WACF EDUCATION CENTER MASTER PLAN
August 2010

For:
Wawasee Area Conservancy Foundation
P.O. Box 548
Syracuse, IN 46567

By:
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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0  Introduction</td>
<td>1</td>
</tr>
<tr>
<td>2.0  Existing Site Conditions and Facilities</td>
<td>1</td>
</tr>
<tr>
<td>2.1  General Property Description</td>
<td>1</td>
</tr>
<tr>
<td>2.2  Facilities</td>
<td>9</td>
</tr>
<tr>
<td>2.3  Existing Habitat (vegetation zones)</td>
<td>9</td>
</tr>
<tr>
<td>3.0  Proposed Site Conditions and Facilities</td>
<td>11</td>
</tr>
<tr>
<td>3.1  Landscape Plan</td>
<td>11</td>
</tr>
<tr>
<td>3.2  Proposed Facility Plan</td>
<td>13</td>
</tr>
<tr>
<td>3.3  Educational Opportunity Plan</td>
<td>14</td>
</tr>
<tr>
<td>4.0  Probable Estimates for Proposed Site Conditions and Facilities</td>
<td>18</td>
</tr>
<tr>
<td>4.1  Landscape Plan</td>
<td>18</td>
</tr>
<tr>
<td>4.2  Facility Plan</td>
<td>20</td>
</tr>
<tr>
<td>4.3  Educational Opportunity Plan</td>
<td>21</td>
</tr>
<tr>
<td>5.0  Conclusions and Recommendations</td>
<td>21</td>
</tr>
</tbody>
</table>
LIST OF FIGURES

1. Location Map, WACF Education Center Property, Kosciusko County, Indiana ................................................................. 3
2. Property Boundaries, WACF Education Center Property, Kosciusko County, Indiana ......................................................... 4
3. Historical aerial photographs of the WACF Education Center Property From 1973 and 1998, Kosciusko County, Indiana .................. 5
4. Two-foot contours and direction of surface water flow on WACF Education Center Property, Kosciusko County, Indiana ................. 6
5. Wetlands and filled wetlands located on and adjacent to the WACF Education Center property, Kosciusko County, Indiana ............ 7
6. General soils map of the WACF Education Center Property, Kosciusko County, Indiana .......................................................... 8
7. Vegetative communities of the WACF Education Center Property, Kosciusko County, Indiana ..................................................... 10
8. Wetland restoration area on west side of WACF Education Center Parcel immediately following removal of fill in 2006 .................. 12
9. Facilities Site plan for WACF Education Center, Kosciusko County, Indiana, including proposed trails, pavilions, and observation platforms .... 14
10. Elevation view of potential viewing platform(s) proposed for the WACF Education Center property on Lake Wawasee (scale ¼ inch=1 foot). Drawing by Heather Harwood, Landscape Architect ........................................ 15
11. Plan view of potential viewing platform(s) proposed for the WACF Education Center property on Lake Wawasee (scale ¼ inch=1 foot). Drawing by Heather Harwood, Landscape Architect ........................................ 16

LIST OF APPENDICES

Appendix A: Wetland Delineation Report
Appendix B: USDA Soils Report
Appendix C: Educational Facility Upgrade Plans
Appendix D: Sign Examples
Appendix E: Trail Map
WACF –Education Center Master Plan

1.0 INTRODUCTION

The Wawasee Area Conservancy Foundation (WACF) is a local public not-for-profit foundation dedicated to the preservation and enhancement of the Wawasee area watershed for present and future generations. The Foundation was formed in 1991 to anticipate, search out, and solve threats to the Wawasee Area Watershed and to its water quality. The Foundation is dedicated to enhancement of the watershed and works hand-in-hand with property owner groups, the State Department of Natural Resources and other governmental and civic organizations that share its concerns. The Foundation is incorporated as a 501(c)(3) corporation.

The Lake Wawasee watershed covers 23,618 acres including Wawasee, Syracuse, Bonar and Papakeechie lakes as well as ten lakes in the upper Turkey Creek sub watershed. To carry out its mission WACF has been acquiring strategic parcels around the lake and throughout the watershed that will help protect and enhance the water quality in Lake Wawasee. WACF has committed to managing and enhancing the natural resources on all of these properties. The purpose of this Master Plan is to document existing conditions and propose a direction for the future use and management of the Education Center property on the west side of Lake Wawasee.

2.0 EXISTING SITE CONDITIONS AND FACILITIES

2.1 General Property Description

The WACF Education Center property described in this report was purchased from several families between 1993 and 2009. The 41.65 acre property adjacent to Lake Wawasee is located in the north half of Sections 16 and 17, Township 34 North, Range 7 East, Kosciusko County, Indiana (Figure 1). The property consists of five parcels adjacent to or accessed from State Road 13. Three parcels of 3.0, 2.72, and 0.68 acres respectively, make up the western arm of the property between State Road 13 and the Conklin Bay wetland. The WACF sign sits on the westernmost parcel. The main parcel is 34.63 acres with approximately 1380 feet of frontage and a developed access off State Road 13 and a 50 foot wide undeveloped access extending east to Grandview Drive in alignment with Hesitation Drive (Figure 2). The final parcel (lake lot) consists of a 0.62 acre lot adjacent to Lake Wawasee and accessed from the main parcel through an easement on a 1.9 acre parcel retained by the Dunithan family (Figure 2). This lake lot has approximately 265 feet of frontage on Lake Wawasee to the north and 210 feet of frontage on the Conklin Bay wetland to the south. Except for surveyed corners marked with wood lathe and flagging tape the property boundaries are currently unmarked and not readily apparent from adjacent private property.

Partial development of the property occurred between 1973 and 1981 with the development of unimproved access roads from Grandview Road west across the center of the property to the eastern boundary of the main parcel and north through the
Dunithan parcel and then west again along Lake Wawasee. Evidence of filling is shown on Figure 3 and on the 1981 photo revision of the USGS topographic map (Figure 1). Some of the fill for this road likely came from the excavation of the channel between the Dunithan parcel and George Street. A secondary spur road was also developed at that time heading north of the main road toward what is now George Street as shown on the USGS topographic map. Subsequent fill activities on the main parcel prior to 2004 resulted in the present contours. No additional fill activities have occurred since 2004, although some limited areas of excavation have occurred to remove some of the fill. The elevation of the property ranges from 870 at Grandview to a low of 859, which is the normal pool elevation of Lake Wawasee. The dominant elevation on the property is approximately 860, while the filled areas range up to 866 (Figure 4).

The property is dominated by wetlands or former wetlands adjacent to Lake Wawasee. The entire property at one time drained to or was continuous with the lake until the constructed road off Grandview drive blocked the natural flow of water to the lake and likely caused unnatural ponding on the south half of the main parcel. Subsequently, ditches were excavated on this southern half and a culvert under State Road 13 installed, so that the south half of the main parcel drains south to Skinner Ditch, which empties into Turkey Creek immediately downstream of Syracuse Lake. Wetlands on the main parcel were delineated using the procedures in the Corps of Engineers 1987 Wetland Delineation manual during 2005 and the boundaries surveyed with a handheld GPS receiver (Figure 5). See Appendix A for the full report. According to this mapping there are 18.6 acres of wetland on the main parcel, leaving 23 acres of upland. The upland areas can be further divided into areas that were naturally dry (~21 acres) and areas that were converted to dry land by filling (~2.0 acres).

The soil mapping of the area predates or ignores the filling activities. The dominant soil type mapped throughout the property, including the lake lot and the easement to the lake lot, are Histosols and Aquolls (He). These are muck soils that developed in saturated (wetland) conditions (Figure 6). The Histosols and Aquolls are mapped continuous with drained Houghton muck (Hx) which lies along the entire State Road 13 frontage east of the entrance into the main parcel. The State Road 13 frontage west of the entrance is mapped in part, as drained Palms muck (Pb), and the remainder in Ormas loamy sand (OrB). Ormas soils, which are natural upland areas also were mapped where the Education Center (home) now sits and on the north boundary of the property along the higher elevations of George Street. A small area of Brady sandy loam (Bp) which lies slightly lower in elevation than the Ormas soils, but is still considered upland, was mapped in the area where much of the fill was dumped northwest of the home site. The eastern boundary of the property rises naturally and was mapped as Boyer Loamy sand (BoB). Because the soils were not mapped at this small of a scale, several areas of natural upland soils, likely Brady or Ormas loamy sands, were not mapped within the Histosols and Aquolls, but are clearly present in the northeastern portion of the main parcel. Appendix B has a more detailed description of the soils present on the property.
Figure 1: Location Map, WACF Education Center property, Kosciusko County, Indiana.
Figure 2: Individual parcel boundaries, WACF Education Center Property, Kosciusko County, Indiana
Figure 3: Historical aerial photographs of the WACF Education Center Property from 1973 (top) and 1998 (bottom), Kosciusko County, Indiana.
Figure 4: Two-foot contours and direction of surface water flow on WACF Education Center Property, Kosciusko County, Indiana.
Figure 5: Wetlands and filled wetlands located on and adjacent to the WACF Education Center property, Kosciusko County, Indiana. Wetlands delineated in 2005 by JFNew. See Appendix A for a complete wetland delineation report.
Figure 6: General soils map of the WACF Education Center Property, Kosciusko County, Indiana. Note: soil mapping was completed prior to or ignored filled areas on property.
2.2 Facilities
There is only one existing building on the property. The approximately 2780 square foot building, including the attached garage, was constructed on the property in 1982. The building is serviced by natural gas, electric, a well, and a septic system. The building has asouthwesterly exposure in the front. The former residence has been converted to an education facility and office for WACF. The building has a working kitchen, foyer, and a meeting area. There is one full bath on the hall from the foyer and one full bath off the master bedroom. In addition to the master bedroom there are two former bedrooms that are currently used by the Ecology and Land Acquisition committees for storage and work space. The access to the building includes an entry from the garage into the kitchen, a front entryway with a full-length covered porch, and a back door from the meeting room. There is a small (4 x 10 foot) storage shed east of the building.

Parking to facilitate the use of the building includes a 300 square foot driveway and approximately 350 lineal feet along the 25-foot wide entrance road. Additionally, an area of approximately 200 feet long by 100 feet wide is kept maintained for aesthetics and parking adjacent to the entrance drive. The lake lot is also a maintained lawn that can be used for parking or outdoor events. Other than gravel on the entrance drive and the driveway to the Education Center, all other roads on the property are unimproved.

2.3 Existing Habitat (vegetation zones)
There are a variety of habitats, both natural and disturbed, within the Education Center Property (Figure 7). The variety of habitats includes shallow marsh, shrub dominated wetland, forested wetland, excavated shallow pond and wetland, open water excavated channels, mesic forest, disturbed forest, and disturbed open lands (filled).

The lake parcel lies approximately one foot in elevation above the normal lake level. It is primarily maintained ornamental grasses. There is some vegetation at the shoreline of Lake Wawasee forming a buffer of approximately three feet. The shoreline vegetation includes purple loosestrife, narrow-leaved cattail, reed canary grass, joe-pyeweed, and goldenrod. The south side of the lake parcel has a 10 to 15 foot buffer of cottonwood trees, red osier dogwood, buckthorn, honeysuckle, and reed canary grass in a 10 foot wide zone before dropping into the Conklin Bay marsh which is dominated by cattails.

The main parcel consists primarily of forested wetland, shrub dominated wetland, and mesic forest. Disturbed forest and disturbed or developed open lands make up most of the remainder. There is approximately 1050 feet of artificial open water channels constructed to drain the south half of the main parcel. An excavated pond adjacent to the building has evolved into a fully vegetated wetland consisting of reed-canary grass, wool grass, and various rushes. The artificial channels drain toward State Road 13 and then on to Skinner Ditch, and eventually to Turkey Creek bypassing Lake Wawasee.

The forested wetlands are dominated by silver maple trees, but also include sycamore, green ash, eastern cottonwood, white oak, American elm, and patches of silky dogwood, grey dogwood, poison ivy, prickly wild gooseberry, false nettle, sensitive fern, Virginia creeper, and Virginia knotweed. The shrub dominated wetlands include button bush, silky dogwood, and red osier dogwood.
The relatively undisturbed mesic forest is dominated by white oak, green ash, black walnut, black cherry, and hickories. The understory of the undisturbed mesic woodland has scattered common greenbrier, American hazelnut, and honeysuckle and likely supports a rich variety of spring ephemerals including spring beauty, trillium, May apple, and cut-leaf toothwort. The disturbed upland forest is dominated by eastern cottonwood, black cherry, white mulberry, honeysuckle, multiflora rose, Virginia creeper, Virginia knotweed, and wood sorrel.

The disturbed open lands include the maintained lawn areas as well as the unmaintained areas of fill. These areas are dominated by fescue and brome grasses, Queen Anne’s lace, goldenrods and asters. Cottonwood and ash seedlings are sprouting on the filled areas.

Figure 7: Vegetative communities of the WACF Education Center property, Kosciusko County, Indiana.
3.0 PROPOSED SITE CONDITIONS AND FACILITIES

3.1 Landscape Plan
The current practice of mowing several acres of turf grass at the education Center wastes energy, disturbs wildlife, and utilizes time or money that could be used for educational purposes. There are a number of “No-Mow” grass mixes on the market that could be planted in place of the existing ornamental grasses. Low maintenance "No Mow" turf mix is a usually a blend of low-growing fine fescue that will form a dense turf and thrive in full sun or partial shade. The established lawn requires little if any watering or fertilizing. The established No-Mow lawn does not need mowing but normally is mowed once or twice a year to keep trees and shrubs from sprouting. A more "cropped" or manicured look can be obtained by mowing it every month or so to a height of 3.5 to 4 inches if desired. No-Mow turf can be driven on, parked on, and otherwise enjoyed as open space. It is recommended that WACF convert at least a portion of the currently mowed turf areas to No-Mow turf to reduce maintenance costs and benefit wildlife.

Visitors to the Education Center should have an opportunity to be immersed in the surrounding natural habitats. Pathways through the varied habitats of the Education Center property would allow visitors hands-on educational opportunities not available in classrooms. Details of the various pathways are discussed in the education section below. Three paths are suggested that would bring a variety of views and themes to a well rounded ecological education of the lake and watershed issues. The first pathway recommended is a very accessible existing path that could be marked with interpretive signage from the building on the main parcel to the lake lot, ending in a viewing platform that overlooks the marsh of Conklin Bay. An extension of the trail westward from the Education Center around the forested wetland and mitigation area and ending at the newly constructed pavilion would allow visitors to experience a perspective from both sides of the Conklin Bay marsh. A second suggested pathway would utilize the east west road and the old north south spur to form a loop encompassing the entire north half of the main parcel allowing visitors to experience an undisturbed shrub wetland, mesic woodlot, and contrasting filled wetlands. The third path would begin and end at the Education Center, looping past the pond and through the forested wetland in the south half of the main parcel east of the building. This path would allow visitors to experience a forested wetland as well as see the methodology used to drain and convert wetlands. These three paths encompass the entire property and with properly trained docents, would expose visitors to all of the natural habitats and their wildlife inhabitants.

There are three areas (refer back to Figure 5) that the former owners of the property were filling to convert wetland to useable ground. The previous owner completed some restoration of the wetlands north and northwest of the building (Figure 8). The completed restoration work appears to have been successful in that vegetation has returned to the excavated areas. More recent attempts in the fall 2009 to restore a portion of the fill area adjacent to the new pavilion resulted in less than ideal conditions. The existing fill consists of building debris (wood, concrete block, concrete slabs, bricks, pipes, plastic, and plaster), fiberglass boat parts, and other garbage. Efforts to remove the majority of debris from the defined restoration area resulted in excavating to a depth...
three to four feet below the original grade leaving open water instead of wetland conditions. Additional fill was utilized in the spring of 2010 to bring these areas back to an acceptable wetland grade for planting. These areas can be restored; however, topsoil replacement should be required for future efforts. The area at the convergence of the east-west road through the woods, and the north-south spur contains approximately ½ acre of predominantly concrete slab fill piles and a number of old steel drums. This area should be targeted for full or partial restoration first, if mitigation or restoration funds become available. Approximately 1/2 to 3/4 acre of the two acres of previously filled wetland is recommended for restoration. The remaining filled areas include roads that will be utilized as paths. Removing all fill on the WACF property is possible, but not recommended due to the cost and disturbance it would cause to adjacent natural habitats.

A number of non-native and invasive (exotic) species exist on the property. In order of dominance they are honeysuckle (*Lonicera japonica*), purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), and buckthorn (*Rhamnus* spp.). There are likely other species present such as garlic mustard (*Allaria petiolata*). These species are present in most Indiana woods and wetlands and therefore it is not unusual to find them on this parcel. These exotic species tend to out-compete native species of plants because they have few if any disease or insect predators in the United States to keep them in balance with the community. The control of exotic species is therefore, highly recommended. It is unlikely that WACF will ever be able to eliminate these species on the property because of the available seed sources on adjacent properties. However, annual control of these species is recommended to encourage the diversity of native plants and the wildlife species supported by native plants. Control is best obtained by one major effort to eliminate as many of the individual exotic plants as possible, followed by annual maintenance to search for re-sprouts and new individuals. An example of an uncontrolled exotic species is the dominance of purple loosestrife in the IDNR marsh adjacent to the north-south spur road. Grants may be available for initial control of exotic species and follow up maintenance or these efforts may be tied to wetland mitigation on the same property.
3.2 Proposed Facility Plan

3.2.1 The Education Center
The existing Education Center building needs improvements for use as a classroom structure. The former living room is now being utilized as the WACF board meeting room as well as a presentation room. It is difficult to seat more than about 20 people in the room for these meetings. Expansion of the room to the south (toward the wetland) or into the foyer would allow for a more efficient meeting room space. Large double insulated windows or sliding glass doors should be included in the rebuilding plans to allow views of the wetland and woods from the meeting room. A door or doors, opening to a raised deck overlooking the wetland would increase the visitor’s access and connection to the natural area. This deck should be constructed to meet Americans with Disabilities Act (ADA) requirements with appropriate handrails and ramps and utilize recycled materials. The deck could be continued or connected by a walkway to a platform immediately above the water elevation in the wetland. This would allow classes to have ADA access to the wetland for study and sample collection with return trips to the classroom having fewer hazards. The Education Center needs internet access for office use and classroom support, and installation has been ordered. As of June 2010 the facility upgrade has been planned (Appendix C).

3.2.2 Pavilion development
There are two pavilions planned for the property (Figure 9). The recently constructed West Pavilion is a 38 foot by 20 foot post and beam structure with a concrete floor supplied with electricity for outlets and lighting for the interior. The West pavilion contains a large stone fireplace and will be a great asset for hosting outdoor meetings and educational seminars. The proposed East Pavilion is currently planned to be 40 foot by 18 foot post and beam structure with a concrete floor and no electric service.

3.2.3 Boundary marking
Marking the boundaries of the WACF parcel with signage is recommended for several reasons. One reason for clearly marking property boundaries is so WACF property visitors do not stray onto adjacent private property. Another is to make adjacent owners aware of the boundary and hopefully discourage them from utilizing or maintaining portions of the WACF property. The most important reason to maintain signage is to advertise the organizations efforts at protecting the WACF watershed. Signs marked with positive verbiage such as “WACF, Preserving Lake Wawasee for future generations” promote understanding of the mission as well as recognition of the property boundary.
3.3 Educational Opportunity Plan
The Education Center should invite visitors to explore the natural habitats of the property while passively educating them using signage. The Education Center can also serve to actively educate targeted age groups on various topics related to lake health. Several of the ideas below address passive educational methods and several address active or interactive education. These ideas are presented here to introduce a variety of topics that WACF could pursue at the Education Center.

3.3.1 Outdoor Educational Opportunities
A relatively accessible, well maintained trail, such as Trail 1 (Figure 9), appeals to a wide audience. Since the Education Center property lies adjacent to one of the most extensive marshes on Lake Wawasee (Conklin Bay) it is suggested that this potential trail be highlighted or enhanced by the addition of a viewing platform overlooking the emergent marsh. The platform could be a simple 10 foot by 12 foot platform constructed 30 inches above the ground, and positioned such that it overhangs the edge of the marsh (Figure 10 and 11). The overhang would allow for an unobstructed view. Limited clearing for the platform and western extension may be necessary; although, most of
the proposed trail is on already improved and maintained ground. This path could continue west of the pavilion to access narrow parcels along State Road 13 and loop around the recently restored wetland.

Figure 10: Elevation view of potential viewing platform(s) proposed for the WACF Education Center property on Lake Wawasee (scale ¼ inch=1 foot). Drawing by Heather Harwood, Landscape Architect.
A mesic woodland and shrub wetland trail (Trail 2) could take advantage of the existing unimproved roads in the northern half of the property and allow access and educational opportunities in the relatively undisturbed habitat north of the road (refer back to Figure 9). This suggested trail takes in a number of habitats and would be an excellent plant identification trail. Four to six inch diameter wood posts topped with six inch by six inch vandal resistant signs could be used to number specific trees or colonies of plants for identification using a brochure, or the sign could include the name and an etched drawing of the plant or leaves. Various sign types are included in Appendix D for examples. This trail could also be used as a more rugged birding trail taking visitors past shrub swamps, mesic woods, and forested wetlands. A good place for a second viewing platform is also shown on Figure 9. An added bonus is that the trail could begin and end at the site of an existing wetland fill. While it is proposed that much of this fill be removed, some could be left in place with an educational sign discussing the affects of wetland loss on water quality and lake ecology.

Immediately adjacent to the east side of the Education Center is a partially impacted forested wetland containing an excavated channel. This channel drains the wetland southward, under State Road 13, into Skinner Ditch. Skinner Ditch flows west to Turkey Creek downstream of Syracuse Lake. The purpose of the proposed Trail 3 (Figure 9)
is to introduce visitors to the look and feel of a forested wetland, while educating them about past drainage practices and the ecological affect of those practices. It is suggested that the trail be unimproved except for vegetation identification or other interpretive signs. Allowing an unimproved trail to be used as a "swamp stomp" brings excitement and adventure to the learning experience. Alternatively, a boardwalk could be constructed following the same path, allowing access for less mobile or disabled individuals. A boardwalk bridge would be required to cross the existing channel.

The proposed Trail 3 could start and end at the emergent wetland study area adjacent to the Education Center. In the facility improvement section of this document we discussed the incorporation of a deck adjacent to this wetland that would be continuous with the deck from the Education Center. The benefit of having this small, isolated emergent wetland adjacent to the Education Center is its potential to serve as a living laboratory. The wetland can support a variety of common emergent species similar to what the Lake Wawasee shoreline supports. The wetland can be planted with a variety of species that don't already exist and could be partially excavated to restore some additional open water. At least some open water should be maintained at a relatively safe depth adjacent to the deck. This open water would allow visitors to use dip nets to capture aquatic macroinvertebrates, frogs, and minnow species present in the wetland and take them back to the classroom for further observation and discussion. Placing a waterfowl nesting box in or adjacent to the wetland could serve as a discussion point about waterfowl native to Lake Wawasee.

3.3.2 Indoor Education Opportunities
Fish play a vital role in the biotic processes of a lake system and are important to the public's overall enjoyment of a lake. Within the Education Center, it is recommended that an area be designated for the purpose of aquatic life education and be a focus for all ages. General information about fish biology, reproduction, life history, and population dynamics can be shared through posters, aquariums, interactive displays, and hands-on activities. Posters of the various species in the lake and their life cycles can be easily obtained and posted on the walls. The Center could contain aquariums holding several fish and turtle species found in Lake Wawasee. Hands on learning could incorporate fish ageing by using a microscope to see the age rings on a fish's scale or fish's ear bone (odolith). The microscope can also be used to look at the microscopic food source of smaller fish including algae and zooplankton. Hands on learning could also include the availability of plastic or foam fish replicas, a mock fishing pond (plastic pool with magnetic fish), and a wet lab with samples of common aquatic macroinvertebrates.

The various rooms available at the Education Center provide an opportunity for a museum type atmosphere using wall paintings or posters. For example a room at the Center could be designated as the Habitat Room. One wall of the room could be painted or postered with native upland forest, the next with a typical native shoreline transition to wetland, the third as shallow water or littoral zone showing the submerged aquatic vegetation, and the final wall as the deep water or lotic zone. The paintings or posters could depict above and below grade to show various life forms which affect the ecology of the lake. An alternate, approach may be to include all the zones on one wall,
and use successive walls to depict a continual degradation of the habitat and its affect on lake ecology.

The existing board room also should serve as the central classroom. The proposed large windows in this room would provide the backdrop and atmosphere for an interactive discussion about their value to lake ecology. The room could be enhanced for education by mounting a chalkboard or dry erase board on either end as well as adding a permanent screen for presentations. At least one wall could be corkboard allowing students or visitors to post photographs and drawings for discussion.

4.0 PROBABLE ESTIMATES FOR PROPOSED SITE CONDITIONS AND FACILITIES

4.1 Landscape Plan

4.1.1 Turf conversion

Estimating the cost for converting the existing areas of turf into No-Mow turf includes the cost of herbicide on the existing lawn and reseeding with No-Mow seed mix. The assumption was made that WACF would convert approximately 2 acres. The unit costs incorporate mobilization of equipment and manpower to complete the 2-acre seeding; therefore, unit costs may actually under estimated for smaller areas and over estimated for larger areas.

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*Turf mix applied at 220lbs per acre

4.1.2 Trail development

Trail 1 makes use of the existing grade and improvements from the Education Center out to the lake lot and required trail development to the west. Trail 2 makes use of existing filled roads for about half of its length as well. Both Trail 1 and 2 include suggested 10 foot by 12 foot viewing platforms constructed 30 inches off the ground. Estimates for materials on the viewing platforms should be doubled if recycled plastic lumber is desired. Trail 3, as proposed, makes use of existing grades and would require little effort to construct unless a boardwalk is desired.

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*includes square footage of handicapped accessible ramp
### Trail 2 Probable Cost

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<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$5,765</strong></td>
</tr>
</tbody>
</table>

*includes square footage of handicapped accessible ramp

### Trail 3 Probable Cost

<table>
<thead>
<tr>
<th>Task</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Number</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Path construction (1,600’)</td>
<td>Hour</td>
<td>$25.00</td>
<td>50</td>
<td>$1,250</td>
</tr>
<tr>
<td>Bridge crossing</td>
<td>Each</td>
<td>$3,000</td>
<td>1</td>
<td>$3,000</td>
</tr>
<tr>
<td>Signage</td>
<td>Each</td>
<td>$30.00</td>
<td>20</td>
<td>$600</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$4,850</strong></td>
</tr>
</tbody>
</table>

### 4.1.3 Deck addition to building and Wetland Enhancement

The proposed plan suggests a 28 foot by 15 foot deck attached to the building with a 5 foot wide by 15 foot ramp connecting to the 6 foot wide by 20 foot long wetland accessible deck. The wetland would need limited excavation, weed control and planting with additional native species. An interpretive sign posted on the deck near the wetland could identify plants and explain the filtering functions of wetlands. Platform materials should be doubled if recycled plastic lumber is desired for the decking.

### Wetland Enhancement

<table>
<thead>
<tr>
<th>Task</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Number</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excavation</td>
<td>Cubic Yard</td>
<td>$25.00</td>
<td>40</td>
<td>$1,000</td>
</tr>
<tr>
<td>Hand Weeding</td>
<td>Square Foot</td>
<td>$2.00</td>
<td>800</td>
<td>$1,600</td>
</tr>
<tr>
<td>Plants</td>
<td>each</td>
<td>$2.00</td>
<td>380</td>
<td>$720</td>
</tr>
<tr>
<td>Planting</td>
<td>each</td>
<td>$1.00</td>
<td>380</td>
<td>$380</td>
</tr>
<tr>
<td>Platform materials</td>
<td>Square Foot</td>
<td>$5.00</td>
<td>615</td>
<td>$3,075</td>
</tr>
<tr>
<td>Platform construction</td>
<td>Hour</td>
<td>$35.00</td>
<td>120</td>
<td>$4,200</td>
</tr>
<tr>
<td>Signage</td>
<td>Each</td>
<td>$300.00</td>
<td>1</td>
<td>$300</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$11,275.00</strong></td>
</tr>
</tbody>
</table>

### 4.1.4 Wetland Restoration

There is the potential to restore up to approximately two acres (87,120 square feet) of wetland by removing fill placed between 1973 and 2004. However, only a limited area of wetland fill removal is recommended due to the expense and potential disturbance to natural wetland areas. The following cost estimate was based on 1,000 square feet of fill removal where the fill is approximately 4 feet above the grade of the wetland. The volume of fill removal was calculated assuming four feet of over excavation due to the fact that the material has sunken into the original muck substrate.
## 4.1.5 Exotics control

Exotics control involves initial cutting and herbicide work (for shrubs) plus annual maintenance. The cost can vary considerably based on the species and the density. The estimated probable costs below assume average densities and only the initial cutting and herbicide work. Annual maintenance of all species could be performed during two or three annual site visits at approximately $600.00 per visit.

<table>
<thead>
<tr>
<th>Task</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Number</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mobilization</td>
<td>each</td>
<td>500</td>
<td>1</td>
<td>$500</td>
</tr>
<tr>
<td>Trees and shrubs</td>
<td>acre</td>
<td>$3,500</td>
<td>18</td>
<td>$63,000</td>
</tr>
<tr>
<td>Herbaceous species</td>
<td>acre</td>
<td>$1,500</td>
<td>23</td>
<td>$34,500</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$98,000</strong></td>
</tr>
</tbody>
</table>

## 4.2 Facility Plan

### 4.2.1 Expansion and rehabilitation of existing building

The proposed expansion of the existing building has too many variables to provide reliable cost estimates in this document. Remodeling of the building interior will be less expensive than an external expansion. Replacement of doors can range from a few hundred dollars to several thousand dollars depending on whether the same size door is utilized or larger doors are installed.

### 4.2.2 Pavilion development

The following estimates are for both pavilions. Pavilion 1 is 38 x 20 (760 square feet) and has proposed electrical service, while Pavilion 2 is 40 feet by 18 feet (720 square feet) with no proposed utilities. Both pavilions are assumed to have concrete floors.

<table>
<thead>
<tr>
<th>Task</th>
<th>Unit</th>
<th>Unit Cost</th>
<th>Number</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade preparation for Pavilion 1</td>
<td>Square foot</td>
<td>$5.00</td>
<td>760</td>
<td>$3,800</td>
</tr>
<tr>
<td>Materials for Pavilion 1</td>
<td>Square foot</td>
<td>$15.00</td>
<td>760</td>
<td>$11,400</td>
</tr>
<tr>
<td>Construction Labor for Pavilion 1</td>
<td>Hour</td>
<td>$50.00</td>
<td>200</td>
<td>$10,000</td>
</tr>
<tr>
<td>Electrical Service for Pavilion 1</td>
<td>Each</td>
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<td>1</td>
<td>$2,000</td>
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<tr>
<td><strong>Total for Pavilion 1</strong></td>
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<td></td>
<td></td>
<td><strong>$27,200</strong></td>
</tr>
<tr>
<td>Grade Preparation for Pavilion 2</td>
<td>Square foot</td>
<td>5.00</td>
<td>720</td>
<td>$3,600</td>
</tr>
<tr>
<td>Materials for Pavilion 2</td>
<td>Square foot</td>
<td>$15.00</td>
<td>720</td>
<td>$10,800</td>
</tr>
<tr>
<td>Construction Labor for Pavilion 2</td>
<td>Hour</td>
<td>$50.00</td>
<td>180</td>
<td>$9,000</td>
</tr>
<tr>
<td><strong>Total for Pavilion 2</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$23,400</strong></td>
</tr>
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</table>
4.2.3 Boundary marking

<table>
<thead>
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<th>Unit</th>
<th>Unit Cost</th>
<th>Number</th>
<th>Total Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posts each</td>
<td></td>
<td>$10.00</td>
<td>30</td>
<td>$300.00</td>
</tr>
<tr>
<td>signs each</td>
<td></td>
<td>$35.00</td>
<td>30</td>
<td>$1,050.00*</td>
</tr>
<tr>
<td>Installation labor</td>
<td>each</td>
<td>$15.00</td>
<td>30</td>
<td>$450.00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td>$1,800.00</td>
</tr>
</tbody>
</table>

* Sign prices range from plastic engraved 10 square inch for $6.00 each to 120 square inch metal engraved signs at $65 each. The above estimate uses an average.

4.3 Educational Opportunity Plan

Rather than provide estimates based on individual items suggested in the Educational Opportunities Section is it suggested that WACF budget a dollar amount that they desire to spend annually on upgrading the facility. For $5,000 a year volunteers could purchase the supplies or equipment necessary to implement any one of the suggestions including a wet lab, theme rooms, projection equipment, or books and supplies.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The Master Plan for the WACF Educational Center addresses 41.65 acres of wetland and upland adjacent to the west shore of Lake Wawasee. The property contains an existing residence, utilities, and several roads and the recent addition of a pavilion. Approximately two acres of the property contain fill material in former wetlands. The plan proposes a number of ideas to utilize the property and the buildings, as well as proposed pavilions for passive and active education. The plan also addresses the removal of non-native species of plants and the restoration of wetland habitat on the property. There are over a million dollars worth of suggested implementation activities in this plan, with the greatest challenge being the removal of fill material from wetland areas. Many actions can be completed for several thousand dollars each, and there is no timeline suggested.

The proposed ideas are meant to spark discussion amongst WACF members on the ultimate use of the property. None of the ideas presented are required, as the land can be left idle, serving the WACF mission to protect it from further degradation and using the building as office space to conduct and support other projects and programs of WACF.

The recommendations are:

1) Develop a budget for the Education Center including annual funding guidelines for simultaneous restoration, educational materials, and signage.
2) Restore wetlands one small section at time using mitigation funding or donations.
3) Seek competing proposals to treat all the non-native species on the property and include at least 3 years of follow-up maintenance.
4) Decide on a set price for mitigation opportunity. What will you charge for another party to “mitigate” by utilizing Education Center property? It is suggested WACF set up a square foot price for this opportunity.
5) Develop Educational opportunities as funds become available. Advertise priorities in donation requests to members.
6) Remodel the Education Center and add the deck out to the proposed demonstration wetland.
7) Enhance the wetland adjacent to the Education Center.
8) Develop the various trails recommended in this document.
APPENDIX A

Wetland Delineation Report
1.0 INTRODUCTION

1.1 J.F. New & Associates, Inc. (JFNew) was contracted to perform a jurisdictional determination and delineation of the boundaries of “waters of the United States,” including wetlands, which occur within a property located at 11585 North State Road 13 in Section 17, Township 34 North, Range 7 East in Kosciusko County, Indiana (Figure 1).

1.2 This report identifies the jurisdictional status of the project area based on JFNew’s best professional understanding and interpretation of the Corps of Engineers Wetland Delineation Manual (1987) and Corps of Engineers guidance documents and regulations. Jurisdictional determinations for other “waters of the United States” were made based on definitions and guidance found in 33 CFR 328.3, Corps Regulatory Guidance Letters, and the wetland delineation manual. The Corps of Engineers administers Section 404 of the Clean Water Act which regulates the discharge of fill or dredged material into all “waters of the United States,” and is the regulatory authority that must make the final determination as to the jurisdictional status of the project area.

2.0 REGULATORY DEFINITIONS

2.1 Waters of the United States
“Waters of the United States” are within the jurisdiction of the Corps of Engineers under the Clean Water Act. “Waters of the United States” is a broad term which includes waters that are used or could be used for interstate commerce. This includes wetlands, ponds, lakes, territorial seas, rivers, tributary streams including any definable intermittent waterways, and some ditches below the “Ordinary High Water Mark (OHWM).” Also included are manmade waterbodies such as quarries and ponds which are no longer actively being mined or constructed. Wetlands, mudflats, vegetated shallows, riffle and pool complexes, coral reefs, sanctuaries, and refuges are all considered special aquatic sites which involve more rigorous regulatory permitting requirements. A specific, detailed definition of “waters of the United States” can be found in the Federal Register (33 CFR 328.3).

2.2 Wetlands
Wetlands are a category of “waters of the United States” for which a specific identification methodology has been developed. As described in detail in the Corps of Engineers Wetland Delineation Manual (1987), wetland boundaries are delineated using three criteria: hydrophytic vegetation, hydric soils, and wetland hydrology.
2.2.1 Wetland Vegetation. In the course of developing the wetland determination methodology the Corps, in cooperation with the U.S. Fish and Wildlife Service, Environmental Protection Agency, and the Soil Conservation Service, compiled a comprehensive list of wetland vegetation. The indicator status of plant species is expressed in terms of the estimated probabilities of that species occurring in wetland conditions within a given region. The indicator categories as defined by the Corps are:

- **Obligate Wetland (OBL)** Occur almost always (estimated probability >99%) under natural conditions in wetlands.

- **Facultative Wetland (FACW)** Usually occur in wetlands (estimated probability 67%-99%), but occasionally found in non-wetlands.

- **Facultative (FAC)** Equally likely to occur in wetlands or non-wetlands (estimated probability 34%-66%).

- **Facultative Upland (FACU)** Usually occur in non-wetlands, but occasionally found in wetlands (estimated probability 1%-33%).

- **Obligate Upland (UPL)** Occur almost always (estimated probability >99%) in uplands.

Plants which are OBL, FACW, and FAC (except FAC-) are considered wetland species. Positive (+) or negative (-) signs more specifically define the frequency of occurrence in wetlands. A positive sign indicates the species is more frequently found in wetlands, and a negative sign indicates the species is less frequently found in wetlands. The percentage of the dominant wetland species in each of the vegetation strata in the sample area determines the hydrophytic or wetland status of the plant community. Soil type and hydroperiod are two factors important in controlling species composition.

2.2.2 Hydric Soils. Hydric soils are defined as soils that are saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions in the upper part. In general, hydric soils are flooded, ponded, or saturated for a week or more during the growing season when soil temperatures are above 32°F. The anaerobic conditions created by repeated or prolonged saturation or flooding results in permanent changes in soil color and chemistry which are used to differentiate hydric from non-hydric soils.

In this report, soil colors are described using the Munsell notation system. This method of describing soil color consists of separate notations for hue, value, and chroma which are combined in that order to form the color designation. The hue notation of a color indicates its relation to red, yellow, green, blue, and purple; the value notation indicates its lightness; and the chroma notation indicates its strength or departure from a neutral of the same lightness.
The symbol for **hue** consists of a number from 1 to 10, followed by the letter abbreviation of the color. Within each letter range, the hue becomes more yellow and less red as the numbers increase. The notation for **value** consists of numbers from 0 for absolute black, to 10 for absolute white. The notation for **chroma** consists of numbers beginning with /0 for neutral grays and increasing at equal intervals. A soil described as 10YR 3/1 soil is more gray than a soil designated 10YR 3/6. The Corps of Engineers color criteria for hydric soils specify that the chroma must be /1 if the soil has no mottles (small variegations in color), and /1 or /2 if the soil is mottled.

### 2.2.3 Wetland Hydrology

Wetland hydrology is defined as the presence of water for a significant period of time at or near the surface (within the root zone) during the growing season. Wetland hydrology is present only seasonally in many cases, and is often inferred by indirect evidence. Hydrology is controlled by such factors as seasonal and long-term rainfall patterns, local geology and topography, soil type, local water table conditions, and drainage. Primary indicators of hydrology are inundation, soil saturation in the upper 12 inches of the soil, water marks, sediment deposits, and drainage patterns. Secondary indicators such as oxidized root channels in the upper 12 inches of the soil, water-stained leaves, local soil survey data, and FAC-neutral vegetation test are sometimes used to identify hydrology. One primary indicator, or two or more secondary indicators are required to establish a positive indication of hydrology.

### 2.2.4 Wetland Definition Summary

In general, an area must meet all three criteria to be classified as a wetland. In certain problem areas such as seasonal wetlands which are not wet at all times, or in recently disturbed (atypical) situations, an area may be considered a wetland if only two criteria are met. In special situations, an area which meets the wetland definition may not be within the Corps of Engineers jurisdiction due to a specific regulatory exemption.

### 3.0 BACKGROUND INFORMATION

#### 3.1 Existing Maps

Several sources of information were consulted to identify potential wetlands and wetland soil units on the site. These include the U.S. Fish and Wildlife Service's *National Wetland Inventory* (NWI) and the Natural Resources Conservation Service's (NRCS) *Soil Survey* for Kosciusko County. These maps identify potential wetlands and wetland soil units on the site. The NWI maps were prepared from high altitude photography and in most cases were not field checked. Because of this, wetlands are sometimes erroneously identified, missed, or misidentified. Additionally, the criteria used in identifying these wetlands were different from those currently used by the Corps of Engineers. The county soil maps, on the other hand, were developed from actual field investigations. However, they address only one of the three required wetland criteria and may reflect historical conditions rather than current site conditions. The resolution of the soil maps limits their accuracy as well. The mapping units are often generalized based on topography, and many mapping units
contain inclusions of other soil types for up to 15% of the area of the unit. The Corps does not accept the use of either of these maps to make wetland determinations.

3.2 National Wetland Inventory Map
The National Wetland Inventory map of the area (Figures 2 and 3) identifies two wetlands associated with the subject property. One large wetland complex is located along the west property boundary. It is described as a palustrine, forested, seasonally flooded wetland (PFO1C). The second wetland area is on and adjacent to the northern and eastern edges of the property. This wetland is a palustrine, emergent, seasonally inundated and/or permanently flooded wetland (PEMC and PEMF).

3.3 Soil Survey
The NRCS Soil Survey of Kosciusko County (Figure 4) identifies five soil series on the site. Of these soils, Histosols and Aquolls (He), Houghton muck, drained (Hx), and Palms muck, gravelly substratum, drained (Pb) are listed as hydric soils. Brady sandy loam (Bp) is not a hydric soil type but may contain unmapped inclusions of hydric soils in depressional areas. Ormas loamy sand (OrB) is not a hydric soil and does not typically contain unmapped inclusions of hydric soils.

4.0 SITE INVESTIGATION AND DESCRIPTION

4.1 Investigation Methodology
The delineation of wetlands and other "waters of the United States" on the site was based on the methodology described in the Corps of Engineers Wetland Delineation Manual (Technical Report Y-87-1) as required by current Corps of Engineers policy.

4.1.1 Delineation Data Sheet. Where stations represent a wetland boundary point they are presented as paired data sheets, documenting the upland and wetland sides of the wetland boundary. The distance the specific upland or wetland stations are from the boundary point is noted on the data sheet. The data sheets used in the jurisdictional delineation process are located in Appendix A. These forms are the written documentation of how representative sample stations meet or do not meet each of the wetland criteria. Other points were also inspected during the delineation process but were not specifically recorded on data sheets.

4.2 General Site Conditions
JFNew inspected the site at 11585 North State Road 13 on August 16, 2005. The site is bordered to the south by State Road 13, and to the north, east, and west by undeveloped land. There was no standing water or saturated soil in the areas examined. The area delineated was forested with a mixture of deciduous trees.
4.3 Wetland
The area delineated is a portion of a large wetland complex located along the west property boundary. The wetland was dominated by silver maple (Acer saccharinum, FACW+) and the upland was dominated by white mulberry (Morus alba, FAC) and eastern cottonwood (Populus deltoides, FAC+). The transitional zone of about 50 feet was dominated by both wetland and upland species.

At data station 5a the wetland vegetation was dominated by false nettle (Boehmeria cylindrica, OBL), green ash (Fraxinus pennsylvanica, FACW), Virginia creeper (Parthenocissus quinquefolia, FAC-), eastern cottonwood, poison ivy (Toxicodendron radicans, FAC+), and American elm. The soil was not saturated within 16 inches of the surface, however secondary indicators such as oxidized root channels, satisfaction of the FAC-neutral test and local soil survey data confirm the presence of wetland hydrology during the growing season. Soil in the wetland test pit exhibited a matrix color of 10YR 3/1 to a depth of twelve inches, and 10YR 4/1 with 10YR 4/6 mottles from twelve to sixteen inches deep. This area meets all three wetland criteria and is therefore within a wetland.

At the adjacent upland data station 5b, the vegetation was dominated by white mulberry, wood sorrel (Oxalis sp, FACU), Virginia creeper, eastern cottonwood, black cherry (Prunus serotina, FACU), and American elm. The soil was not saturated within 16 inches of the surface, and only one secondary indicator of wetland hydrology, local soil survey data. Soil in the 16-inch deep test pit exhibited a matrix color of 10YR 3/1 throughout the profile, meeting the hydric soil criteria. This area meets only one of the wetland criteria and is therefore not within a wetland.

At data station 10a the wetland vegetation was dominated by grey dogwood (Cornus foemina, FACW-), green ash, Virginia creeper, Virginia knotweed (Polygonum virginianum, FAC), eastern cottonwood, prickly wild gooseberry (Ribes cynosbati, UPL), swamp white oak (Quercus bicolor, FACW+), and American elm. The soil was not saturated within 16 inches of the surface, however secondary indicators such as local soil survey data and satisfaction of the FAC-neutral test confirm the presence of wetland hydrology during the growing season. Soil in the wetland test pit exhibited a matrix color of 10YR 3/1 in the upper ten inches of the soil profile, and 10YR 4/2 with 10YR 4/6 mottles from ten to sixteen inches deep. This area meets all three wetland criteria and is therefore within a wetland.

Vegetation at the adjacent upland data station 10b was dominated by tartarian honeysuckle (Lonicera tatarica, FACU), white mulberry, Virginia knotweed, eastern cottonwood, black cherry, and multiflora rose (Rosa multiflora, FACU). The soil was not saturated within sixteen inches of the surface, and there was only one secondary indicator, local soil survey data. Soil in the 16-inch deep test pit exhibited a matrix color of 10YR 3/1 from the surface to a depth of ten inches, and 10YR 4/2 with 10YR 4/6 mottles from ten to sixteen inches deep. This area meets only the hydric soils criterion and is therefore not within a wetland.
The vegetation at data station 15a was dominated by wetland species including grey dogwood, green ash, sensitive fern (*Onoclea sensibilis*, FACW), Virginia knotweed and swamp white oak. The soil was not saturated within sixteen inches of the surface, however two secondary indicators, local soil survey data and satisfaction of the FAC-neutral test, confirm the presence of wetland hydrology during the growing season. The soil in the 16-inch deep test pit exhibited a matrix color of 10YR 3/1 in the upper eight inches of the soil profile, and 10YR 5/2 with 10YR 3/8 mottles from eight to sixteen inches deep. This area meets all three wetland criteria and is therefore within a wetland.

At the adjacent upland data station 15b the vegetation was dominated by grey dogwood, American hazelnut (*Corylus americana*, FACU-), green ash, may apple (*Podophyllum peltatum*, FACU), swamp white oak, common greenbrier (*Smilax rotundifolia*, FAC), and poison ivy. There were no primary indicators of wetland hydrology within 16 inches of the surface, and only one secondary indicator, satisfaction of the FAC-neutral test for hydrophytic vegetation. Soil in the 16-inch deep test pit exhibited a matrix color of 10YR 3/1 in the upper eight inches of the profile, and 10YR 5/3 with 10YR 4/6 mottles from eight to sixteen inches deep. This area meets only one of the wetland criteria and is therefore not within a wetland.

5.0 JURISDICTIONAL ANALYSIS

5.1 Corps of Engineers
The Corps of Engineers has authority over the discharge of fill or dredged material into “waters of the United States.” This includes authority over any filling, mechanical land clearing, or construction activities that occur within the boundaries of any “water of the United States”. A permit must be obtained from the Corps of Engineers before any of these activities occur. Permits can be divided into three general categories: the Regional General Permit for Indiana, Nationwide Permits, and Individual Permits.

The *Regional General Permit* for Indiana authorizes activities associated with the construction or installation of new facilities or structures as well as for agriculture or mining. Proposed wetland impacts must be less than 1 acre and meet specific criteria in order to qualify for these permits. Section 401 Water Quality Certification must be obtained from the Indiana Department of Environmental Management before the Corps will perform their permit review.

*Nationwide Permits* have been developed for projects which meet specific criteria and are deemed to have minimal impact on the aquatic environment. *Individual Permits* are required for projects that do not fall into one of the specific Nationwide Permits or the Regional General Permit or that are deemed to have significant environmental impacts. These permits are much more difficult to obtain and receive a much higher level of regulatory agency and public scrutiny and may require several months to more than a year for processing.
5.2 Indiana State Wetland Permit Program
HEA 1798, which became law on January 27, 2004 as amended by HEA 1277, creates a new isolated wetlands regulatory permit program in Indiana. Therefore, delineation reports must be submitted to the Corps of Engineers to determine whether they meet the criteria as "waters of the United States." before a permit process can be determined. If a person plans an activity that may affect a state regulated isolated wetland, a permit application must be sent to IDEM including an initial assessment of the class of the wetland(s) as outlined in HEA 1798. For regulated wetland activities in state regulated wetlands, compensatory mitigation is required. The approved mitigation ratios are outlined in HEA 1798.

5.3 Other Agencies
The Indiana Department of Natural Resources (IDNR) has jurisdiction over the floodway of ditches and streams with a watershed greater than one (1) square mile. If impacts are proposed to jurisdictional floodways, a Construction-In-A-Floodway Permit may be required from the IDNR.

6.0 SUMMARY AND CONCLUSIONS
JFNew inspected the property at 11585 North State Road 13 on August 16, 2005. The wetland boundary paralleling State Road 13 was delineated from the existing north-south driveway west toward the property line. We recommend that this report be forwarded to the Corps for verification and determination of jurisdictional status of the wetlands before any fill activities are begun.
FRESHWATER WETLAND CLASSIFICATION

P - PALUSTRINE

<table>
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<th>RB</th>
<th>UB</th>
<th>AB</th>
<th>US</th>
<th>ML</th>
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</thead>
<tbody>
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</tr>
<tr>
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<td>2)</td>
<td>3)</td>
<td>4)</td>
<td>5)</td>
<td>6)</td>
<td>7)</td>
<td>8)</td>
<td>9)</td>
</tr>
<tr>
<td>1)</td>
<td>2)</td>
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<td>4)</td>
<td>5)</td>
<td>6)</td>
<td>7)</td>
<td>8)</td>
<td>9)</td>
</tr>
<tr>
<td>1)</td>
<td>2)</td>
<td>3)</td>
<td>4)</td>
<td>5)</td>
<td>6)</td>
<td>7)</td>
<td>8)</td>
<td>9)</td>
</tr>
</tbody>
</table>

MODIFYING TERMS

In order to more adequately describe wetland and aquatic habitats water regime, water chemistry, soil of special modifiers may be applied.

<table>
<thead>
<tr>
<th>WATER REGIME</th>
<th>WATER CHEMISTRY</th>
<th>SOIL</th>
<th>SPECIAL MODIFIERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>NON-TIDAL</td>
<td>INLAND SALINITY</td>
<td>pH MODIFIERS FOR FRESHWATER</td>
<td></td>
</tr>
<tr>
<td>A Temporarily Flooded</td>
<td>J Intermittently Flooded</td>
<td>7 Hypersaline</td>
<td>a Acid</td>
</tr>
<tr>
<td>B Saturated</td>
<td>K Artificially Flooded</td>
<td>8 Eusaline</td>
<td>t Circumneutral</td>
</tr>
<tr>
<td>C Seasonally Flooded</td>
<td>W Intermittently Flooded/ Temporary</td>
<td>9 Mixosaline</td>
<td>g Alkaline</td>
</tr>
<tr>
<td>D Seasonally Flooded/ Well-Drained</td>
<td>Y Saturated/ Semipermanent/ Seasonal</td>
<td>0 Fresh</td>
<td>h Organic</td>
</tr>
<tr>
<td>E Seasonally Flooded/Saturated</td>
<td>Z Intermittently Exposed/ Permanent</td>
<td></td>
<td>i Mineral</td>
</tr>
<tr>
<td>F Semipermanently Flooded</td>
<td>U Unknown</td>
<td></td>
<td>j Diked/Impounded</td>
</tr>
<tr>
<td>G Intermittently Exposed</td>
<td></td>
<td></td>
<td>k Artificial Substrate</td>
</tr>
<tr>
<td>H Permanently Flooded</td>
<td></td>
<td></td>
<td>x Excavated</td>
</tr>
</tbody>
</table>

Dominance types must be added by users. Classification of wetland and deepwater habitats of the U.S. Cowardin et. al. 1979 as modified for national wetland inventory mapping conventions.

Figure 3: Key to National Wetland Inventory
11585 North State Road 13
Hubert Dunihan
Kosciusko County, Indiana
Figure 4: Soils Map and Legend
11585 North State Road 13
Hubert Dunithan
Kosciusko County, Indiana

Scale: 1" = 1,000'

Map Source: NRCS Soil Survey of Kosciusko County, Indiana
# DATA SHEET: WETLAND DELINEATION

| Project/Site: | 11585 North State Road 13, Syracuse | Date: | 8/16/2005 |
| Client: | Hubert Dunilhan | County: | Kosciusko |
| Investigator(s): | J. Richardson | State: | IN |

## WETLAND

### STATION # 5a
- Distance from Stake: 10’
- Normal Circumstances?
  - Yes
- Significantly Disturbed?
  - No
- Potential Problem Area?
  - No

### STATION # 5b
- Distance from Stake: 10’
- Normal Circumstances?
  - Yes
- Significantly Disturbed?
  - No
- Potential Problem Area?
  - No

## VEGETATION

### DOMINANT SPECIES
- Boehmeria cylindrica
- Fraxinus pennsylvanica
- Parthenocissus quinquefolia
- Populus deltoids
- Toxicodendron radicans
- Ulmus americana

### STRATUM
- Herbaceous
- Vine
- Tree
- Sapling

### INDICATOR
- FACW
- FAC
- FAC+

### VEGETATION

### DOMINANT SPECIES
- Morus alba
- Oxalis sp.

### STRATUM
- Herbaceous

### INDICATOR
- FAC

### Percent of Species OBL, FACW, FAC (excl. FAC+): 83%

### Percent of Species OBL, FACW, FAC (excl. FAC-): 50%

### Remarks:
- ☐ Meets the hydrophytic vegetation criterion.
- ☐ Does not meet the hydrophytic vegetation criterion.
- ☐ Other:

### HYDROLOGY

### Field Indicators:
- Depth of Surface Water: None
- Depth to Free Water: > 15’
- Depth to Saturated Soil: > 15’

### PRIMARY INDICATORS
- Inundated
- Saturated <12’
- Water marks
- Sediment deposit
- Drainage patterns: Ox. root channels, Water-stained leaves, Local soil survey data, FAC- Neutral test, Other (ex. in Remarks)

### SECONDARY INDICATORS
- Depth of Surface Water: None
- Depth to Free Water: > 15’
- Depth to Saturated Soil: > 15’

### PRIMARY INDICATORS
- Ox. root channels
- Water-stained leaves
- Local soil survey data
- FAC- Neutral test
- Other (ex. in Remarks)

### SECONDARY INDICATORS
- Depth of Surface Water: None
- Depth to Free Water: > 15’
- Depth to Saturated Soil: > 15’

### Remarks:
- ☐ Meets the wetland hydrology criterion.
- ☐ Does not meet the wetland hydrology criterion.
- ☐ Other:

## SOILS

### Map Unit Name: Histosols and Aquolls (He)
### Profile Description:
- DEPTH: 0 - 12”
  - MATRIX: 10YR 3/1
  - MOTTE: none
  - TEXTURE: Sandy loam
- DEPTH: 12 - 16”
  - MATRIX: 10YR 4/1
  - MOTTE: 10YR 4/6
  - TEXTURE: Clay loam

### HYDRIC SOIL INDICATORS
- Histosol
- Histic epipedon
- Sulficod odor
- Aquic moisture reg.
- Gleyed
- Low Chroma

### Remarks:
- ☐ Meets the hydric soil criterion.
- ☐ Does not meet the hydric soil criterion.
- ☐ Other:

## WETLAND DETERMINATION

### Hydrophytic vegetation present?
- Yes
- No

### Wetland hydrology present?
- Yes
- No

### Hydric soils present?
- Yes
- No

### Remarks:
- ☐ Qualifies as a wetland.
- ☐ Does not qualify as a wetland.
- ☐ Other:
# Data Sheet: Wetland Delineation

**Project/Site:** 11585 North State Road 13, Syracuse  
**Client:** Hubert Dunithan  
**Investigator(s):** J. Richardson  
**Date:** 8/16/2005  
**County:** Kosciusko  
**State:** IN

## Wetland

<table>
<thead>
<tr>
<th>Station #</th>
<th>Distance from Stake</th>
<th>Normal Circumstances?</th>
<th>Significant Disturbed?</th>
<th>Potential Problem Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td>10a</td>
<td>10'</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Vegetation

<table>
<thead>
<tr>
<th>Dominant Species</th>
<th>Stratum</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Corrnus foemina</td>
<td>Shrub</td>
<td>FACW-</td>
</tr>
<tr>
<td>Fraxinus pennsylvanica</td>
<td>Tree</td>
<td>FACW</td>
</tr>
<tr>
<td>Parthenocissus quinquefolia</td>
<td>Vine</td>
<td>FAC-</td>
</tr>
<tr>
<td>Polygonum virginianum</td>
<td>Herbaceous</td>
<td>FAC</td>
</tr>
<tr>
<td>Populus deltoides</td>
<td>Tree</td>
<td>FAC+</td>
</tr>
<tr>
<td>Ribes cymosati</td>
<td>Shrub</td>
<td>UPL</td>
</tr>
<tr>
<td>Quercus bicolor</td>
<td>Tree</td>
<td>FACW+</td>
</tr>
<tr>
<td>Ulmus americana</td>
<td>Tree</td>
<td>FACW-</td>
</tr>
</tbody>
</table>

Percent of Species OBL, FACW, FAC (excl. FAC-): 75%

Remarks:
- ☐ Meets the hydrophytic vegetation criterion.
- ☐ Does not meet the hydrophytic vegetation criterion.
- ☐ Other:

### Hydrology

<table>
<thead>
<tr>
<th>Field Indicators</th>
<th>Depth of Surface Water</th>
<th>Depth to Free Water</th>
<th>Depth to Saturated Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Indicators</td>
<td>None</td>
<td>&gt; 16&quot;</td>
<td>&gt; 16&quot;</td>
</tr>
</tbody>
</table>

Secondary Indicators:
- Ox. root channels
- Saturated <12"
- Water-stained leaves
- Water marks
- Sediment deposit
- Drainage patterns

Remarks:
- ☐ Meets the wetland hydrology criterion.
- ☐ Does not meet the wetland hydrology criterion.
- ☐ Other:

## Soils

### Map Unit Names

- Histosols and Aquolls (He)

### Texture

- Sandy loam

### Hydrologic Soil Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>0 - 10&quot;</td>
</tr>
<tr>
<td>Histic epipedon</td>
<td>10YR 3/1</td>
</tr>
<tr>
<td>Sulficid odor</td>
<td>10YR 4/2</td>
</tr>
</tbody>
</table>

Remarks:
- ☐ Meets the hydrologic soil criterion.
- ☐ Does not meet the hydrologic soil criterion.
- ☐ Other:

### Wetland Determination

- Hydrophytic vegetation present? Yes
- Wetland hydrology present? Yes
- Hydric soils present? Yes

Remarks:
- ☐ Qualifies as a wetland.
- ☐ Does not qualify as a wetland.
- ☐ Other:

---

## Upland

<table>
<thead>
<tr>
<th>Station #</th>
<th>Distance from Stake</th>
<th>Normal Circumstances?</th>
<th>Significant Disturbed?</th>
<th>Potential Problem Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td>10b</td>
<td>10'</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

### Vegetation

<table>
<thead>
<tr>
<th>Dominant Species</th>
<th>Stratum</th>
<th>Indicator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lonicera tartarica</td>
<td>Shrub</td>
<td>FACU</td>
</tr>
<tr>
<td>Morus alba</td>
<td>Tree</td>
<td>FAC</td>
</tr>
<tr>
<td>Polygonum virginianum</td>
<td>Herbaceous</td>
<td>FAC</td>
</tr>
<tr>
<td>Populus deltoides</td>
<td>Tree</td>
<td>FAC+</td>
</tr>
<tr>
<td>Prunus serotina</td>
<td>Tree</td>
<td>FACU</td>
</tr>
<tr>
<td>Rosa multiflora</td>
<td>Shrub</td>
<td>FACU</td>
</tr>
</tbody>
</table>

Percent of Species OBL, FACW, FAC (excl. FAC-): 50%

Remarks:
- ☐ Meets the hydrophytic vegetation criterion.
- ☐ Does not meet the hydrophytic vegetation criterion.
- ☐ Other:

### Hydrology

<table>
<thead>
<tr>
<th>Field Indicators</th>
<th>Depth of Surface Water</th>
<th>Depth to Free Water</th>
<th>Depth to Saturated Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary Indicators</td>
<td>None</td>
<td>&gt; 16&quot;</td>
<td>&gt; 16&quot;</td>
</tr>
</tbody>
</table>

Secondary Indicators:
- Ox. root channels
- Saturated <12"
- Water-stained leaves
- Water marks
- Sediment deposit
- Drainage patterns

Remarks:
- ☐ Meets the wetland hydrology criterion.
- ☐ Does not meet the wetland hydrology criterion.
- ☐ Other:

### Soils

### Map Unit Names

- Histosols and Aquolls (He)

### Texture

- Sandy loam

### Hydrologic Soil Indicators

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Depth</th>
</tr>
</thead>
<tbody>
<tr>
<td>Histosol</td>
<td>0 - 10&quot;</td>
</tr>
<tr>
<td>Histic epipedon</td>
<td>10YR 3/1</td>
</tr>
<tr>
<td>Sulficid odor</td>
<td>10YR 4/2</td>
</tr>
</tbody>
</table>

Remarks:
- ☐ Meets the hydrologic soil criterion.
- ☐ Does not meet the hydrologic soil criterion.
- ☐ Other:

### Wetland Determination

- Hydrophytic vegetation present? Yes
- Wetland hydrology present? Yes
- Hydric soils present? Yes

Remarks:
- ☐ Qualifies as a wetland.
- ☐ Does not qualify as a wetland.
- ☐ Other:
# Data Sheet: Wetland Delineation

**Project/Site:** 11585 North State Road 13, Syracuse  
**Date:** 8/16/2005

**Client:** Hubert Dunithan  
**County:** Kosciusko

**Investigator(s):** J. Richardson  
**State:** IN

## Wetland

<table>
<thead>
<tr>
<th>STATION #</th>
<th>Distance from Stake:</th>
<th>Normal Circumstances?</th>
<th>Significantly Disturbed?</th>
<th>Potential Problem Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td>15a</td>
<td>10'</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

## Upland

<table>
<thead>
<tr>
<th>STATION #</th>
<th>Distance from Stake:</th>
<th>Normal Circumstances?</th>
<th>Significantly Disturbed?</th>
<th>Potential Problem Area?</th>
</tr>
</thead>
<tbody>
<tr>
<td>15b</td>
<td>10'</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

## Vegetation

### Dominant Species
- **Corncus foemina**
- **Fraxinus pennsylvanica**
- **Onclea sensibilis**
- **Polygynum virginianum**
- **Quercus bicolor**

### Stratum
- Shrub
- Herbaceous
- Tree

### Indicator
- FACW-
- FACU+
- FAC-

### Percent of Species OBL, FACW, FAC (excl. FAC-)
- 100%

### Percent of Species OBL, FACW, FAC (excl. FAC-)
- 71%

### Remarks:
- ☐ Meets the hydrophytic vegetation criterion.
- ☐ Does not meet the hydrophytic vegetation criterion.
- ☐ Other:

## Hydrology

### Field Indicators
- Depth of Surface Water: None
- Depth to Free Water: > 16'
- Depth to Saturated Soil: > 16'

### Primary Indicators
- Ox. root channels
- Water-stained leaves
- Ox. root channels
- Water-stained leaves
- Local soil survey data
- Local soil survey data

### Secondary Indicators
- FAC- Neutral test
- FAC- Neutral test
- Other (ex. in Remarks)
- Other (ex. in Remarks)

### Remarks:
- ☐ Meets the wetland hydrology criterion.
- ☐ Does not meet the wetland hydrology criterion.
- ☐ Other:

## Soils

### Map Unit Name: Histosols and Aquolls (He)

### Profile Description: Depth 0 - 8'
- Matrix: 10YR 3/1
- Mottle: none
- Texture: Silt loam

### Depth 8 - 16'
- Matrix: 10YR 5/2
- Mottle: 10YR 3/8
- Texture: Silt loam

### Hydric Soil Indicators
- Histosol
- Histic epipedon
- Sulfic odor
- Aquic moisture reg.
- Gleyed
- Low Chroma

### Remarks:
- ☐ Meets the hydric soil criterion.
- ☐ Does not meet the hydric soil criterion.
- ☐ Other:

## Wetland Determination

### Hydrophytic vegetation present? ☑ Yes ☐ No
### Wetland hydrology present? ☑ Yes ☐ No
### Hydric soils present? ☑ Yes ☐ No

### Remarks:
- ☐ Qualifies as a wetland.
- ☐ Does not qualify as a wetland.
- ☐ Other:

## Soils

### Map Unit Name: Ormas loamy sand (OrB)

### Profile Description: Depth 0 - 8'
- Matrix: 10YR 3/1
- Mottle: none
- Texture: Sandy loam

### Depth 8 - 16'
- Matrix: 10YR 5/3
- Mottle: 10YR 4/6
- Texture: Sandy loam

### Hydric Soil Indicators
- Histosol
- Histic epipedon
- Sulfic odor
- Aquic moisture reg.
- Gleyed
- Low Chroma

### Remarks:
- ☐ Meets the hydric soil criterion.
- ☐ Does not meet the hydric soil criterion.
- ☐ Other:

## Wetland Determination

### Hydrophytic vegetation present? ☑ Yes ☐ No
### Wetland hydrology present? ☑ Yes ☐ No
### Hydric soils present? ☑ Yes ☐ No

### Remarks:
- ☐ Qualifies as a wetland.
- ☐ Does not qualify as a wetland.
- ☐ Other:
APPENDIX B

USDA Soils Report
Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://soils.usda.gov/sqi/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (http://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

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# Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preface</td>
<td>2</td>
</tr>
<tr>
<td>How Soil Surveys Are Made</td>
<td>5</td>
</tr>
<tr>
<td>Soil Map</td>
<td>7</td>
</tr>
<tr>
<td>Soil Map</td>
<td>7</td>
</tr>
<tr>
<td>Legend</td>
<td>8</td>
</tr>
<tr>
<td>Map Unit Legend</td>
<td>9</td>
</tr>
<tr>
<td>Map Unit Descriptions</td>
<td>10</td>
</tr>
<tr>
<td>Kosciusko County, Indiana</td>
<td>12</td>
</tr>
<tr>
<td>Ao—Aquents—Urban land complex, rarely flooded</td>
<td>12</td>
</tr>
<tr>
<td>BoB—Boyer loamy sand, 0 to 6 percent slopes</td>
<td>12</td>
</tr>
<tr>
<td>Bp—Brady sandy loam</td>
<td>13</td>
</tr>
<tr>
<td>He—Histosols and Aquolls</td>
<td>14</td>
</tr>
<tr>
<td>Hx—Houghton muck, drained</td>
<td>15</td>
</tr>
<tr>
<td>OrB—Ormas loamy sand, 2 to 6 percent slopes</td>
<td>16</td>
</tr>
<tr>
<td>Pb—Palms muck, gravelly substratum, drained</td>
<td>17</td>
</tr>
<tr>
<td>Se—Sebewa loam</td>
<td>18</td>
</tr>
<tr>
<td>W—Water</td>
<td>18</td>
</tr>
<tr>
<td>References</td>
<td>19</td>
</tr>
</tbody>
</table>
How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the
individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.
**MAP LEGEND**

- **Area of Interest (AOI)**
  - ☑️ Area of Interest (AOI)
- **Soils**
  - ☐️ Soil Map Units
- **Special Point Features**
  - ☺️ Blowout
  - ☓️ Borrow Pit
  - ☜️ Clay Spot
  - ◆ Closed Depression
  - ◆ gravel Pit
  - ☞ Gravelly Spot
  - ☪️ Landfill
  - ☯️ Lava Flow
  - ☙️ Marsh or swamp
  - ☠️ Mine or Quarry
  - ☪️ Miscellaneous Water
  - ☯️ Perennial Water
  - ♯ Rock Outcrop
  - ☑️ Saline Spot
  - ☐ Sandy Spot
  - ☞ Severe Eroded Spot
  - ♂ Sinkhole
  - ♡ Slides or Slip
  - ☇ Sodic Spot
  - ☪️ Spoil Area
  - ☘️ Stony Spot
  - ☝ Very Stony Spot
  - ☜ Wet Spot
  - ☞ Other
- **Special Line Features**
  - ☞ Gully
  - ☞ Short Steep Slope
  - ☞ Other
- **Political Features**
  - ☐ Cities
- **Water Features**
  - ☐ Oceans
  - ☞ Streams and Canals
- **Transportation**
  - ☞ Interstate Highways
  - ☞ US Routes
  - ☞ Major Roads
  - ☞ Local Roads

**MAP INFORMATION**

Map Scale: 1:4,320 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Coordinate System: UTM Zone 16N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Kosciusko County, Indiana
Survey Area Data: Version 11, Aug 10, 2009

Date(s) aerial images were photographed: 7/19/2003

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.
### Map Unit Legend

Kosciusko County, Indiana (IN085)

<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ao</td>
<td>Aquents-Urban land complex, rarely flooded</td>
<td>4.9</td>
<td>7.3%</td>
</tr>
<tr>
<td>BoB</td>
<td>Boyer loamy sand, 0 to 6 percent slopes</td>
<td>6.3</td>
<td>9.4%</td>
</tr>
<tr>
<td>Bp</td>
<td>Brady sandy loam</td>
<td>2.1</td>
<td>3.2%</td>
</tr>
<tr>
<td>He</td>
<td>Histosols and Aquolls</td>
<td>39.2</td>
<td>58.2%</td>
</tr>
<tr>
<td>Hx</td>
<td>Houghton muck, drained</td>
<td>3.9</td>
<td>5.8%</td>
</tr>
<tr>
<td>OrB</td>
<td>Ormas loamy sand, 2 to 6 percent slopes</td>
<td>8.5</td>
<td>12.6%</td>
</tr>
<tr>
<td>Pb</td>
<td>Palms muck, gravelly substratum, drained</td>
<td>1.3</td>
<td>2.0%</td>
</tr>
<tr>
<td>Se</td>
<td>Sebewa loam</td>
<td>0.1</td>
<td>0.2%</td>
</tr>
<tr>
<td>W</td>
<td>Water</td>
<td>0.9</td>
<td>1.3%</td>
</tr>
<tr>
<td><strong>Totals for Area of Interest</strong></td>
<td></td>
<td><strong>67.3</strong></td>
<td><strong>100.0%</strong></td>
</tr>
</tbody>
</table>

### Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially
where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a soil series. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An association is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An undifferentiated group is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.
Kosciusko County, Indiana

Ao—Aquents-Urban land complex, rarely flooded

Map Unit Setting
- **Elevation**: 600 to 1,150 feet
- **Mean annual precipitation**: 34 to 40 inches
- **Mean annual air temperature**: 47 to 52 degrees F
- **Frost-free period**: 140 to 185 days

Map Unit Composition
- **Aquents and similar soils**: 60 percent
- **Urban land and similar soils**: 40 percent

Description of Aquents

Setting
- **Landform**: Outwash plains, till plains, moraines
- **Parent material**: Loamy drift

Properties and qualities
- **Depth to restrictive feature**: More than 80 inches
- **Drainage class**: Poorly drained
- **Depth to water table**: More than 80 inches
- **Frequency of flooding**: Rare
- **Frequency of ponding**: Rare

Description of Urban Land

Setting
- **Landform**: Outwash plains

Properties and qualities
- **Depth to restrictive feature**: More than 80 inches
- **Drainage class**: Well drained
- **Depth to water table**: More than 80 inches
- **Frequency of flooding**: None
- **Frequency of ponding**: None

Interpretive groups
- **Land capability (nonirrigated)**: 8

BoB—Boyer loamy sand, 0 to 6 percent slopes

Map Unit Setting
- **Elevation**: 600 to 1,150 feet
- **Mean annual precipitation**: 34 to 40 inches
- **Mean annual air temperature**: 47 to 52 degrees F
- **Frost-free period**: 140 to 185 days
Map Unit Composition

Boyer and similar soils: 100 percent

Description of Boyer

Setting

Landform: Moraines, outwash plains, stream terraces
Landform position (two-dimensional): Backslope, summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy over loamy outwash over sandy and gravelly outwash

Properties and qualities

Slope: 0 to 6 percent
Depth to restrictive feature: 20 to 40 inches to strongly contrasting textural stratification
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 55 percent
Available water capacity: Low (about 4.2 inches)

Interpretive groups

Land capability (nonirrigated): 3s

Typical profile

0 to 9 inches: Loamy sand
9 to 14 inches: Sandy loam
14 to 37 inches: Sandy loam
37 to 60 inches: Gravelly coarse sand

Bp—Brady sandy loam

Map Unit Setting

Elevation: 600 to 1,200 feet
Mean annual precipitation: 34 to 40 inches
Mean annual air temperature: 47 to 50 degrees F
Frost-free period: 140 to 170 days

Map Unit Composition

Brady and similar soils: 90 percent

Description of Brady

Setting

Landform: Stream terraces, outwash plains
Landform position (two-dimensional): Shoulder, backslope, summit
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy outwash over sandy and gravelly outwash

**Properties and qualities**
- **Slope:** 0 to 1 percent
- **Depth to restrictive feature:** 34 to 56 inches to strongly contrasting textural stratification
- **Drainage class:** Somewhat poorly drained
- **Capacity of the most limiting layer to transmit water (Ksat):** High (2.00 to 6.00 in/hr)
- **Depth to water table:** About 6 to 18 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** None
- **Calcium carbonate, maximum content:** 25 percent
- **Available water capacity:** Moderate (about 7.5 inches)

**Interpretive groups**
- **Land capability (nonirrigated):** 2w

**Typical profile**
- 0 to 9 inches: Sandy loam
- 9 to 37 inches: Sandy loam
- 37 to 56 inches: Loamy sand
- 56 to 80 inches: Gravelly sand

---

**He—Histosols and Aquolls**

**Map Unit Setting**
- **Elevation:** 600 to 1,150 feet
- **Mean annual precipitation:** 34 to 40 inches
- **Mean annual air temperature:** 47 to 52 degrees F
- **Frost-free period:** 140 to 185 days

**Map Unit Composition**
- **Histosols, undrained, and similar soils:** 80 percent
- **Aquolls, undrained, and similar soils:** 20 percent

**Description of Histosols, Undrained**

**Setting**
- **Landform:** Depressions on outwash plains, depressions on terraces, depressions on till plains, depressions on moraines
- **Down-slope shape:** Concave
- **Across-slope shape:** Concave
- **Parent material:** Herbaceous organic material

**Properties and qualities**
- **Slope:** 0 to 1 percent
- **Depth to restrictive feature:** More than 80 inches
- **Drainage class:** Very poorly drained
- **Depth to water table:** More than 80 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** Frequent
Description of Aquolls, Undrained

Setting

Landform: Depressions on outwash plains, depressions on terraces, depressions on till plains, depressions on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy drift

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: Frequent

Hx—Houghton muck, drained

Map Unit Setting

Elevation: 640 to 940 feet
Mean annual precipitation: 34 to 40 inches
Mean annual air temperature: 47 to 51 degrees F
Frost-free period: 170 to 185 days

Map Unit Composition

Houghton, drained, and similar soils: 75 percent

Description of Houghton, Drained

Setting

Landform: Depressions on outwash plains, depressions on till plains, depressions on lake plains, depressions on moraines
Landform position (two-dimensional): Footslope, toeslope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 10 percent
Available water capacity: Very high (about 23.9 inches)
Interpretive groups
  Land capability (nonirrigated): 3w

Typical profile
  0 to 9 inches: Muck
  9 to 80 inches: Muck

OrB—Ormas loamy sand, 2 to 6 percent slopes

Map Unit Setting
  Elevation: 600 to 1,150 feet
  Mean annual precipitation: 34 to 40 inches
  Mean annual air temperature: 47 to 52 degrees F
  Frost-free period: 140 to 185 days

Map Unit Composition
  Ormas and similar soils: 100 percent

Description of Ormas

Setting
  Landform: Outwash plains, stream terraces
  Landform position (two-dimensional): Backslope, shoulder
  Landform position (three-dimensional): Side slope
  Down-slope shape: Linear
  Across-slope shape: Linear
  Parent material: Sandy over loamy outwash over sandy and gravelly outwash

Properties and qualities
  Slope: 2 to 6 percent
  Depth to restrictive feature: 45 to 75 inches to strongly contrasting textural stratification
  Drainage class: Well drained
  Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
  Depth to water table: More than 80 inches
  Frequency of flooding: None
  Frequency of ponding: None
  Calcium carbonate, maximum content: 55 percent
  Available water capacity: Low (about 5.2 inches)

Interpretive groups
  Land capability (nonirrigated): 3e

Typical profile
  0 to 10 inches: Loamy sand
  10 to 22 inches: Loamy sand
  22 to 34 inches: Sand
  34 to 48 inches: Gravelly coarse sandy loam
  48 to 52 inches: Gravelly coarse sand
  52 to 60 inches: Gravelly coarse sand
Pb—Palms muck, gravelly substratum, drained

Map Unit Setting
  *Elevation:* 600 to 1,150 feet
  *Mean annual precipitation:* 34 to 40 inches
  *Mean annual air temperature:* 47 to 52 degrees F
  *Frost-free period:* 140 to 185 days

Map Unit Composition
  *Palms, drained, and similar soils:* 100 percent

Description of Palms, Drained

Setting
  *Landform:* Depressions on outwash plains, depressions on moraines
  *Landform position (two-dimensional):* Toeslope
  *Down-slope shape:* Concave
  *Across-slope shape:* Concave
  *Parent material:* Herbaceous organic material over loamy glaciofluvial deposits over sandy and gravelly outwash

Properties and qualities
  *Slope:* 0 to 2 percent
  *Depth to restrictive feature:* More than 80 inches
  *Drainage class:* Very poorly drained
  *Capacity of the most limiting layer to transmit water (Ksat):* Moderately high to high (0.20 to 2.00 in/hr)
  *Depth to water table:* About 0 to 6 inches
  *Frequency of flooding:* None
  *Frequency of ponding:* Frequent
  *Calcium carbonate, maximum content:* 60 percent
  *Available water capacity:* Very high (about 15.0 inches)

Interpretive groups
  *Land capability (nonirrigated):* 3w

Typical profile
  *0 to 9 inches:* Muck
  *9 to 14 inches:* Muck
  *14 to 22 inches:* Muck
  *22 to 28 inches:* Muck
  *28 to 42 inches:* Sandy clay loam
  *42 to 52 inches:* Gravelly coarse sand
  *52 to 60 inches:* Gravelly coarse sand
Se—Sebewa loam

Map Unit Setting

- **Elevation:** 600 to 1,000 feet
- **Mean annual precipitation:** 34 to 40 inches
- **Mean annual air temperature:** 47 to 50 degrees F
- **Frost-free period:** 140 to 170 days

Map Unit Composition

- **Sebewa and similar soils:** 85 percent

Description of Sebewa

Setting

- **Landform:** Depressions on outwash plains, depressions on stream terraces
- **Landform position (two-dimensional):** Toeslope, footslope
- **Down-slope shape:** Linear
- **Across-slope shape:** Concave
- **Parent material:** Loamy outwash over sandy and gravelly outwash

Properties and qualities

- **Slope:** 0 to 1 percent
- **Depth to restrictive feature:** 20 to 40 inches to strongly contrasting textural stratification
- **Drainage class:** Poorly drained
- **Capacity of the most limiting layer to transmit water (Ksat):** Moderately high to high (0.60 to 2.00 in/hr)
- **Depth to water table:** About 0 inches
- **Frequency of flooding:** None
- **Frequency of ponding:** Frequent
- **Calcium carbonate, maximum content:** 25 percent
- **Available water capacity:** Moderate (about 6.7 inches)

Interpretive groups

- **Land capability (nonirrigated):** 2w

Typical profile

- **0 to 14 inches:** Loam
- **14 to 36 inches:** Clay loam
- **36 to 60 inches:** Very gravelly coarse sand

W—Water

Map Unit Composition

- **Water:** 100 percent
References


APPENDIX C

Education Center Facility Upgrade
VIEWING PLATFORM PLAN

SCALE = 1/4" = 1'-0"

DECK
+30°

TRAIL

VIEW TO
WETLAND

26" H. HANDRAIL

4 - 16" TREADS,
5 - 6" RISERS

STEP UP

+30°
(MAX)

FAMT

LTP RESIDENT
GRANULAR SURFACE

5 - 4" (9 @ 6"

12'-0"

7'-0"

10'-0"
APPENDIX D

Sign Examples
AMERICAN HORNBEAM

Carpinus caroliniana

A small slow-growing short-lived tree. The often crooked trunk covered with a smooth slate grey bark is characteristically ridged, resembling the muscles of a flexed arm. The wood is close-grained and very hard.

http://server12.sitewizard.co.uk/sites/dabgraphics/images/4nature_lrg.jpg

http://www.davidarthur.us/Philpott/

http://www.windsor-hill.org/whesnatr.htm

http://www.plaquemaker.com/Garden_Signs.html
Eco-Signs Trail posts & Trailmarker systems

1.5 MI.
MARKER 16

Please allow us the opportunity to quote your project!
info@eco-signs.com

Made from "recycled plastic lumber" HDPE. Won't chip, crack, rust, warp, splinter or peel. Never needs paint or stain. Buries directly into concrete or dirt, will not rot. Bugs hate it. Withstands any harsh climate. Standard size 36' 48' 72'
Colors- Weathered Wood, Cedar, Forest Green, White

Engraved Trail Symbols

Two tone Arrow Inlay's

Vinyl Graphic Color Logo

Mile Markers

Campsite Numbers

Reflective Numbers

"911" GPS Co-ordinates

Recycle Symbol

Price each Quantity discounts apply
3x4x36" $49
3x4x48" $59
4x4x36" $59
4x4x48" $69

Engraving $15
Reflective graphics $15
Two color arrow inserts $15
Color logo's $20
Welcome to the WACF Education Center