

THE BLUFFS AT YOUNGS CREEK

SECTIONS 1, 2 & 3

OPERATIONS & MAINTENANCE MANUAL

BMP TYPE:

WET DETENTION POND

SUMP CATCH BASINS

PROJECT NUMBER: 83540

BMP OWNER:

WINDSTAR HOMES, LLC

Contact Person: Mark Alt

5374 Cayman Drive

Carmel, Indiana 46033

Contact Phone Number: (317) 223-4257

PREPARED BY:

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DATE PREPARED:

May 8, 2019

"I affirm, under the penalties of perjury, that I have taken reasonable care to redact each Social Security Number in this document, unless required by law."



Brian M. Brown

OPERATIONS AND MAINTENANCE MANUAL

THE BLUFFS AT YOUNGS CREEK, SECTIONS 1, 2 & 3

JOB# 83540

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OPERATIONS AND MAINTENANCE MANUAL

THE BLUFFS AT YOUNGS CREEK, SECTIONS 1, 2 & 3

PURPOSE AND BACKGROUND

Each year thousands of acres of Indiana land undergoes disturbance and/or is converted for the construction of subdivisions, commercial and industrial centers, highways, and other land uses. Agriculture and urban development are the two major types of land-disturbing activities in Indiana. Both are very important to the economic well being of the citizens of the state. Without proper planning and the wise selection of storm water management measures, these areas of soil disturbance are very vulnerable to accelerated erosion and sedimentation.

Whenever vegetation is removed from the land's surface, the soil becomes exposed to the erosive effects of wind and water. Although erosion is a natural process, it can be greatly accelerated by human action that disturbs the land's surface. While it is true that the tons of soil eroded on agricultural lands is much greater, it has been proven that the amount of soil eroded on a per-acre basis can be many times greater on active construction sites. The loss of soil through erosion commonly results in the loss of good topsoil and the associated minerals and nutrients required for plant establishment and growth.

Soil erosion not only causes on-site damage problems, but can also negatively impact water quality downstream through sediment pollution. It has been shown that sediment is the number one water quality pollutant by volume in Indiana.

Sediment damage can take many forms. Sediment accumulation in wetlands can reduce their capacity to retain storm water and its value to wildlife. Sediment deposition in storm sewers can reduce their efficiency and capacity. Sediment and accompanying nutrients often reaches lakes and leads to algal blooms, a decrease in lake depth, and a decrease in the recreational and aesthetic value of the lake.

In addition to erosion and sediment damage, the building of residential subdivisions, shopping centers, industrial parks, schools, recreational attractions, etc. can have a significant effect on the patterns and amounts of storm water runoff during and after construction takes place. This often leads to water quality degradation and more frequent flooding events. The final land use associated with many projects will also contribute to the discharge of pollutants. These pollutants will typically be generated by the activities that are associated with the final land use.

It is important to practice effective storm water management and treatment of storm water runoff before, during, and after construction. Otherwise, the landowner and/or public may end up paying more for project reconstruction and replacement/maintenance of existing infrastructure. Furthermore, public environmental awareness demands that land users work with nature, and not against it, to protect Indiana's land and water resources.

There are many ways to minimize the impacts of urbanization and protect the integrity of Indiana's natural resources. One method is through careful planning and inclusion of proven storm water management measures in a project's construction and development plans. Careful planning can prevent or at the very least alleviate much of the damage caused by erosion and sedimentation and the pollutants that will be associated with the final land use. However, careful planning and incorporation of appropriate storm water quality measures into a project's construction plans is not enough. These measures must be deployed and maintained on the site throughout all construction phases. (Indiana Storm Water Quality Manual, 2007)

This manual provides engineers, developers, builders, contractors, government officials, and other with guidance on the inspection and maintenance of installed post-construction storm water quality measures for The Bluffs at Youngs Creek, Sections 1, 2 & 3.

STORM WATER QUALITY CONTROL REQUIREMENTS

BMP OWNER CONTACT INFORMATION

Windstar Homes, LLC

Contact Person: Mark Alt

5374 Cayman Drive

Carmel, Indiana 46033

Contact Phone Number: (317) 223-4257

The project site owner must submit to the City of Franklin a Storm Water Pollution Prevention Plan (SWPPP) that would show the placement of appropriate BMP(s) specified in the City of Franklin Stormwater Management Ordinance. The noted BMP(s) must be designed, constructed, and maintained according to guidelines provided or referenced in the City of Franklin Stormwater Management Ordinance.

It is the policy of the City of Franklin that the water quality management program be performance-based. To that end, a best management practice (BMP) approved for use in the City will be capable of meeting the Maximum Extent Practical (MEP) removal target for TSS whether the control be a single structure or a series of controls.

In addition to TSS removal, a BMP must also be designed to store and treat the water quality volume (WQv) and hold that water quality volume for 24 hours past the peak of the runoff event. The water quality volume is the storage needed to capture and treat the runoff from 20% of the larger of 1/2" direct runoff or runoff from the 1 1/4" 24 hr rainfall event.

INSPECTION AND MAINTENANCE

It is essential that any approved BMP be properly inspected and maintained in order to assure the TSS removal performance. Therefore, an inspection and maintenance plan is required. The City encourages the use of a high-efficiency, low maintenance BMP(s) that has the potential for removal of multiple storm water pollutants.

The City and/or its representatives have the right to enter the property to inspect the BMP(s). In the event that the City finds a BMP in need of maintenance or repair, the City will notify the BMP owner of the necessary maintenance or repairs and give the BMP owner a timeframe for completing the maintenance or repairs. If the maintenance or repairs are not completed within the designated timeframe, the City shall perform the maintenance or repairs and bill the BMP owner for the actual costs for the work.

Annual inspection reports are not required to be submitted to The City of Franklin. A self-monitoring program must be implemented by the project site owner to ensure the stormwater pollution prevention plan is working effectively. A trained individual, acceptable to the City, shall perform a written evaluation of the project site by the end of the next business day following each measurable storm event. If there are no measurable storm events within a given week, the site should be monitored at least once in that week. Weekly inspections by the trained individual shall continue until the entire site has been stabilized and a Notice of Termination has been issued. The trained individual should look at the maintenance of existing stormwater pollution prevention measures, including erosion and sediment control measures, drainage structures, and construction materials storage/containment facilities, to ensure they are functioning properly. The trained individual should also identify additional measures, beyond those originally identified in the stormwater pollution prevention plan, necessary to remain in compliance with all applicable statutes and regulations.

The resulting evaluation reports must include the name of the individual performing the evaluation, the date of the evaluation, problems identified at the project site, and details of maintenance, additional measures, and corrective actions recommended and completed.

APPENDIX A

Once the site is stabilized, routine monthly and annual inspections are the responsibility of the BMP owner. The BMP owner shall be financially responsible for any maintenance or repairs required by the City and/or its representatives during the City's inspections. The BMP owner will maintain all inspection records and, upon the request of the City, provide copies in an organized fashion, within 48 hours upon request.

REFERENCES

1. Indiana Storm Water Quality Manual - October 2007
2. City of Franklin Subdivision Control Ordinance - July 2013
3. City of Franklin Stormwater Management Ordinance - August 2011

WET DETENTION POND

THE BLUFFS AT YOUNGS CREEK, SECTIONS 1, 2 & 3

PURPOSE & BACKGROUND

A post-construction BMP for The Bluffs at Youngs Creek is a wet detention pond labelled Lake #1. Wet detention ponds, including storm water ponds, retention ponds, and wet extended detention ponds, are constructed basins that contain a permanent pool of water and treat polluted storm water runoff. The most commonly used wet detention ponds are extended detention ponds. The purpose of a wet detention pond is to detain storm water runoff long enough for contaminated sediments to settle and remain in the pond and allow the water in the pond to be displaced by the next rain event. This sedimentation process removes particulates, organic matter, and metals from the water while nutrients are removed through biological uptake. By capturing and retaining runoff, wet ponds control both storm water quantity and quality. A higher level of pollutant removal and storm water quality can be achieved through the use of wet detention ponds than with many other storm water management measures such as sand filters and dry ponds. (Indiana Storm Water Quality Manual, 2007)

INSPECTION & MAINTENANCE ACTIVITIES

The performance of a wet detention pond is highly dependant on the inspection and maintenance of the pond. If the pond is not properly maintained, the ability to remove pollutants will decrease.

The BMP owner agrees to the following monthly inspection program:

| Inspection Item | Inspection Procedure |
|-------------------------|--|
| 1. Vegetation | <ul style="list-style-type: none">Some species of plants are considered invasive and should be removed within one month of discovery. Invasive species include reed canary grass, purple loosestrife, common reed, and narrow leaf cattail. Appendix A contains photos of these four common invasive species.No trees shall be planted in the BMP. If trees appear, they should be removed.Landscaped area of the banks that are eroded or have exposed bare earth shall be restored to proper grade, stabilized, and re-seeded with the appropriate native seed mixtures. |
| 2. Floatable Pollutants | <ul style="list-style-type: none">Remove all floatable debris.Note visible pollution such as oily sheens, discoloration, and cloudy or muddy water.Remove shoreline pollution such as trash or oily liquids.Remove miscellaneous debris. |
| 3. Erosion | <ul style="list-style-type: none">Inspect inlet, outlet, headwall and endwall areas for erosion and undercutting. If erosion is occurring, additional scour protection measures will need to be employed.Areas of severe erosion or other conditions that may constitute a public hazard should be corrected as soon as possible and prior to the next monthly inspection. |
| 4. Outlet | <ul style="list-style-type: none">All pond outlets shall be inspected and checked for debris and obstructions that disrupt the flow within the storm water management system. If any pipes are obstructed, they must be cleared. |
| 5. Embankment | <ul style="list-style-type: none">Animal burrows should be controlled or removed when present in densities that endanger the integrity of the embankment. Damage caused by animal burrows must be repaired as soon as possible. Any burrowing |

| | |
|--|---|
| | <p>control effort will need to be carefully planned and executed to avoid negative impacts on adjacent habitats and wildlife. Such measures will be confined to the embankment. Animals that may be on concern are beavers and muskrat.</p> <ul style="list-style-type: none"> Inspect the slopes of the BMP for any sliding or displacement of scour protection. Please note location and describe failure. |
|--|---|

Maintenance responsibilities shall remain in effect for the life of the BMP from the date the construction is completed. Inspections must be documented on the inspection form included in this Operations and Maintenance Manual.

| Maintenance Item | Maintenance Procedure |
|------------------------------|--|
| 1. Vegetation | <p>Although the wet pond BMP is expected to develop into a dynamic ecosystem that will eventually require little or no vegetation maintenance, some vegetation maintenance will be required in the first two years following construction in order to give the new plant communities a chance to become well established.</p> <p>Precautionary measures must be taken to prevent invasive species from establishing. These species should be either physically removed or treated with herbicide by a qualified plant maintenance professional. Physical removal is strongly preferred above the application of herbicide. If herbicide is used, application must be conducted in compliance with federal, state, and local laws and regulations. Replant and reseed vegetation when damaged, vandalized or removed in compliance with original planting specifications.</p> |
| 2. Aquatic Weeds | <p>In some instances, algae and other forms of undesired plant life may become established in the wet pond. Extremely dense algae and submerged weeds also cause fish kills as a result of oxygen depletion. Some ponds may develop problems with microscopic algae and floating weeds, such as duckweed. Herbicide application, copper sulfate, or other approved algae control methods are suggested. Any chemical applications must be conducted in compliance with federal, state, and local laws and regulations.</p> |
| 3. Nuisance Wildlife Species | <p>In addition to burrowing animals, geese may be attracted to the wet pond BMP(s). Turf grass is typically proposed around the wet pond fringe areas. However, it is suggested that native shrubs and ground cover be planted in the buffer area to help deter geese by making it more difficult for them to approach the ponds.</p> |
| 4. Rip-Rap | <p>Periodic inspection is required of rip rap areas. Look for slumping, displaced rock material, and erosion. Check for accumulated sediment, bank instability, and scour holes. Any areas that have sustained damage shall be promptly restored to comply with original specifications.</p> |

EMERGENCY CONTACT INFORMATION

Johnson County Emergency Management Agency - (317) 346-4655
Johnson County Surveyor's Office - (317) 364-4341
Indiana Department of Environmental Management (IDEM) - (317) 232-8603
City of Franklin, MS4 Coordinator - (888) 736-3640

REFERENCES

1. Indiana Storm Water Quality Manual - October 2007
2. City of Franklin Subdivision Control Ordinance - July 2013
3. City of Franklin Stormwater Management Ordinance - August 2011

SUMP CATCH BASINS

THE BLUFFS AT YOUNGS CREEK, SECTIONS 1, 2 & 3

PURPOSE & BACKGROUND

Some BMPs for The Bluffs at Youngs Creek are sump catch basins located at curb inlet structures # 408 & #409. The sump catch basins are storm structures constructed with a sump which serves as a sediment storage basin that can be accessed and cleaned out when necessary.

INSPECTION & MAINTENANCE ACTIVITIES

The performance of a sump catch basin is highly dependant on the inspection and maintenance of the structure. If the structure is not properly maintained, the ability to remove pollutants will decrease. The BMP owner will need to provide the maintenance for the sediment removal.

The BMP owner agrees to the following monthly inspection program:

1. Remove manhole lid or open pavement grate to expose inside of box structure.
2. Lower a dip stick equipped with a ball valve (Sludge Judge or similar device) into opened box structure.
3. Measure the depth of sedimentation. The level of sedimentation shall not exceed 12 inches before maintenance.
4. In the event that maintenance is required, call a local vector company to remove sediments and other debris with a vacuum truck. Dispose of all waste in accordance with the City of Franklin and any applicable state, and/or federal requirements.

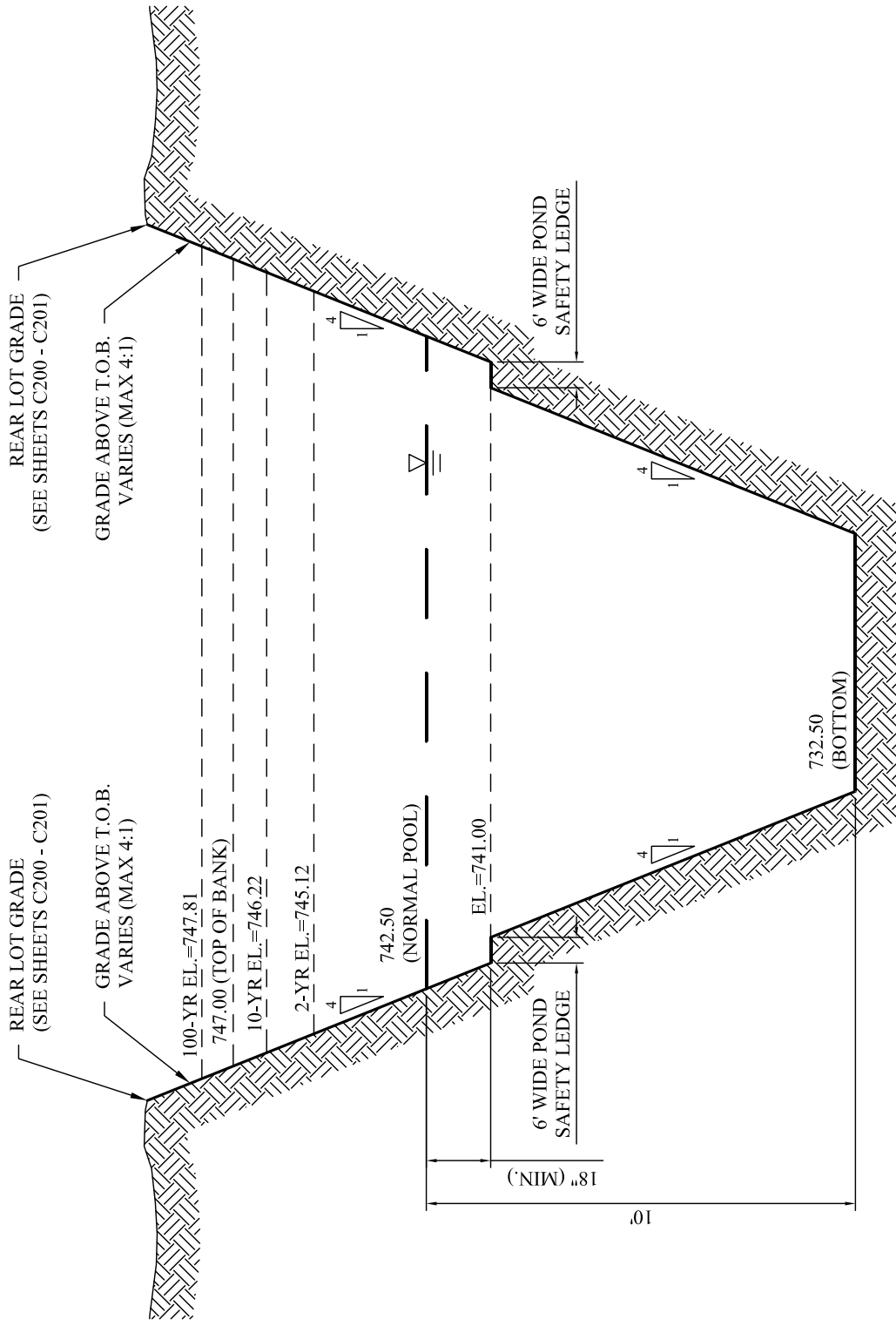
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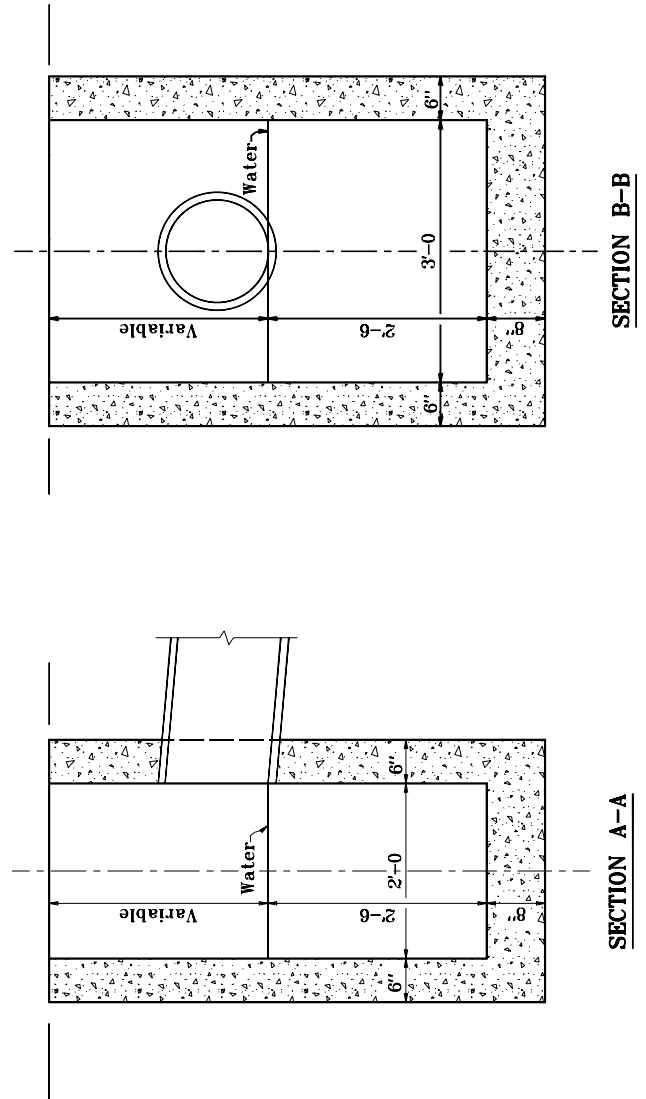
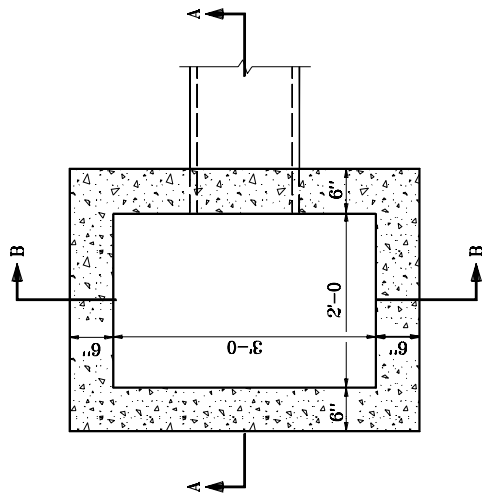
REFERENCES

1. Indiana Storm Water Quality Manual - October 2007
2. City of Franklin Subdivision Control Ordinance - July 2013
3. City of Franklin Stormwater Management Ordinance - August 2011

APPENDIX B



LAKE #1
CROSS SECTION ("A-A")
 NOT-TO-SCALE



| | |
|---|--|
| INDIANA DEPARTMENT OF TRANSPORTATION | |
| CATCH BASIN | |
| TYPE K | |
| APRIL 1995 | |
| STANDARD DRAWING NO. E 720-CBST-05 | |
| DETAILS PLACED IN THIS FORMAT 11-15-99 | |
| /s/ Anthony L. Urenovich 11-15-99 DESIGN STANDARDS ENGINEER DATE | |
| /s/ Firooz Zandi 11-15-99 CHIEF HIGHWAY ENGINEER DATE | |
| ORIGINALLY APPROVED 4-03-95 | |



APPENDIX C

Detention Pond Operation, Maintenance, and Management Inspection Checklist

Project: _____

Location: _____

Date: _____ **Time:** _____

Inspector: _____ **Title:** _____

Signature: _____

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|--|---------------------------------|----------|
| 1. Embankment and emergency spillway | | |
| Healthy vegetation with at least 85% ground cover. | | |
| No signs of erosion on embankment. | | |
| No animal burrows. | | |
| Embankment is free of cracking, bulging, or sliding. | | |
| Embankment is free of woody vegetation. | | |
| Embankment is free of leaks or seeps | | |
| Emergency spillway is clear of obstructions. | | |
| Vertical/horizontal alignment of top of dam "As-Built" | | |
| 2. Riser and principal spillway | | |
| Low flow outlet free of obstruction. | | |
| Trash rack is not blocked or damaged. | | |
| Riser is free of excessive sediment buildup | | |
| Outlet pipe is in good condition. | | |
| Control valve is operational | | |
| Outfall channels are stable and free of scouring. | | |

| Maintenance Item | Satisfactory/ Unsatisfactory | Comments |
|--|---------------------------------|----------|
| 3. Permanent Pool (Wet Ponds) | | |
| No Evidence of undesirable vegetation | | |
| No accumulation of floating or floatable debris | | |
| No evidence of shoreline scour or erosion | | |
| 4. Sediment Forebays | | |
| Sediment is being collected by forebay(s) | | |
| Forebay is not in need of cleanout (less than 50% full) | | |
| 5. Dry Pond Areas | | |
| Healthy vegetation with at least 85% ground cover. | | |
| No undesirable woody vegetation | | |
| Low flow channels clear of obstructions | | |
| No evidence of sediment and/or trash accumulation | | |
| 6. Condition of Outfall into Ponds | | |
| No riprap failures | | |
| No evidence of slope erosion or scouring | | |
| Storm drain pipes are in good condition, with no evidence of non-stormwater discharges | | |
| Endwalls/Headwalls are in good condition | | |

SUMP CATCH BASIN BMP INSPECTION CHECKLIST

| STRUCTURE NO. | STRUCTURE CONDITION | SEDIMENTATION LEVEL | DATE |
|---------------------------|---------------------|---------------------|------|
| (total # structures = XX) | (poor, fair, good) | (in.) | |
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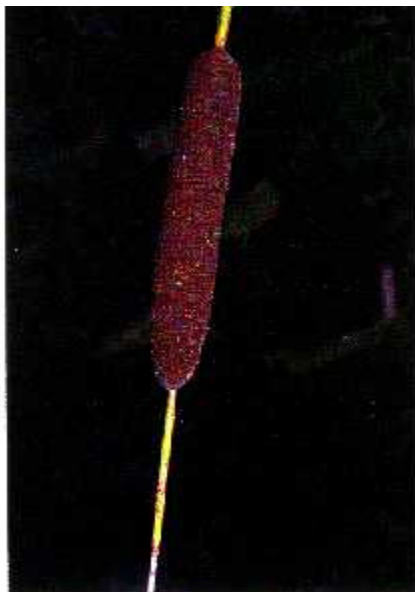
PHOTOS OF INVASIVE PLANT SPECIES



Reed Canary Grass



Purple Loosestrife



Narrow Leaf Cattail



Common Reed

APPENDIX D

BMP OWNER ACKNOWLEDGMENT

THE BLUFFS AT YOUNGS CREEK, SECTIONS 1, 2 & 3

ACKNOWLEDGMENT AGREEMENT

This Operations and Maintenance Manual is submitted to the City of Franklin with the intent to insure the longevity and adequate functioning of the BMP(s) owned by Windstar Homes, LLC, for The Bluffs at Youngs Creek, Sections 1, 2 & 3. By submitting this Operations and Maintenance Manual to the City of Franklin with plans to construct the BMP(s), the BMP owner noted above agrees to follow and abide by the inspection schedule and maintenance activities listed in this manual. The BMP owner noted above is responsible for any additional maintenance and/or repair activities to maintain the function and longevity of the BMP(s).

BMPs:

Wet Detention Pond: Lake #1

Sump Catch Basins: Str. #408 & #409

Owner Signature

Date

Printed

STATE OF INDIANA)
)
COUNTY OF HAMILTON) SS:

BEFORE ME, the undersigned, a Notary Public in and for said County and State personally appeared _____ Owner/Agent
subscribed and sworn before me this _____ day of _____, _____.

County of Residence

Signature

Commission Expiration Date

Printed Name