Kline Island
Bank Stabilization
Project Report

Prepared For:
Lake and River Enhancement Program
Indiana DNR Division of Fish and Wildlife
1353 Governors Drive
Columbia City, Indiana 46725

Tippecanoe Watershed Foundation
PO Box 55
North Webster, Indiana 46555

Epworth Forest Conference Center
(Indiana Conference United Methodist Church)
8580 Wesley Lane
North Webster, Indiana 46555

Prepared By:
S&L Environmental Group, Inc.
15504 C.R. 42
Goshen, Indiana 46528

www.slenvirogroup.com

February 2016
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Project Report

1.0 Executive Summary

The banks on Kline Island have been actively eroding for many years due to wave action caused by wind-energy and recreational boating. The southwest and northwest banks are the most severely eroded areas on the island. The bank erosion has slowly reduced the surface area of the island, damaging fishery habitat, increasing turbidity, and re-releasing nutrients into the water.

DNR Fishery Biologist, Jed Pearson, originally identified the severity of the bank erosion and contacted Lyn Crighton, Tippecanoe Watershed Foundation (TWF) to discuss potential programs and funding sources to address the problem. In 2013 a report was completed which identified the problem and provided potential solutions, Lake Webster Island Protection Project. In 2014 TWF and the Epworth Forest Conference Center identified two potential Grant Programs for controlling shoreline erosion. The TWF submitted a Grant application to the Midwest Glacial Lakes Partnership (USFWS) and received funding approval in 2015. Epworth Forest Conference Center, which is the owner of Kline Island, submitted a Design/Build Grant application to the DNR Lake and River Enhancement Program in January 2014 and received funding approval in August 2014.

Following final approval of the two Grant applications Epworth Forest Conference Center entered into a contract with S&L Environment Group, Inc. (S&L) to prepare and implement design plans to stabilize 300 ft. of bank from further erosion. Implementation of the design plans was completed in December 2015 and included: (1) construction of a bio-engineered seawall consisting of a glacial stone toe-wall spanning 300 ft. of the southwest shoreline, (2) planting of native live stakes into the glacial stone toe-wall and, (3) planting of a native seed and plant plugs into the disturbed bank above the glacial stone toe-wall.

2.0 Project Purpose

2.1 Objective - To eliminate bank erosion on the southwest shoreline of Kline Island by installing 300 ft. of bio-engineered seawall.

2.2 Accomplishment - 300 ft. of the southwest bank was stabilized by reconstructing the bank slope, adding glacial stone to the slope to provide a hard barrier, planting of live tree stakes in the stone near water line and planting of native plant plugs and seed mixture into the slope above the glacial stone toe-wall. The height (Elevation) of the glacial stone was determined by calculating the projected wave height.
3.0 Project Description

3.1 General Location - The Kline Island project is located within Tippecanoe Township in Kosciusko County in North Webster, Indiana on Lake Webster. The geographic coordinates of the general project location is 41°19’39.69” N 85°41’09.98” W.

3.2 Site Specific Location - The Kline Island project includes 300 ft. of the southwest bank of the island.
3.3 **Project interest** - The Epworth Forest Conference Center, Tippecanoe Watershed Foundation, and Webster Lake Conservation Association made this project a reality. The three organizations provided financial support, participated in the review of the design plans and followed the construction activities. On-site and off-site meetings were held before finalizing the design plans. In-kind services were provided by Epworth Forest and other volunteers from TWF and the Webster Lake Homeowner Association. The volunteer activities were supervised by S&L.

Major funding contributions and project support were received through the DNR Lake and River Enhancement Program and the Midwest Glacial Lakes Partnership (USFWS).

### 4.0 Project Design

The following job tasks were completed per design plans and as noted in the As-Builds in Appendix A of this report. Minor field adjustments were made during the project to better reflect the site conditions.

4.1 **Mobilization** - Preparations were made so excavating equipment and materials could be transported to Kline Island from the designated loading area.

4.2 **De-brushing** - Trees and brush were removed from the construction work limits to allow for the excavating of the new slope and installation of the glacial stone.

4.3 **Grading** - A slope of 2H:1V was constructed along the stretch of shoreline where the glacial stone was to be placed. Excess excavated soil was stock piled on the island to be used during the final grading.

4.4 **Installation of glacial stone** - 8”-12” glacial stone was transported to Kline Island and installed on the 300 ft. of newly established 2H:1V bank slope. The size, slope, and height of the stone toe-wall were directly related to the size of the waves experienced on Lake Webster from wind energy and recreational boating.

4.5 **Grading, Seeding, and Mulching** - The bank slope above the toe-wall was constructed to a 2H:1V or flatter slope prior to seeding. Native seed was broadcast on the bank slope above the stone toe-wall before installing the erosion control blankets to protect the new seeding from erosion.

4.6 **Installation of Native Plants** - 1000 native grass, sedge and forb plant plugs were installed above the stone toe-wall by volunteers from the Epworth Forest Conference Center and the Webster Lake Homeowners Association. Volunteers were supervised by S&L.

4.7 **Native Tree Planting** – 75 live tree stakes were planted slightly above the ordinary high water mark within the stone toe-wall. The dormant live stakes were planted in late December on 4 ft. spacing.
5.0 Project Logistics

5.1 Permit Requirements - A Lake Preservation Permit was required by the Indiana Department of Natural Resources Water Division. The Army Core of Engineers reviewed the design plans and determined no further action was required as the project was classified as Category 1. Notification of IDEM was not necessary for this project because it was classified as a Category 1 project. The Lake Preservation Permit application required providing “Public Notice” to adjacent property owners giving them the opportunity to review and comment on the proposed project.

5.2 Construction Timing - Construction on the Kline Island Project started the first week of September. The new bank slope was created and the stone toe-wall was installed by the 1st of October in time to plant Native seed and plugs. The project was completed in mid-December when the dormant live tree stakes were harvested and installed in the stone toe-wall slightly above ordinary high water level.

5.3 Project Contractor - S&L Environmental Group, Inc was awarded the bid for the design and construction of this project and was determined to be qualified to design and oversee the construction activities.

5.4 Method of Construction – Construction equipment and materials were transported to and from the island by a 24 ft. by 30 ft. barge. The de-brushing and excavating of the designed slope was completed with equipment on the island. Placement of the stone toe-wall was completed from the barge by loading the excavator and stone onto the barge.

6.0 Future Project Inspection and Maintenance

6.1 Post Construction Inspection - Post construction inspection should be completed twice a year, spring and fall, as well as after major storm events to ensure functionality during these critical times.

6.2 Vegetative Inspection - The native seeding will be inspected in the spring of 2016 to confirm the success of germination and establishment of additional seeding may be required to obtain 75% ground coverage. Native plant plugs and live tree stakes will need to be inspected after ice thaw in the spring and after heavy boat traffic in the fall to verify planting success and survival rate.

6.3 Structural Inspection - Tie-ins on both ends of the glacial stone toe-wall will need to be inspected after ice-thaw each spring. Replace any stones that may have been displaced by ice forming or thawing events. Inspect the stone toe-wall after peak boating periods and after all major storm events to determine if the stone toe-wall was adversely affected by the wave action. Buoys should be moved a greater distance from the island if wave action from boats are adversely affecting the toe-wall.

7.0 Estimated Load Reductions

The EPA Region 5 Load Reduction Program was used to estimate the load reductions of sediment, phosphorus, and nitrogen. Results can be found in Appendix F.
APPENDIX A

As-Build Engineering Plans
APPENDIX B

Engineering Calculations and Specifications
Kline Island- Calculations- Wave Height and Protection Height

Tip of the Mint Watershed Council- Shoreline Erosion- 3rd Edition

*Note: The design criteria were adapted from information developed by NRCS and USACOE E.

Fetch Distance- 2390 L.F. (West to Northwest)

Average sustained over-water wind speed- 35mph

-Rough face (Glacial Stone) 2:1 slope= 1.5’

Significant wave height- 1.55’

Runner-up- 1.55’ X 1.15’= 1.8’

Lower Limit- Normally 1.0’-1.5’ below ordinary high water mark- not practical in this situation, therefore, glacial stone was approved.

Upper Limit- Height above ordinary high water mark- must be 0.5-1.0’ above runner up height

1.8’+ 0.7’= 2.5’ Upper Limit

Wave height from watercraft- To be controlled by placement of buoys to control water craft speed and reduce wave activity on the banks of Kline Island.

Soil Type and Description-

-Kosciusko sandy loam on 0-6% slope

-Stratified gravelly course sand to course sand 40” down
APPENDIX C

Photographs
1 – Mobilization equipment loaded with mini-excavator and track machine in the loading and unloading area

2 – Pre-Construction picture of the southwest bank of Kline Island
3 - Post-Construction picture of the southwest bank of Kline Island. De-brushing, new slope construction, installation of glacial stone toe-wall, and placement of straw blankets over native seed are depicted.

4 - Pre-Construction picture of the southwest bank of Kline Island
5 – Post-Construction picture of the southwest bank of Kline Island representing the reconstruction of the slope to 2H:1V

6-7 – Live stakes being installed on approximately 4 ft. spacing, located slightly above the ordinary high water mark
8 – Construction of the new slope with a mini-excavator

9 – Volunteers planting native plant plugs within straw blankets
APPENDIX D

Correspondence
January 19, 2015

Angie McClurg
Epworth Forest Conference Center
8580 Wesley Lane
North Webster, Indiana 46555

RE: Contractors update of activities and progress for the Kline Island Bank Stabilization Design/Build Project:

Ms. McClurg:

The following activities and progress have been made to date:

1. **Project Coordination** – S&L Environmental Group received a signed “Proposal” on November 25th to complete a total of 300 LF of Bank Stabilization on Kline Island. Top priority was to stabilize the south end of the Island first and then stabilize the most critical bank on the west side to complete a total of 300 LF. Angie requested a list of potential IN-Kind services and a list was provided.

On December 4th S&L Environmental Group received a request to identify the most critical areas along the west bank and provide a cost-estimate for stabilizing those areas. Epworth Forest indicated an interest to complete additional bank stabilization, if funding was available. Colby and Wayne Stanger, S&L Environmental Group met with Angie and Chris, Epworth Forest, on the morning of December 15th to discuss potential access areas and discuss the status of In-Kind services. In the afternoon Colby and Wayne made an on-site visit to the Island to complete an engineering survey of the banks and to prioritize the most critically eroding areas along the west bank of the Island. On December 24th the information prioritizing the most critical areas on the west bank and an estimated cost per foot were provided.

Wayne Stanger and Lyn Crighton met on December 30th to discuss and review the various funding sources committed to the project.

On January 13, 2015, Angie indicated Epworth Forest was still in the process of determining the extent of In-Kind services they could provide. Angie indicated the extent of In-Kind services would determine if additional bank stabilization (beyond the original 300LF) could be completed as part of the project.
2. **Project Design** – Engineer survey was completed on December 15th. Some preliminary design was completed to provide cost estimate for additional bank stabilization should funds become available. The final design is on hold until a determination is made concerning funding availability to complete additional bank stabilization.

3. **Project Permitting** – Preliminary permit data has been gathered, but the Permit Application cannot be completed and submitted until final determination as to the extent of the bank stabilization.

Wayne Stanger  
Senior Consultant  
574-536-9879  

Cc: Doug Nusbaum  
Lyn Crighton  
Colby Stanger  
Terry Frederick
Kline Island

Legend:
- Cities and Towns (Local)
- Townships
- Lakes
- House Numbers
- State Roads and US Highways
- Road Centerlines
- Railroads

Priority #1
250 LF

Priority #2
195 LF

Priority #3
180 LF

Webster Lake

113 ft

Last Data Upload: 12/24/2014 5:11:52 AM

developed by
The Schneider Corporation
www.schneidercorp.com
March 9, 2015

Angie McClurg
Epworth Forest Conference Center
8580 Wesley Lane
North Webster, Indiana 46555

RE: Contractors update of activities and progress for the Kline Island Bank Stabilization Design/Build Project:

Ms. McClurg:

The following activities and progress were made during February and early March:

1. **Project Coordination** - Staff at Epworth Forest continue to solicit In-kind donors to provide project materials, which could allow stabilizing more than the 300 LF of banks proposed in the original Scope of Services.
   
   S&L Group has communicated the need to reach a decision soon to avoid potential permit and construction delays for not only Kline Island but also the Loon Lake project.

2. **Project Design** - The project survey is completed and the engineering design data has been gathered to complete the preliminary design. Completion of the preliminary design is on hold until a determination is made concerning funding availability to complete additional bank stabilization.

3. **Project Permitting** – Documentation and Data for the DNR – “Lake Preservation Act” permit has been gathered, but the permit application cannot be completed and submitted until the preliminary design is completed.
Wayne Stanger  
Senior Consultant  
574-536-9879  

Cc: Doug Nusbaum  
    Lyn Crighton  
    Colby Stanger  
    Terry Frederick
April 28, 2015

Angie McClurg
Epworth Forest Conference Center
8580 Wesley Lane
North Webster, Indiana 46555

RE: Contractors update of activities and progress for the Kline Island Bank Stabilization Design/Build Project:

Ms. McClurg:

The following activities and progress were made during late March and April:

1. **Project Coordination** – Decision was reached on March 16\(^{th}\) to proceed with the project based on the original 300 LF of Shoreline Protection. A draft “Planting Plan” was submitted to Nate Thomas, DNR Lakes Biologist for review. The “Planting Plan” was finalized following a few revisions.

2. **Project Design** – The project design plans have been finalized following an on-site meeting with DNR Division of Water on April 21\(^{st}\).

3. **Project Permitting** - DNR Permit Application (Public Freshwater Lake) was submitted on March 19\(^{th}\). Public Notices to adjacent property owners, within a 0.25 of a mile of the project, were mailed on March 23th. Preliminary design plans were reviewed by DNR. Due to the lakeward distance of the glacial stone placement DNR schedule a site visit on April 21\(^{st}\). Received email from DNR on April 23\(^{rd}\) indicating the proposed design would be acceptable. Final design plans and other required documentation were submitted to DNR on April 28\(^{th}\) to allow them to complete final review.
Wayne Stanger  
Senior Consultant  
574-536-9879  

Cc:  Doug Nusbaum  
     Lyn Crighton  
     Colby Stanger  
     Terry Frederick  
     Jeffery Stanger
June 22, 2015

Angie McClurg
Epworth Forest Conference Center
8589 Wesley Lane
North Webster, Indiana 46555

RE: Contractors update of activities and progress of the Kline Island Bank Stabilization Design/Build Project.

Ms McClurg:

Since the last update the focus has been on obtaining all of the required permits and reviews for the project to move forward. On May 6th, following the DNR site meeting, the permit application was placed in “abeyance” status due to DNR request for additional information. S&L submitted the requested information on the same day, which included an Engineering Report provided by a Professional Engineer. With the assistance of Angie additional information was provided to DNR concerning Epworth Forest non-profit status and activity use of the island.

DNR forward the permit application to the Army Core of Engineers (ACOE) on May 12th to determination if the project qualified for the “, “Programmatic General Permit”(PGP). The DNR Permit was approved on May 18th. We received a phone call on June 3rd from the ACOE indicating the design plans were acceptable and met the requirements of “PGP”. The ACOE indicated no further notification would be coming from their office since DNR is authorized to approve the application for both IDEM and ACOE, under the provisions of the “PGP”. It is not necessary to notify IDEM since the project qualified for the “PGP” and construction activities will effect less than 300 LF and 0.1 acre.

The good news is we can now move forward with the project. Construction is scheduled to begin late August or early September. The schedule could vary slightly depending on weather conditions.

Colby Stanger will serve as the Project Construction Manager

If you have any questions do not hesitate to ask.
Wayne Stanger
Senior Consultant
574-536-9879

Cc: Doug Nusbaum
    Lyn Crighton
    Colby Stanger
    Terry Frederick
    Jeffrey Stanger
APPENDIX E

Permits
STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
CERTIFICATE OF APPROVAL
PUBLIC FRESHWATER LAKE

APPLICATION # : PL-22885
LAKE : Webster Lake
APPLICANT : Epworth Forest Conference Center
Angie McClurg
8580 Wesley Lane
North Webster, IN 46555-9854

AGENT : S&L Environmental Group, Inc.
Colby Stanger
15504 County Road 42
Goshen, IN 46528

AUTHORITY : IC 14-26-2 with 312 IAC 11

DESCRIPTION : A new bioengineered seawall will be constructed along 250' of the southwest shore of the island. The wall will be composed of glacial stone and live willow stakings. The bank will be graded to a 2:1 slope and vegetated with native wetland plantings. The excavated material will be placed landward of the legal shoreline on the island in a low area. In addition, a new bioengineered seawall will be constructed along 50' of the northwest shore of the island. The wall will be composed of glacial stone and live willow stakings. Details of the project are contained in information received electronically at the Division of Water on March 19, 2015 and in plans and information received at the Division of Water on April 21, 2015, April 29, 2015, April 30, 2015, May 4, 2015, May 6, 2015 and May 11, 2015.

LOCATION : Klene Island; located approximately 1000' south of the Epworth Forest Conference Center near North Webster, Tippecanoe Township, Kosciusko County Section 11, T 33N, R 7E, North Webster Quadrangle
UTM Coordinates: Downstream 4575962 North, 609955 East

APPROVED BY : James J. Hebenstreit, PE, Assistant Director
Division of Water
APPROVED ON : May 18, 2015

Included: Notice Of Right To Administrative Review - General Conditions - Special Conditions - Service List
STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
NOTICE OF RIGHT TO ADMINISTRATIVE REVIEW
APPLICATION #: PL- 22885

This signed document constitutes the issuance of a permit by the Department of Natural Resources, subject to the conditions and limitations stated on the pages entitled "General Conditions" and "Special Conditions".

The permit or any of the conditions or limitations which it contains may be appealed by applying for administrative review. Such review is governed by the Administrative Orders and Procedures Act, IC 4-21.5, and the Department’s rules pertaining to adjudicative proceedings, 312 IAC 3-1.

In order to obtain a review, a written petition must be filed with the Division of Hearings within 18 days of the mailing date of this notice. The petition should be addressed to:

Director
Division of Hearings
Indiana Government Center North, Room N501A
100 North Senate Avenue
Indianapolis, Indiana 46204

The petition must contain specific reasons for the appeal and indicate the portion or portions of the permit to which the appeal pertains.

If an appeal is filed, the final agency determination will be made by the Natural Resources Commission following a legal proceeding conducted before an Administrative Law Judge. The Department of Natural Resources will be represented by legal counsel.
(1) If any archaeological artifacts or human remains are uncovered during construction, federal law and regulations (16 USC 460, at sea, 35 C.F.R. 800.11, et al) and State Law (IC 14-21-1) require that work must stop and that the discovery must be reported to the Division of Historic Preservation and Archaeology within 2 business days.

Division of Historic Preservation and Archaeology
Room W274
402 West Washington Street
Indianapolis, IN 46204

Telephone: (317) 232-1946, FAX: (317) 232-6036

(2) This permit must be posted and maintained at the project site until the project is completed.

(3) This permit does not relieve the permittee of the responsibility for obtaining additional permits, approvals, easements, etc., as required by other federal, state, or local regulatory agencies. These agencies include, but are not limited to:

Agency
Indiana Department of Environmental Management
Local city or county planning or zoning commission

Telephone Number
(317) 232-8488 or (800) 451-8027

(4) This permit must not be construed as a waiver of any local ordinance or other state or federal law.

(5) This permit does not relieve the permittee of any liability for the effects which the project may have upon the safety of the life or property of others.

(6) This permit may be revoked by the Department of Natural Resources for violation of any condition, limitation or applicable statute or rule.

(7) This permit shall not be assignable or transferable without the prior written approval of the Department of Natural Resources. To initiate a transfer contact

Mr. Michael W. Neyer, PE, Director
Division of Water
Room W274
402 West Washington Street
Indianapolis, IN 46204

Telephone: (317) 232-4180, Toll Free: (877) 929-3755
FAX: (317) 232-4579

(8) The Department of Natural Resources shall have the right to enter upon the site of the permitted activity for the purpose of inspecting the authorized work.

(9) The receipt and acceptance of this permit by the applicant or authorized agent shall be considered as acceptance of the conditions and limitations stated on the pages entitled "General Conditions" and "Special Conditions."
STATE OF INDIANA
DEPARTMENT OF NATURAL RESOURCES
SPECIAL CONDITIONS
APPLICATION #: PL-22685

PERMIT VALIDITY: This permit is valid for 24 months from the “Approved On” date shown on the first page. If work has not been completed by May 18, 2017 the permit will become void and a new permit will be required in order to continue work on the project.

This permit becomes effective 18 days after the “MAILED” date shown on the first page. If both a petition for review and a petition for a stay of effectiveness are filed before this permit becomes effective, any part of the permit that is within the scope of the petition for stay is stayed for an additional 15 days.

CONFORMANCE: Other than those measures necessary to satisfy the “General Conditions” and “Special Conditions”, the project must conform to the information received by the Department of Natural Resources on: March 19, 2015, April 21, 2015, April 29, 2015, April 30, 2015, May 4, 2015, May 6, 2015 and May 11, 2015. Any deviation from the information must receive the prior written approval of the Department.

<table>
<thead>
<tr>
<th>Number</th>
<th>Special Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>minimize the movement of resuspended bottom sediment from the immediate project area</td>
</tr>
<tr>
<td>(2)</td>
<td>revegetate all bare and disturbed areas landward of the shoreline with a mixture of grasses (excluding all varieties of tall fescue) and legumes as soon as possible upon completion</td>
</tr>
<tr>
<td>(3)</td>
<td>all excavated material must be properly spread landward of the shoreline on the property described on page 1 under “DESCRIPTION” or completely removed from the project site such that erosion and off-site sedimentation of the material is prevented</td>
</tr>
<tr>
<td>(4)</td>
<td>the vegetative component of a bioengineered wall is critical to the function of the wall and must be maintained throughout the life of the wall; replace dead or lost plants with the same species or other approved species within one growing season</td>
</tr>
<tr>
<td>(5)</td>
<td>pursuant to 312 IAC 11-4-2 (h), do not place an impermeable material or structure (including but not limited to concrete, steel, or vinyl walls) directly behind the new seawall approved by this permit</td>
</tr>
<tr>
<td>(6)</td>
<td>the placement of the bioengineered seawall along this shoreline does not constitute an alteration that would change the shoreline classification on this project or nearby sites where shoreline classifications would be necessary for future permit application review</td>
</tr>
<tr>
<td>(7)</td>
<td>send photos, digital or hard copy, of the bioengineered seawall no later than 14 days after completion to Nate Thomas, Lakes Permitting Biologist, Division of Fish and Wildlife, 1353 S Governors Dr., Columbia City, IN 46725, <a href="mailto:NThomas@dnr.in.gov">NThomas@dnr.in.gov</a></td>
</tr>
<tr>
<td>(8)</td>
<td>any equipment and/or cables placed on a public waterway must be clearly marked with navigation buoys described in 312 IAC 5-4 in a manner that would be visible to any watercraft operator in the area</td>
</tr>
<tr>
<td>(9)</td>
<td>any equipment and/or cables left in a public waterway in times of limited visibility must, in addition to the requirement listed above, be marked with flashing amber warning lights and reflective signage warning watercraft operators of the hazards</td>
</tr>
</tbody>
</table>
due to steep shoreline conditions, a legal shoreline delineation could not be completed; therefore, please contact Jennifer Ware at jware@dnr.in.gov or 317-234-1093 at least two weeks prior to the start of construction.
APPENDIX F

Estimated Load Reduction
Bank Stabilization

If estimating for just one bank, put "0" in areas for Bank #2.

Please select a soil textural class:

- Sands, loamy sands
- Sandy loam
- Fine sandy loam
- Loams, sandy clay loams, sandy clay
- Silty clay loam, silty clay loam
- Clay
- Fine sandy loam
- Loams, sandy clay loams, sandy clay
- Silty clay loam

Please fill in the gray areas below:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Bank #1</th>
<th>Bank #2</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Length (ft)</td>
<td>300</td>
<td>0</td>
<td>500</td>
</tr>
<tr>
<td>Height (ft)</td>
<td>8.1</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Lateral Recession Rate (ft/yr)*</td>
<td>0.5</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Soil Weight (tons/ft3)</td>
<td>0.0525</td>
<td>0.0525</td>
<td>0.04</td>
</tr>
</tbody>
</table>

** Soil P Conc (lb/lb soil)**

- USER
- 0.0005
- 0.0005
- 0.0005

** Soil N Conc (lb/lb soil)**

- USER
- 0.001
- 0.001
- 0.001

* Lateral Recession Rate (LRR) is the rate at which bank deterioration has taken place and is measured in feet per year. This rate may not be easily determined by direct measurement. Therefore best professional judgement may be required to estimate the LRR. Please refer to the narrative descriptions in Table 1.

Estimated Load Reductions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>BMP Efficiency* Bank #1</th>
<th>BMP Efficiency* Bank #2</th>
<th>Bank #1</th>
<th>Bank #2</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sediment Load Reduction (ton/year)</td>
<td>1.0</td>
<td>1.0</td>
<td>63.8</td>
<td>0.0</td>
<td>150</td>
</tr>
<tr>
<td>Phosphorus Load Reduction (lb/year)</td>
<td></td>
<td></td>
<td>54.2</td>
<td>0.0</td>
<td>150</td>
</tr>
<tr>
<td>Nitrogen Load Reduction (lb/yr)</td>
<td></td>
<td></td>
<td>108.4</td>
<td>0.0</td>
<td>300</td>
</tr>
</tbody>
</table>

* BMP efficiency values should be between 0 and 1, and 1 means 100% pollutant removal efficiency.
APPENDIX G

Plant Materials
SOUTHWEST BANK AS-BUILD PLANTING PLAN

- 75 LIVE TREE STAKES PLANTED INTO THE GLACIAL STONE SLIGHTLY ABOVE THE ORIGINAL HIGH WATER MARK
- EXISTING GRADE 0.5:1 SLOPE
- PROPOSED GRADE 2:1 SLOPE
- DS0-6" GLACIAL STONE - 1 FT DEPTH
- DS0-6" GLACIAL STONE - 1 FT DEPTH
- OHWM ELEV. 852.8
- EXISTING GRADE ELEV. 851.8
- ELEV. 862.3
- ELEV. 863.0
- SC250 EROSION CONTROL BLANKET INSTALLED ON SLOPE ABOVE THE GLACIAL STONE TOE-WALL
- THE CONSTRUCTED SLOPE ABOVE THE GLACIAL STONE TOE-WALL VARIED IN WIDTH FROM 6 FT TO 15 FT.

NOTE:
- THE 1000 NATIVE PLANTS WERE PLANTED ON 2 FT SPACING WITHIN THE EROSION CONTROL BLANKET.
- ONE ROW OF PLANTS WERE PLANTED 3 FT FROM THE TOP OF THE STONE INTO THE GLACIAL STONE AREA.
Contact Wayne Stanger. Live Stakes for Kline Island Bank Stabilization. Live stakes not available until late November or early December. Prices do not include shipping.
**Quote**

**Ship To**

S & L Environmental Group  
15504 County Rd 42  
Goshen, IN 46528  
Ph. (574) 536-9879

**Quote**

S & L Environmental Group  
15504 County Rd 42  
Goshen, IN 46528  
Ph. (574) 536-9879

<table>
<thead>
<tr>
<th>Project No</th>
<th>Project Name</th>
<th>Stock Number</th>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Quantity Ordered</th>
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<td>PF-ASTERI-P50</td>
<td>Aster ericoides</td>
<td>heath aster</td>
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Contact Wayne Stanger. Quoted 1000 Plugs for installing in a glacial stone seawall. Prices do not include shipping.

Subtotal:  
Sales Tax:  
Freight: 0.00  
Discount: 0.00  
Amount Paid: 0.00  
Amount Due:  

This Quote is good for 30 days. This amount includes any discounts and credits.

To convert this quote to an order, please sign and date below and mail or fax back. Your signature indicates your acceptance of our terms and agreements as published in our catalog or as may be revised from time to time. For a copy of our terms, please call.

Signature:  
Date:  

Page 1 of 2
## Picking Ticket

**Order Number:** IN6021319  
**Order Date:** 10/6/2015

**Sold To:**  
S & L Environmental Group  
15504 County Rd 42  
Goshen, IN 46528  
Ph. (574) 536-9879

**Ship To:**  
S & L Environmental Group  
15504 County Rd 42  
Goshen, IN 46528  
Ph. (574) 536-9879

**Salesperson:** JFRITZ  
**Ship Date:** 10/7/2015  
**Ship Via:** Customer Pickup  
**Customer PO Proj. Name:** Upper Bank Mix  
**Proj. No:** Kline Island

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<tr>
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Native Seed Mix on slope above glacial stone toe-wall. This was added to the seeding plan. Approximately 0.14 acre seeded.

BLEND SEED: Contact Wayne Stanger. This Upper Bank Mix (2'-4' above NWL) is quoted to cover 0.17 ac. Wayne will pick up Thursday AM.