

Chapter 6: Mitigation and Commitments for the Single Preferred Alternative

Since the publication of the DEIS, this chapter has been revised to reflect mitigation commitments for the Single Preferred Alternative (Major Moves Alternative).

6.1 Traffic and Transportation

Mitigation measures for maintenance of traffic, as detailed in the DEIS, remain unchanged.

6.2 Pedestrian/Bicycle Access

Pedestrian access will be provided at all over/underpasses and interchanges. Bicycle access will be coordinated with respective local plans during the final design phase of the project. Details sidewalks and shared use paths will be developed in consultation with Pedestrian/Trails Work Group (see Chapter 6 Table 6.1-1).

6.3 Relocation Assistance

Mitigation measures of displaced housing include relocating residents into available and comparable housing within their township or school district, depending on availability of housing in each location. Details of mitigation regulations are detailed in the DEIS.

As in the DEIS, adequate replacement housing exists for all proposed displacements except for those in the under \$50,000 range (Table 5.3-1). These displacements represent the mobile home units displaced by the Major Moves Alternative located in North Glenn Village (Appendix A, Sheet 9). However, residential displacements within North Glenn Village may be mitigated on site. There are 14 mobile homes that will be potentially displaced by the project. As of April 4, 2008, five of these homes were vacant and for sale. Adequate replacement housing opportunities for the remaining families/individuals exist within the village. At least 15 mobile homes were observed as being for sale. As well, at least eight vacant lots were observed. Most of the displaced mobile homes could be physically relocated to these vacancies.

**Table 6.3-1
Available Housing Units***

Price Range (\$K)	Available Housing			Total Displaced Single Housing Units for the Major Moves Alternative
	Carmel/Clay Township	Westfield/ Washington Township	Total Homes Available within Project Area	
0 – 50	0	15**	15	13
50 – 100	3	4	7	4
100 – 150	18	60	78	24
150 – 200	83	66	149	14
200 – 250	73	41	114	1
> 250	402	157	559	0
Total	579	343	922	56

* Source: John McMullen, Realtor, Coldwell Banker/Kaiser (Data as of April 4, 2008)

** Field observations of mobile homes for sale in North Glenn Village

Mitigation measures for displaced commercial properties, as detailed in the DEIS, remain unchanged.

6.4 Major Utilities/Geodetic Control Monuments

Mitigation measures for impacts to utilities and geodetic monuments, as detailed in the DEIS, remain unchanged.

6.5 Historic and Archaeological Resources

6.5.1 Historic Resources

Following the publication of the DEIS, the DHPA determined that the Hunt House was no longer eligible for listing on the NRHP due to its current condition. Therefore, the Memorandum of Agreement (MOA) was amended to include only mitigation measures for impacts to Lindley Farm. The Net Benefit Section 4(f) commits to providing a safer access to Lindley Farm from SR 38 than its existing access from US 31. These measures have not changed since the publication of the DEIS. A copy of the completed MOA amendment will be included in the FEIS.

6.5.2 Archaeological Resources

After receiving the DHPA's concurrence on the Phase Ia archaeological investigation, as detailed in the DEIS, the 191st Street interchange was shifted to the north approximately 300 feet to avoid impacting a business, which was one of the design modification associated with the Major Moves Alternative. This shift resulted in the alternative's impacts extending outside the original Phase Ia archaeological investigation area. As a result, an investigation was conducted for this area and an addendum to the original report was prepared and submitted to the DHPA for concurrence. Although three sites were identified, none were recommended to be eligible for the NRHP.

Mitigation measures for impacts to archaeological resources, as detailed in the DEIS, remain unchanged.

6.6 Air Quality

Mitigation measures for impacts to air quality, as detailed in the DEIS, remain unchanged.

6.7 Noise

Changes to this section since the publication of the DEIS:

- Incorporation of the updated noise assessment summarized in Section 4.8.
- Incorporation of changes to the INDOT *Highway Traffic Noise Policy* as of January 2007.

Mitigation measures for noise impacts, as detailed in the DEIS, remain unchanged. Though the project area was reassessed for noise impacts, the Reasonableness and Feasibility evaluation indicated no need for noise abatement for this project.

6.7.1 Traffic Noise Impacts

Noise mitigation measures must be considered at all sensitive receivers where traffic noise impacts are predicted. As shown in Section 4.8, the Major Moves Alternative will result in 56 impacted noise receptors. The typical method of mitigating traffic noise impacts is to construct a noise barrier in the form of an earthen berm and/or vertical wall. According to INDOT's *Highway Traffic Noise Policy*, when impacts have been identified, there must be consideration of any reasonable and feasible measures that would abate the traffic noise impacts. Some abatement must be implemented if it is both feasible and reasonable to do so on any significant segment of the project. INDOT's definition of feasible and reasonable noise abatement is provided below.

6.7.2 Feasibility of Abatement

"Feasible" means that it is structurally and acoustically possible to attenuate traffic noise by at least 7 dBA $L_{eq}(h)$ at impacted first-row receptors in the design year. Traffic noise abatement measures include traffic control measures (TCM), alteration of vertical or horizontal alignment, acquisition of buffering land, noise insulation of impacted receivers, and construction of traffic noise barriers. Noise barriers were evaluated and found to be feasible at seven locations.

6.7.3 Reasonableness of Abatement

"Reasonable" means that INDOT believes abatement of traffic noise impacts is prudent based on consideration of the following factors:

1. The number of benefited receivers (those for whom the mitigation will benefit by at least 5 dBA $L_{eq}(h)$) at the noisiest hour conditions. This number is not necessarily the number of receivers impacted.
2. The cost of abatement on a benefited receiver basis and on a project level basis. The Indiana Department of Transportation has set the acceptable cost per benefited receiver as \$25,000. This cost is arrived at by applying a cost basis of \$20 per square foot to the noise barrier. Based on the increased cost of noise barriers in excess of twenty feet in height, INDOT does not consider any wall taller than twenty feet to be cost-effective.
3. The views of noise impacted residents. Potential negative impacts of noise barriers include unsightliness, shortened daylight, poor air circulation, degradation by weather, reduced safety, vandalism, and restriction of access for emergency vehicles.

Based on INDOT's *Highway Traffic Noise Policy*, the feasibility and reasonableness of noise barriers were evaluated at all locations in the project area where noise impacts were identified for the Major Moves Alternative. These evaluations are summarized in Table 5.7-1.

Impacts are predicted at several isolated or scattered residences. To provide significant noise reduction at these locations, a barrier's length must normally be eight times the distance from the barrier to the residence. (For example, a residence located 100 feet from the barrier would require a barrier 800 feet long and would cost at least \$160,000, far more than INDOT's \$25,000 criterion.) Therefore, noise abatement is not considered reasonable in these instances and detailed barrier designs were not done. Furthermore, all of these residences will probably be displaced. However, noise barriers for all impacts will be analyzed again in the final design phase of this project. At other locations where impacts are predicted, there is a more concentrated or cluster of residences and therefore additional evaluation was conducted.

As shown in Table 6.7-1, barrier designs were analyzed for seven locations in the project area. The reasonableness of noise barriers at each impacted receiver location was evaluated for economic reasonableness as outlined in INDOT’s policy. Barrier heights, lengths, and square footages were determined using TNM’s barrier design feature for barriers that would be expected to achieve a 7 dBA noise reduction at impacted, first row receivers. Other receivers may also benefit, but the designs were not optimized for non-impacted receivers. Costs were estimated using INDOT’s recommended barrier cost of \$20 per square foot. None of the barriers were found to be reasonable based on cost.

Additional noise abatement measures were evaluated and found to be either unwarranted or infeasible. Federal guidelines allow for the insulation of public use or non-profit institutional structures. Other noise abatement measures considered to be infeasible include altering the vertical or horizontal alignment, eliminating truck traffic, and reducing the speed limit. Throughout the final design phase, however, other noise abatement measures will continue to be investigated.

As shown in Table 6.7-1, barriers would not be considered cost-effective based on INDOT’s cost effectiveness criteria at any of the impacted locations. Furthermore, no other noise abatement measures are considered feasible. As a result, no noise mitigation is recommended for this project.

**Table 6.7-1
Summary of Reasonableness of Noise Abatement**

Location	Impacted Receivers	Number of Benefited Receivers	Barrier Cost per Benefited Receiver	Comments
South of 111 th : Meridian Suburban	RS515 through RS 565	11	\$32,400	
North of 131 st : Meridian Heights	RN130	2	\$118,000	
North of 136 th : Rohrer	RN140, RN145, RN150	4	\$95,000	
North of 136 th : Autumn Lakes	RS411, RS412	2	\$140,000	Twenty-foot barrier only achieves 7 dBA reduction at one receiver.
South of 161 st : Buena Vista/Farr Hills	RS285, RS290, RS295	9	\$30,500	
North of 181 st : North Glenn Village	RS165, RS170	2	\$60,000	
South of 196 th : Justin Morgan	RN315, RN325, RN335	7	\$54,000	If the barrier is designed to protect only the residences impacted (not the training center at RN335), the cost would be reduced to \$48,000/benefited unit.

NR = Not Reasonable on a cost basis.

6.8 Streams

Mitigation measures for impacts to streams are included in Section 5.10.

6.9 Floodplains

Mitigation measures for impacts to floodplains, as detailed in the DEIS, remain unchanged.

6.10 Wetlands and Streams

6.10.1 Wetlands

Wetland mitigation for the Major Moves Alternative will require the creation of forested wetlands (PFO), scrub-shrub wetlands (PSS), and emergent wetlands (PEM). The total acreage required for mitigation purposes is 15.83 acres. The same mitigation ratios are being used as those reported in the 2003 DEIS. Impacts that will require mitigation are summarized in Table 5.10-1 below. Based on mitigation requirements the acreage required is as follows: 0.60 acre of jurisdictional forested wetlands and 1.4 acres of isolated forested wetlands; 0.37 acre of jurisdictional scrub-shrub wetlands and 0.11 acre of isolated scrub-shrub wetlands; and 1.4 acres of jurisdictional emergent wetlands and 2.9 acres of isolated emergent wetlands will be required for wetland impacts.

**Table 6.10-1
Wetland Mitigation Acreage for the Major Moves Alternative**

Wetland Type	Regulatory Authority	Acres of Impact	Mitigation Ratio	Mitigation Acreage
Emergent	Corps	1.40	2:1	2.80
	IDEM	2.90	2:1	5.80
Scrub-shrub	Corps	0.37	3:1	1.11
	IDEM	0.10	2:1	0.20
Forested	Corps	0.60	4:1	2.40
	IDEM	1.40	2.5:1	3.50
Total		6.77		15.81

6.10.2 Potential Mitigation Sites

Just as the function and value of impacted wetlands varies, the function and value for created wetlands may vary as well. Wetland mitigation plans should take into consideration the following functions and values:

- General wildlife habitat;
- Flood attenuation;
- Short- and long-term surface water storage;
- Sediment/nutrient/toxicant removal;
- Sediment and/or shoreline stabilization;
- Food chain support and/or production export; and
- Groundwater discharge and recharge.

Potential wetland mitigation sites for the Major Moves Alternative are located in the same 8-digit watershed as the US 31 Improvement Project. These sites occur in the Loamy, High Lime Till Plains ecoregion, an ecoregion historically characterized by beech forests, oak-sugar maple forests, and elm-ash forests growing on nearly level terrain. These off-corridor wetland mitigation sites have been identified with the assistance of the Hamilton County District Conservationist, Natural Resource Conservation Service (NRCS). These are sites on private property where owners have expressed to the NRCS an interest in wetland mitigation. Additionally, Ron Dixon, an independent consultant has property in both Boone and Johnson counties that are available as mitigation sites.

One of the sites, The DeHart Farms Goose Creek Potential Mitigation site is located in Johnson County, Indiana and is located along a portion of Goose Creek. The site is currently in agricultural production, but contains surrounding wooded and scrub-shrub areas. The site appears to contain adequate hydrological sources for establishing wetland hydrology. Two unnamed tributaries to Goose Creek flow through the site. The majority of the site is also located in a topographically low position in the landscape. Portions of the site periodically flood in the spring. Natural surface runoff coupled with removing agricultural drain tiles and minor grading would likely foster suitable conditions for wetland establishment.

A final site will be chosen, in part, based on the following characteristics:

- A reliable permanently existing water supply that is capable of supporting wetlands;
- Appropriate topographic location that is sustainable for wetlands in perpetuity;
- Accessible for construction, monitoring, and maintenance;
- Should be able to mirror the functions and values of those wetlands being impacted; and
- Will be in the same watershed.

6.10.3 Other Mitigation Options

There is often an opportunity through private land acquisition or conservation easements to preserve existing high-quality wetlands or enhance lower-quality wetlands to increase their functions and values. The benefit of purchasing land with existing wetlands is that the uncertainty of establishing supportive hydrology for wetland creation would be avoided. While preservation of existing wetlands is an option, an assessment would be needed to determine functions and values of the wetlands and the preliminary jurisdictional status. Low quality or non-jurisdictional wetlands may not fulfill the mitigation requirements.

6.10.4 Construction

All applicable permits will be displayed at the mitigation site. Prior to any construction activity, silt fence will be installed along the perimeter of the construction limits. The sites will be graded to the appropriate elevations set forth in the final mitigation plan.

6.10.5 Planting Plan

Mitigation plant species will likely include a combination of seed, woody stems, and herbaceous plugs. All plant material will be purchased from native plant nurseries that can insure that the materials are obtained from the appropriate ecoregion. Seeds will be purchased based on recommended mixes for specific conditions. At least four weeks prior to any plantings, any existing invasive species on the mitigation site will be treated with a herbicide or with some other approved removal method.

For both woody stems and herbaceous plugs, purchases will not include those species that are characteristically considered volunteer species such as cottonwood (*Populus deltoides*), soft rush (*Juncus effusus*), and sedges like (*Carex tribuloides* and *Carex frankii*). All seed mixes will include a temporary cover crop of seed oats (*Avena sativa*) and annual rye (*Lolium multiflorum*). No special removal needs of either are anticipated. Additionally, many mitigation sites provide for the planting of buffer zones. Here, the entire buffer zone would be seeded with a basic prairie mix.

The preferred planting zones are provided for all wetlands species based on the following key:

- S = Saturated (0-4 inches above water)
- ES = Emergent Shallow (0-4 inches below water)
- ED = Emergent Deep (4-18 inches below water)
- A = Aquatic (18-36 inches below water)

The wetland indicator status for all species is also provided. This indicator status represents the estimated probability of a species occurring in a wetland. The categories are defined as follows:

- Obligate Wetland (OBL) - almost always occurs (>99%) in wetlands
- Facultative Wetland (FACW) – usually occurs (67-99%) in wetlands
- Facultative (FAC) – equally likely to occur in both wetlands (34-66%) and non-wetlands
- Facultative Upland (FACU) – unlikely to occur (1-33%) in wetlands
- Obligate Upland (UPL) – occurs in wetlands in other regions but not in the region specified

6.10.6 Seeding

Seeding installation should occur from October 1 through July 1 to maximize efficacy. The seedbed will be inspected to insure that it has been properly compacted and graded and free from tree roots, stones, or other foreign objects. Seed will be broadcast on tilled soil or installed with a no-till seed drill no more than ¼ inch deep. Seed mixes will include mixtures for wooded wetlands, emergent wetlands, and a basic prairie mix for buffer zones. Tables 5.10-2, 5.10-3, and 5.10-4 provide the appropriate seed mixes for each condition.

**Table 6.10-2
Wooded Wetland Establishment Seed Mix**

Common Name	Scientific Name	Indicator Status	Plant Zone	Ounces per acre
Permanent Graminoids				
Blue joint grass	<i>Calamagrostis Canadensis</i>	OBL	S	1
Fringed sedge	<i>Carex crinita</i>	FACW+	ES	2
Common hop sedge	<i>C. lupulina</i>	OBL	ES	4
Bottlebrush sedge	<i>C. lurida</i>	OBL	ES	1.5
Narrow-leaved cattail sedge	<i>C. squarrosa</i>	OBL	ES	2
Rough-cluster sedge	<i>C. cephaloidea</i>	FACU+	S	1.5
Common cattail sedge	<i>C. typhina</i>	OBL	ES	2
Brown fox sedge	<i>C. vulpinoidea</i>	OBL	ES	4
Virginia wild rye	<i>Elymus virginicus</i>	FACW-	S	20
Fowl manna grass	<i>Glyceria striata</i>	OBL	S	2
Rice cut grass	<i>Leersia oryzoides</i>	OBL	ES/ED	2
Dark green rush	<i>Scirpus atrovirens</i>	OBL	S	2
Prairie cord grass	<i>Spartina pectinata</i>	FACW+	S	1
Total				45
Temporary Cover				
Common oats	<i>Avena sativa</i>	NI		537
Annual rye	<i>Lolium multiflorum</i>	NI		112
Total				649
Forbs				
Water plantain (various)	<i>Alisma spp.</i>	OBL	ED	3
Great angelica	<i>Angelica altropurpurea</i>	OBL	S	1
Bristly aster	<i>Symphyotrichum puniceum</i>	OBL	S	0.75
Flat-top aster	<i>Doellingeria umbellata</i>	FACW	S	0.25
Nodding bur marigold	<i>Bidens cernua</i>	OBL	S	2.5
Tall bell flower	<i>Campanulastrum americanum</i>	FAC	S	0.25
Button bush	<i>Cephalantus occidentalis</i>	OBL	ED/A	0.5
Sneezeweed	<i>Helenium autumnale</i>	FACW+	S	2
Cow parsnip	<i>Heracleum lanatum</i>	FACW	S	0.75
Swamp rose mallow	<i>Hibiscus moscheutos</i>	OBL	ES/ED	2
Great blue lobelia	<i>Lobelia siphilitica</i>	FACW+	S/ES	1.5
Monkey flower	<i>Mimulus ringens</i>	OBL	ES	1.25
Wild golden glow	<i>Rudbeckia laciniata</i>	FACW+	S	0.75
Wingstem	<i>Verbesina alternifolia</i>	FACW	S	2
Total				18.5

Table 6.10-3

Emergent Wetland Seed Mix

Common Name	Scientific Name	Indicator Status	Plant Zone	Ounces per acre
Permanent Graminoids				
Bristly sedge	<i>Carex comosa</i>	OBL	S	2.5
Common lake sedge	<i>Carex lacustris</i>	OBL	ES	0.25
Bottlebrush sedge	<i>C. lurida</i>	OBL	ES	4
Brown fox sedge	<i>C. vulpinoidea</i>	OBL	ES	6
Blunt spike rush	<i>Eleocharis ovata</i>	OBL	ED	1
Common rush	<i>Juncus effuses</i>	OBL	S/ES	1
Rice cut grass	<i>Leersia oryzoides</i>	OBL	ES/ED	3
Hard-stemmed bulrush	<i>Schoenoplectus acutus</i>	OBL	ES/ED	2.5
Chairmaker's rush	<i>Schoenoplectus pungens</i>	NI	ES	4
Great bulrush	<i>Schoenoplectus tabernaemontani</i>	OBL	ES/ED	6
Total				30.25
Temporary Cover				
Common oats	<i>Avena sativa</i>	NI		360
Annual rye	<i>Lolium multiflorum</i>	NI		104
Total				464
Forbs				
Sweet flag	<i>Acorus calamus</i>	OBL	ES/ED	1
Swamp milkweed	<i>Asclepias incarnata</i>	OBL	S/ES	1.5
Water plantain (various)	<i>Alisma</i> spp.	OBL	ES/ED	2
Button bush	<i>Cephalantus occidentalis</i>	OBL	ED/A	1
Swamp loosestrife	<i>Decodon verticillatus</i>	OBL	ES/ED/A	1.25
Spotted Joe-pye weed	<i>Eupatorium maculatum</i>	OBL	S	0.5
Rose mallow (various)	<i>Hibiscus</i> spp.	OBL	ES/ED	3
Blue flag iris	<i>Iris virginica</i>	OBL	ES	6
Cardinal flower	<i>Lobelia cardinalis</i>	OBL	S/ES	0.25
Great blue lobelia	<i>Lobelia siphilitica</i>	FACW+	S/ES	1.5
Seedbox	<i>Ludwigia alternifolia</i>	OBL	ES	0.25
Monkey flower	<i>Mimulus ringens</i>	OBL	ES	1
Arrow arum	<i>Peltandra virginica</i>	OBL	ES/ED/A	16
Pickereel weed	<i>Pontederia cordata</i>	OBL	ED/A	10
Broad-leaved arrowhead	<i>Sagittaria latifolia</i>	OBL	ES/ED	2
American bur reed	<i>Sparganium americanum</i>	OBL	ED/A	2
Common bur reed	<i>Sparganium eurycarpum</i>	OBL	ES	4
Blue vervain	<i>Verbena hastata</i>	FACW+	S	1
Wild rice	<i>Zizania aquatica</i>	OBL	A	8
Total				62.25

**Table 6.10-4
Basic Prairie Seed Mix for Buffer Zones**

Common Name	Scientific Name	Indicator Status	Ounces per acre
Permanent Graminoids			
Big bluestem	<i>Andropogon gerardii</i>	FAC-	13
Side-oats grama	<i>Bouteloua curtipendula</i>	NI	14
Prairie sedge mix	<i>Carex bicknellii/ C. brevior</i>	FAC-/FAC	1
Canada wild rye	<i>Elymus Canadensis</i>	FAC-	22
Switch grass	<i>Panicum virgatum</i>	FAC+	2.5
Little bluestem	<i>Schizachyrium scoparium</i>	FACU-	22
Indian grass	<i>Sorghastrum nutans</i>	FACU+	28
Total			102.5
Temporary Cover			
Common oats	<i>Avena sativa</i>	NI	360
Annual rye	<i>Lolium multiflorum</i>	NI	120
Total			480
Forbs			
Wild columbine	<i>Aquilegia Canadensis</i>	FAC-	0.5
Butterfly milkweed	<i>Asclepias tuberosa</i>	NI	1.5
New England aster	<i>Symphyotrichum novae-angliae</i>	FACW	1.5
Partridge pea	<i>Chamaecrista fasciculata</i>	FACU-	2.75
Tall coreopsis	<i>Coreopsis tripteris</i>	FAC	1.5
Purple prairie clover	<i>Dalea purpurea</i>	NI	2
Illinois sensitive plant	<i>Desmanthus illinoensis</i>	FAC-	1.5
Broad-leaved purple coneflower	<i>Echinacea purpurea</i>	NI	3
Rattlesnake master	<i>Eryngium yuccifolium</i>	FAC+	1
False sunflower	<i>Heliopsis helianthoides</i>	FACU-	0.25
Round-headed bush clover	<i>Lespedeza capitata</i>	FACU	1
Rough blazing star	<i>Liatris aspera</i>	NI	1
Wild bergamot	<i>Monarda fistulosa</i>	FACU	0.75
Prairie cinquefoil	<i>Potentilla arguta</i>	FACU-	0.75
Common mountain mint	<i>Pycnanthemum virginianum</i>	FACW+	0.5
Yellow cone flower	<i>Ratibida pinnata</i>	NI	2.5
Black-eyed susan	<i>Rudbeckia hirta</i>	FACU	2
Prairie dock	<i>Silphium terebinthinaceum</i>	FAC-	0.75
Smooth tall ironweed	<i>Vernonia gigantea</i>	FAC	2
Total			26.75

6.10.7 Tree and shrub installation

Trees and shrubs will be inspected for health at arrival and kept moist until installation. Woody species will be planted in the designated planting zones at 10 feet on-center in the forested wetland mitigation areas. This would require approximately 380 stems per acre. Bare root trees and shrubs are generally sold in bundles of 25 and to optimize success, it is recommended that

bare root trees and shrubs be planted in the spring. Table 6.10-5 provides a list of some of the most likely tree species, their indicator status, and plant zone.

Shrubs species will be selected based on their wetland indicator status of OBL, FACW or FACW+. Spacing will likely be similar to that of the tree species which would again, require approximately 380 stems per acre. As with the trees, bare rooted shrubs are sold in bundles of 25 and spring planting is recommended. Table 6.10-6 provides a list of some of the most likely shrub species, their indicator status, and planting zone.

**Table 6.10-5
Suggested Tree Species with Indicator Status and Plant Zone**

Species	Indicator Status	Plant Zone
Silver Maple (<i>Acer saccharinum</i>)	FACW	S
Kingnut Hickory (<i>Carya laciniosa</i>)	FACW	S
Silky Dogwood (<i>Cornus amomum</i> v. <i>schuetzeana</i>)	FACW+	S
Winterberry (<i>Ilex verticillata</i>)	FACW+	S
Swamp White Oak (<i>Quercus bicolor</i>)	FACW+	S
Pin Oak (<i>Quercus palustris</i>)	FACW	S

**Table 6.10-6
Suggested Shrub Species with Indicator Status and Plant Zone**

Species	Indicator Status	Plant Zone
Button Bush (<i>Cephalanthus occidentalis</i>)	OBL	ED/A
Silky Dogwood (<i>Cornus amomum</i> v. <i>schuetzeana</i>)	FACW+	S
Pussy Willow (<i>Salix discolor</i>)	FACW	S
American Highbush Cranberry (<i>Viburnum opulus</i> v. <i>americanum</i>)	FACW	S

6.10.8 Herbaceous plug installation

The success of any planting methodology can be enhanced by the use of herbaceous plugs. If used, herbaceous plugs will be planted on two-foot centers. Plugs are generally sold in trays of 38 and at two-foot centers, 10,868 would be needed per acre. Selecting species should be based, in part, on the species ability to withstand some habitat modification. Coefficients of Conservatism (C values) have been established for most plant species across the country. These C values are indicative of a species ability to withstand habitat modification. Values range from 1 to 10 with 1 representing those species most likely to withstand habitat modification and 10 representing those species least likely. The choices for herbaceous plugs should represent species

with a C value of 5 or less. Table 6.10-7 provides a list of suggested species, indicator status, and plant zone.

**Table 6.10-7
Suggested Species for Herbaceous Plugs with Indicator Status, and Plant Zone**

Species	Indicator Status	Plant Zone
Blue joint grass (<i>Calamagrostis canadensis</i>)	OBL	S
Spreading oval sedge (<i>Carex normalis</i>)	FACW+	S
Spotted Joe-pye weed (<i>Eupatorium maculatum</i>)	FACW	S
Sneezeweed (<i>Helenium autumnale</i>)	FACW	S
Torrey's rush (<i>Juncus torreyi</i>)	FACW	S
Prairie cord grass (<i>Spartina pectinata</i>)	FACW+	S

6.10.9 Wetland Management and Monitoring Plan

The main objective of the Wetland Management and Monitoring Plan is to establish a five-year management and monitoring period for all areas proposed for mitigation credit. This management and monitoring period is installed to foster the desired development of the mitigation areas through accepted applied management techniques. The five-year management and monitoring period shall commence on the date that grading and planting of the mitigation area is completed with the approved mitigation plan. Annual monitoring reports will be provided to the Corps for a five-year period. These reports will document site-specific conditions, such as vegetation, soils, and hydrology. The data collected from the monitoring inspections will be evaluated to determine whether the performance standards are achieved.

6.10.10 Wetland Mitigation Management

Management of the vegetation in the wetland mitigation area may include selective application of herbicide to control aggressive plant species, such as common reed (*Phragmites australis*), purple loosestrife (*Lythrum salicaria*), cattail (*Typha* spp.), and reed canary grass (*Phalaris arundinacea*). Intensive management of the plant community may be required in the first few years following construction to reduce weed populations. These species, including others, can displace desirable species, reducing floristic diversity in the mitigated areas. Management activities that will probably need to be undertaken throughout the five-year monitoring period include prescribed burning, herbicide application, mowing, and supplemental plantings.

All of the installed plants in the wetland mitigation area will be periodically watered during the first growing season, if required. It is essential that recently planted vegetation be properly cared for during the initial stages of development. Periodic watering during the first growing season will improve plant viability and decrease the chances of possible future replanting costs.

Any areas that are devoid of vegetation in the wetland mitigation area by the third or fourth year following construction will be replanted. If the devoid area is lacking the appropriate hydrology,

modifications in the grade or water levels will be made accordingly. All regarded areas will be reseeded and/or planted with the appropriate species.

6.10.11 Wetland Mitigation Monitoring

Permanent sampling transects will be randomly established in each proposed plant community zone of the wetland creation area. All transects will be plotted on project drawings and permanently marked with posts at endpoint locations. A series of sample quadrats will be placed along transects to collect data that will adequately represent the vegetation in the wetland creation area. Inventories of all vascular plants in each quadrant will be compiled and analyzed collectively with the Floristic Quality Assessment.

A detailed soil description of the soil, using the Munsell color chart, as well as soil texture and structure will be recorded. The profile description will include noting the presence of redoximorphic features such as iron/manganese accumulations, oxidized rhizospheres, mottles, and depleted zones. The type, relative abundance, location, and color of these features will be recorded. The sample points will be used for each vegetation community and marked in the field and on plans. The soil will be examined in this location annually, with an undisturbed soil profile described each successive year.

The hydrologic condition of the wetland creation area will be monitored concurrently with the vegetation monitoring. Surface water elevations will be recorded by measuring the depth of inundation. Soil moisture data will be noted by examining soil conditions at the surface, and results will be recorded as dry, moist, or saturated soil conditions.

6.10.12 Wetland Mitigation Success Criteria

The success of any wetland mitigation project is determined based on three characteristics including vegetation, hydrology, and water quality. The minimum criteria for success follows;

Vegetation

1. Mean density per acre should match proposed mean density per acre and should be composed of at least 50 percent of the approved plant species (those species found on-site for five consecutive years).
2. No single species should constitute more than 25 percent (percent of aerial cover) of the surviving species.
3. Greater than 50 percent (percent of aerial cover) of the surviving dominant species should meet the current federal delineation manual definition for hydrophytic vegetation.
4. Native, non-invasive vegetation should cover at least 70 percent of the site.
5. The site should meet the proposed Cowardin Classification.
6. By the end of the monitoring period, none of the dominant species in any wetland community zone may be non-native species.

Hydrology

1. The site should meet the proposed Cowardin or HGM Classification.
2. The wetland hydrology should match the proposed hydrology.
3. The site should be self-sustaining

Water Quality

1. If a state water quality certificate is issued, the site should meet the standards set forth in that certificate.
2. There should not be greater than 10 percent deviation regarding surface area coverage of open water, bare ground between the impact site and the mitigation site.

6.10.13 Streams

Stream crossings should be planned to minimize channel impacts and avoid channel realignments. When stream impacts are unavoidable, the 8,313 linear feet of stream impacted will be mitigated according to IDNR guidelines including but not limited to the following:

- The physical disturbance of streams and associated riparian vegetation, especially large trees overhanging affected water bodies should be limited to only that which is absolutely necessary to complete the project;
- The use of three-sided culverts for stream enhancement and wildlife movement;
- Where reasonable, low-water work should be restricted;
- Where reasonable, channel work and vegetation clearing should be restricted to within the width of the normal approach road right-of-way;
- The extent of artificial bank stabilization should be minimized;
- If riprap is utilized for bank stabilization, it should be extended below low-water elevation to provide aquatic habitat;
- Channel work during the fish spawning season (April 1 through June 30) should be avoided; and
- Where stream relocation is necessary, mitigation measures such as riparian plantings, channel design, and other restoration features will be explored with staff from various agencies at the time of permitting.

If necessary for mitigation purposes, stream creation is an acceptable alternative. In developing plans for stream creation, careful attention should be given to the appropriate creation of stream morphology, in-stream habitat, and riparian zones. The following stream characteristics should be considered important in developing plans for stream creation:

- Adequate numbers of pools, riffles, and runs;
- Adequate sinuosity (at least two bends per 200 feet);
- Adequate in-stream habitat provided by large woody debris, boulders, and rootwads;
- Pointbars with emergent wetland species;
- Adequate riparian zones planted with appropriate seed mixes and woody stems; and
- Additional habitat-enhancing features such as undercut banks, overhanging vegetation, shallows (slow waters), oxbows, and rootmats.

A pool/riffle sequence spacing should approximate 5-7 times the channel width. For example, for a stream base width 10 feet, a pool/riffle sequence should occur every 50 to 70 feet. Riffles should be well defined and deep with an obvious and fast current. Pools should be at least 3 feet deep without an obvious current and runs should be at least 15 feet long with an obvious current.

In-stream habitat features for optimal success should cover 50 percent or more of any given reach. Reach is defined as either a pool/riffle/run sequence or merely a 200-foot length of stream.

Riparian zones are obviously important for a variety of reasons such as protecting the stream from agricultural or urban runoff impacts. The appropriate seed mixes, woody stems, and even herbaceous plugs facilitate floodplain formation, bank stabilization, and erosion control. Planting trees such as black willow directly above proposed pool locations will allow for future formation of rootwads thus enhancing in-stream habitat.

A successful stream creation project will have the following characteristics;

- No substantial aggradation or degradation;
- 80 percent or better survival rate of plantings;
- Stable stream with pattern, profile, and dimension of similar reference reach type;
- Minimal evidence of instability such as down-cutting, deposition, bank erosion, or an increase in sand or finer substrate material; and
- Obviously being populated by appropriate biologicals.

Additionally, a monitoring plan should be developed following initial documentation of the created channel's dimension, pattern, and profile along with the establishment of permanent cross-sections selected to represent approximately 50 percent pools and 50 percent riffle areas. Monitoring is performed each year for a five-year period.



Plate 1. Proposed mitigation site from the southwest corner of the field facing northeast.



Plate 2. Proposed mitigation site from the southwest corner of the field facing north.



Plate 3. Proposed mitigation site from the northwest corner of the field facing south.



Plate 4. Proposed mitigation site from the northwest corner of the field facing southeast.



Plate 5. Proposed mitigation site from the northwest corner of the field facing east northeast.



Plate 6. Proposed mitigation site from the northeast corner of the field facing southwest.



Plate 7. Proposed mitigation site from the northeast corner of the field facing west.



Plate 8. Proposed mitigation site from the northeast corner of the field facing south.



Plate 9. Proposed mitigation site from the southeast corner of the field facing north.



Plate 10. Proposed mitigation site from the southeast corner of the field facing northwest.



Plate 11. Proposed mitigation site from the southeast corner of the field facing west southwest.



Plate 12. Proposed mitigation site from the southeast corner of the field facing west.



Plate 13. Proposed mitigation site from the center of the field facing south.



Plate 14. Proposed mitigation site from the center of the field facing west.



Plate 15. Proposed mitigation site from the center of the field facing north.



Plate 16. Proposed mitigation site from the center of the field facing east.

Another site is The Ron Taylor Potential Mitigation site is located in Boone County, Indiana and is located along a portion of Finley Creek. It is located north of SR 32 and east of North CR 1100 E. The site is in the Upper White River 8-digit watershed and is approximately 58 acres. The majority of the site is currently in agricultural production but contains some wooded and shrub-scrub areas along the creek and in the northwestern portion of the property. The site appears to contain adequate hydrological sources for establishing wetland hydrology as Finley Creek borders the eastern and southeastern portion of the site. The majority of the site is also located in a topographically low position in the landscape. Portions of the site periodically flood in the spring. Natural surface runoff coupled with removing agricultural drain tiles and minor grading would likely foster suitable conditions for wetland establishment.

6.11 Visual Impacts and Aesthetics

Mitigation measures for impacts to aesthetic resources, as detailed in the DEIS, remain unchanged.

6.12 Construction

Mitigation measures for impacts related to construction, as detailed in the DEIS, remain unchanged.

6.13 Wellhead Protection Zones

Mitigation measures for impacts to wellhead protection zones, as detailed in the DEIS, remain unchanged.

6.14 Permits

Permitting requirements, as detailed in the DEIS, remain unchanged.

6.15 Design

6.15.1 Section 4(f)

The MOA and the Net Benefit Section 4(f) commit to providing a safer access to Lindley Farm from SR 38. Furthermore, the MOA commits to providing vegetative screening in proximity to Lindley Farm.

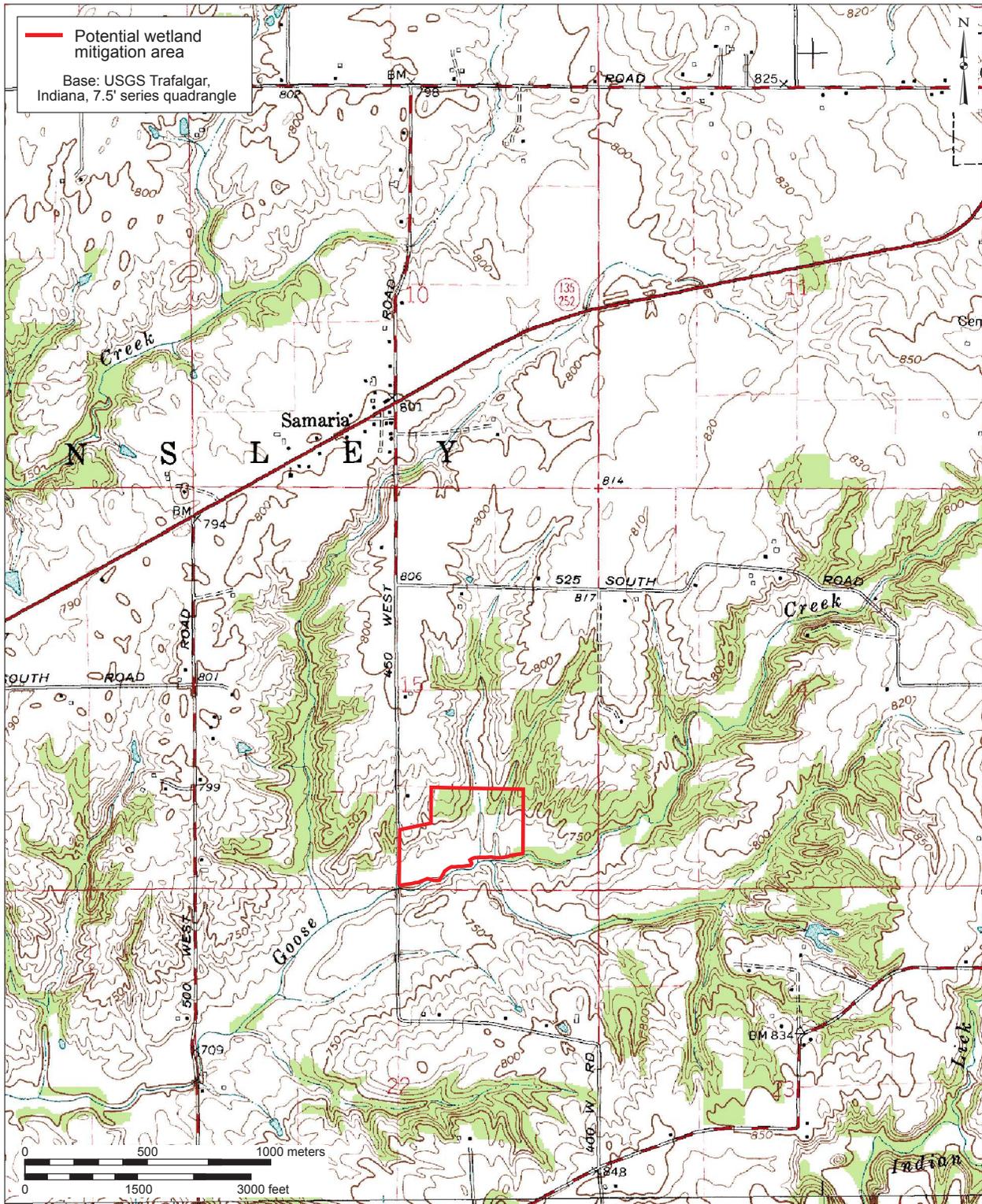
As it is no longer considered eligible for listing on the NRHP, the Hunt House is no longer considered a Section 4(f) resource. Therefore, avoidance of this property is no longer necessary. All other Section 4(f) avoidance measures, as detailed in the DEIS, remain unchanged.

6.15.2 Hazardous Material Sites

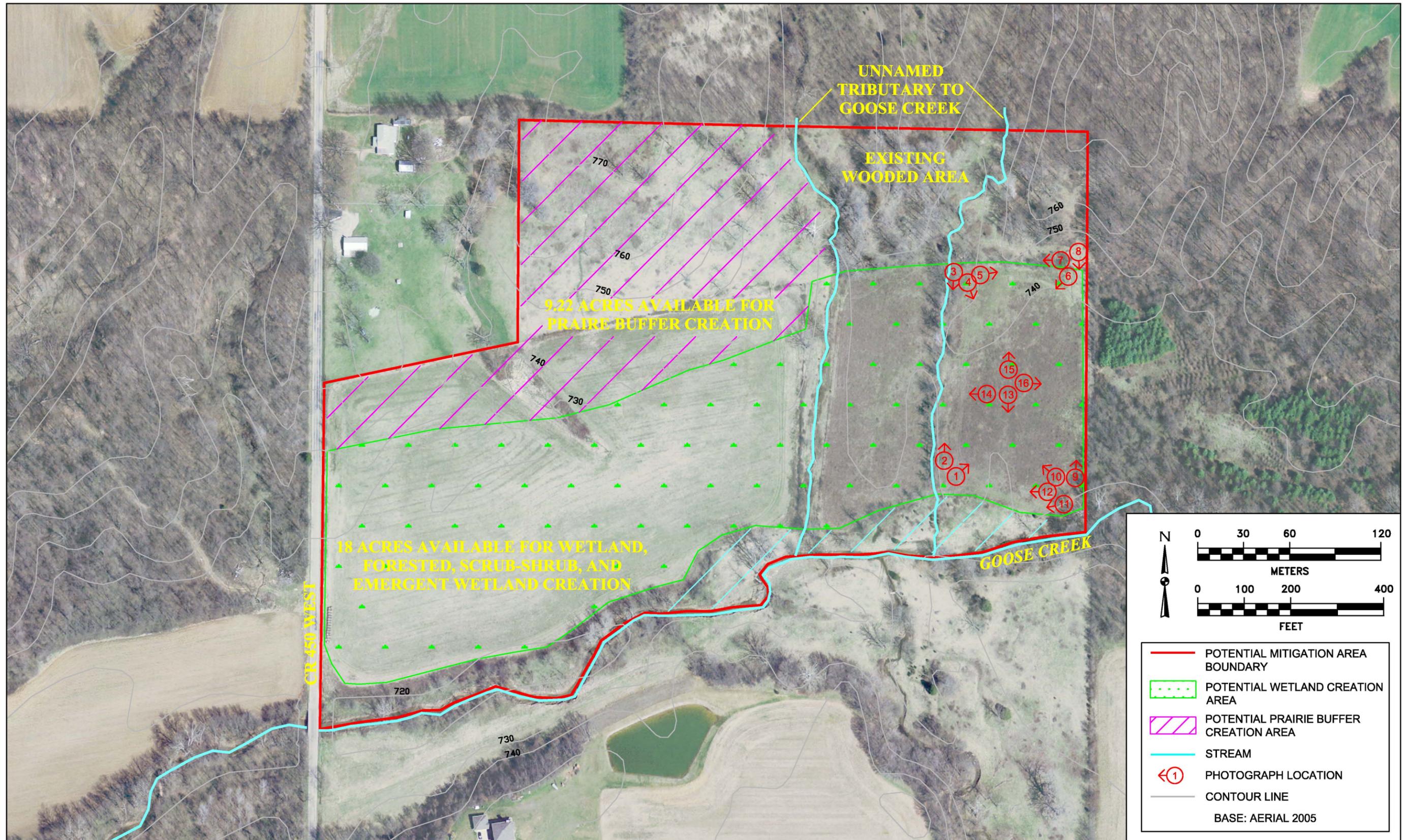
It is anticipated that a Phase II Environmental Site Assessment will be required during the design phase for all fourteen of the hazardous material sites potentially impacted by the Major Moves Alternative.

6.15.3 Public Involvement

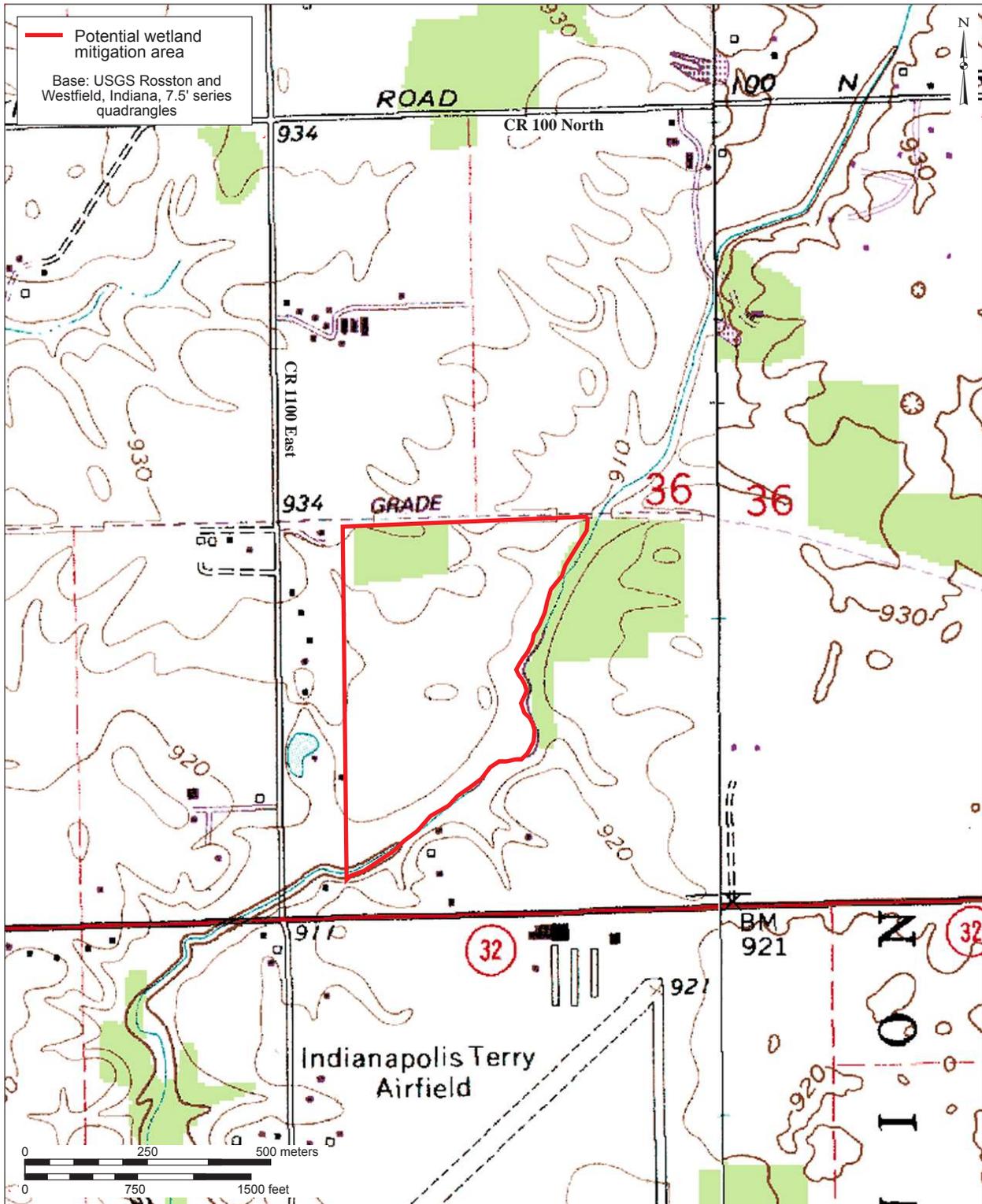
The Community Advisory Committee (CAC) and the Pedestrian/Trails Work Group will continue to meet as the project moves into final design and construction phases.



Portion of the 1965 Trafalgar, Indiana quadrangle (USGS 7.5' topographic map) showing the DeHart Farms Goose Creek Mitigation Site.



DeHart Farms Goose Creek Mitigation Site.



Portion of the 1987 Rosston and 1992 Westfield, Indiana quadrangles (USGS 7.5' topographic maps) showing the Boone County Mitigation Site.

