permit # 870 (Assigned by Department)

The Louisiana Department of Wildlife and Fisheries' Scenic Rivers program is authorized by LRS title 56, Chapter 9 Part II. This law requires permits authorizing activities in or affecting rivers that have been designated by the Louisiana Legislature as Natural and Scenic. Information provided on this form will be used in evaluating the application for a permit. Information in this application is made a matter of public record through issuance of a public notice. Disclosure of the information requested is voluntary, however, the data requested are necessary in order to communicate with the applicant and to evaluate the permit application. If necessary information is not provided, the permit application cannot be processed nor can a permit be issued.

APPLICANT INFORMATION

Name of Applicant Southwestern Energy Production Co.	Name of Agent (if any) Nixon Engineering Solutions, LLC
Address 550 Greens Road	Address 401 Hamilton Road, Ste 120
Address	Address
City, State, Zip Houston, TX 77067	City, State, Zip Bossier City, LA 71111
Phone (281) 618-2874	Phone (318) 747-9669

DESCRIPTION OF THE PROPOSED ACTIVITY

Brief summary of the description and purpose of the proposed activity (details to be attached as a separate document)

Water withdraw for hydraulic fracturing of oil well.

Is any portion of the activity complete? YES (NO) (If yes indicate month and year of completion)

LOCATION OF PROPOSED ACTIVITY

Stream Name	Bayou De Loutre	Names, Addresses, Phone Numbers of Adjacent Property Owners
Parish	Union Parish	
Section	13	
Township	T23N	
Range	R02W	
Latitude/Longitude	32 59' 52.5"N / 92 32' 13.7"W	

ENVIRONMENTAL ASSESSMENT

Must be a separate document. See the attached instruction sheet for completing the assessment.

CONFIRMATION OF INFORMATION ACCURACY

Application is hereby made for a Scenic River Use Permit to authorize the activities described herein. I certify that I am familiar with the information contained in this application, and that, to the best of my knowledge and belief, such information is true, complete, and accurate. I further certify that I possess the authority to undertake the proposed activities, or I am acting as the duly authorized agent of the applicant.

Signature

11/30/2012
Date

Form # LSR3 May 2002

11/30/2012

Louisiana Scenic River Permit Application for:

Bayou De Loutre Water Withdraw at Oakland Bridge Road

UNION PARISH, LA

NOVEMBER 30, 2012

STATE OF LOUISIANA
KURT M. NIXON
License No. 31,039
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING

11/30/2012

Prepared for:

WAYNE SHORTLE
SOUTHWESTERN ENERGY PRODUCTION COMPANY
550 GREENS PARKWAY
HOUSTON, TX 77067

NIXON™
ENGINEERING SOLUTIONS

101 Milam Street, Ste 202
Shreveport, LA 71101
318-222-2667

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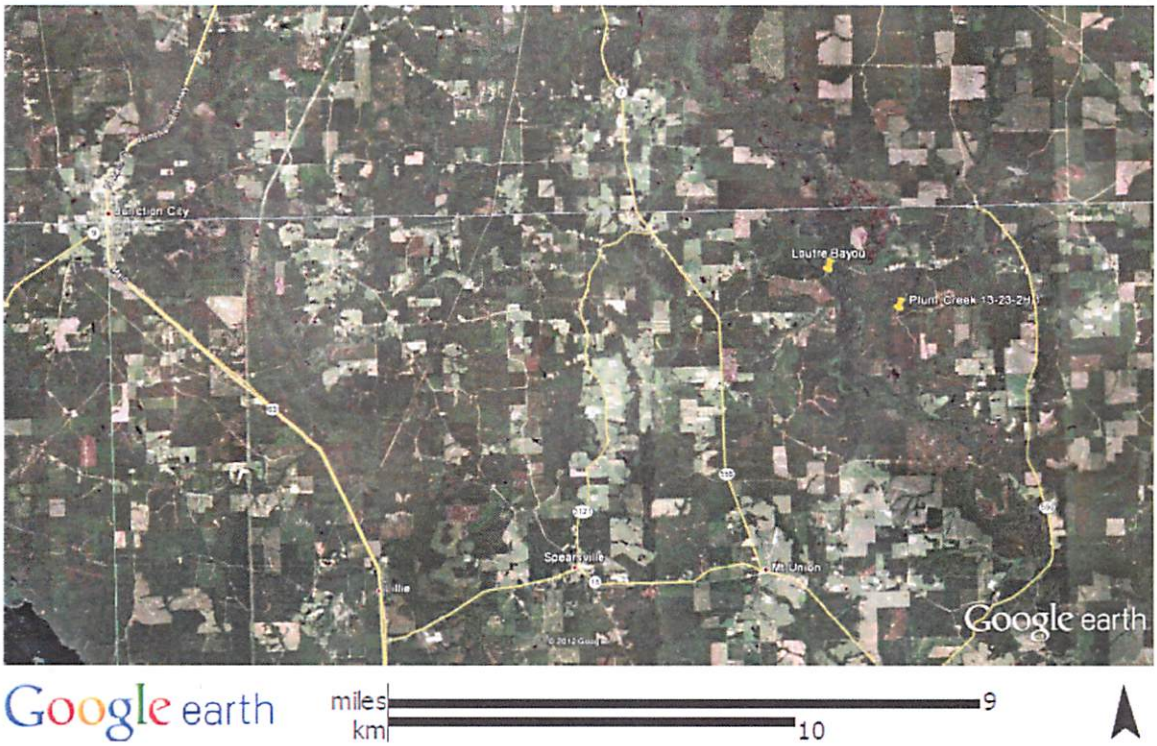
PROJECT DESCRIPTION

Southwestern Energy Production Co. is working to develop the Plum Creek 13-23-2H No.1 well in Union Parish, LA. The development of this well will involve horizontal drilling and hydraulic fracturing. The water needed for the hydraulic fracturing is intended to come from Bayou de Loutre. The approximate location of both the proposed well and the water withdraw location on Bayou de Loutre are shown in the Vicinity Map (Figure 1).

As related to the Scenic Rivers Permit the project will consist of the proposed withdraw location at the intersection of Oakland Bridge Rd and Bayou de Loutre (Latitude 32°59'52.5" and Longitude 92°32'13.7"). The equipment for this withdraw will consist of a screened intake hose, a trailer mounted pump, and a temporary water line from the pump to the frac pit. All of this equipment will be located within the public right of way of Union Parish. The intake location is planned for the immediate downstream side of the bridge with the pump to be at the southeastern toe of the bridge embankment. It is anticipated that the entire duration of the water withdraw project will be 7-14 days.

Figure 1 - Vicinity Map



PROJECT LOCATION

As mentioned in the project description the proposed withdraw location is at the intersection of Oakland Bridge Rd and Bayou de Loutre (Latitude 32°59'52.5" and Longitude 92°32'13.7"). This location is approximately 10.9 miles east of Junction City, LA. Two additional location drawings are given in Figures 2 and 3. Figure 2 gives a color coded representation of the ground topography. The topography

data is taken from Louisiana 3m LIDAR data. Figure 3 gives an enlarged aerial photo with contour lines of the proposed project location.

Figure 2 – LIDAR Elevation Data @ Withdraw Point

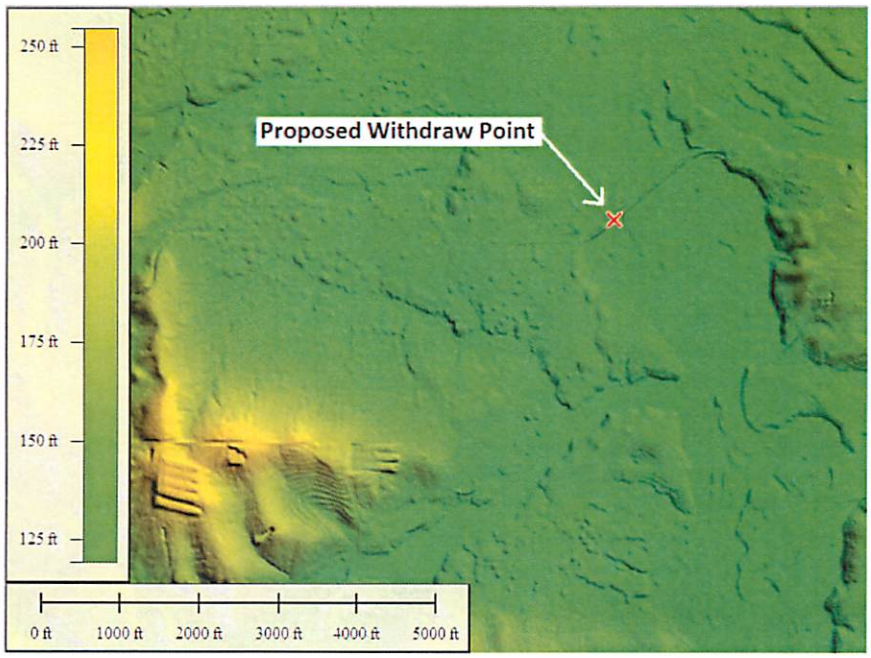


Figure 3 – Aerial Photo & Contours @ Withdraw Point

SITE PHOTOGRAPHS

Photos of the project site were taken from the northeast side of the river. In addition, pictures were taken looking upstream and downstream of the bayou from the Oakland Bridge Road bridge.

Figure 4 – Northeast (Project Side) Looking Southwest

Figure 5 – On Bridge Looking North (Upstream)

Figure 6 – On Bridge Looking South (Downstream)

OTHER REQUIRED PERMITS

The following is a list of the other permits, which need to be acquired as part of the withdrawal and transportation of water from Bayou de Loutre. This list is compiled based on our experience with similar projects, knowledge of the site, and the agencies involved. We reserve the right to amend this list if it is found there are other agencies or regulatory requirements which have been overlooked.

- Louisiana DNR – Running Surface Water Use CEA

ENVIROMENTAL ASSESSMENT

Existing Land Use

The proposed pull point is located just downstream of the Oakland Bridge Rd bridge. Apparent right of way is unknown. The surrounding area is predominately rural timber land.

Historical/Archeological Sites

A search was conducted on the Louisiana State Register of Historic places. The nearest historic location is approximately 14 miles southwest of the project in Bernice, LA. The project location is not a historical or archeological site according to the search.

Economic Impact of the Project

This is an exploratory well by Southwestern to assess the potential for their holdings in the Brown Dense/Lower Smackover formation. This single well will generate increases in tax revenue for Union Parish and the State of Louisiana through severance taxes, ad valorem taxes, sales tax and other taxing mechanisms. If the potential of the well is found to meet expectations, it could have further impacts in encouraging the development of the entire field across the northern Union Parish area.

Wilderness/Rural Quality

At the point of withdraw the wilderness quality is minimal to non-existent due to the site work and alterations already preformed as part of the bridge construction and maintenance.

Scenic/Aesthetic Value

The location of the withdraw point has natural scenic value both upstream and downstream of the bridge. This value may temporarily suffer slightly with the addition of a trailer-mounted pump. However the temporary nature of the project will not have a lasting impact on the aesthetic value of the area.

Recreational Use/ Opportunity

There was no recreational use of this specific location occurring at the time of visit. It can be assumed that anglers occasionally utilize the area by parking on the shoulders and fishing under the bridge.

Ecological System Present

The ecological system at the bridge appears to be typical for a maintained section of natural bayou. The area within the channel banks is mostly grass with occasional trees. Outside of and on either side of the channel banks is the hardwood bottomland floodplain of Bayou de Loutre.

Fish and Wildlife in the Area

The pump is planned to be located within the public right of way. Since the right of way is regularly maintained by the parish and due to the temporary nature of the pumps no significant disruptions are anticipated to wildlife movements and habitats. Similarly the screened intake in the water for the short duration should have limited impact on any fish populations located under the bridge.

A review of the Department of Fish and Wildlife's rare species data base lists two endangered species for Union Parish they are the Red-Cockaded Woodpecker and the Bald Eagle. The habitats for these two endangered species are not found within the project limits. They will not be impacted by the temporary pumping. In addition, the database lists eleven species for Union Parish which have grades of S3 or less meaning their occurrence within Louisiana is rare to imperiled. Ten of these eleven species are fish or other aquatic life. Therefore care will be taken in adequate screening of the intake to limit uptake of aquatic life.

Botanical Elements

The vegetation on the banks of the stream is grassy with occasional trees as can be seen in Figure 4. Shallow depths near the bridge allow for a few islands within the stream containing small trees and grass.

Geological Features

There are no significant geological features visible from the surface.

Hydrological Features

The primary hydrological feature is Bayou de Loutre and its associated floodplain. Bayou de Loutre is a large bayou, which drains portions of Union Parish in Louisiana and Union County in Arkansas. The natural floodplain associated with this bayou is also fairly large at nearly a mile wide as can be seen in Figure 2. The natural floodplain however has been constricted so that the entire basin flows underneath the Oakland Bridge.

Water Quality/Quantity

The Louisiana 305 list published in March 22, 2012 by DEQ and approved by EPA does not list Bayou De Loutre as an impaired water body.

The primary potential impact of this project deals with water quantity, as this project involves a large withdrawal. Therefore a detailed investigation was conducted to look at water quantity impacts. This investigation consisted of collecting velocity measurements and cross section data at the proposed pull point to establish the existing flow and determine if this flow could support the proposed withdrawals without significant impact.

The velocity measurements were collected by Nixon Engineering Solutions, LLC (NES) using a Global Water FP211 velocity flow meter. Measurements were taken at points across the stream to determine an average velocity at the cross section. The cross section and current water surface elevation were surveyed by Goodwin Professional Services, LLC. The cross-section, measured field data, and calculated results are shown on the sheet titled "CEA X-Section" in *Appendix A: Maps and Figures*.

Using the cross section, water surface elevation, and velocity measurements the existing flow was calculated for Bayou de Loutre as 28.0 cfs at the time of measurement. In addition, a series of calculations was performed to create a family of rating curves based on different channel velocities and water surface elevations. These rating curves graphically depict flow changes with respect to changes in water surface elevation or changes in velocity. Due to the very large nature of the watershed for Bayou de Loutre, which includes parts of Union Parish in Louisiana and Union County in Arkansas, a watershed delineation was not performed for this stream.

The proposed withdrawal data supplied by Southwestern Energy is shown in table 1.

Table 1 – Proposed Withdrawals

Withdraw Characteristics	Minimum Allowable
Max Pump Capacity	4.71 cfs
Total Withdraw	2,807,292 cu. ft.
Max Withdraw Duration	8 Days
Average Withdraw	4.1 cfs

For the purposes of this report a minimum flow within the stream was established as a guide in determining adverse impacts to the stream. This minimum flow within the stream was set at 27.1 cfs. This minimum flow is such that the Proposed Average Withdraw will not utilize more than 5% of the total channel flow. The small use of total flow will minimize potential impacts during anticipated withdraws. It is quite possible that this stream will be able to support withdraws year round. However the stream will still need to be monitored, particularly during the July through October timeframe when water levels and flows are typically at their lowest. Table 3 gives a summary of the minimum recommended flow conditions needed within Bayou de Loutre to allow withdrawal.

Table 2 – Minimum Allowable Stream Characteristics for Withdrawal

Withdraw Characteristics	Minimum Allowable
Water Surface	122.4 (NAVD 88)
Velocity	0.05 fps
Flow	27.1 cfs

As a practical application of verifying these minimum criteria it is recommended that a gage stick be placed at the proposed pull point with a mark at an elevation of 122.4 (NAVD 88). This mark will allow the proposed pumping operator to easily determine if it is safe to withdraw water at the proposed rate.

Estimated changes in the water surface were calculated assuming water was withdrawn at the calculated minimum stream requirements as well as at the current measured conditions.

Table 3 – Change in Water Surface Due to Proposed Withdrawal

Flow Conditions	Change in WS Elev
Minimum Allowable	-0.33 ft / -4.0 in

Finally, Bayou de Loutre is an ungaged stream. However Little Corney Bayou is gaged stream with over 50 years of data which is adjacent to Bayou de Loutre and possesses similar topography and similar rainfall characteristics. Table 4 is a statistical summary of that 50 years of daily average flow values categorized by month. From this table it can be seen that based on the monthly mean flow rates, Little Corney Bayou should not be counted on to supply the needed water quantities in August or September and would be marginal for October or July. The drainage basin of Bayou de Loutre is approximately 30% smaller than the basin of Little Corney Bayou. Therefore the actual flows in Bayou de Loutre would be expected to be smaller than Little Corney Bayou but the seasonal fluctuation patterns should be similar. Of course there are obvious variations from year to year as can be seen in the large difference between the monthly maximum and the monthly minimum. This is why minimum stream characteristics were calculated for the actual pull point and a gage stick recommended.

Table 4 – Statistics of Monthly Mean Data for Water Years 1956-2011 in CFS

	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Mean	81.2	144	292	337	406	381	365	228	140	70.8	26.3	43.0
Max	1718	977	1333	1140	1256	1222	2764	852	1391	985	202	464
Min	0.03	6.66	20.7	34.4	45.4	36.6	49.8	11.5	3.40	0.01	0.00	0.00

LEGAL AGREEMENT

See *Appendix B: Legal Agreement* for a copy of the signed legal agreement.

COMPLIANCE HISTORY

The applicant has fully complied with the Scenic Rivers Act on previous projects in Louisiana.

STEPS TO MINIMIZE IMPACTS

The following steps have been taken to minimize the impacts to Bayou de Loutre due to the proposed water withdraw.

- Located the project within existing public right of way and existing bridge crossing
- Conducted study of existing flows in Bayou de Loutre
- Established benchmark for when flow withdraw is allowable and when it will cause undue impacts on the bayou
- Screen intake to minimize uptake of aquatic life

PROJECT ALTERNATIVE

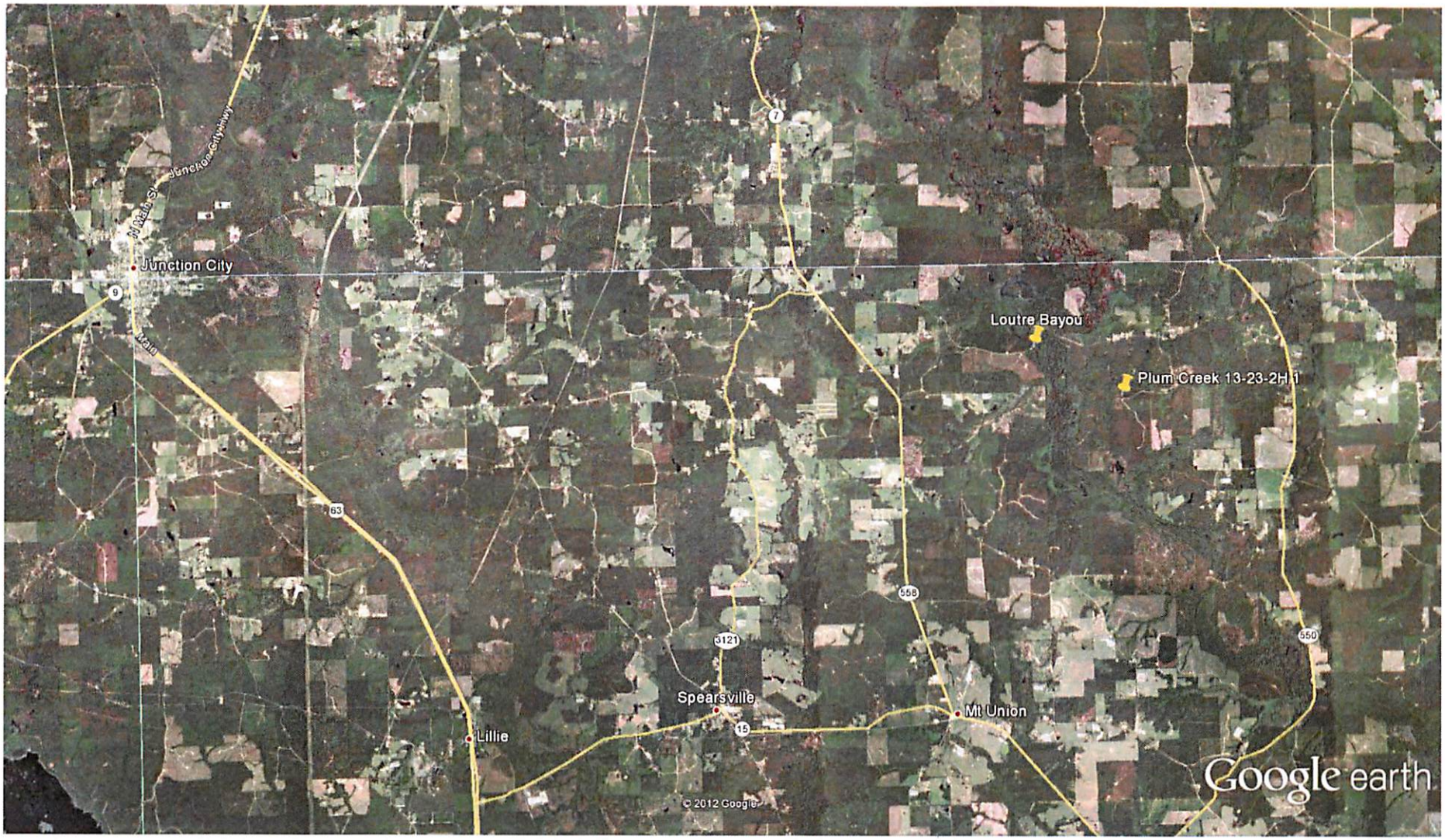
In very broad general terms the projects has two options for acquiring the water it needs for the project, either surface water or ground water. The specific source can vary from municipal water systems, private ponds, private wells, public streams, or public lakes to name a few. However all of these will either use surface water or ground water. We agree with the Louisiana Water Resources Report dated March 15, 2012 which encouraged the use of Louisiana's abundant surface water over the use of high quality groundwater for hydraulic fracturing. An addition variable is how the water is moved to the well site. It is our opinion that moving the water through the use of pumps and temporary waterlines produces much less impact on the surrounding environment than a steady stream of trucks hauling the water to the proposed well.

SUMMARY

Overall the proposed project when following the stated withdraw guidelines, will not negatively impact the scenic or natural qualities of Bayou de Loutre. This project is also in line with the findings of the Louisiana Water Resource Report to the State Legislature published in March 15, 2012 on water use for hydraulic fracturing.

MAPS & FIGURES

Appendix A



Google earth

miles 9

km 10

FIELD MEASUREMENTS

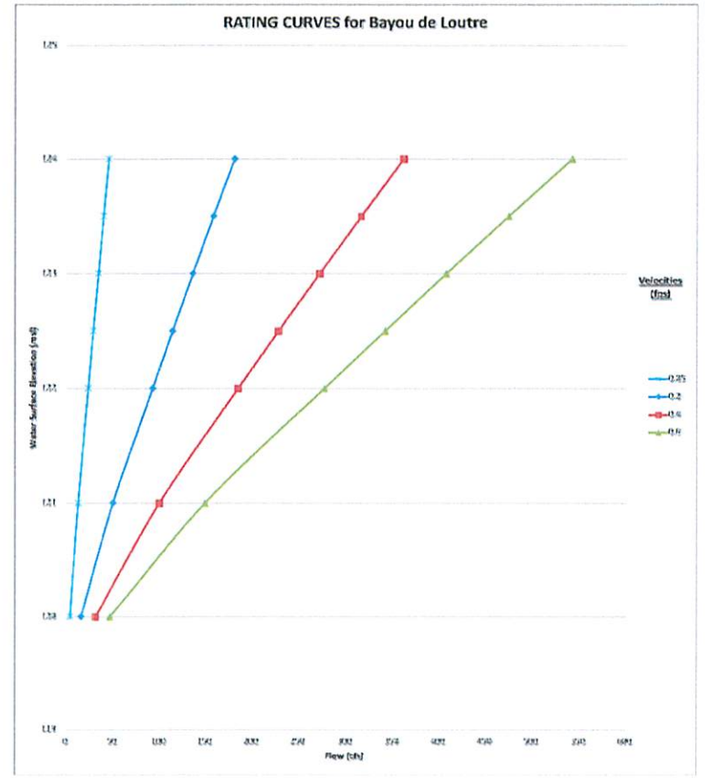
- Water Surface = 122.5 msl
- Average Velocity = <0.1 fps
- Cross Section = Downstream of Oakland Bridge Rd
- Area = 560.9 sq. ft
- Calc. Flow = N/A

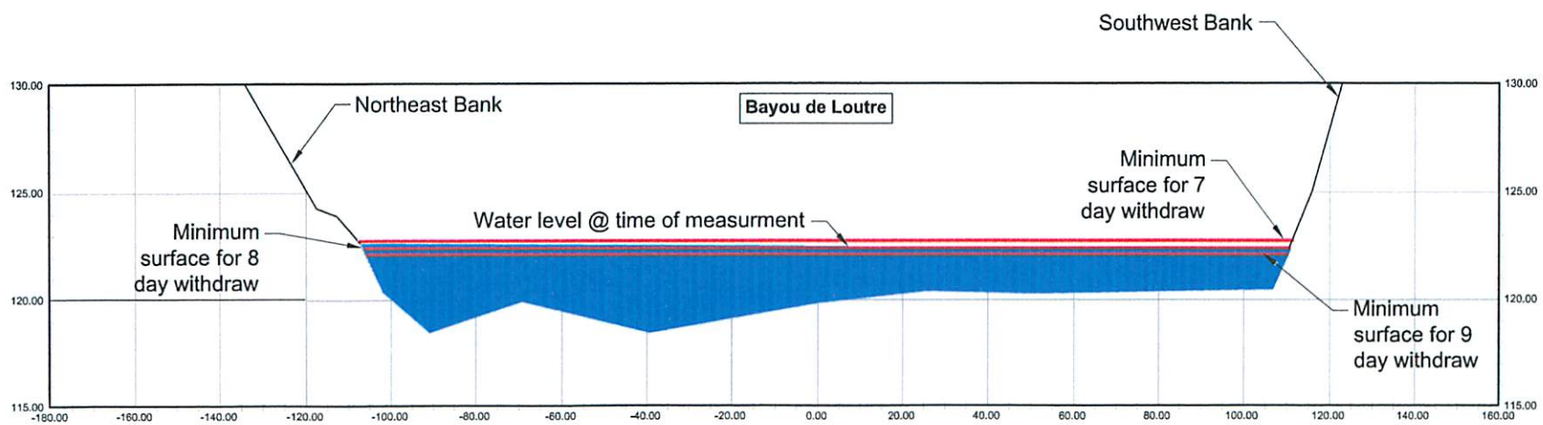
DESIGN WITHDRAWS

- Max Pump Capacity = 2100 gpm = 4.7 cfs
- Total Withdraw = 21,000,003 gal = 2,807,292 cu. ft.
- Withdraw Durations = 7, 8 or 9 days
- 7 Day Avg Withdraw = 2083 gpm = 4.6 cfs
- 8 Day Avg Withdraw = 1823 gpm = 4.1 cfs
- 9 Day Avg Withdraw = 1621 gpm = 3.6 cfs

MIN STREAM REQUIREMENTS

Duration	7 Days	8 Days	9 Days
Min Water Surface	122.8 NAVD 88	122.4 NAVD 88	122.1 NAVD 88
Min Velocity	0.05 fps	0.05 fps	0.05 fps
Min Flow	30.9 cfs	27.1 cfs	24.1 cfs





NIXON ENGINEERING SOLUTIONS
101 MILAM STREET SUITE 202
SHREVEPORT, LA 71101
KNixon@NixonEng.com
(318) 222-2667

Project Data:

Bayou De Loutre
Pull Point #1

Southwestern Energy
Sec 11, T23N-R02W
Union Parish, LA

Seal:

STATE OF LOUISIANA
KURT M. NIXON
License No. 31969
PROFESSIONAL ENGINEER
IN
CIVIL ENGINEERING
07/09/2012

NO.	DATE	REVISION

Sheet Title:

X-Section

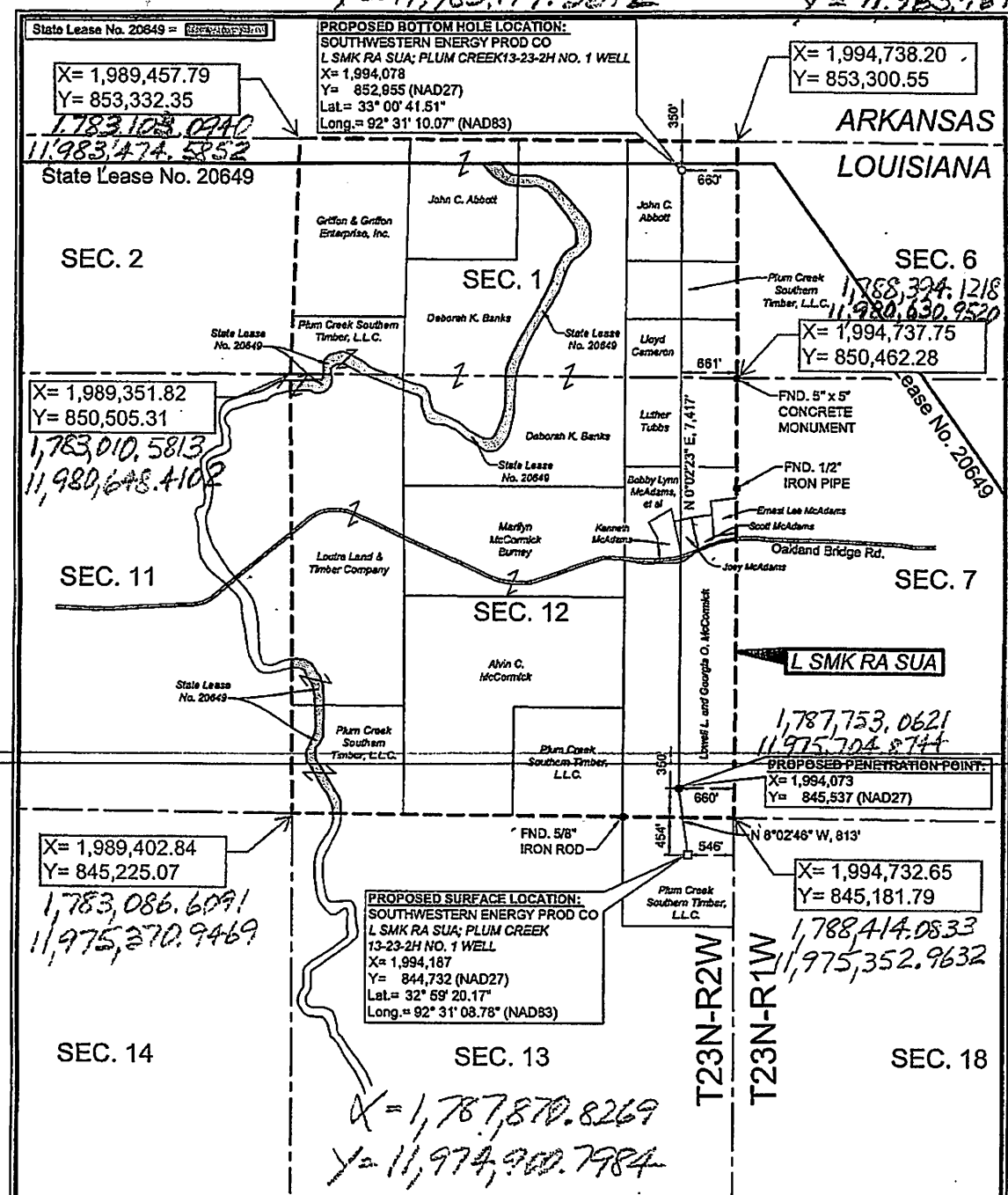
Drawn By:	Project Number:
JRB	0043.12.10
Scale: 1" = 30'	Date: 07/02/2012

Sheet:

C1.0

X= 1,787,722.8577
Y= 11,983,119.3392

X= 1,788,381.0984
Y= 11,983,467.8562



Southwestern Energy Prod Co-
L SMK RA SUA; PLUM CREEK 13-23-2H NO.1 WELL
Surveyed on June 5, 2012 as follows:
PROPOSED SURFACE LOCATION being 454' from the North line and 546' from the East line of Section 13, located in Section 13, T23N-R2W, Union Parish, Louisiana.
PROPOSED PENETRATION POINT to be 350' from the South line and 660' from the East line of Section 12, located in Section 12, T23N-R2W, Union Parish, Louisiana.
PROPOSED BOTTOM HOLE LOCATION to be 350' from the North line and 660' from the East line of Section 1, located in Section 1, T23N-R2W, Union Parish, Louisiana.

NAD27 LOUISIANA NORTH ZONE

Elevation of ground at location 139' (NAVD88).

1,500 0 750 1,500
Scale: 1" = 1,500'

NOTE: This plat is not a property boundary survey and as such does not comply with the "Minimum Standards for Property Boundary Surveys" as adopted by the Louisiana Professional Engineering Land Surveying Board.

There are no residential or commercial structures, not owned by the applicant, his lessor, or other predecessor in interest, within a 500' radius of the proposed location as of 06-05-12.

PRELIMINARY
Leroy J. Gary, Jr.
Professional Land Surveyor
Registration No. 4793

SOUTHWESTERN ENERGY PROD CO
L SMK RA SUA; PLUM CREEK 13-23-2H NO. 1 WELL
SECTION 13, T23N-R2W
UNION PARISH, LOUISIANA

FENSTERMAKER
135 Regency Sq. Lafayette, LA 70508
Ph. 337-237-2200 Fax. 337-232-3299
www.fenstermaker.com

DRAWN BY: TPF	REVISIONS	
PROJ. MGR.: TPF		
DATE: 06/27/2012		
FILENAME: T:\2012\2125210\DWG\2125210_LOC.dwg		

LEGAL AGREEMENT

Appendix B

State of Louisiana

BOBBY JINDAL
GOVERNOR

DEPARTMENT OF WILDLIFE AND FISHERIES

ROBERT J. BARHAM
SECRETARY

Dear Scenic River Permit Applicant:

Please review and concur on the following statement regarding the issuance of permits by the Louisiana Department of Wildlife and Fisheries. This agreement must be signed and returned before a Scenic River Permit can be issued.

"I have been advised and do understand that by applying for and accepting a Scenic Rivers permit issued by the Louisiana Department of Wildlife and Fisheries, I am being allowed to engage in an activity which would otherwise be prohibited by law or for which a permit is required. I understand that the permit is not a license and confers no property right upon me. I specifically agree to abide by all State and Federal fish and wildlife laws and regulations, and all State and Federal laws and regulations which relate to this permit or the permitted activity, and by all other terms and conditions of this permit. I understand that the permit for which I am applying may be suspended, annulled, withdrawn or revoked and that I may be assessed civil penalties, all in accordance with the provision of the Louisiana Administrative Procedure Act, and that I may be denied future permits as a consequence of my failure to fully and completely comply with the terms and conditions of the permit, as well as other laws and regulations pertinent thereto. If served with or notified of a cease and desist order signed by the Scenic Rivers Administrator, I agree to immediately and without delay cease all activities and operations which relate to the permitted activity or which are impacting the Scenic River, until such time as the matter can be resolved in an adjudicatory hearing pursuant to the Louisiana Administrative Procedure Act. I understand and agree that any permit issued to me by the Louisiana Department of Wildlife and Fisheries is in the nature of a privilege which is being voluntarily extended to me by the Department and the failure on my part to cooperate with the Department can result in the loss of the privilege conferred and the denial of future requests for permits. By accepting this permit, I evidence my agreement to be bound by all conditions and stipulations set forth herein."

Authorized Signature

4-2-13
Date

REV. 12/7/98

P.O. BOX 98000 • BATON ROUGE, LOUISIANA 70898-9000 • PHONE (225) 765-2800
AN EQUAL OPPORTUNITY EMPLOYER

PUBLIC NOTICE

Appendix C

PUBLIC NOTICE

Request for Scenic River Permit on Bayou De Loutre @ Oakland Bridge Road

The Secretary of the Louisiana Department of Wildlife and Fisheries as Administrator of the Louisiana Natural Scenic River System is currently considering the application of Southwestern Energy for a permit to withdraw water on Bayou De Loutre. The decision to grant or deny this permit in the public interest will be based on an evaluation of the probable impacts of the proposed activity on Bayou De Loutre.

Copies of the application can be seen by the public at the Department of Wildlife and Fisheries main office, Room 432, 2000 Quail Drive, Baton Rouge, LA and at the District Office in the District where the proposed activity is located. The public is invited to comment on this permit request for a period of forty-five (45) days. Responses should convey sound reasoning for or against the proposal and be mailed to Scenic Rivers Program, LDWF, P.O. Box 98000, Baton Rouge, LA 70898-9000.

PERMIT APPLICATION

Appendix C