

Jenny Skufca  
Incidental Take Authorization Coordinator  
Illinois Department of Natural Resources  
One Natural Resources Way  
Springfield, IL 62702  
217-557-8243

Arcadis U.S., Inc.  
1717 West 6th Street  
Suite 210  
Austin  
Texas 78703  
Tel 512 451 1188  
Fax 512 451 2930  
www.arcadis.com

Subject:

**Marathon Pipe Line LLC, Muddy Creek WRCL 739 Pipeline Maintenance Project, Cumberland County, Illinois;**  
**Conservation Plan for the State-threatened Eastern Sand Darter (*Ammocrypta pellucidum*).**

**Illinois Department of Natural Resources Conservation Plan**  
**(Application for an Incidental Take Authorization)**  
**Per 520 ILCS 10/5/5 and 17 Ill. Adm. Code 1080**

**PROJECT APPLICANT:** Marathon Pipe Line (MPL)

**PROJECT NAME:** Muddy Creek WRCL 739 Pipeline Project

**COUNTY:** Cumberland

**AREA OF IMPACT:** Muddy Creek

ENVIRONMENTAL

Date:  
June 29, 2017

Contact:  
Scott Walker

Phone:  
512-527-6076

Email:  
Scott.Walker@arcadis.com

Our ref:  
03256301.0003

**ARCADIS U.S., Inc.**  
TX Engineering License # F-533  
Geoscientist License # 50158

According to Title 520 of the Illinois Combined Statutes (ILCS), Section 10/5/5, the Illinois Department of Natural Resources (IDNR) may authorize, under prescribed terms and conditions, incidental taking of threatened and endangered species if the project applicant submits to IDNR a conservation plan. The conservation plan must include the following:

1. A description of the impact that the proposed taking is likely to have on one or more species on the Illinois list;
2. The measures the applicant or other parties will take to minimize and mitigate that impact and the funding that will be available to implement those steps, including but not limited to bonds, insurance, or escrow;
3. A description of the alternative actions to the taking the applicant considered and the reasons why those alternatives will not be used;

4. Data and information to assure that the proposed taking will not reduce the likelihood of the survival or recovery of the endangered species or threatened species in the wild within the State of Illinois, the biotic community of which the species is a part, or the habitat essential to the species' existence in Illinois;
5. An implementing agreement that specifically names, and describes the obligations and responsibilities of all the parties that will be involved in the taking as authorized by the permit; and
6. Any other measures that IDNR may require as being necessary or appropriate for purposes of the plan.

The enclosed Application for Incidental Take and associated Conservation Plan provides the applicable project information required under 520 ICLS 10/5/5.

## PROJECT DESCRIPTION

Based on information provided by Marathon Pipe Line Company (MPL), the WRCL 739 pipeline crosses Muddy Creek approximately two miles west/southwest of Jewett, Illinois (Figure 1). The location of the maintenance site is within Muddy Creek at 39.1987° N and 88.2807° W, less than 100 feet south of the crossing of Cumberland Road. The site is approximately one mile east of Woodbury, Illinois. MPL has an active easement with the landowner providing right of way to lay, maintain, operate and remove a pipe line for transportation of oil. A copy of the easement is enclosed as Attachment D. Table 1 provides the property ownership information, address, and legal description of the property.

**Table 1. Property Ownership Information, Address, and Legal Description**

Property Owner	Property Address	Tax Parcel Identification Number	Legal Description
Donald Holsapple Trust	508 East Cumberland, Greenup, IL 62428	12-26-100-001	508 E Cumberland Greenup, IL 62428 217-923-5673
Judy Shafer C/O Thad Shaffer & Judith K. Shafer	984 U.S. Route 40 Jewett, IL 62436	12-26-100-001	15 11 <sup>th</sup> St. Jewett, IL 62436 217-923-3833

The construction efforts that Marathon proposes (Proposed Action) will be to cover and stabilize the pipeline using a geotextile matting system and rock riprap. The pipeline is currently exposed across Muddy Creek for approximately 69 feet within the ordinary high water mark (OHWM) (Figure 2). The area of disturbance within Muddy Creek associated with the proposed pipeline maintenance activities extends 30 feet upstream and downstream of the pipeline centerline, delimiting a 60-foot survey corridor. The OHWM at the pipeline crossing is approximately 69 feet; therefore, the survey area is approximately 4,140 square feet (0.095 acre) (Figure 2).

The 50-foot wide MPL pipeline right-of-way (ROW) has one 10-inch diameter product line (WRCL 739) that crosses Muddy Creek at Station 5543+68 in Jewett, Cumberland County, Illinois. A railroad bridge is located upstream of the pipeline. The WRCL pipeline is exposed in the creek for approximately 69 linear feet due to bed degradation and bank migration.

MPL proposes to armor the WRCL pipeline with a system of articulating concrete revetment mattresses and to install subgrade rock grade control and erosion control blanket to cover and protect the pipeline. First, the project area will be dewatered and then graded as necessary. A woven geotextile material will be placed atop the grade, followed by the installation of the Submar mat system. The mats will extend across the creek from the right-descending high bank to the left-descending high bank as depicted on the attached design drawings. The flank edges and the upstream and downstream edges of the mat system will toe in to 2-foot deep and 3-foot deep excavated anchor trenches, respectively, that will be backfilled with existing material. A 3-foot deep by 10-foot long subgrade rock grade control will be installed on the downstream end of the mat system to prevent head-cutting from progressing upstream, and erosion control blanket will be placed on disturbed areas of the project site. Submar's mat system will cover and protect the WRCL pipeline in the matted area.

All work will be done with a Caterpillar 329 Trackhoe, a mini trackhoe, and a skid steer. The site will be accessed from the west bank ROW which will be entered from a private gravel road off Cumberland Rd approximately 800 feet west of the crossing. Equipment will be staged along the west bank ROW 100-feet from the west bank of Muddy Creek.

### **Project Schedule**

The project is proposed to begin in September and will take approximately four weeks to complete. Installation of the impact avoidance exclusion barriers, described in further detail below, will be conducted prior to the maintenance activities within Muddy Creek. Installation of the exclusion barriers will take approximately two days to complete. Following installation of the exclusion barriers, initial equipment mobilization and site preparation will be completed in approximately one week. Stabilization of the pipeline via installation of the geotextile matting will take approximately 2 weeks to complete. Site stabilization, cleanup, and equipment removal will take an additional week to complete. Once all equipment has been removed from the site, and final site stabilization has been conducted, the exclusion barriers will be removed. Therefore, the proposed project completion date is approximately 4 weeks from date of project start.

## **ALTERNATIVE ACTIONS**

### **Proposed Action**

The Muddy Creek WRCL 739 pipeline has become exposed to the elements resulting in potential structural integrity and stability issues necessitating the maintenance activities. Natural lateral erosion of the stream channel, down-cutting within the channel, down-cutting within the channel, and migration of the thalweg has occurred over time due to normal stream flow and from periodic high-velocity/intensity flood events. The proposed maintenance effort will cover and stabilize the pipeline using a geotextile matting system and rock riprap. This method is based on similar projects within the area, and across the country, which provides long-term pipeline protection. The proposed impact avoidance measures are

based on conditions observed within the project area, available biological resource information, and current scientific literature.

### **Alternative Action**

Removal of the existing pipeline, and installation of a new pipeline using hydraulic directional drilling (HDD) install methods, was evaluated for this project. However, the cost of pipeline installation via HDD is prohibitively expensive, yet the project would still require similar impacts to Muddy Creek associated with the removal of the existing pipeline. Removal of the existing pipeline would require cutting back the stream banks with heavy equipment to expose the pipeline, cutting the pipeline, capping the remaining pipeline ends, and removal of the pipeline from the creek using heavy equipment. This alternative would still have similar project impacts on Muddy Creek, and would require installation of the impact avoidance measures described below, but would incur a significantly higher overall project cost due to the HDD methods. As a result, this alternative was not chosen as the proposed action.

### **No-action Alternative**

The No-action alternative would result in continued stream bed degradation, which could increase the probability of property damage, petroleum products release, and impacts to surrounding habitat and species present.

## **BIOLOGICAL DESCRIPTION OF AFFECTED SPECIES**

### **Eastern Sand Darter**

The Eastern sand darter (*Ammocrypta pellucida*) is listed as threatened in Illinois (Illinois Endangered Species Protection Board, February 22, 2011). The species belongs to the class Actinopterygii (ray-finned fishes), order Perciformes, and family Percidae (Adams and Burr, 2004). The species is a terete and pellucid darter with a row of 9-13 brown dots along the lateral line, and a similar row along the dorsal ridge (Smith, 1979). A pronounced snout exhibits dusky markings, and several rows of scales above the lateral line are distinctly pigmented when compared to the body. The species has 8-10 dorsal spines, 8-10 anal rays, and one anal spine, with widely separated dorsal fins. There is not a needlelike spine projecting backward from the opercle. The eastern sand darter is similar in appearance to the western sand darter (*Ammocrypta clara*), but has more scales and pigment and lacks the opercular spine. Maximum length of the eastern sand darter is approximately three inches.

The eastern sand darter occurs in rivers of high water quality over beds of pure sand, where it buries itself for protection and cover (Adams and Burr, 2004; Smith, 1979). Microhabitat variables such as substrate, water depth, and water velocity have been found to account for significant variation in species abundance, and the presence of sand substrate alone accounted for 46 percent of the variance (Daniels, 1993). In field collections, Daniels (1993) and Facey (1998) found eastern sand darters were most abundant on the depositional bank of the channel, directly downstream of a bend. The eastern sand darter mostly consumes midge larvae.

The known locations of the eastern sand darter are in Illinois, Kentucky, Indiana, Michigan, Ohio, West Virginia, Pennsylvania, Vermont and New York. Within Illinois, there are 36 recorded occurrences yielding 500 individual eastern sand darters. The location of this species is primarily in the Embarrass River and

its tributaries, with a limited population in the Middle Fork Vermilion River. Although the study area does not occur within the Embarrass River, Little Wabash drainage, or Wabash River, Muddy Creek is a tributary of the middle Embarrass River, located approximately 4.5 river miles to the east/southeast. Observation of eastern sand darters in the Muddy Creek project area potentially constitutes a new occurrence of the species.

Spawning activities of the eastern sand darter are typically between May and September and have only been observed in laboratories (Adams and Burr 2004). Studies have shown that spawning occurs in water temperatures between 14.4 and 24.4 degrees Celsius (°C) and in areas with low silt levels. The male initiates the process by chasing the female. The female then moves to the sandy bed material where the male mounts her and they vibrate to bury their tails in the sand. Other males will often move beside the mating pair and begin vibrating. The eggs are deposited in the sand individually. The female lays an average of 71 eggs. Eggs are translucent, spherical, and adhesive, with an average size of 1.4 millimeters (mm). After spawning, there is no parental support. The young hatch at a length of 5.5 mm. The males and females typically mature by the end of the first year while, although some females may not mature until their second year. The typical life span is two to three years, with a maximum of four years.

Arcadis conducted a presence/absence survey for eastern sand darters within the proposed project footprint in Muddy Creek on August 23, 2016. The survey was conducted in accordance with the general methods described in *Status Survey and Management Implications of the Harlequin Darter and Eastern Sand Darter in Southeastern Illinois* (Henry et al., 2009), supplemented by *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers* (Barbour et al., 1999).

The survey was conducted using a combination of backpack electrofishing, seining, and dip-netting. Two variable-voltage backpack electrofishers were used: Smith-Root Model LR-20B and a Halltech HT-2000 backpack unit. The seine consisted of a 4' x 20' minnow seine with 1/4" mesh and the dip-nets were made of 1/8" mesh. The guidance literature suggested using two seining methods to survey for eastern sand darters in waters that are less than one meter in depth, with low stream velocity, and with relatively few sampling obstructions (e.g., snags, boulders, large debris): kick sets and downstream hauls.

For kick sets, two biologists position the 20' seine downstream of the habitat to be sampled while the backpack operator shocks their way downstream toward the net, disturbing substrates, logs, and rocks with their feet as they walk. This method is typically employed in areas where the stream current is sufficient to sweep stunned fishes into the net and over complex habitats (e.g. areas with snags, woody debris, cobbles, etc.). Downstream hauls are conducted by having two biologists pull the 20' seine downstream, keeping the lead line in contact with the substrate, while the backpack operator walks in front of the net sweeping the anode back and forth just in front of the net. This method is typically employed in runs, pools, and riffle edges with few snags. However, due to extremely low flow rates in the study area (less than 0.5 cubic feet per second [cfs]), kick sets were not conducted as there was insufficient flow to sweep stunned fishes into the downstream seine. Thus, Arcadis utilized a combination of backpack electrofishing with dip-nets, followed by downstream and upstream seine hauls paired with backpack electrofishing.

Stream morphology consisted of a shallow riffle complex at the northern margin of the study area (upstream) that transitioned into a long, slow moving pool. The long pool was located within the project area (i.e., the area of direct impact), but the riffle complex was located outside of the area of direct impact. Stream width was approximately 60 feet and water depth ranged from approximately one foot at

the northern study area boundary to greater than six feet at the southern boundary. Streamflow within the study area was low, averaging less than 0.5 cubic feet per second (cfs). The substrate of Muddy Creek within the study area consisted primarily of soft clay and silt; however, the riffle complex exhibited a gravelly-sand substrate with occasional cobbles, boulders, and an adjacent depositional sand bar. Five darter species were collected during the presence/absence survey, including five eastern sand darters. All darter species, including the five eastern sand darters, were collected from the riffle complex with gravelly-sand substrate (located outside of the area of direct impact), which is consistent with the typical habitat requirements of the species.

## **SPECIES IMPACT ASSESSMENT**

During the pipeline maintenance project, eastern sand darter individuals that are present within, or adjacent to, the area of proposed impact may be taken if not relocated or excluded from the impact area prior to maintenance activities. If present during the maintenance activities, the placement of the geotextile matting and rock riprap could crush individuals, resulting in a direct take. Additionally, the placement of geotextile matting and rock riprap could cover suitable habitat, thereby permanently removing it from the aquatic ecosystem. However, the installation of exclusion barriers, paired with species collection and relocation efforts during the installation of the exclusion barriers, will reduce or prevent direct impacts to eastern sand darters. Additionally, the eastern sand darter habitat observed during the presence/absence survey is located outside of the project impact area. Therefore, the placement of geotextile matting and rock riprap will not permanently remove eastern sand darter habitat.

The area to be impacted by pipeline maintenance activities is approximately 4,140 square feet (0.095 acre). Due to the size of the proposed maintenance area, effects on the eastern sand darter and its habitat will be negligible. During maintenance activities, MPL anticipates the potential to take one to two eastern sand darters. The proposed maintenance of the pipeline is not anticipated to impact the continued use of the stream segment by the eastern sand darter. The substrate of Muddy Creek within the study area consisted primarily of soft clay and silt; however, the riffle complex exhibited a gravelly-sand substrate with occasional cobbles, boulders, and an adjacent depositional sand bar. This is consistent with the upstream and downstream observations of potential eastern sand darter habitat. No additional planned maintenance activities are expected to impact habitat for the eastern sand darter. Based on the proposed impacts, surveyed densities, and planned recovery and release of the fish from the affected area, no long-term effects on the eastern sand darter are anticipated.

## **IMPACT MINIMIZATION AND MONITORING MEASURES**

The project will seek to minimize the effects of the pipeline maintenance rather than mitigate the impacts. To minimize the possible effects of construction on eastern sand darter, MPL proposes to perform isolation and exclusion measures within the active stream channel. Block nets will be installed at both upstream and downstream locations based on the pipeline crossing, site characteristics, and in consideration of the type and extent of the planned in-water work. The block nets will be composed of nylon mesh (approximately 9.5 mm). The netting will be secured with anchor bags, filled with gravel, and will be left in place for the duration of the maintenance activities. A qualified biologist will conduct visual inspections of the block nets to ensure proper function and to remove debris or fish tangled in the net. Existing bed materials will not be used to fill anchor bags. Disturbance to the stream substrate will be

minimized by working within the proposed construction area between the block nets. Once the block nets are installed, fish remaining between the nets will be captured and removed. Seining and dip netting will occur prior to electrofishing to further minimize and avoid take of the eastern sand darter, as described below.

### **Electrofishing**

Electrofishing will be conducted once netting methods have been implemented. To minimize the risk of injury to fish, electrofishing will not be conducted under poor water visibility conditions. Block nets will be monitored for stunned fish that float downstream after being shocked. Arcadis' biologist will ensure that electrofishing attempts use the minimum voltage, pulse width, and rate settings necessary to achieve the desired response (galvanotaxis). Water conductivity will be measured in the field prior to each electrofishing attempt to determine appropriate settings. Electrofishing methods and equipment will comply with guidelines outlined by the NMFS (2000).

If the fish present in the project area do not exhibit a response to electrofishing, the settings will gradually be increased until the appropriate response is achieved. The lowest effective settings for pulse width, pulse rate, and voltage will be used to minimize risks to both personnel and fish. Safe implementation is a high priority and biologists will ensure the safety of all individuals assisting with electrofishing attempts, including planning for and providing all necessary safety equipment and materials (e.g., insulated waders and gloves, first aid/CPR kit, a current safety plan with emergency contacts and phone numbers, etc.). Only individuals that are trained and familiar with the use of electrofishing equipment will provide direct assistance during electrofishing attempts.

### **Holding and Handling**

Fish handling will be kept to the minimum necessary to remove fish from the isolated work area. Fish capture and removal operations will be planned and conducted to minimize the amount and duration of handling. Biologists will maintain captured fish in water to the maximum extent possible during seining/netting, handling, and transfer for release.

Biologists will ensure that water quality conditions are adequate for fish in the holding tanks (buckets, or coolers). Biologists will make all efforts to provide a healthy environment for captured fish, including ensuring low densities in holding containers to avoid effects of overcrowding. Large fish will be kept separate from smaller fish or released downstream to avoid predation. The operations will use water-to-water transfers whenever possible.

Once the maintenance activities are completed and the block nets have been removed, the fish being held will be released upstream of the disturbance area near the original sampling location where the darters were captured. MPL does not anticipate the need to monitor the effects of the maintenance measures on the eastern sand darter beyond the completion of construction.

### **Continued Use of the Project Area**

Following completion of the proposed maintenance, the stream banks will be recontoured to resemble pre-construction conditions and disturbed areas will be stabilized with a native seed mix to prevent soil erosion and stream sedimentation. Once stabilized, all equipment will be removed from the site and the

exclusion barriers will be removed from Muddy Creek. Removal of the exclusion barriers will allow unrestricted use of, and movement within, Muddy Creek by all aquatic species, specifically the eastern sand darter. The natural hydrology of Muddy Creek will be unaffected by the proposed maintenance activities. Therefore, the proposed maintenance of the pipeline is not anticipated to impact the continued use of the stream segment by the eastern sand darter.

### Mitigation

Because MPL is already implementing species impact avoidance measures (e.g. only placing pipeline stabilization material outside of suitable eastern sand darter habitat) and impact minimization measures (e.g., installing exclusion barriers and relocating collected individuals), MPL proposes the following mitigation measure.

- Additional presence/absence survey: MPL will conduct a presence/absence survey on 500 feet of Muddy Creek, 250 feet upstream and 250 feet downstream from the project area, to further identify and delineate potential eastern sand darter populations and habitat within Muddy Creek. The presence/absence survey will follow the survey methods conducted by Arcadis on August 23, 2016.
- The IDNR has scaled the mitigation value for this potential authorization to \$5,200. The IDNR scales aquatic species mitigation by analyzing the species status, species trend, project footprint size, degree of impact, estimated take; plus additional factors such as whether the project is a benefit to the species (such as dam removal), whether the habitat is unique, the duration of impact, and project contribution to public safety. The scaling concluded that mitigation should provide the equivalent of 20% of the value of a fish propagation project. The total value of a species propagation project is approximately \$26,000. The check will be provided to the IDNR prior to construction

### Monitoring

MPL will conduct a site monitoring visit within the maintenance area approximately 30 days after project completion to ensure all disturbed areas are stable and the site is successfully revegetating. The monitoring will focus on evaluating in-stream water quality, habitat conditions, soil stability/erosion, and vegetation recruitment within the disturbed area. An additional two monitoring events will occur within 5 years of project completion per coordination with IDNR. The presence/absence survey proposed as mitigation above will provide added information about the eastern sand darter population within Muddy Creek, without directly impacting those individuals within the project area. MPL will prepare a site monitoring report to document the results and provide the report to IDNR within 30 days of project completion.



## **ADAPTIVE MANAGEMENT PRACTICES**

MPL does not anticipate any additional modifications to the in-stream habitat, or additional impacts to the eastern sand darter, as a result of the limited pipeline maintenance/stabilization activities. The project area has experienced natural lateral erosion of the stream channel, down-cutting within the channel, and migration of the thalweg due to normal stream flow and from periodic high-velocity/intensity flood events. These erosive effects have exposed the existing pipeline, which creates risks to the aquatic ecosystem due to potential pipeline rupture.

The proposed maintenance activities will stabilize and protect the pipeline, stabilize the banks from continued erosion, and reduce downstream sedimentation. The streambed will be returned to relatively normal contours and elevations, which existed prior to the erosion and pipeline exposure. As a result, the project design, and associated best management practices, will not change the course, condition, and normal flows of Muddy Creek. These maintenance activities will further minimize impacts to eastern sand darter by reducing the potential for future stream channel degradation and downstream sedimentation on or near the pipeline crossing during flood events, which will help preserve the existing eastern sand darter habitat located immediately upstream from the project area. The maintenance activities will also reduce the risk of accidental pipeline rupture due to the pipeline exposure, which would have a significant detrimental impact on eastern sand darters, as well as other aquatic species.

Should any future changes to MPL facility operations be proposed, which may have the potential to impact eastern sand darter, separate coordination would be initiated with IDNR. Future changes may include unforeseen erosion or design failure; unanticipated collection of flood debris, scour of the existing eastern sand darter habitat located upstream; changes in high or low flows (e.g., creating narrow, high-velocity channels or isolated low-flow pools). MPL currently conducts periodic operations and maintenance inspections on their pipelines to evaluate at-risk infrastructure and site conditions. MPL will continue to conduct these inspections within the project area.

### **Verification of Adequate Funding**

MPL is committed to funding the construction and operation of the Muddy Creek WRCL 739 pipeline, including any costs associated with constraints or conditions imposed by the permitting process. MPL has been anticipating the minimization and mitigation requirements addressed within this conservation plan and understand that if changes are made to the project that could potentially impact eastern sand darter resources, coordination with IDNR will be required. MPL verifies that adequate funding exists to support and implement all mitigation activities described in the conservation plan.

## **POPULATION SURVIVAL AND RECOVERY DATA**

According to IDNR (2009), the eastern sand darter is found in the Embarras River, but does not appear to inhabit the lowest reaches of the river drainage. The species is currently known to occur in the Middle Fork of the Vermilion River and the middle Embarras River; however, it is considered extirpated from the remainder of its range in Illinois, the upper Little Wabash drainage, and the main stem of the Wabash River. Existing populations were determined to be higher than expected in portions of the river where this fish was captured. No fish were captured in the Wabash River during the 2009 IDNR study. The species will continue to be affected by continued channelization, pollution and sewage effluents, urbanization, and

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Incidental Take Authorization Coordinator  
Illinois Department of Natural Resources  
June 29, 2017

storm drainage. However, the proposed project will not reduce the likelihood of the survival or recovery of the endangered or threatened species in the wild within the State of Illinois, the biotic community of which the species is a part, or the habitat essential to the species existence in Illinois.

### IMPLEMENTING AGREEMENT

The following individuals will confirm that all actions proposed in this conservation plan will be effectively implemented and executed. MPL certifies that each of the following participants in the execution of this conservation plan has the legal authority to carry out their respective obligations and responsibilities under the conservation plan.

#### Joshua Stuff

Marathon Pipe Line LLC  
Environmental, Safety & Regulatory Manager Compliance Official

Signature: \_\_\_\_\_



#### Scott Walker

Principal Ecologist  
Arcadis U.S., Inc.

Signature: \_\_\_\_\_



The IDNR is responsible for the review of the conservation plan and any subsequent issuance of an Incidental Take Authorization (ITA). MPL is responsible for securing authorization for incidental take, as well as acquiring all necessary U.S. Army Corps of Engineers (USACE) Section 404 and IDNR permits. ARCADIS, U.S, Inc. is the consulting agent retained by MPL to assist with preparation of the ITA application and any required eastern sand darter recovery and relocation effort.

The proposed project schedule is provided on page 3 of this conservation plan. Construction is scheduled to begin in September, once the ITA has been granted. Installation of the impact avoidance exclusion barriers will be conducted prior to the maintenance activities within Muddy Creek, followed by the species recovery and relocation effort. Primary recovery and relocation will be conducted prior to the maintenance activities, but ongoing observation and recovery/relocation will be conducted during the maintenance

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Incidental Take Authorization Coordinator  
Illinois Department of Natural Resources  
June 29, 2017

activities, as needed. MPL's Contractor will then mobilize equipment (1 week to complete) and install the geotextile matting and rock riprap stabilization materials (approximately 2 weeks to complete). Once all equipment has been removed from the site, and final site stabilization has been conducted (1 week to complete), the exclusion barriers will be removed. Therefore, the proposed project completion date will be approximately 4 weeks from start date.

All appropriate state and federal permits and notifications will be completed and approved prior to project implementation. MPL submitted a Joint Permit Application to the USACE - St. Louis District Regulatory Division for Section 404 permit authorization, and subsequently received approval for this project in the form of permit authorization LRL-2016-116-mad (see Attachment B). No federal authorizations for take of threatened or endangered species have been issued for the proposed project.

Sincerely,

Arcadis U.S., Inc.

Scott Walker  
Principal Ecologist

Copies:  
Amber Mosier - MPL

Enclosures:

### **Figures**

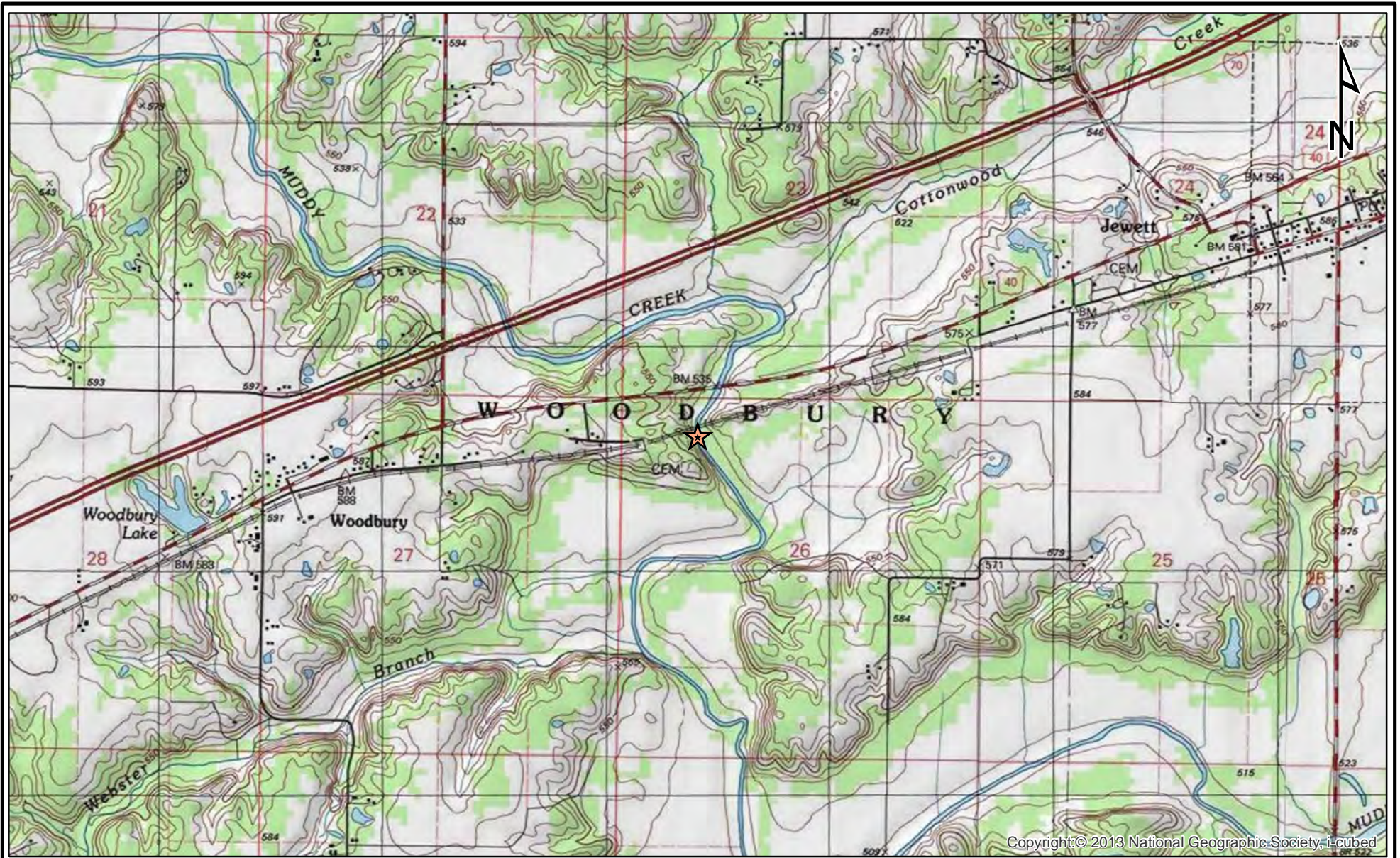
- 1 Vicinity Map
- 2 Sand Darter Survey and Clearance Area

### **Attachments**

- A. Eastern Sand Darter Survey Report, Marathon Pipe Line LLC Muddy Creek WRCL 739 Project, Cumberland County, Illinois
- B. U.S. Army Corps of Engineers Authorization ID No. LRL-2016-116-mad
- C. Muddy Creek WRCL 739 Cumberland County, Jewett, IL Design Plans
- D. Existing Easement 459-135-739

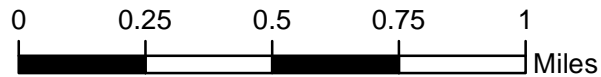
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★ Project Location



Marathon Pipe Line, Cumberland County, Illinois  
Muddy Creek WRCL 739  
Eastern Sand Darter ITA

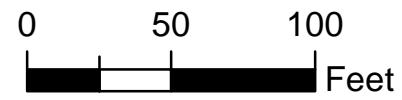
Vicinity Map



FIGURE  
1





- Pipeline
- Stream (with flow direction)
- Ordinary High Water Mark
- Exclusion Netting
- Area of Direct Impact (ADI)
- Survey/Clearance Area



Marathon Pipe Line, Cumberland County, Illinois  
Muddy Creek WRCL 739  
Eastern Sand Darter ITA

**Sand Darter Survey  
Clearance Area**

  | FIGURE 2

Marathon Petroleum Company, LP

# **MUDDY CREEK WRCL 739 PROJECT CUMBERLAND COUNTY, ILLINOIS**

Eastern Sand Darter Survey Report

October 2016



**MUDDY CREEK  
WRCL 739  
PROJECT –  
Cumberland  
County, Illinois**

**Eastern Sand Darter Survey  
Report**

Prepared for:

Marathon Petroleum Company, LP

Prepared by:

Arcadis U.S., Inc.

1717 West 6th Street

Suite 210

Austin

Texas 78703

Tel 512 451 1188

Fax 512 451 2930

Our Ref.:

03256301.0000

Date:

October 2016

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## 1 INTRODUCTION

Arcadis U.S., Inc. (Arcadis) was contracted by Marathon Petroleum Company, LP (Marathon) to conduct a presence/absence survey for the Illinois state-listed threatened fish species eastern sand darter (*Ammocrypta pellucida*) within the Muddy Creek WRCL 739 project area, located in Jewett, Cumberland County, Illinois (hereafter referred to as the study area) (**Figure 1**). Eastern sand darters were observed within the study area during the field survey and the following survey report provides a description of the eastern sand darter and its habitat along with the methods and results of the survey.

Based on information provided by Marathon, the WRCL 739 pipeline crosses Muddy Creek approximately two miles west/southwest of Jewett, Illinois. The pipeline is currently exposed across Muddy Creek for approximately 69 feet within the ordinary high water mark (OHWM) (**Figure 2**). Marathon proposes to cover and stabilize the pipeline using a geotextile matting system and rock riprap. The area of disturbance within Muddy Creek associated with the proposed pipeline maintenance activities extends 30 feet upstream and downstream of the pipeline centerline, delimiting a 60-foot survey corridor. The OHWM at the pipeline crossing is approximately 69 feet; therefore, the survey area is approximately 4,140 square feet (**Figure 2**).

Included in this survey report is a background literature and database review for the species. The survey was designed to evaluate the presence or absence of this species within the study area, evaluate the potential for impacts associated with project implementation, and provide recommendations for appropriate impact avoidance, requisite permitting, and/or mitigation. The survey methods and results presented in this report are based on knowledge of the natural resources in the region, a review of relevant background literature, and discussions with agency representatives and/or ichthyological experts.

## 2 SPECIES AND HABITAT DISTRIBUTION

### 2.1 Eastern Sand Darter

One state-listed threatened fish species, the eastern sand darter, and one state-listed endangered fish species, the Harlequin darter (*Etheostoma histrio*), are indicated by the Illinois Department of Natural Resources (IDNR, 2016a) and Illinois Endangered Species Protection Board – Illinois Natural Heritage Database (2014) as species of potential occurrence in Cumberland County, Illinois. The eastern sand darter is currently known to occur in the Middle Fork of the Vermilion River and the middle Embarras River; however, it is considered extirpated from the remainder of its range in Illinois, the upper Little Wabash drainage, and the main stem of the Wabash River (Henry et al., 2009). Although the study area does not occur within the Embarras River, Little Wabash drainage, or Wabash River, Muddy Creek is a tributary of the middle Embarras River, located approximately 4.5 river miles to the east/southeast. Therefore, it is considered a species of potential occurrence within the study area. The Harlequin darter is restricted to a 20-mile stretch of the Embarras River in Cumberland and Jasper counties, Illinois (Smith, 1979; Henry et al., 2009). As a result, the Harlequin darter is not considered a species of potential occurrence within the study area.

The eastern sand darter belongs to the class *Actinopterygii* (rayfinned fishes), order *Perciformes*, and family *Percidae* (Adams and Burr, 2004). The species is a terete and pellucid darter with a row of 9-13 brown dots along the lateral line, and a similar row along the dorsal ridge (Smith, 1979). A pronounced snout exhibits dusky markings, and several rows of scales above the lateral line are distinctly pigmented when compared to the body. The species has 8-10 dorsal spines, 8-10 anal rays, and one anal spine, with widely separated

dorsal fins. There is not a needlelike spine projecting backward from the opercle. The eastern sand darter is similar in appearance to the western sand darter (*Ammocrypta clara*), but has more scales and pigment and lacks the opercular spine. Maximum length of the eastern sand darter is approximately three inches.

The eastern sand darter occurs in rivers of high water quality over beds of pure sand, where it buries itself for protection and cover (Adams and Burr, 2004; Smith, 1979). Microhabitat variables such as substrate, water depth, and water velocity have been found to account for significant variation in species abundance, and the presence of sand substrate alone accounted for 46 percent of the variance (Daniels, 1993). In field collections, Daniels (1993) and Facey (1998) found eastern sand darters were most abundant on the depositional bank of the channel, directly downstream of a bend.

## 3 REGULATORY FRAMEWORK

### 3.1 State-listed Threatened and Endangered Species

In 1972, the Illinois General Assembly enacted the Illinois Endangered Species Act (ILESA) under the Illinois Compiled Statutes (520 ILCS 10/1). The Endangered Species Protection Board was created after the passage of the ILESA to implement the Act, which was designed to “protect those species of plants and animals native to Illinois which are in danger of being lost from the wild in Illinois.” The Endangered Species Protection Board is an independent board, but works closely with IDNR and the Illinois Nature Preserves Commission to ensure ongoing species preservation.

Under 520 ILCS 10/3, it is unlawful for any person:

- (1) To possess, take, transport, sell, offer for sale, give, or otherwise dispose of any animal or the product thereof of any animal species which occurs on the Illinois List;
- (2) To deliver, receive, carry, transport, or ship in interstate or foreign commerce plants listed as endangered by the federal government without a permit therefore issued by the Department as provided in Section 4 of the Act;
- (3) To take plants on the Illinois List without the express written permission of the landowner; or
- (4) To sell or offer for sale plants, or plant products of endangered species, on the Illinois List.

The eastern sand darter is state-listed threatened by the Endangered Species Protection Board and is indicated as a species of potential occurrence in Cumberland County (Illinois Endangered Species Protection Board, 2014).

## 4 METHODS

Arcadis reviewed site maps, aerial photographs, natural resource database accounts, and other relevant scientific literature to complete preliminary determinations of the available resources, potentially suitable habitat, and known extent (or proximity) of eastern sand darter within the study area. A map of the survey area is provided in **Figure 2**. Specific methods of survey for the eastern sand darter are described below.

The eastern sand darter survey was conducted on August 23, 2016 and in accordance with the general methods described in *Status Survey and Management Implications of the Harlequin Darter and Eastern Sand Darter in Southeastern Illinois* (Henry et al., 2009), supplemented by *Rapid Bioassessment Protocols for Use in Streams and Wadeable Rivers* (Barbour et al., 1999).

#### 4.1.1 Presence/Absence Survey

The presence/absence survey was conducted using a combination of backpack electrofishing, seining, and dip-netting. Two variable-voltage backpack electrofishers were used: a Smith-Root Model LR-20B and a Halltech HT-2000 backpack unit. The seine consisted of a 4' x 20' minnow seine with 1/4" mesh and the dip-nets were made of 1/8" mesh. The guidance literature suggested using two seining methods to survey for eastern sand darters in waters that are less than one meter in depth, with low stream velocity, and with relatively few sampling obstructions (e.g., snags, boulders, large debris): kick sets and downstream hauls.

For kick sets, two biologists position the 20' seine downstream of the habitat to be sampled while the backpack operator shocks their way downstream toward the net, disturbing substrates, logs, and rocks with their feet as they walk. This method is typically employed in areas where the stream current is sufficient to sweep stunned fishes into the net and over complex habitats (e.g. areas with snags, woody debris, cobbles, etc.). Downstream hauls are conducted by having two biologists pull the 20' seine downstream, keeping the lead line in contact with the substrate, while the backpack operator walks in front of the net sweeping the anode back and forth just in front of the net. This method is typically employed in runs, pools, and riffle edges with few snags. However, due to extremely low flow rates in the study area (less than 0.5 cubic feet per second [cfs]), kick sets were not conducted as there was insufficient flow to sweep stunned fishes into the downstream seine. As a result, Arcadis utilized a combination of backpack electrofishing with dip-nets, followed by downstream and upstream seine hauls paired with backpack electrofishing.

Electrofishing was conducted for approximately 2.25 hours by two crews of two biologists, totaling approximately 4.5 man-hours of electrofishing. During this time, all accessible habitats in the study area and immediate vicinity were surveyed and electrofishing continued until no new species were encountered. Arcadis then conducted two downstream seine hauls according to the methods described above, and conducted two upstream seine hauls following the same method (**Figure 2**). Seining was conducted for approximately 1.25 man-hours. The thalweg depth was greater than six feet, which was not accessible for survey by wading. However, Arcadis biologists did extend the electrofisher anode around logs, brush piles, and root wads near the edge of the thalweg while other biologists dip-netted fish as they left the structures.

All fish collected during the survey were identified in the field to the lowest taxonomic level practical. Representative individuals of each species were measured (total length) and observations were made of individuals with diseases or other anomalies. Photographic voucher specimens were collected in the field prior to releasing the fish. Identification of fish species and scientific nomenclature followed *The Fishes of Illinois* (Smith, 1979).

#### 4.1.2 Habitat Evaluation

Water quality measurements and habitat characteristics were collected within the study area during the field survey. Water temperature, dissolved oxygen, conductivity, and pH were measured using a Yellow Springs Institute (YSI) Series 600L multiprobe, equipped with an optical dissolved oxygen probe. As specified by the manufacturer, this instrument has the following accuracy: temperature,  $\pm 0.15$  degrees Celsius ( $^{\circ}\text{C}$ ); specific conductance, 0.001 mS/cm; pH,  $\pm 0.2$ ; DO,  $\pm 0.2$  milligrams per liter (mg/L). Velocity and depth were measured with a Marsh-McBirney Flowmate 2000<sup>®</sup> digital flow meter and wading rod.

Habitat data collected within the study area included estimates and descriptions of stream width, bank slopes, bank erosion potential, depth, habitat type (riffle, pool, run, or glide), substrate composition, aquatic plants, in-stream cover, tree canopy, and riparian cover. Observations of stream use, maximum pool depth, channel modifications, channel sinuosity, reach slope, and channel flow status were made over the entire

study area. Data was recorded on standardized Physical Characterization/Water Quality Field Data Sheets (Barbour et. al. 1999).

## 4.2 Survey Results

The study area is characterized by steep, vertical banks with a broad, forested riparian community adjacent to the maintained pipeline right-of-way. Dominant tree species within the riparian community included American sycamore (*Platanus occidentalis*), Ohio buckeye (*Aesculus glabra*), and honey locust (*Gleditsia triacanthos*). Within the maintained right-of-way, the riparian community consisted of dense native and non-native herbaceous species, dominated by sunflower (*Helianthus annuus*), giant ragweed (*Ambrosia trifida*), and Indian woodoats (*Chasmanthium latifolium*). Stream morphology consisted of a shallow riffle complex at the northern margin of the study area (upstream) that transitioned into a long, slow moving pool. The long pool was located within the project area (i.e., the area of direct impact), but the riffle complex was located outside of the area of direct impact.

Stream width was approximately 60 feet and water depth ranged from approximately one foot at the northern study area boundary to greater than six feet at the southern boundary. Streamflow within the study area was low, averaging less than 0.5 cfs. The substrate of Muddy Creek within the study area consisted primarily of soft clay and silt; however, the riffle complex exhibited a gravelly-sand substrate with occasional cobbles, boulders, and an adjacent depositional sand bar (**Figure 2**). Completed Physical Characterization/Water Quality Field Data Sheets are provided in **Appendix A**. Study area habitat photographs are provided in **Appendix B**. Water quality data collected during the field survey are provided in **Table 1**, below.

**Table 1. Water Quality Data Collected within the Muddy Creek Study Area**

Water Quality Parameter	Measurement/Units
Temperature	21.65 °C
Turbidity	13.8 NTU
Specific Conductivity	466 mS/cm
Salinity	0.22 ppt
pH	7.56
Oxidation Reduction Potential (ORP)	39 mV
Dissolved Oxygen (DO)	6.36 mg/L (72.4 %)

Twenty fish species, representing 13 genera and seven families, were collected during the field survey, including five eastern sand darters (**Table 2**). All darter species, including the five eastern sand darters, were collected from the riffle complex with gravelly-sand substrate (located outside of the area of direct impact), which is consistent with the typical habitat requirements of the species. Photographs of each fish species collected during the field survey are provided in **Appendix B**. The locations of eastern sand darter habitat and fish collection are provided on **Figure 2**.

Table 2. Number of Fish Species Collected During the Field Survey and their Collection Method

Family	Common Name	Scientific Name	Number Collected	Collection Method
<b>Atherinidae (silversides)</b>	Brook silverside	<i>Labidesthes sicculus</i> (Cope)	39	Electrofishing/seine hauls
<b>Catostomidae (suckers)</b>	Golden redbhorse	<i>Moxostoma erythrurum</i> (Rafinesque)	1	Seine hauls
<b>Centrarchidae (sunfish family)</b>	Green sunfish	<i>Lepomis cyanellus</i> Rafinesque	19	Electrofishing
	Bluegill	<i>Lepomis macrochirus</i> Rafinesque	22	Electrofishing
	Longear sunfish	<i>Lepomis megalotis</i> (Rafinesque)	20	Electrofishing
	Largemouth bass	<i>Micropterus salmoides</i> (Lacépède)	3	Electrofishing/seine hauls
	White crappie	<i>Pomoxis annularis</i> Rafinesque	1	Electrofishing
<b>Clupeidae (herrings)</b>	Gizzard shad	<i>Dorosoma cepedianum</i> (Lesueur)	1	Electrofishing
<b>Cyprinidae (minnows and carp)</b>	Silverjaw minnow	<i>Ericymba buccata</i> Cope	5	Seine hauls
	Spotfin shiner	<i>Notropis spilopterus</i> (Cope)	42	Electrofishing/seine hauls
	Sand shiner	<i>Notropis stramineus</i> (Cope)	4	Seine hauls
	Bluntnose minnow	<i>Pimephales notatus</i> (Rafinesque)	90	Electrofishing/seine hauls
	Bullhead minnow	<i>Pimephales vigilax</i> (Baird & Girard)	12	Electrofishing/seine hauls
	Unknown	--	39	Electrofishing/seine hauls
<b>Cyprinodontidae (killfishes)</b>	Blackstripe topminnow	<i>Fundulus notatus</i> (Rafinesque)	24	Electrofishing
<b>Percidae (darters and perches)</b>	Eastern sand darter	<i>Ammocrypta pellucida</i> (Putnam)	5	Seine hauls
	Greenside darter	<i>Etheostoma blennioides</i> Rafinesque	1	Seine hauls
	Rainbow darter	<i>Etheostoma caeruleum</i> Storer	3	Electrofishing/seine hauls
	Johnny darter	<i>Etheostoma nigrum</i> Rafinesque	2	Electrofishing/seine hauls
	Blackside darter	<i>Percina maculata</i> (Girard)	1	Seine hauls

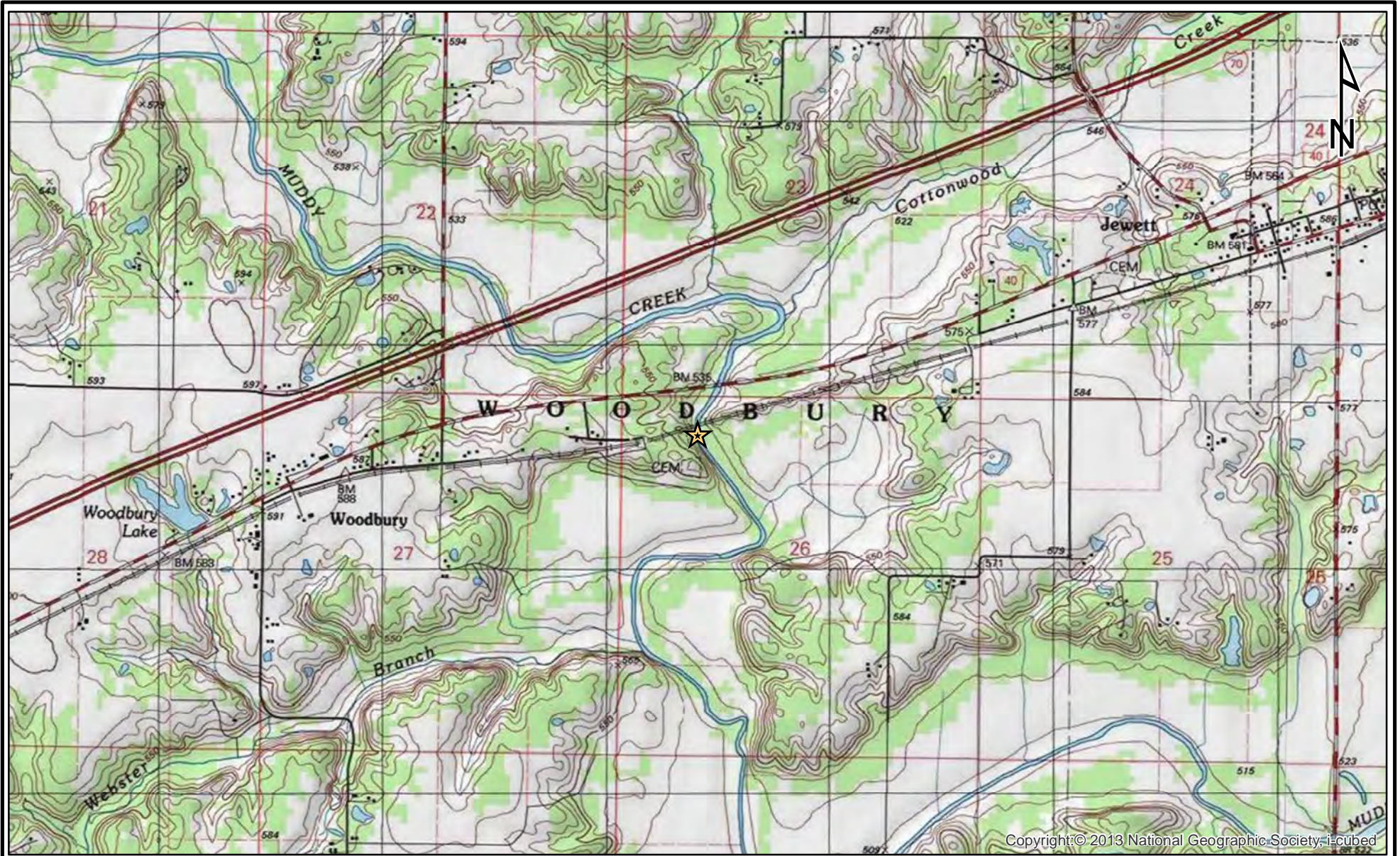
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# FIGURES

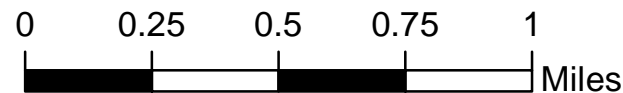






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★ Project Location









Marathon Pipe Line, Cumberland County, Illinois  
Muddy Creek WRCL 739 Eastern Sand  
Darter Survey Report

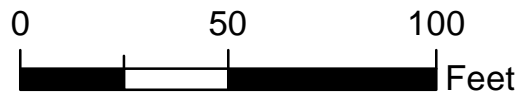
Vicinity Map



FIGURE  
1



-  Depositional Gravelly-Sand
-  Eastern Sand Darter Collection Location
-  Project Footprint
-  Flow Direction
-  Area of Direct Impact (ADI)
-  Pipeline



Marathon Pipe Line, Cumberland County, Illinois  
Muddy Creek WRCL 739 Eastern Sand Darter  
Survey Report

**Eastern Sand Darter Survey  
Site Details**



# APPENDIX A

Completed Physical Characterization/Water Quality Field Data Sheets



**PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET  
(FRONT)**

STREAM NAME <u>Muddy Creek</u>	LOCATION <u>Jewett, Illinois</u>	
STATION # _____ RIVERMILE _____	STREAM CLASS <u>Perennial</u>	
LAT _____ LONG _____	RIVER BASIN <u>Wabash</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>J. Henson, M. Frackelton, E. Hinkle, S. Walker</u>		
FORM COMPLETED BY <u>J. Henson</u>	DATE <u>8/23/16</u> TIME <u>10:27</u> <input checked="" type="radio"/> AM <input type="radio"/> PM	REASON FOR SURVEY <u>Eastern P/A survey for sand darter</u>

<b>WEATHER CONDITIONS</b>	<p>Now</p> <input type="checkbox"/> storm (heavy rain) <input type="checkbox"/> rain (steady rain) <input type="checkbox"/> showers (intermittent) <input checked="" type="checkbox"/> %cloud cover <input type="checkbox"/> clear/sunny	<p>Past 24 hours</p> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> %	<p>Has there been a heavy rain in the last 7 days?  <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No</p> <p>Air Temperature <u>75</u> °C</p> <p>Other _____</p>
<b>SITE LOCATION/MAP</b>	<p>Draw a map of the site and indicate the areas sampled (or attach a photograph)</p>		
<b>STREAM CHARACTERIZATION</b>	<p>Stream Subsystem  <input checked="" type="checkbox"/> Perennial <input type="checkbox"/> Intermittent <input type="checkbox"/> Tidal</p> <p>Stream Origin  <input type="checkbox"/> Glacial <input type="checkbox"/> Spring-fed  <input type="checkbox"/> Non-glacial montane <input checked="" type="checkbox"/> Mixture of origins  <input type="checkbox"/> Swamp and bog <input type="checkbox"/> Other _____</p> <p>Stream Type  <input type="checkbox"/> Coldwater <input checked="" type="checkbox"/> Warmwater</p> <p>Catchment Area _____ km<sup>2</sup></p>		

PHYSICAL CHARACTERIZATION/WATER QUALITY FIELD DATA SHEET  
(BACK)

<b>WATERSHED FEATURES</b>	Predominant Surrounding Landuse <input checked="" type="checkbox"/> Forest <input type="checkbox"/> Commercial <input type="checkbox"/> Field/Pasture <input type="checkbox"/> Industrial <input type="checkbox"/> Agricultural <input type="checkbox"/> Other <input type="checkbox"/> Residential	Local Watershed NPS Pollution <input checked="" type="checkbox"/> No evidence <input type="checkbox"/> Some potential sources <input type="checkbox"/> Obvious sources  Local Watershed Erosion <input type="checkbox"/> None <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Heavy
<b>RIPARIAN VEGETATION</b> (18 meter buffer)	Indicate the dominant type and record the dominant species present <input checked="" type="checkbox"/> Trees <input type="checkbox"/> Shrubs <input type="checkbox"/> Grasses <input type="checkbox"/> Herbaceous dominant species present <u>Platanus occidentalis, Aesculus glabra, Glehnia trireanthos</u>	
<b>INSTREAM FEATURES</b>	Estimated Reach Length <u>100</u> m Estimated Stream Width <u>60</u> m Sampling Reach Area <u>6,000</u> m <sup>2</sup> Area in km <sup>2</sup> (m <sup>2</sup> x1000) _____ km <sup>2</sup> Estimated Stream Depth <u>4-8</u> m Surface Velocity (at thalweg) <u>0.29</u> m/sec <u>ft/sec</u> <u>avg velocity</u>	Canopy Cover <input type="checkbox"/> Partly open <input checked="" type="checkbox"/> Partly shaded <input type="checkbox"/> Shaded High Water Mark <u>75</u> m Proportion of Reach Represented by Stream Morphology Types <input type="checkbox"/> Riffle <u>10</u> % <input type="checkbox"/> Run _____ % <input type="checkbox"/> Pool <u>90</u> % Channelized <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Dam Present <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
<b>LARGE WOODY DEBRIS</b>	LWD <u>10</u> m <u>ft</u> + 2    - 1 large stump/fallen tree. Density of LWD _____ m <sup>2</sup> /km <sup>2</sup> (LWD/ reach area) <u>Root wad on sw bank.</u>	
<b>AQUATIC VEGETATION</b>	Indicate the dominant type and record the dominant species present <input type="checkbox"/> Rooted emergent <input type="checkbox"/> Rooted submergent <input type="checkbox"/> Rooted floating <input type="checkbox"/> Free floating <input type="checkbox"/> Floating Algae <input type="checkbox"/> Attached Algae dominant species present <u>none present</u> Portion of the reach with aquatic vegetation <u>0</u> %	
<b>WATER QUALITY</b>	Temperature <u>21.65</u> °C Specific Conductance <u>466</u> mS/cm Dissolved Oxygen <u>6.36</u> mg/L ( <u>72.4</u> %) pH <u>7.56</u> Turbidity <u>13.8</u> NTU WQ Instrument Used <u>YSI 6920</u>	Water Odors <input type="checkbox"/> Normal/None <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Fishy <input type="checkbox"/> Other  Water Surface Oils <input type="checkbox"/> Slick <input type="checkbox"/> Sheen <input type="checkbox"/> Globs <input type="checkbox"/> Flecks <input type="checkbox"/> None <input type="checkbox"/> Other  Turbidity (if not measured) <input type="checkbox"/> Clear <input checked="" type="checkbox"/> Slightly turbid <input type="checkbox"/> Turbid <input type="checkbox"/> Opaque <input type="checkbox"/> Stained <input type="checkbox"/> Other
<b>SEDIMENT/SUBSTRATE</b>	Odors <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Sewage <input type="checkbox"/> Petroleum <input type="checkbox"/> Chemical <input type="checkbox"/> Anaerobic <input type="checkbox"/> None <input type="checkbox"/> Other  Deposits <input type="checkbox"/> Sludge <input type="checkbox"/> Sawdust <input type="checkbox"/> Paper fiber <input type="checkbox"/> Sand <input type="checkbox"/> Relict shells <input type="checkbox"/> Other  Looking at stones which are not deeply embedded, are the undersides black in color? <input checked="" type="checkbox"/> Yes <input checked="" type="checkbox"/> No	

INORGANIC SUBSTRATE COMPONENTS (should add up to 100%)			ORGANIC SUBSTRATE COMPONENTS (does not necessarily add up to 100%)		
Substrate Type	Diameter	% Composition in Sampling Reach	Substrate Type	Characteristic	% Composition in Sampling Area
Bedrock			Detritus	sticks, wood, coarse plant materials (CPOM)	<u>7%</u>
Boulder	> 256 mm (10")	<u>10%</u>	Muck-Mud	black, very fine organic (FPOM)	
Cobble	64-256 mm (2.5"-10")		Marl	grey, shell fragments	
Gravel	2-64 mm (0.1"-2.5")	<u>2%</u>			
Sand	0.06-2mm (gritty)	<u>25%</u>			
Silt	0.004-0.06 mm	<u>20%</u>			
Clay	< 0.004 mm (slick)	<u>43%</u>			

## HABITAT ASSESSMENT FIELD DATA SHEET — HIGH GRADIENT STREAMS (FRONT)

STREAM NAME _____		LOCATION _____	
STATION # _____ RIVERMILE _____		STREAM CLASS _____	
LAT _____ LONG _____		RIVER BASIN <span style="font-size: 2em; color: blue;">N/A</span>	
STORET # _____		AGENCY _____	
INVESTIGATORS _____			
FORM COMPLETED BY _____		DATE _____ TIME _____ AM PM	REASON FOR SURVEY _____

	Habitat Parameter	Condition Category			
		Optimal	Suboptimal	Marginal	Poor
Parameters to be evaluated in sampling reach	1. Epifaunal Substrate/ Available Cover	Greater than 70% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are <u>not</u> new fall and <u>not</u> transient).	40-70% mix of stable habitat; well-suited for full colonization potential; adequate habitat for maintenance of populations; presence of additional substrate in the form of newfall, but not yet prepared for colonization (may rate at high end of scale).	20-40% mix of stable habitat; habitat availability less than desirable; substrate frequently disturbed or removed.	Less than 20% stable habitat; lack of habitat is obvious; substrate unstable or lacking.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	2. Embeddedness	Gravel, cobble, and boulder particles are 0-25% surrounded by fine sediment. Layering of cobble provides diversity of niche space.	Gravel, cobble, and boulder particles are 25-50% surrounded by fine sediment.	Gravel, cobble, and boulder particles are 50-75% surrounded by fine sediment.	Gravel, cobble, and boulder particles are more than 75% surrounded by fine sediment.
	SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0
	3. Velocity/Depth Regime	All four velocity/depth regimes present (slow-deep, slow-shallow, fast-deep, fast-shallow). (Slow is < 0.3 m/s, deep is > 0.5 m.)	Only 3 of the 4 regimes present (if fast-shallow is missing, score lower than if missing other regimes).	Only 2 of the 4 habitat regimes present (if fast-shallow or slow-shallow are missing, score low).	Dominated by 1 velocity/ depth regime (usually slow-deep).
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
4. Sediment Deposition	Little or no enlargement of islands or point bars and less than 5% of the bottom affected by sediment deposition.	Some new increase in bar formation, mostly from gravel, sand or fine sediment; 5-30% of the bottom affected; slight deposition in pools.	Moderate deposition of new gravel, sand or fine sediment on old and new bars; 30-50% of the bottom affected; sediment deposits at obstructions, constrictions, and bends; moderate deposition of pools prevalent.	Heavy deposits of fine material, increased bar development; more than 50% of the bottom changing frequently; pools almost absent due to substantial sediment deposition.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	
5. Channel Flow Status	Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.	Water fills >75% of the available channel; or <25% of channel substrate is exposed.	Water fills 25-75% of the available channel, and/or riffle substrates are mostly exposed.	Very little water in channel and mostly present as standing pools.	
SCORE	20 19 18 17 16	15 14 13 12 11	10 9 8 7 6	5 4 3 2 1 0	

**HABITAT ASSESSMENT FIELD DATA SHEET—HIGH GRADIENT STREAMS (BACK)**

Habitat Parameter	Condition Category																					
	Optimal					Suboptimal					Marginal					Poor						
<b>6. Channel Alteration</b>	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.						
<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0	
<b>7. Frequency of Riffles (or bends)</b>	Occurrence of riffles relatively frequent; ratio of distance between riffles divided by width of the stream <7:1 (generally 5 to 7); variety of habitat is key. In streams where riffles are continuous, placement of boulders or other large, natural obstruction is important.					Occurrence of riffles infrequent; distance between riffles divided by the width of the stream is between 7 to 15.					Occasional riffle or bend; bottom contours provide some habitat; distance between riffles divided by the width of the stream is between 15 to 25.					Generally all flat water or shallow riffles; poor habitat; distance between riffles divided by the width of the stream is a ratio of >25.						
	<b>SCORE</b>	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
	<b>SCORE ___ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
	<b>SCORE ___ (RB)</b>	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>8. Bank Stability (score each bank)</b>  Note: determine left or right side by facing downstream.	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.						
	<b>SCORE ___ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
	<b>SCORE ___ (RB)</b>	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
	<b>SCORE ___ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>9. Vegetative Protection (score each bank)</b>	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.						
	<b>SCORE ___ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
	<b>SCORE ___ (RB)</b>	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
	<b>SCORE ___ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
<b>10. Riparian Vegetative Zone Width (score each bank riparian zone)</b>	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.						
	<b>SCORE ___ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
	<b>SCORE ___ (RB)</b>	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
	<b>SCORE ___ (LB)</b>	Left Bank 10 9					8 7 6					5 4 3					2 1 0					

Total Score \_\_\_\_\_

### HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (FRONT)

STREAM NAME <u>Muddy Creek</u>	LOCATION <u>Janett, IL</u>	
STATION # _____ RIVERMILE _____	STREAM CLASS <u>Perennial</u>	
LAT _____ LONG _____	RIVER BASIN <u>Wabash</u>	
STORET # _____	AGENCY _____	
INVESTIGATORS <u>J. Henson, M. Frackelton, E. Hinkle, S. Walker</u>		
FORM COMPLETED BY <u>J. Henson</u>	DATE TIME <u>8/23/16</u> <u>10:27</u> AM PM	REASON FOR SURVEY <u>PA Survey for Eastern sand Darter</u>

Habitat Parameter	Condition Category			
	Optimal	Suboptimal	Marginal	Poor
<b>1. Epifaunal Substrate/ Available Cover</b>  Greater than 50% of substrate favorable for epifaunal colonization and fish cover; mix of snags, submerged logs, undercut banks, cobble or other stable habitat and at stage to allow full colonization potential (i.e., logs/snags that are not new fall and not transient).  SCORE <u>7</u>	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
<b>2. Pool Substrate Characterization</b>  Mixture of substrate materials, with gravel and firm sand prevalent; root mats and submerged vegetation common.  SCORE <u>10</u>	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
<b>3. Pool Variability</b>  Even mix of large-shallow, large-deep, small-shallow, small-deep pools present.  SCORE <u>13</u>	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
<b>4. Sediment Deposition</b>  Little or no enlargement of islands or point bars and less than <20% of the bottom affected by sediment deposition.  SCORE <u>11</u>	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0
<b>5. Channel Flow Status</b>  Water reaches base of both lower banks, and minimal amount of channel substrate is exposed.  SCORE <u>13</u>	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0	20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0



HABITAT ASSESSMENT FIELD DATA SHEET—LOW GRADIENT STREAMS (BACK)

Habitat Parameter	Condition Category																				
	Optimal					Suboptimal					Marginal					Poor					
6. Channel Alteration	Channelization or dredging absent or minimal; stream with normal pattern.					Some channelization present, usually in areas of bridge abutments; evidence of past channelization, i.e., dredging, (greater than past 20 yr) may be present, but recent channelization is not present.					Channelization may be extensive; embankments or shoring structures present on both banks; and 40 to 80% of stream reach channelized and disrupted.					Banks shored with gabion or cement; over 80% of the stream reach channelized and disrupted. Instream habitat greatly altered or removed entirely.					
SCORE 13	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
7. Channel Sinuosity	The bends in the stream increase the stream length 3 to 4 times longer than if it was in a straight line. (Note - channel braiding is considered normal in coastal plains and other low-lying areas. This parameter is not easily rated in these areas.)					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					The bends in the stream increase the stream length 1 to 2 times longer than if it was in a straight line.					Channel straight; waterway has been channelized for a long distance.					
SCORE 11	20	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
8. Bank Stability (score each bank)	Banks stable; evidence of erosion or bank failure absent or minimal; little potential for future problems. <5% of bank affected.					Moderately stable; infrequent, small areas of erosion mostly healed over. 5-30% of bank in reach has areas of erosion.					Moderately unstable; 30-60% of bank in reach has areas of erosion; high erosion potential during floods.					Unstable; many eroded areas; "raw" areas frequent along straight sections and bends; obvious bank sloughing; 60-100% of bank has erosional scars.					
SCORE 7 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 7 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
9. Vegetative Protection (score each bank)	More than 90% of the streambank surfaces and immediate riparian zone covered by native vegetation, including trees, understory shrubs, or nonwoody macrophytes; vegetative disruption through grazing or mowing minimal or not evident; almost all plants allowed to grow naturally.					70-90% of the streambank surfaces covered by native vegetation, but one class of plants is not well-represented; disruption evident but not affecting full plant growth potential to any great extent; more than one-half of the potential plant stubble height remaining.					50-70% of the streambank surfaces covered by vegetation; disruption obvious; patches of bare soil or closely cropped vegetation common; less than one-half of the potential plant stubble height remaining.					Less than 50% of the streambank surfaces covered by vegetation; disruption of streambank vegetation is very high; vegetation has been removed to 5 centimeters or less in average stubble height.					
SCORE 8 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 8 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					
10. Riparian Vegetative Zone Width (score each bank riparian zone)	Width of riparian zone >18 meters; human activities (i.e., parking lots, roadbeds, clear-cuts, lawns, or crops) have not impacted zone.					Width of riparian zone 12-18 meters; human activities have impacted zone only minimally.					Width of riparian zone 6-12 meters; human activities have impacted zone a great deal.					Width of riparian zone <6 meters; little or no riparian vegetation due to human activities.					
SCORE 7 (LB)	Left Bank 10 9					8 7 6					5 4 3					2 1 0					
SCORE 7 (RB)	Right Bank 10 9					8 7 6					5 4 3					2 1 0					

Total Score 122

# FISH SAMPLING FIELD DATA SHEET (FRONT)

page 1 of 3

STREAM NAME <u>Muddy Creek</u>	LOCATION <u>Jewett Illinois</u>
STATION # _____ RIVERMILE _____	STREAM CLASS <u>Perennial</u>
LAT _____ LONG _____	RIVER BASIN <u>Wabash</u>
STORET # _____	AGENCY _____
GEAR _____	INVESTIGATORS <u>J. Henson, M. Frackelton, S. Walker, E. Hinkle</u>
FORM COMPLETED BY <u>J. Henson</u>	DATE <u>8/23/16</u> TIME <u>10:27</u> AM <input checked="" type="checkbox"/> PM <input type="checkbox"/>
	REASON FOR SURVEY <u>PA survey for Eastern Sand Darter</u>

SAMPLE COLLECTION	How were the fish captured? <input checked="" type="checkbox"/> back pack <input type="checkbox"/> tote barge <input type="checkbox"/> other <u>20' seine</u>
	Block nets used? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
	Sampling Duration Start time <u>10:27 am</u> End time <u>2:45 pm</u> Duration <u>4 hr 18 mins</u>
	Stream width (in <sup>feet</sup> meters) Max <u>60</u> Mean <u>60</u>
HABITAT TYPES	Indicate the percentage of each habitat type present <input type="checkbox"/> Riffles <u>10</u> % <input type="checkbox"/> Pools <u>90</u> % <input type="checkbox"/> Runs _____ % <input type="checkbox"/> Snags _____ % <input type="checkbox"/> Submerged Macrophytes <u>7</u> % <input type="checkbox"/> Other ( _____ ) _____ %
GENERAL COMMENTS	

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)	ANOMALIES*							
			D	E	F	L	M	S	T	Z
<u>Largemouth bass</u>	<u>3</u>									
<u>white crappie</u>	<u>1</u>									
<u>Bluntnose minnow</u>	<u>90</u>									
<u>Longear Sunfish</u>	<u>20</u>									

FISH SAMPLING FIELD DATA SHEET (BACK)

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)	ANOMALIES*							
			D	E	F	L	M	S	T	Z
Bluegill Sunfish	22				8	1				
Green Sunfish	19									11
										injured
Gizzard shad	1									
Silverside <del>minnow</del>	39									
Satin shiner	42									
Billhead minnow	12									
Black-striped top minnow	24									
Greenside Darter	1									

\* ANOMALY CODES: D = deformities; E = eroded fins; F = fungus; L = lesions; M = multiple DELT anomalies; S = emaciated; Z = other

FISH SAMPLING FIELD DATA SHEET (BACK)

SPECIES	TOTAL (COUNT)	OPTIONAL: LENGTH (mm)/WEIGHT (g) (25 SPECIMEN MAX SUBSAMPLE)	ANOMALIES*							
			D	E	F	L	M	S	T	Z
Rainbow darter	3									
Johnny darter	2									
Unknown #1	39									
Sand Shiner	4									
Silverjaw minnow	5									
Blackside Darter	1									
Eastern Sand Darter	5									
Golden Redhorse	1									

\* ANOMALY CODES: D = deformities; E = eroded fins; F = fungus; L = lesions; M = multiple DELT anomalies; S = emaciated; Z = other

FISH SAMPLE LOG-IN SHEET

Date Collected	Collected By	Number of Containers	Preservation	Station #	Stream Name and Location	Date Received by Lab	Lot Number	Date of Completion		
								sorting	mounting	identification
None collected										

Serial Code Example: F0754001(1)  
F = Fish (B = Benthos; P = Periphyton) ■ 0754 = project number ■ 001 = sample number ■ (1) = lot number (e.g., winter 1996 = 1; summer 1996 = 2)

# APPENDIX B

## Site Photographs



## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo: 1**

**Date:**  
8-23-2016

**Description:**  
View of survey area, with adjacent railroad bridge in the background. Facing north (upstream) towards riffle complex and sandbar.



**Photo: 2**

**Date:**  
8-23-2016

**Description:**  
View of survey area, facing south (downstream).

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo: 3**

**Date:**  
8-23-2016

**Description:**  
View of exposed pipeline  
on the right stream bank.  
Photo facing upstream.



**Photo: 4**

**Date:**  
8-23-2016

**Description:**  
Large depositional sand  
bar associated with riffle  
complex on northern  
boundary of the study area.  
Eastern sand darters were  
collected from this location.



## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo: 5**

**Date:**

8-23-2016

**Description:**

View of in-stream sand bar (gravelly-sand) that extends southward (downstream) into the study area. Photo facing downstream.



**Photo: 6**

**Date:**

8-23-2016

**Description:**

View of riffle complex with gravelly-sand substrate. Remnant railroad piers are visible in the streambed. Eastern sand darters were collected slightly downstream from this location.

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo: 7**

**Date:**  
8-23-2016

**Description:**

Downstream seining of the sandbar habitat. Per the recommended survey protocol, an electrofisher was used in conjunction with seine hauls to increase collection efficiency.



**Photo: 8**

**Date:**  
8-23-2016

**Description:**

Example of seine collection.

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 9

**Date:**  
8-23-2016

**Description:**  
Eastern sand darter  
(*Ammocrypta pellucida*)  
collected in riffle complex  
on northern boundary or  
study area.



**Photo:** 10

**Date:**  
8-23-2016

**Description:**  
Eastern sand darter  
collected in riffle complex  
on northern boundary or  
study area.

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 11

**Date:**  
8-23-2016

**Description:**  
Eastern sand darter  
collected in riffle complex  
on northern boundary or  
study area.



**Photo:** 12

**Date:**  
8-23-2016

**Description:**  
Greenside darter  
(*Etheostoma blennioides*).

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 13

**Date:**  
8-23-2016

**Description:**  
Blackside darter (*Percina maculata*).



**Photo:** 14

**Date:**  
8-23-2016

**Description:**  
Darters in small photarium.

## Project Photographs

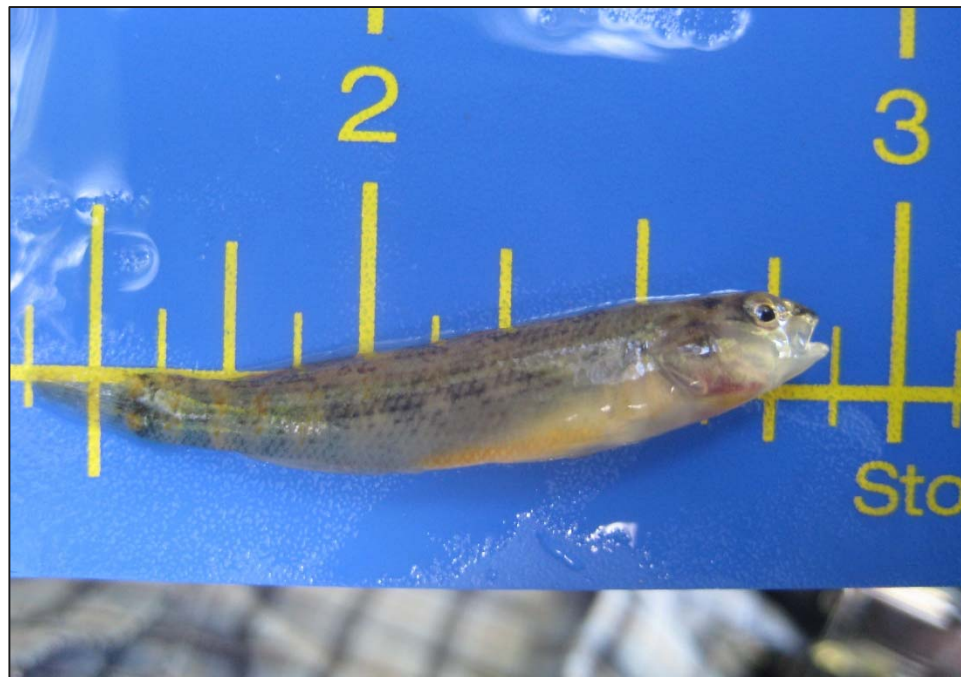
Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 15

**Date:**  
8-23-2016

**Description:**  
Johnny darter (*Etheostoma nigrum*).



**Photo:** 16

**Date:**  
8-23-2016

**Description:**  
Rainbow darter  
(*Etheostoma caeruleum*).

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 17

**Date:**  
8-23-2016

**Description:**  
Silverjaw minnow  
(*Ericymba buccata*).



**Photo:** 18

**Date:**  
8-23-2016

**Description:**  
Bullhead minnow  
(*Pimephales vigilax*).

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 19

**Date:**  
8-23-2016

**Description:**  
Blackstripe topminnow  
(*Fundulus notatus*).



**Photo:** 20

**Date:**  
8-23-2016

**Description:**  
Sand shiner (*Notropis  
stramineus*).



## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 21

**Date:**  
8-23-2016

**Description:**  
Largemouth bass  
(*Micropterus salmoides*).



**Photo:** 22

**Date:**  
8-23-2016

**Description:**  
White crappie (*Pomoxis annularis*).

## Project Photographs

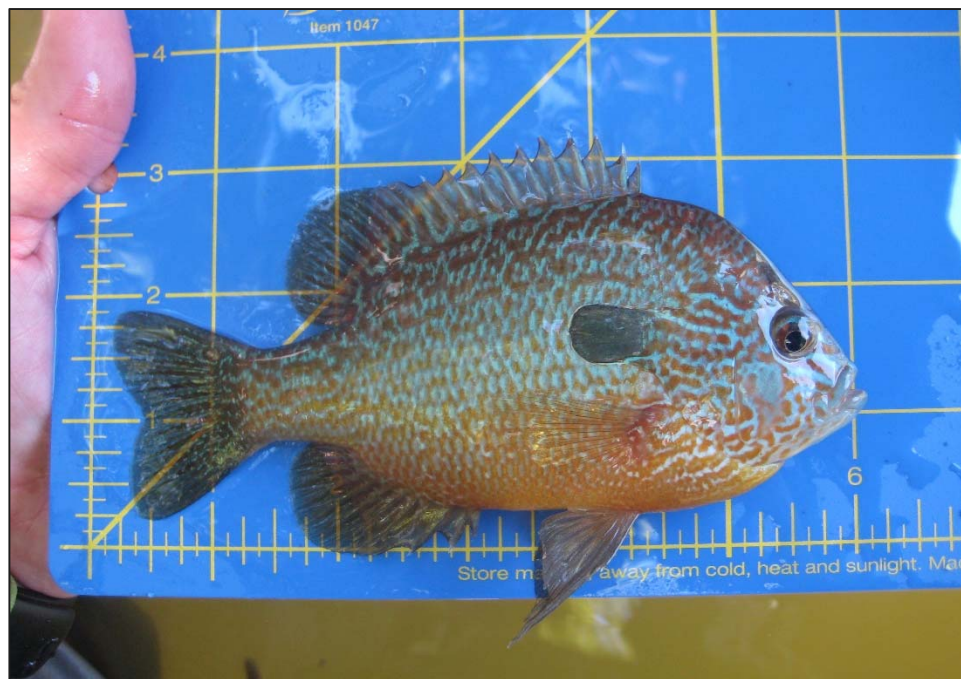
Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 23

**Date:**  
8-23-2016

**Description:**  
Bluntnose minnow  
(*Pimephales notatus*).



**Photo:** 24

**Date:**  
8-23-2016

**Description:**  
Longear sunfish (*Lepomis megalotis*)

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 25

**Date:**  
8-23-2016

**Description:**  
Bluegill (*Lepomis  
macrochirus*).



**Photo:** 26

**Date:**  
8-23-2016

**Description:**  
Gizzard shad (*Dorosoma  
cepedianum*)

## Project Photographs

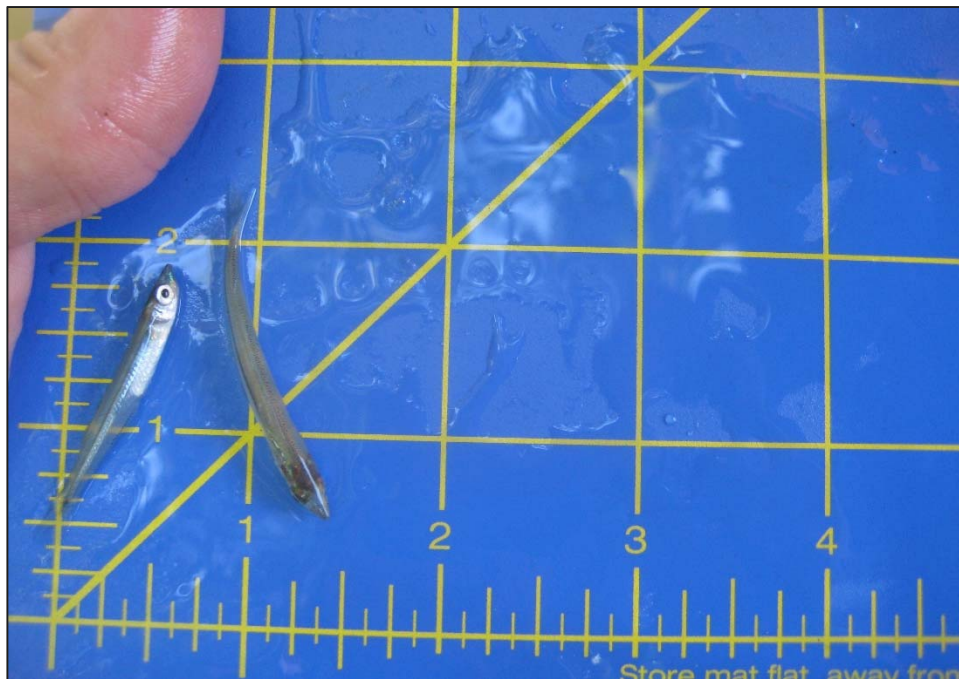
Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 27

**Date:**  
8-23-2016

**Description:**  
Green sunfish (*Lepomis cyanellus*).



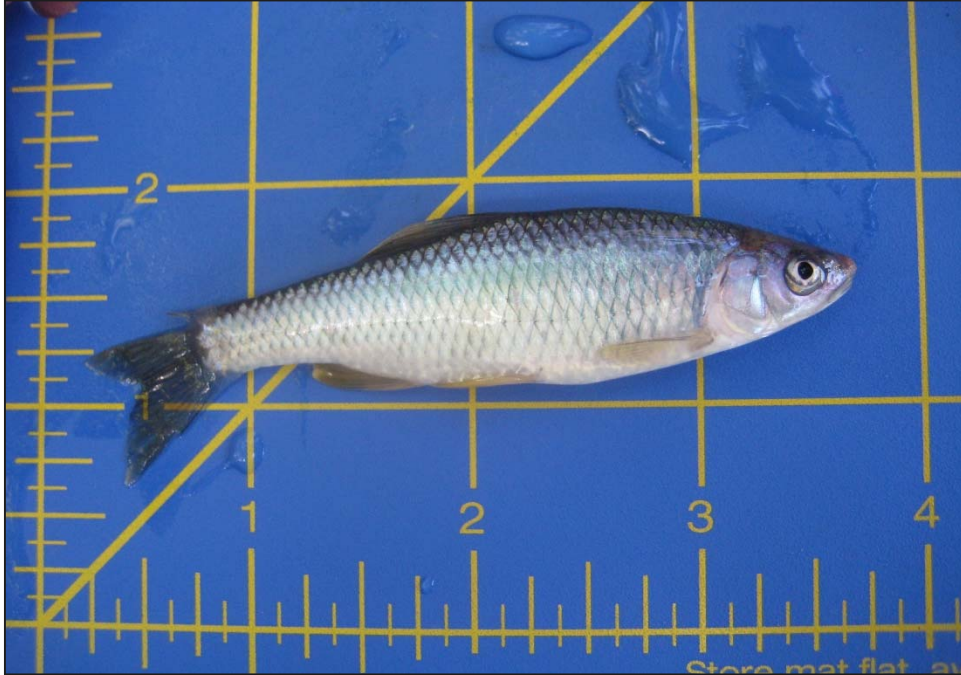
**Photo:** 28

**Date:**  
8-23-2016

**Description:**  
Brook silverside  
(*Labidesthes sicculus*).

## Project Photographs

Muddy Creek WRCL 739 Project  
Eastern Sand Darter Survey Report  
Cumberland County, Illinois



**Photo:** 29

**Date:**  
8-23-2016

**Description:**  
Spotfin shiner (*Notropis spilopterus*).



**Photo:** 30

**Date:**  
8-23-2016

**Description:**  
Darters in small photarium.

Arcadis U.S., Inc.

1717 West 6th Street

Suite 210

Austin, Texas 78703

Tel 512 451 1188

Fax 512 451 2930

[www.arcadis.com](http://www.arcadis.com)

A decorative graphic consisting of three thin orange lines. One line is horizontal, extending across the bottom of the page. Two other lines are diagonal, starting from the bottom left and extending towards the top right, crossing the horizontal line.

**DEPARTMENT OF THE ARMY**  
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE  
CORPS OF ENGINEERS  
P.O. BOX 59  
LOUISVILLE KY 40201-0059  
FAX: (502) 315-6677

March 17, 2016

Operations Division  
Regulatory Branch (West)  
ID No. LRL-2016-116-mad

Mr. Shawn Wallenfelsz  
Marathon Pipe Line, LLC  
539 South Main Street  
Findlay, Ohio 45840

Dear Mr. Wallenfelsz:

This is in response to your request dated January 22, 2016, for authorization to armor an exposed 10-inch diameter product line that crosses Muddy Creek in Cumberland County, Illinois. Armoring would occur using a system of articulating concrete revetment mattresses, with associated grading, installation of grade control structures, and erosion protection. The information supplied by you was reviewed to determine whether a Department of the Army (DA) permit will be required under the provisions of Section 404 of the Clean Water Act.

Your proposal is considered maintenance of a structure, which has been previously authorized, either by DA Permit or by having been constructed prior to current Federal laws. Therefore, the project is authorized under the provisions of 33 CFR 330 Nationwide Permit (NWP) No. 3, Maintenance, as published in the Federal Register February 21, 2012. Under the provisions of this authorization, you must comply with the enclosed Terms and General Conditions for Nationwide Permit No. 3, and the enclosed Water Quality Certification (WQC) General and Specific Conditions for Nationwide Permit No. 3 dated April 2, 2012, issued by the Illinois Environmental Protection Agency (ILEPA).

This verification is valid until the NWP is modified, reissued, or revoked. All of the existing NWPs are scheduled to be modified, reissued, or revoked prior to March 18, 2017. It is incumbent upon you to remain informed of changes to the NWPs. We will issue a public notice when the NWPs are reissued. Furthermore, if you commence or are under contract to commence this activity before the date that the relevant nationwide permit is modified or revoked, you will have 12 months from the date of the modification or revocation of the NWP to complete the activity under the present terms and conditions of this nationwide permit. The enclosed Compliance Certification should be signed and returned when the project is completed. Please note that we

also perform periodic inspections to ensure compliance with our permit conditions and applicable Federal laws. A copy of this letter will be forwarded to the ILEPA and to your agent (see enclosure for addresses).

If you have any questions, please contact this office by writing to the above address, ATTN: CELRL-OPF-W, or by calling me at 502-315-6689. All correspondence pertaining to this matter should refer to our ID No. LRL-2016-116-mad`.

Sincerely,

Original Signed

Matt Dennis  
Project Manager  
Regulatory Branch

Enclosures



ADDRESS FOR COORDINATING AGENCY

Mr. Bernard Killian  
Director  
Illinois Environmental Protection Agency  
Bureau of Water  
Watershed Management Section #15  
1021 North Grand Avenue East  
P.O. Box 19276  
Springfield, Illinois 62794-9276

ADDRESS FOR AUTHORIZED AGENT

Mr. Marcel Estay  
Submar, Inc.  
P.O. Box 4417  
Houma, Louisiana 70361

**CONSTRUCTION NOTES**

1. ALL WORK IS TO BE PERFORMED IN LOW FLOW CONDITIONS WHEN POSSIBLE. IT IS PREFERRED THAT WORK OCCURS DURING THE DRY SEASON (OR OTHERWISE UPSTREAM CONTROLS MANAGED TO MINIMIZE FLOW). CONTRACTOR SHALL MONITOR WEATHER CONDITIONS AND PLAN CONSTRUCTION ACTIVITIES ACCORDINGLY TO AVOID IN-STREAM WORK DURING RAIN EVENTS AND MINIMIZE EXPOSURE OF DISTURBED SOILS TO RAINFALL.
2. CONSTRUCTION EQUIPMENT AND VEHICLES SHALL BE IN GOOD WORKING CONDITION AND FREE OF HYDRAULIC, FUEL OR OIL LEAKS. THERE SHOULD BE A PORT-O-POT ON-SITE. FUEL, HEAVY EQUIPMENT AND ALL CHEMICAL PRODUCTS SHOULD HAVE ADEQUATE CONTAINMENT.
3. PERIMETER EROSION AND SEDIMENT CONTROLS SHALL BE ESTABLISHED ALLOWING FOR SUBSEQUENT CLEARING AND GRUBBING WITHIN THE PROJECT AREA.
4. SALVAGE, FURNISH AND WASTE MATERIALS SHALL BE TEMPORARILY STOCKPILED IN A DESIGNATED APPROVED AREA UNTIL FINAL HANDLING FOR ULTIMATE PLACEMENT. IT IS THE RESPONSIBILITY OF THE SELECTED CONTRACTOR TO ESTABLISH APPROVED STOCKPILE, STAGING AND ACCESS AREAS. IF A RAIN EVENT IS EMINENT, THEN A SILT FENCE SHALL BE INSTALLED BETWEEN THE STOCKPILE SOIL AND THE EXISTING STREAM.
5. UPON COMPLETION OF WORK, ALL EXCESS OR TEMPORARILY STOCKPILED SOILS, STUMPS OR OTHER MATERIAL SHALL BE PERMANENTLY REMOVED AND PLACED IN UPLAND STORAGE AREAS, PER LOCAL, STATE AND FEDERAL REQUIREMENTS.
6. IT MAY BE NECESSARY TO DIVERT STREAM FLOW AROUND THE WORKING AREA TO FACILITATE CONSTRUCTION USING A BYPASS PUMP OR JERSEY BARRIER. IN NO INSTANCE SHALL SILT LADEN WATER BE DISCHARGED INTO THE STREAM, DIRECTLY OR INDIRECTLY.
7. ALL TEMPORARY ACCESS, STAGING, STOCKPILE OR OTHER TEMPORARILY DISTURBED AREAS SHALL BE STABILIZED AND REESTABLISHED TO THEIR PRE-CONSTRUCTION CONDITIONS, INCLUDING GRADE AND VEGETATION.
8. ALTHOUGH THIS PLAN MAKES EVERY ATTEMPT TO ACCOUNT FOR EROSION AND SEDIMENT CONTROL, BANK STABILIZATION AND CONSTRUCTION LOGISTICS, UNFORESEEN CIRCUMSTANCES MAY ARISE THAT REQUIRE ADDITIONAL OR MODIFIED MEASURES TO CONTROL SEDIMENT, STABILIZE RIPARIAN STREAM BANKS AND FACILITATE STRUCTURE INSTALLATION. CONTRACTOR SHALL WORK WITH CLIENT AND ENGINEER, AS NECESSARY, TO ENSURE THAT THE PROJECT IS CONSTRUCTED IN ACCORDANCE WITH THE INTENT OF THESE PLANS.
9. THE ENGINEER, OR QUALIFIED DESIGNEE, SHALL BE PRESENT DURING CONSTRUCTION OF IN-STREAM WORK TO ENSURE COMPLIANCE WITH CONSTRUCTION PLANS AND APPLICABLE REGULATIONS. CONTRACTOR SHALL GIVE 72 HOURS NOTICE TO CLIENT AND THE ENGINEER PRIOR TO CONSTRUCTION.

**ENVIRONMENTAL NOTES**

1. THE OWNER SHALL NOTIFY ALL CONTRACTORS, SUBCONTRACTORS & MATERIAL SUPPLIERS THAT DUMPING OF CHEMICALS INTO THE STORM DRAIN SYSTEM IS PROHIBITED.
2. PERMITTEE SHALL MAINTAIN CONSTRUCTION SITE IN SUCH A CONDITION THAT AN ANTICIPATED STORM DOES NOT CARRY WASTES OR POLLUTANTS OFF THE SITE. POTENTIAL POLLUTANTS INCLUDE BUT ARE NOT LIMITED TO: SOLID OR LIQUID CHEMICAL SPILLS; WASTES FROM PAINTS, STAINS, SEALANTS, GLUES, LIMES, PESTICIDES, HERBICIDES, WOOD PRESERVATIVES AND SOLVENTS; ASBESTOS FIBERS, PAINT FLAKES OR STUCCO FRAGMENTS; FUELS, OILS, LUBRICANTS AND HYDRAULIC, RADIATOR OR BATTERY FLUIDS; FERTILIZERS, VEHICLE/EQUIPMENT WASH WATER AND CONCRETE WASH WATER; CONCRETE, DETERGENT OR FLOATABLE WASTES; WASTES FROM ANY ENGINE/EQUIPMENT STEAM CLEANING OR CHEMICAL DEGREASING; AND SUPER CHLORINATED POTABLE WATER LINE FLUSHING. DURING CONSTRUCTION, PERMITTEE SHALL DISPOSE OF SUCH MATERIALS IN A SPECIFIED AND CONTROLLED TEMPORARY AREA ON-SITE, PHYSICALLY SEPARATED FROM POTENTIAL STORM WATER RUNOFF, WITH ULTIMATE DISPOSAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REQUIREMENTS.
3. CONTRACTOR SHALL CONSTRUCT PROJECT AS AUTHORIZED IN PERMITTED DRAWINGS. ANY CHANGES MUST FIRST BE APPROVED BY PROJECT MANAGER, OWNER AND INSPECTOR AND DOCUMENTED IN THE CONSTRUCTION CREW BOOK.

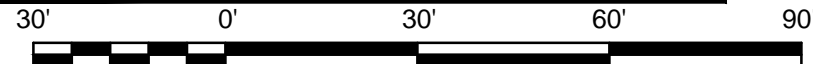
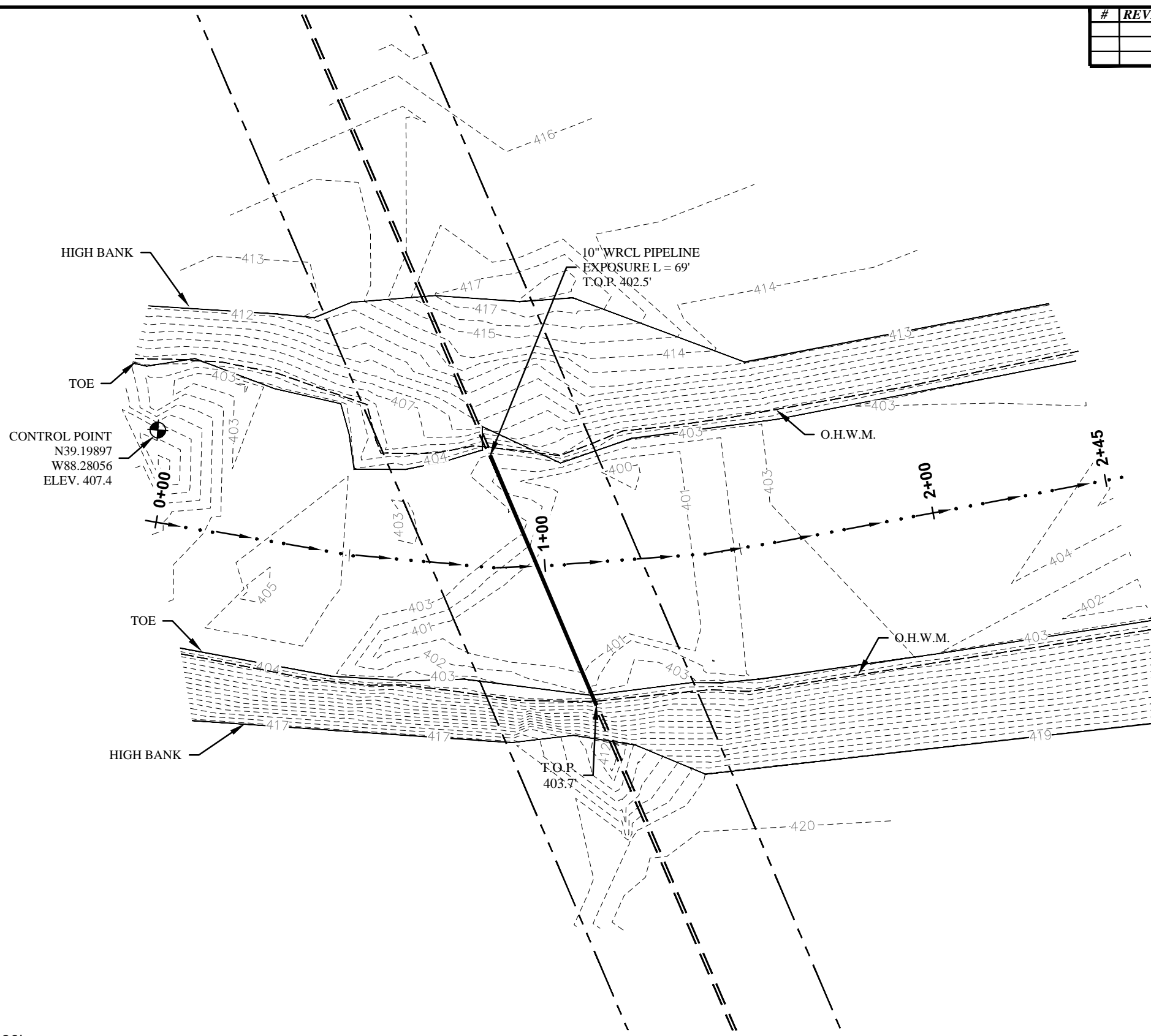
**GRADING NOTES**

1. ALL WORK SHALL BE IN ACCORDANCE WITH ANY SPECIAL REQUIREMENTS OF THE PERMIT.
2. NO EXCAVATION SHALL BE STARTED WITHOUT FIRST NOTIFYING ONE CALL 48 HOURS PRIOR TO COMMENCEMENT OF WORK. A PRE-GRADING MEETING SHALL BE SCHEDULED AT THE SITE BEFORE START OF GRADING WITH THE FOLLOWING PEOPLE PRESENT: OWNER, CONTRACTOR & INSPECTOR.
3. PRIOR TO ANY CLEARING, BRUSHING OR DEMOLITION, OTHER THAN WHAT IS AUTHORIZED, APPROVAL MUST BE OBTAINED FROM THE PROJECT MANAGER AND INSPECTOR.
4. CUT SLOPES SHALL NOT BE STEEPER THAN 1.5:1 SLOPE.
5. ALL TRENCH BACKFILLS SHALL BE EXAMINED AND CERTIFIED BY THE SITE INSPECTOR PER THE GRADING PLAN.
6. DUST ABATEMENT SHALL BE CONTROLLED BY WATERING.
7. SANITARY FACILITIES SHALL BE MAINTAINED ON THE SITE PLUS CONTAINMENT.
8. ALL PUBLIC ROADWAYS MUST BE MAINTAINED DAILY OF ALL DEBRIS DEPOSITED ON THEM AS A RESULT OF THE CONSTRUCTION OPERATION. CLEANING IS TO BE DONE TO THE SATISFACTION OF THE OWNER.

**SURVEY NOTES**

1. ALL LOCATIONS OF UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO START OF CONSTRUCTION.
2. SURVEY WAS PERFORMED ON 10/7/2015.
3. DATA COLLECTED WITH GPS+GLONASS
4. ALL VERTICAL ELEVATIONS REFERENCED TO N.A.V.D. 88.
5. STATE PLANE COORDINATE SYSTEM - NAD83 ILLINOIS EAST STATE PLANE.

#	REVISION	DATE



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805 Dunn Street  
 Houma, LA 70360  
 Ph. 985-868-0001  
 Fax 985-851-0108  
 Email: submar@submar.com  
 Website: www.submar.com

MUDDY CREEK  
 WRCL 739  
 CUMBERLAND COUNTY  
 JEWETT, IL

SHEET TITLE:  
**EXISTING  
 CONDITIONS**

CONTACT:  
 SHAWN WALLENFELSZ

**LEGEND:**

- EXPOSED PIPELINE
- BURIED PIPELINE
- FLOW LINE
- RIGHT OF WAY
- O.H.W.M. ORDINARY HIGH WATER MARK

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DATE: 1/20/16  
 SHEET: 1 of 7  
 SCALE: 1" = 30'  
 PROJECT #: 13801  
 DRAWING #: C-101  
 DWN BY: MJP  
 CKD BY: BMC

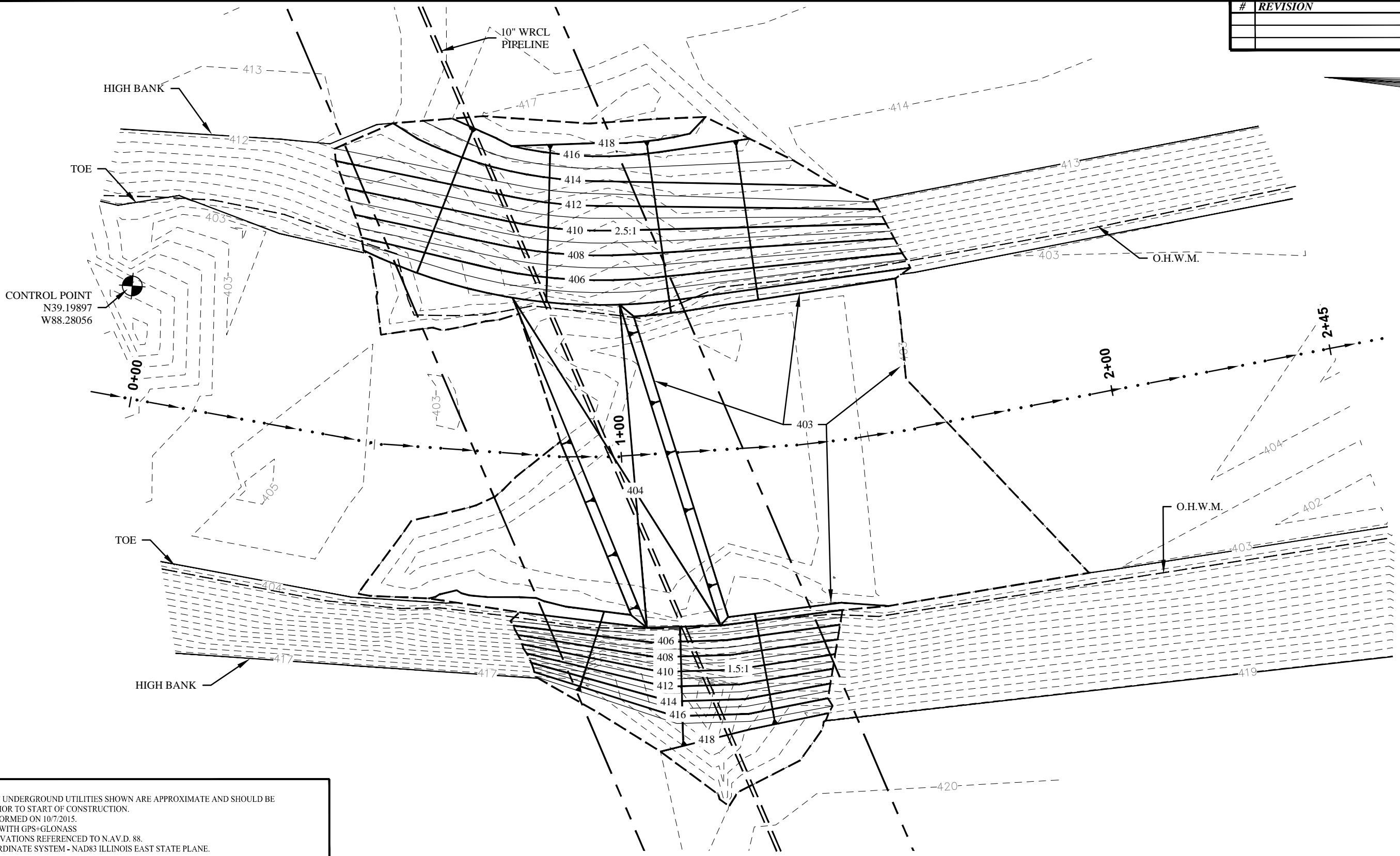
PHONE: 419-421-4373

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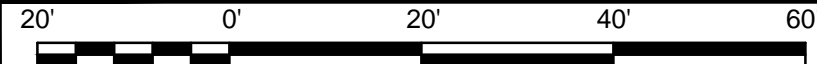
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**SURVEY NOTES**  
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 5. STATE PLANE COORDINATE SYSTEM - NAD83 ILLINOIS EAST STATE PLANE.



1" = 20'  
 1" = 20'

805 Dunn Street  
 Houma, LA 70360  
 Ph. 985-868-0001  
 Fax 985-851-0108  
 Email: submar@submar.com  
 Website: www.submar.com

**MUDDY CREEK  
 WRCL 739  
 CUMBERLAND COUNTY  
 JEWETT, IL**

**SHEET TITLE:  
 PROPOSED SITE  
 GRADING PLAN**

**LEGEND:**  
 = = = BURIED PIPELINE  
 - - - - FLOW LINE  
 - - - - RIGHT OF WAY  
 O.H.W.M. ORDINARY HIGH WATER MARK

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DATE: 1/20/16  
 SHEET: 2 of 7

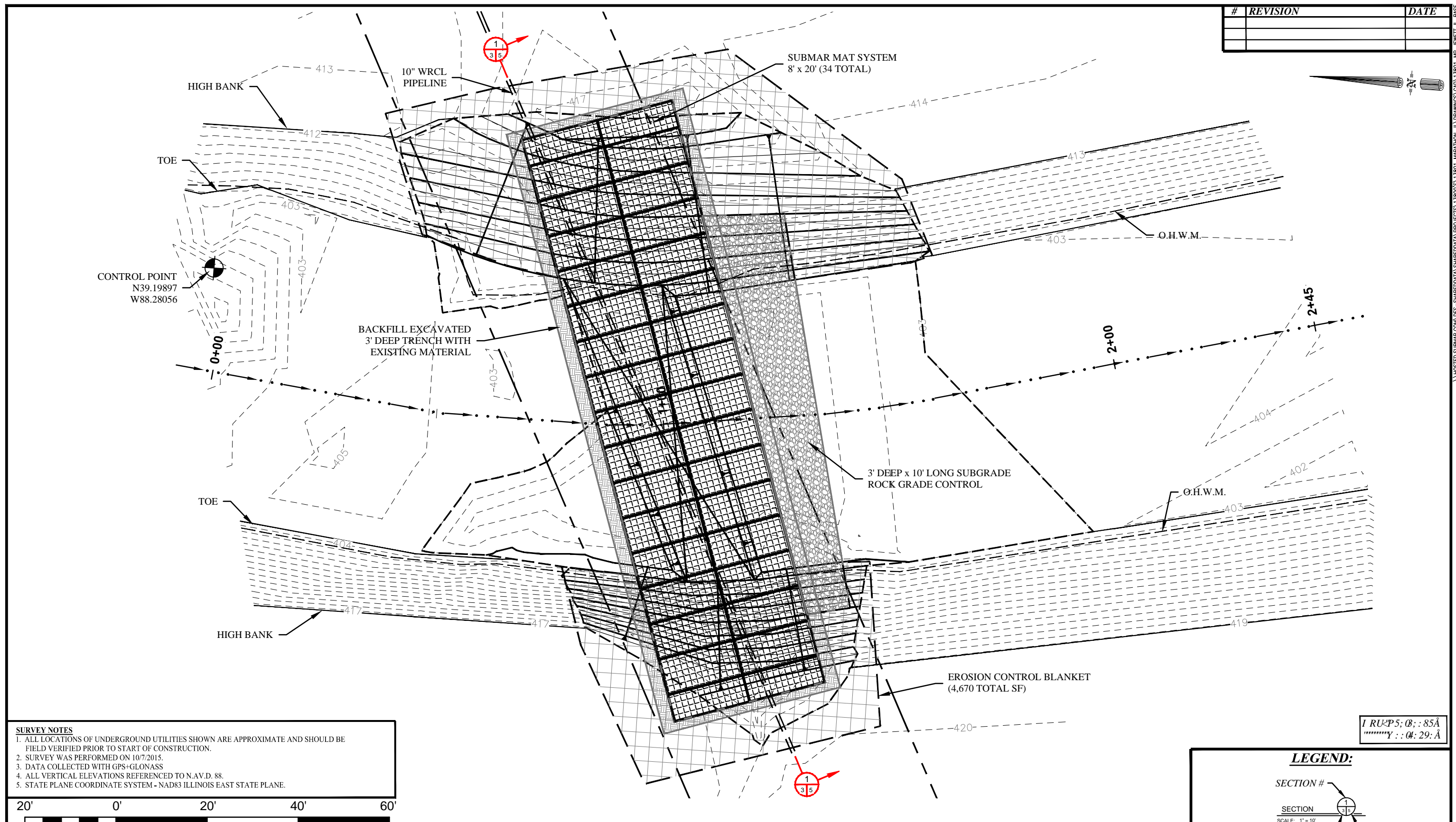
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 PROJECT #: 13801  
 DRAWING #: C-102

DWN BY: MJP  
 CKD BY: BMC

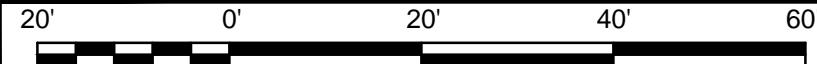
CONTACT: SHAWN WALLENFELSZ

PHONE: 419-421-4373

#	REVISION	DATE



**SURVEY NOTES**  
 1. ALL LOCATIONS OF UNDERGROUND UTILITIES SHOWN ARE APPROXIMATE AND SHOULD BE FIELD VERIFIED PRIOR TO START OF CONSTRUCTION.  
 2. SURVEY WAS PERFORMED ON 10/7/2015.  
 3. DATA COLLECTED WITH GPS+GLONASS  
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 5. STATE PLANE COORDINATE SYSTEM - NAD83 ILLINOIS EAST STATE PLANE.



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805 Dunn Street  
 Houma, LA 70360  
 Ph. 985-868-0001  
 Fax 985-851-0108  
 Email: submar@submar.com  
 Website: www.submar.com

**MUDDY CREEK  
 WRCL 739  
 CUMBERLAND COUNTY  
 JEWETT, IL**

**SHEET TITLE:  
 PROPOSED SUBMAR  
 MAT ARMORMENT PLAN**

**CONTACT:  
 SHAWN WALLENFELSZ  
 PHONE:  
 419-421-4373**

**LEGEND:**

SECTION # 1/35

SECTION SCALE: 1" = 10'

SHEET # WHERE SECT. IS TAKEN FROM

SHEET # WHERE SECT. IS DRAWN

== == == BURIED PIPELINE

→ . . . → FLOW LINE

----- RIGHT OF WAY

O.H.W.M. ORDINARY HIGH WATER MARK

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DATE: 1/20/16  
 SHEET: 3 of 7

SCALE: 1" = 20'  
 PROJECT #: 13801  
 DRAWING #: C-103

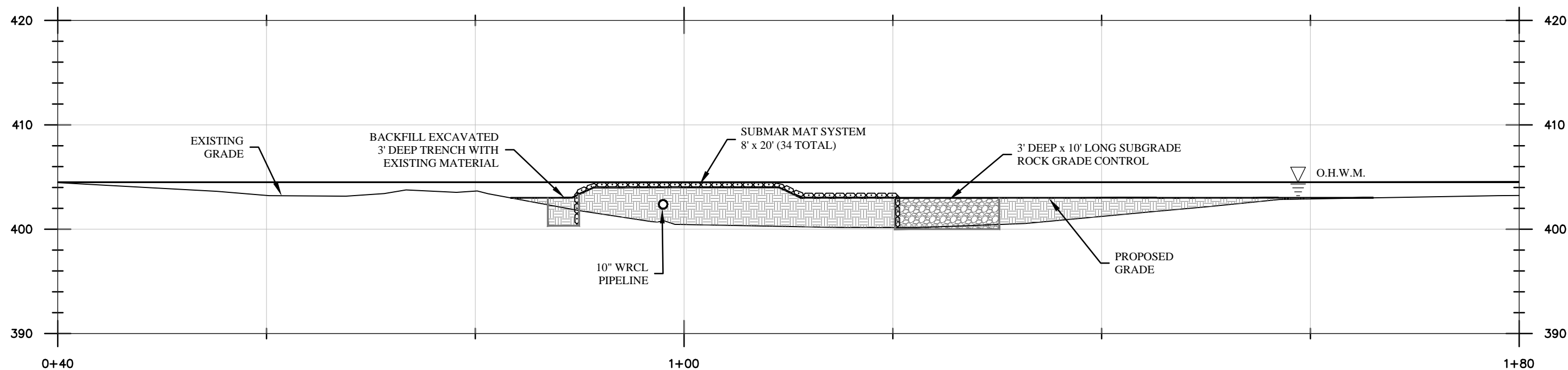
DWN BY: MJP  
 CKD BY: BMC

CONTACT: SHAWN WALLENFELSZ

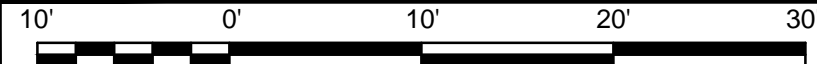
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#	REVISION	DATE



**SURVEY NOTES**  
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1" = 20'  
 1" = 10'

805 Dunn Street  
 Houma, LA 70360  
 Ph. 985-868-0001  
 Fax 985-851-0108  
 Email: submar@submar.com  
 Website: www.submar.com

MUDDY CREEK  
 WRCL 739  
 CUMBERLAND COUNTY  
 JEWETT, IL

SHEET TITLE:  
**PROFILE**

**LEGEND:**

- BURIED PIPELINE
- PROPOSED FILL
- PROPOSED CUT
- O.H.W.M. ORDINARY HIGH WATER MARK

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DATE: 1/20/16  
 SHEET: 4 of 7

SCALE: 1" = 10'

PROJECT #: 13801

DRAWING #: C-104

DWN BY: MJP

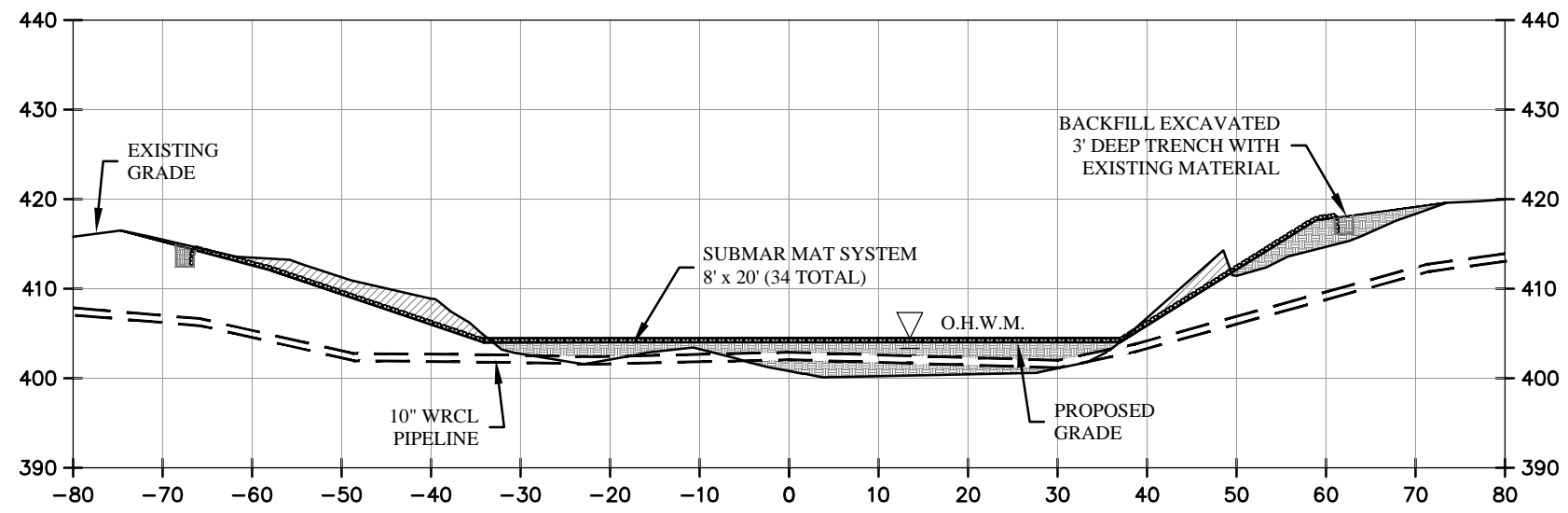
CKD BY: BMC

CONTACT: SHAWN WALLENFELSZ

PHONE: 419-421-4373

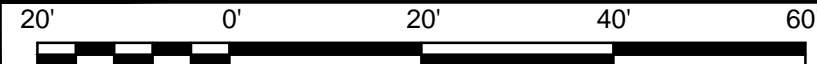
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#	REVISION	DATE



SECTION 1  
3 5  
SCALE: 1" = 20'

**SURVEY NOTES**  
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 2. SURVEY WAS PERFORMED ON 10/7/2015.  
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 4. ALL VERTICAL ELEVATIONS REFERENCED TO N.A.V.D. 88.  
 5. STATE PLANE COORDINATE SYSTEM - NAD83 ILLINOIS EAST STATE PLANE.



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**LEGEND:**

SECTION # 3  
4 7

SHEET # WHERE SECT. IS TAKEN FROM      SHEET # WHERE SECT. IS DRAWN

- BURIED PIPELINE
- PROPOSED FILL
- PROPOSED CUT
- O.H.W.M.      ORDINARY HIGH WATER MARK

805 Dunn Street  
 Houma, LA 70360  
 Ph. 985-868-0001  
 Fax 985-851-0108  
 Email: submar@submar.com  
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**MUDDY CREEK  
 WRCL 739  
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 JEWETT, IL**

SHEET TITLE:  
**CROSS SECTION**

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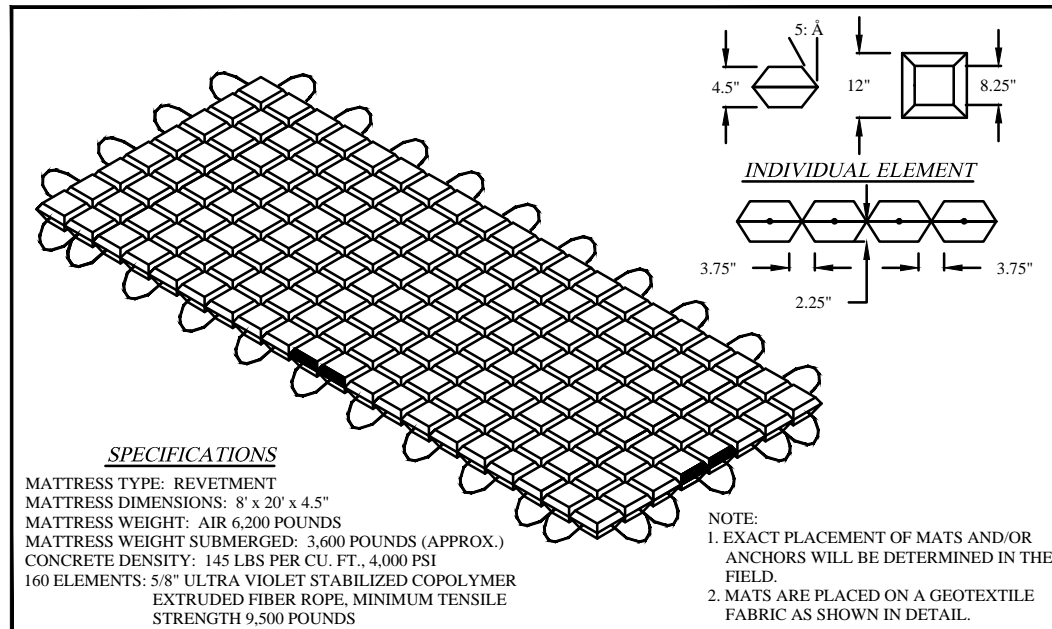
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CONTACT: SHAWN WALLENFELSZ

PHONE: 419-421-4373

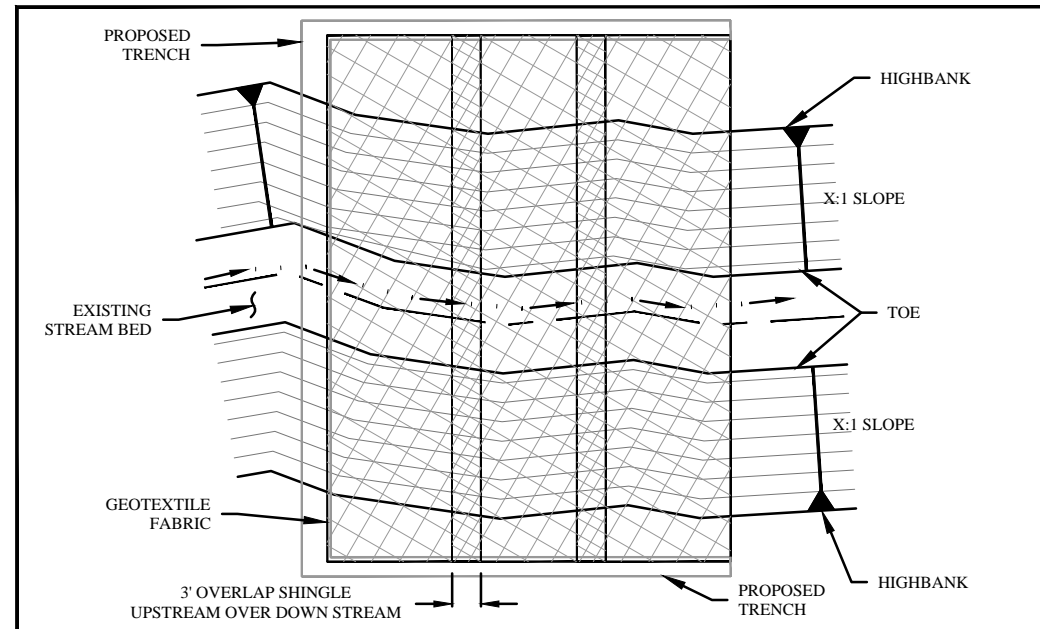
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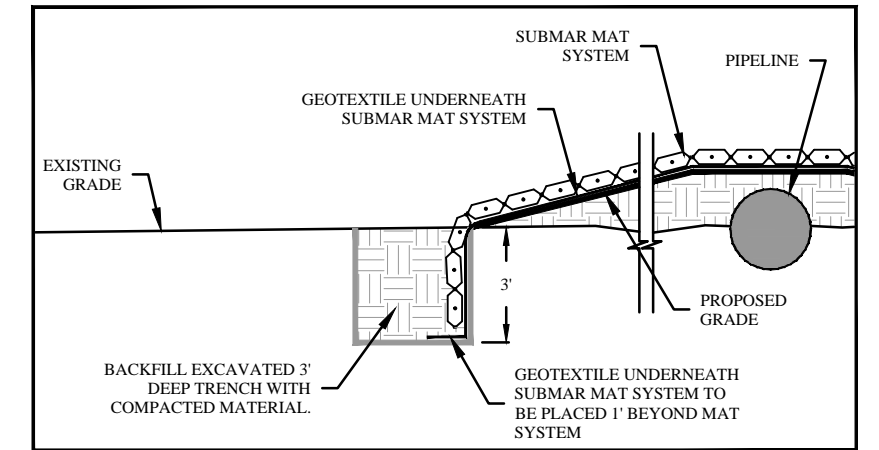
**SUBMAR MAT SYSTEM**

SCALE: N.T.S.



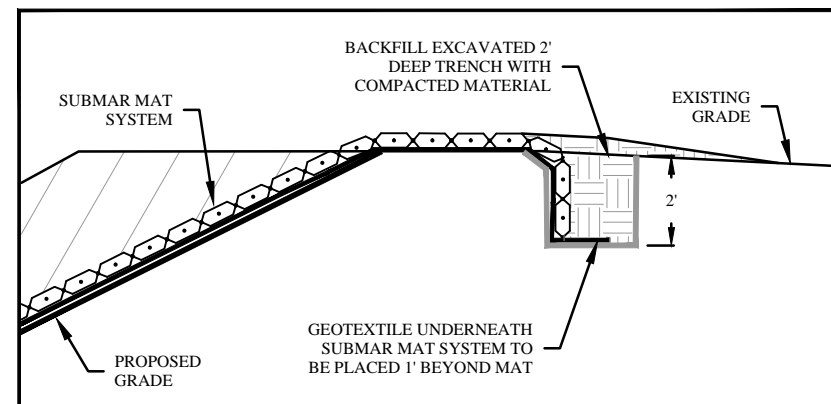
**GEOTEXTILE PLAN LAYOUT**

SCALE: N.T.S.



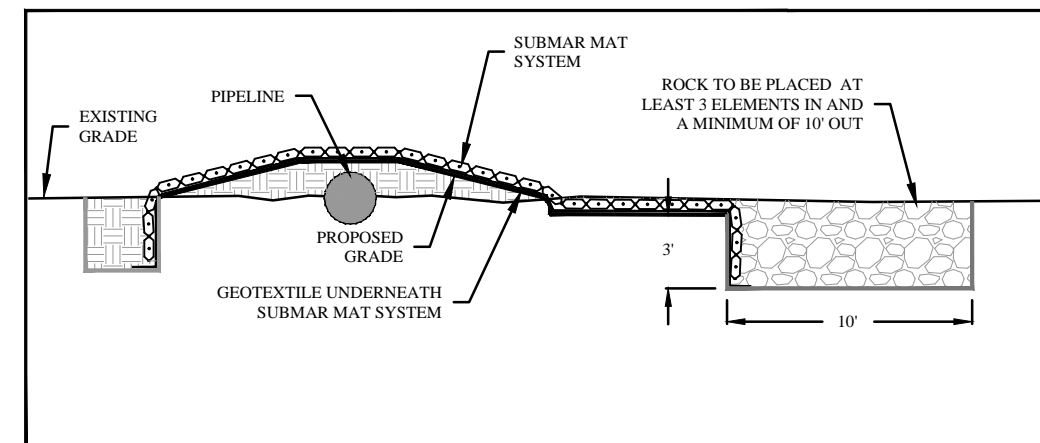
**UPSTREAM ANCHOR TRENCH DETAIL**

SCALE: N.T.S.



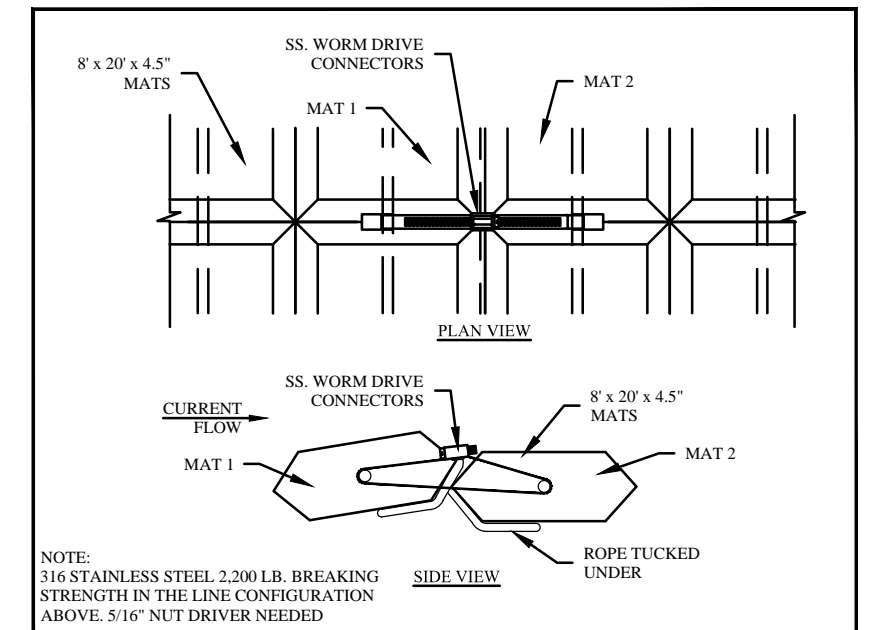
**FLANK TRENCH DETAIL**

SCALE: N.T.S.



**ROCK SUBGRADE ROCK GRADE CONTROL DETAIL**

SCALE: N.T.S.



**PERIMETER MAT CONNECTION DETAIL**

SCALE: N.T.S.

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805 Dunn Street  
 Houma, LA 70360  
 Ph. 985-868-0001  
 Fax 985-851-0108  
 Email: submar@submar.com  
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MUDDY CREEK  
 WRCL 739  
 CUMBERLAND COUNTY  
 JEWETT, IL

SHEET TITLE:

TYPICAL DETAILS

LEGEND:

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DATE: 1/20/16

SHEET: 6 of 7

SCALE: N.T.S.

PROJECT #: 13801

DRAWING #: C-106

DWN BY: MJP

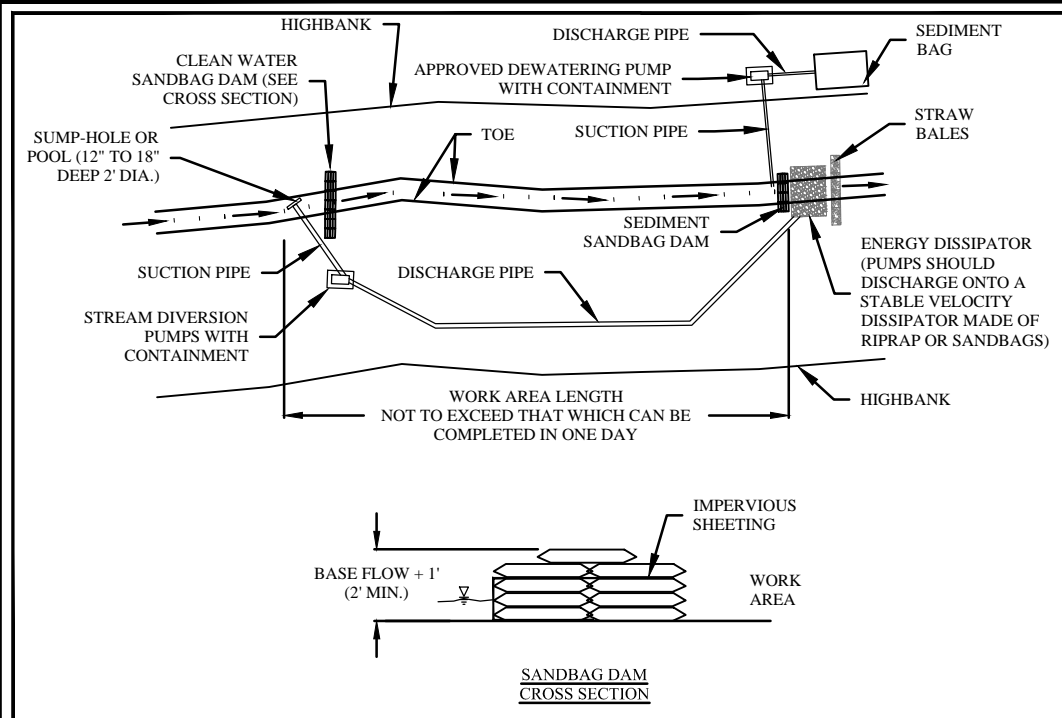
CKD BY: BMC

CONTACT: SHAWN WALLENFELSZ

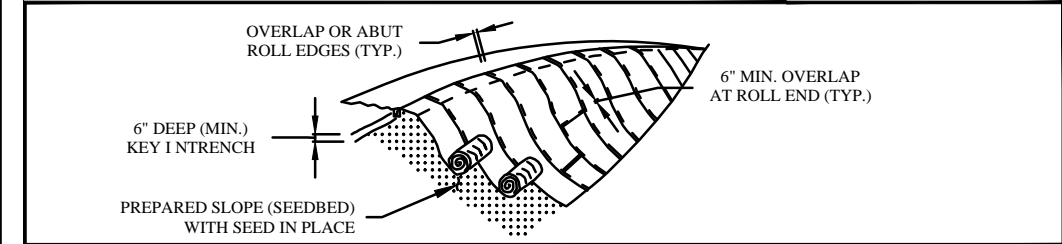
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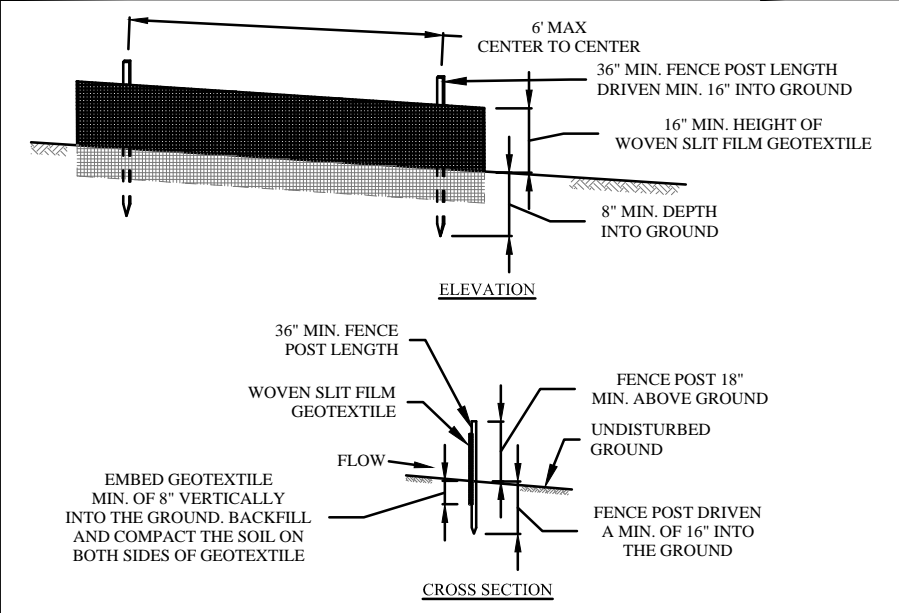
**DEWATERING DETAIL**  
SCALE: N.T.S.



**EROSION CONTROL BLANKET CONSTRUCTION SPECIFICATIONS**

- USE TEMP. SOIL STABILIZATION MATTING MADE OF DEGRADABLE (LASTS 6 MOS. MIN.) NATURAL OR MAN-MADE FIBERS (MOSTLY ORGANIC). MAT MUST HAVE UNIFORM THICKNESS & DISTRIBUTION OF FIBERS THROUGHOUT & BE SMOLDER RESISTANT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING & NON-TOXIC TO VEGETATION & SEED GERMINATION & NON-INJUROUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAX MESH OPENING OF 2"x2" & SUFFICIENTLY BONDED OR SEWN ON 2" CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
- SECURE MATTING USING STEEL STAPLES, WOOD STAKE OR BIODEGRADABLE EQUIVALENT. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MIN. GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY "U" SHAPED STAPLES MUST AVERAGE 1" TO 1-1/2" WIDE & BE A MIN. 6" LONG. "T" SHAPED STAPLES MUST HAVE A MIN. 8" MAIN LEG, A MIN. 1" SECONDARY LEG, & A MIN. 4" HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12" TO 24" IN LENGTH, 1" x 3" IN CROSS SECTION & WEDGE SHAPED AT THE BOTTOM.
- PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREP. & PERMANENT SEEDING IN ACCORDANCE WITH SPECS. PLACE MATTING WITHIN 48 HRS OF COMPLETING SEEDING OPERATIONS UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION & SEDIMENT CONTROL PLAN.
- UNROLL MATTING DOWN SLOPE. LAY MAT SMOOTHLY & FIRMLY UPON THE SEEDED SURFACE. AVOID STRETCHING THE MATTING.
- OVERLAP OR ABUT ROLL EDGES PER MANUFACTURING RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6" (MIN.) WITH THE UPSLOPE MAT OVERLAPPING ON TOP OF THE DOWNSLOPE MAT.
- KEY IN THE UPSLOPE END OF MAT 6" (MIN.) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, & TAMPING TO SECURE THE MAT END IN THE KEY.
- STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4" (MAX.) CENTERS THROUGHOUT & 2" (MAX.) CENTERS ALONG SEAMS, JOINTS & ROLL ENDS.
- ESTABLISH & MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

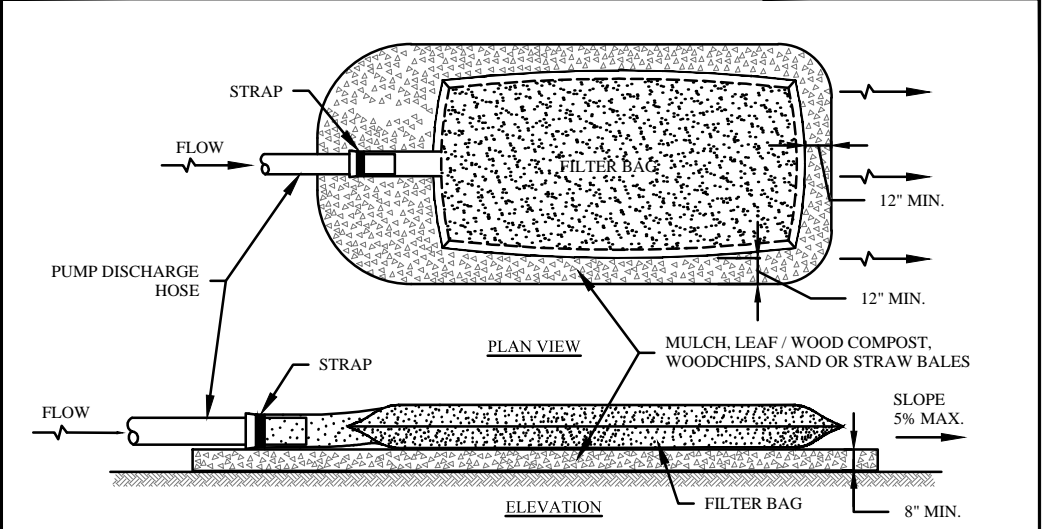
**EROSION CONTROL BLANKET DETAIL**  
SCALE: N.T.S.



**SILT FENCE CONSTRUCTION SPECIFICATIONS**

- USE 36" MINIMUM POSTS DRIVEN 16" MINIMUM INTO GROUND NO MORE THAN 6' APART.
- USE WOVEN SLIT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.
- PROVIDE MANUFACTURER CERTIFICATION TO THE AUTHORIZED REPRESENTATIVE OF THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT THE GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
- EMBED GEOTEXTILE A MINIMUM OF 8" VERTICALLY INTO THE GROUND. BACKFILL AND COMPACT THE SOIL ON BOTH SIDES OF FABRIC.
- WHERE 2 SECTIONS OF GEOTEXTILE ADJOIN: OVERLAP, TWIST AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL.
- EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF 5' HORIZONTAL UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS.
- REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

**SILT FENCE DETAIL**  
SCALE: N.T.S.



**FILTER BAG CONSTRUCTION SPECIFICATIONS**

- TIGHTLY SEAL SLEEVE AROUND THE PUMP DISCHARGE HOSE WITH A STRAP OR SIMILAR DEVICE.
- PLACE FILTER BAG ON SUITABLE BASE (E.G., MULCH, LEAF/WOOD COMPOST, WOOD CHIPS, SAND OR STRAW BALES) LOCATED ON A LEVEL OR 5% MAX. SLOPING SURFACE. DISCHARGE TO A STABILIZED AREA. EXTEND BASE A MIN. OF 12" FROM EDGES OF BAG.
- CONTROL PUMPING RATE TO PREVENT EXCESSIVE PRESSURE WITHIN THE FILTER BAG IN ACCORDANCE WITH THE MANUFACTURING RECOMMENDATIONS. AS THE BAG FILLS WITH SEDIMENT, REDUCE PUMPING RATE.
- REMOVE & PROPERLY DISPOSE OF FILTER BAG UPON COMPLETION OF PUMPING OPERATIONS OR AFTER BAG HAS REACHED CAPACITY, WHICHEVER OCCURS FIRST. SPREAD THE DEWATERED SEDIMENT FROM THE BAG IN AN APPROVED UPLAND AREA AND STABILIZE WITH SEED AND MULCH BY THE END OF THE WORK DAY. RESTORE THE SURFACE AREA BENEATH THE BAG TO ORIGINAL CONDITION UPON REMOVAL OF THE DEVICE.
- USE NONWOVEN GEOTEXTILE WITH DOUBLE STITCHED SEAMS USING HIGH STRENGTH THREAD. SIZE SLEEVE TO ACCOMMODATE A MAX. 4" DIA. PUMP DISCHARGE HOSE. THE BAG MUST BE MANUFACTURED FROM A NONWOVEN GEOTEXTILE THAT MEETS OR EXCEEDS MIN. AVERAGE ROLL VAULES (MARV) FOR THE FOLLOWING:  

GRAB TENISLE	250 LB	ASTM D-4632
PUNCTURE	150 LB	ASTM D-4833
PERMITTIVITY (SEC)	30" SEC	CUVO T/66; 3
UV RESISTANCE	70% STRENGTH @ 500 HOURS	ASTM D-4355
APPARENT OPENING SIZE (AOS)	0.15 - 0.18 MM	ASTM D-4751
SEAM STRENGTH	90%	ASTM D-4632
- REPLACE FILTER BAG IF BAG CLOGS OR HAS RIPS, TEARS OR PUNCTURES. DURING OPERATION KEEP CONNECTION BETWEEN PUMP HOSE AND FILTER BAG WATER TIGHT. REPLACE BEDDING IF IT BECOMES DISPLACED.

**FILTER BAG DETAIL**  
SCALE: N.T.S.

1 RUP; B; : 85A  
\*\*\*\*\*Y : 0: 29: A

**SUBMAR**  
Synergy with Nature

805 Dunn Street  
Houma, LA 70360  
Ph. 985-868-0001  
Fax 985-851-0108  
Email: submar@submar.com  
Website: www.submar.com

**MUDDY CREEK  
WRCL 739  
CUMBERLAND COUNTY  
JEWETT, IL**

**SHEET TITLE:  
TYPICAL DETAILS**

**LEGEND:**

THESE CONCEPTUAL DRAWINGS ARE PREPARED BY SUBMAR FOR ESTIMATING PURPOSES ONLY AND ARE NOT CONSTRUCTION DRAWINGS. THESE CONFIDENTIAL DRAWINGS MAY NOT BE COPIED UNLESS APPROVED BY SUBMAR, INC.	EQRJ TH J V1 UWDO CT. PEO 2016 ALL RIGHTS RESERVED.	DATE: 1/20/16	SHEET: 7 of 7	SCALE: N.T.S.	PROJECT #: 13801	DRAWING #: C-107	DWN BY: MJP	CKD BY: BMC	CONTACT: SHAWN WALLENFELSZ	PHONE: 419-421-4373
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For and in Consideration of Our Honor and no (no. \$100) Dollars, to me in hand paid, the receipt of which is hereby acknowledged,

C. H. Garratt

do hereby grant to THE OHIO OIL COMPANY, its successors or assigns, the right of way to lay, maintain, operate and remove a pipe line for the transportation of oil and erect, maintain and operate a telegraph or telephone line, if the same shall be found necessary on, over and through

my lands, situate in Section 26 & 27 Woodbury Township, Cumberland County, State of Ill

bounded and described as follows:  
On the North by lands of Being the part lying West of Meady  
On the East by lands of Creek in the N.W. 1/4 Sect 26 also  
On the South by lands of The E. 1/2 of the North East 1/4 Sect 27  
On the West by lands of

with ingress and egress to and from the same. The said grantor, heirs or assigns to fully use and enjoy the said premises, except for the purposes hereinbefore granted to the said THE OHIO OIL COMPANY, which hereby agrees to pay any damages which may arise to crops and fences from the laying, maintaining, operating and removing said pipe line; said damages if not mutually agreed upon, to be ascertained and determined by three disinterested persons, one thereof to be appointed by the said grantor, heirs or assigns, one by the THE OHIO OIL COMPANY, its successors or assigns, and the third by the two so appointed as aforesaid, and the award of such three persons shall be final and conclusive. And it is hereby further agreed that the said THE OHIO OIL COMPANY, its successors or assigns, may at any time lay one or more additional lines of pipe alongside of the first line as herein provided, upon the payment of a like consideration for each line so laid, and subject to the same conditions; also to have the right to change the size of its pipes, the damages, if any, to crops and fences in making such change to be paid by the said THE OHIO OIL COMPANY.

*The line to be laid along the Kansas Rail road and buried so as not to interfere with the cultivation or drainage of the land. The telegraph line if built shall be in line with the Kansas tele poles and the grantor is to be in no way responsible to the said Kansas Co. The above amount includes construction damages*

WITNESS the following signatures and seals on this 13<sup>th</sup> day of

March A. D. 1907

Signed, sealed and delivered in presence of

(1) J. J. Gillies  
(2) \_\_\_\_\_

C. H. Garratt



STATE OF INDIANA, }  
COUNTY OF \_\_\_\_\_

Before me \_\_\_\_\_ a \_\_\_\_\_  
this \_\_\_\_\_ day of \_\_\_\_\_ A. D. 190 \_\_\_\_\_

acknowledged the execution of the annexed deed.

STATE OF ILLINOIS, }  
COUNTY OF Cumberland

I, G. B. Willan Justice of Peace  
do hereby certify that C. H. Garratt

personally known to me to be the same person whose name he subscribed to the foregoing instrument, appeared before me this day in person, and acknowledged that he signed, sealed and delivered the said instrument as his free and voluntary act, for the uses and purposes therein set forth.

Given under my hand and \_\_\_\_\_ seal, this 13<sup>th</sup> day of March  
A. D. 1907

G. B. Willan J. P.



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Indexed

D-89

BY 135-738,739

Form 113

Series

BX 6

Line No.

85-A

RIGHT OF WAY DAMAGES.

e. v. Farrell

TO

THE OHIO OIL COMPANY.

Line 8 to 100000000 to 100000000

Length 200 - Rods

ENTERED

J. R. Q.

STATE OF OHIO, ss.

Declarant County.

This instrument was filed for record at 2 o'clock P. M., and duly recorded in book 2 of Declarant County page 965

Witness my hand and seal of office this 14th day of March 1907.

Ent. J.

L. B.

83

MAR 30 1907

R. of W. Dept.

Sub No.

Statement No.