APPENDIX 6

4.0 IDENTIFYING CRITICAL AREAS

Water quality data, trends in land use development, and comments from stakeholders in the watershed were utilized to identify critical areas within the Upper Wabash River watershed. Critical areas include areas that are of benefit to water quality and storage within the watershed, areas that are suspected of degrading water quality, and areas impeding the natural drainage and infiltration of the watershed. Areas that are considered to be beneficial to the Upper Wabash River watershed should be protected or enhanced, and those areas or activities suspected of degrading water quality or increasing the risk of flooding should be targeted for implementation of management measures.

4.1 BENEFICIAL CRITICAL AREAS

Identifying land uses and activities that have a negative impact on water quality or the assimilation of increased water quantity is often the primary focus of watershed planning. While managing the impacts of these activities can and does improve water quality and assimilation, it is equally important to identify the existing land use conditions and activities in a watershed that currently enhance or protect water quality and reduce the risk of flood related damages. As these areas are protected, the potential of further degradation will be reduced.

WETLANDS

Within the Upper Wabash River Watershed, there are nearly 2,000 acres of woody or emergent herbaceous wetlands. There are approximately 70 acres within the 05120101-010 subwatershed, 430 acres of wetlands within the 05120101-040 subwatershed, 600 acres of wetlands within the 05120101-050 subwatershed, and within the 05120101-060 subwatershed an approximate 700 acres of wetlands exist. Areas identified as wetlands by the National Wetland Inventory (NWI) are located in Exhibit 6.

These wetlands have the ability to serve several functions in regard to the protection and enhancement of water quality. Water flowing into, or stored in a wetland may be retarded allowing increased time for the uptake of nutrients, settling of suspended solids, and evaporation or infiltration of excess water. If wetlands did not exist, this water would be directed to the nearest open water system; pollutants included. The ability to recharge the surrounding area with slowly released water helps provide a more consistent soil moisture level in an agricultural setting, while allowing for groundwater recharge at the same time. Wetlands also serve the watershed as wildlife habitat areas providing cover from predators while also serving as a food source. Several projects listed above involved restoration or protection of critical wetlands and these areas will be beneficial to the functioning of the natural landscape as well as the historical heritage of the area.

The individual County Comprehensive Plans have identified the importance of wetlands to the Environmental and the need for protection of existing wetlands. The Adams County Comprehensive Plan of 1994 discusses the need to consider existing wetlands in reviewing development proposals, promote preservation of existing wetlands, and to encourage landowners to restore marginally productive farm land to wetland status. Jay County has stated that any development that will destroy or harm any environmentally sensitive areas, such as wetlands) should be discouraged. While the Wells County Comprehensive Plan does not specifically identify wetlands, it does state that an extensive system of conserved open space following the county's major watercourses has been proposed.

In order to provide the most benefit to the Upper Wabash River Basin, the 11-digit HUC prioritized for wetland protection should be the 05120101-060 subwatershed, while the 11-digit HUC prioritized for wetland construction or restoration efforts should be the 05120101-010 subwatershed. However, as none of the 11-digit subwatersheds have more than 2% of the land use classified as woody or emergent wetlands, protection, restoration, and construction efforts should be carried out watershed wide.

Protected Lands

Areas that are protected through the purchase of conservation easements carry with them obligations for perpetuity. These areas are often obtained as a measure of protection prior to land use alterations. However, it is possible, and successful to purchase a particularly sensitive area and restore the flora, fauna, and water quality benefits that had been removed or damaged. Areas maintained through a conservation easement have the ability to lessen pollutant loadings, provide habitat, reduce flood damages, and allow for protection of critical land uses.

Parks, recreational areas, and open space areas allow for the increased potential for infiltration of stormwater, uptake of nutrients, and entrapment of solids such as sediment, thus reducing the loadings to streams, rivers and ditches. These low development areas, if placed in sensitive locations can also reduce monetary damages caused by frequent flooding. Flood damages to the open space or recreational areas could be far lower than damages to residences or other structures routinely found along a water course.

The listing below identifies the nearly 2,800 acres of land protected by conservation easement or maintained as a natural area within the boundaries of the Upper Wabash River Watershed, or within close proximity.

- Ouabache State Park - This State Park is located in the south-east quadrant of Wells County and is bordered to the west by County Road 450E, to the north by County Road 100 S, and to the east by IND 301. The entire southern edge of the 1,104 acre park property abuts the Wabash River.

- Ouabache State Park - These 39.36 acres are adjacent to the park entrance and the Wabash River. This land provides potential for development of bike and hiking trails with Bluffton.
- Rainbow Bend – This area consists of 14 acre floodplain forest adjacent to the Wabash River.
- Wabash River Greenway Trail - This 6 acre parcel provides public access to the Wabash River as a part of The City of Bluffton Wetlands Restoration and Trail Project.
- Bluffton Wetlands & Greenway, Adjacent to the Ouabache State Park, and bordered on the south by the Wabash River, this 115.084 acres helps to conserve and preserve a natural wetland as part of the existing Wabash River Greenway trail.
- Limberlost State Historic Site and Swamp Wetlands – The following listing details over 1,400 acres of wetland areas in various stages of restoration within the watershed.
    - Original 12 acres of the Limberlost Bird Sanctuary established in 1947 contains 8 acres of flatwoods wetland and a 4-acre Nature Preserve forest.
    - 143 acres in the Loblolly Marsh in Jay County 1996 is a restored marsh with a wetland overlook and an Americans with Disabilities Act trail.
    - 45 acres in the Loblolly Marsh in Jay County 1996 – restored pothole has an Americans with Disabilities Act trail and boardwalk over a restored wetland.
    - 240 acres in the Loblolly Marsh in Jay County 1997 – restored marsh and potholes to teach geology. The 25-acre woodland is arrayed with many native plants and several rare species.
    - 38 acres in the Limberlost Swamp in Adams County 1998 – restored floodplain wetlands show nearly a decade of restoration regeneration.
    - 152 acres in the Limberlost Swamp in Adams County 1999 – restored potholes and a swamp Nature Preserve. This property is very secluded and will provide a refuge for the wildlife in the area.
    - 327 acres in the Limberlost Swamp in Adams County 2000 – partially restored
    - 26 acres of the Limberlost Bird Sanctuary Addition 2000 – restored forest land shows 6 years of regeneration and a wildlife watering facility.
    - 9 acres in the Limberlost Swamp in Adams County 2001 – partially restored
    - 65 acres in the Wabash River Area in Adams County 2001 – restored floodplains has Americans with Disabilities Act trails to the Wabash River's edge, a canoe launch for river studies, an Americans with Disabilities Act trail to a restored oxbow wetland, Native American Indian restored historic trail and river ford.

- 24 acres in the Wabash River Area in Adams County 2001 – mature floodplain wetland forest with proposed Americans with Disabilities Act trail
- 8 acre oxbow island in the Wabash River Area in Adams County 2002 – Nature Preserve mature floodplain forest on an oxbow with Great Blue Heronry
- 27 acres in the Limberlost Swamp in Adams County 2003 – reforestation and emergent wetlands planned
- 20 acres in the Limberlost Swamp in Adams County 2005 – planning
- 39 acres of the Limberlost Bird Sanctuary Addition 2005 – restored
- 113 acres in the Limberlost Swamp in Adams County 2005 – planning
- 58 acres in the Limberlost Swamp in Adams County 2005 – planning
- 14 acres of the Limberlost Bird Sanctuary Addition 2006 – planning
- 15 acres of the Limberlost Bird Sanctuary Addition 2006 – Reforestation planned.
- 70 acres in early contractual purchase agreement during 2007-08 – future purchases will continually improve the water quality and reduce the intensity of the flooding losses.

Areas with Central Sewer or Other Treatment Facilities

Residential areas that are serviced by a centralized wastewater facility such as a WWTP or an operational package plant have reduced the potential for sewage or other household effluent to enter a nearby drainage ditch, stream or river. While there are risks and impacts associated with such services, the benefits far outweigh the detriments regarding the protection and enhancement of water quality. Treatment facilities have the ability to efficiently and effectively treat household wastewater while discharging significantly cleaner water into the receiving water bodies.

Areas serviced by centralized treatment facilities in the watershed include the Town of Geneva and the Town of Bryant. The City of Bluffton, the City of Portland and the Town of Berne are areas serviced by centralized treatment facilities, very near to the watershed boundaries. As these incorporated areas continue to grow in population, it may eventually become necessary to extend the service areas for the wastewater treatment plants. This may provide the opportunity for residences to abate their current on-site septic systems, thus reducing the overall potential for untreated household wastewater to enter the streams and tributaries in the Upper Wabash River watershed.

Critical service areas are those municipalities with separated storm and sanitary sewer utilities operating at less than or equal to half the design capacity. Feasibility studies need to be completed for these critical areas to determine the facility's operational ability and cost projections to extend services to those residents within 2 miles of the current service area.

4.2 CRITICAL AREAS AS POTENTIAL SOURCES OF POLLUTION

Critical areas identified below are considered by the UWRBC Steering Committee to be potential sources of pollution within the watershed. In order to minimize the water quality impacts associated with these areas, it will be important to target the implementation of management measures identified later in Table 5-1, Table 5-2, Table 5-3, and Table 5-4 toward these critical areas.

FAILING SEPTIC SYSTEMS

A source of the elevated pathogen bacteria in the watershed may be associated with improperly functioning, failed, or non-existent residential septic systems. Many factors can lead to the failure of a residential septic system; the age of the system, lack of regular maintenance to the system, and heavy clay soils. Within the Upper Wabash River watershed, the unincorporated areas lack a centralized sewage disposal system, limiting homeowners to on-site septic systems. It is crucial that these homeowners are equipped with the necessary information and knowledge as to the proper maintenance of the system to prevent failure. As the more populated areas of the City of Berne, the City of Bluffton, the Town of Bryant, the Town of Geneva, and the City of Portland continue to grow in size, it will become more feasible to provide sanitary sewer services to those residences in close proximity to these areas. The importance to provide a centralized sanitary sewer system is underlined by information prepared by Purdue University Extension onsite regarding wastewater disposal in Indiana. Adams County, according to 1990 US Census data had an approximate 4,300 households utilizing onsite wastewater disposal systems. Soils in Adams County considered to be severely limited for proper septic system function based on NRCS criteria was estimated to be 100%. Similarly, within Jay and Wells Counties there are an estimated 3,700 and 4,700 households respectively utilizing onsite wastewater treatment systems. Further, in each of Jay and Wells Counties more than 96% of the soils are classified by NRCS as severely limited for septic systems.

Residential on-site sewage systems located within the floodway or 100-year floodplain are at a higher risk of discharging improperly treated effluent, bacteria, and pathogens into receiving waterbodies. As the soils become saturated due to rainfall, and the receiving streams are inundated, there is little to no treatment occurring within the soil absorption field. Routine flooding of those systems located in the floodplain may also have detrimental effects on the individual components of the system.

The most critical are those areas within the watershed where a cluster of 20 or more rural homes with residential septic systems installed more than 10 years ago in soils with NRCS defined severe limitation for onsite wastewater disposal or treatment. Utilizing digital aerial photography, 8 clusters of septic systems as well as the Town of Linn Grove and the Town of New Corydon were identified and are shown on Exhibit 5. These clusters are all located near to the Wabash River or associated tributary streams and may provide concentrated loadings of nutrients and/or bacteria if several of these systems are failing to adequately treat the household wastes. Water quality monitoring should be initiated immediately upstream as well as immediately downstream of these areas to further assess the impact on water quality and macro-invertebrate communities.

Areas Prone to Flooding

Areas prone to flooding can also be sensitive to other issues related to water or habitat quality degradation, as well as cumulative effects of increased water quantity within the stream system. Poorly managed floodplains where increased construction or other land use changes have occurred result in increased vulnerabilities to the new structures and to downstream areas as well. If water is not allowed to infiltrate the soil layers due to increased impervious surfaces, runoff volumes and downstream loadings will be increased. These increased volumes of water may mobilize trees and other near stream debris creating the potential for in-stream obstructions or log jams.

The term "log-jam" is defined by the Indiana Administrative Code as the accumulation of lodged trees, root wads, or other debris that impedes the ordinary flow of water through a waterway. As these log jams are created, areas of significant erosion and streambank destabilization are created further degrading water quality through sedimentation. Log jams may range in severity from leaning trees that need to be removed and utilized to stabilize the nearby streambank, to areas requiring large excavation equipment from both the land and within the stream for proper removal. With each degree of severity and corresponding workload, restrictions and guidelines provided by IDNR and the US Army Corps of Engineers (USACE) must be adhered to rigorously. Plans of work and permits are also required for more intensive situations. Some areas in the Wabash River watershed are sensitive to log jams and associated debris deposition and/or increased streambank erosion. These areas, shown on Exhibit 5, were selected by the Adams, Jay, and Wells County Surveyors and are considered critical requiring constant observation and maintenance.

The risks to structural damages and watercourse damages can be decreased through preventative measures including detailed stream studies to establish floodways, floodplains, and base flood elevations. Utilizing the associated information will provide better knowledge regarding the stream and allow for proper floodplain management. Furthermore, the installation of United States Geological Survey (USGS) stream gages designed to monitor water quality, elevation, and flow will provide the necessary baseline information as well as information regarding low and high water events. Longevity of record for each gage is also important to monitor trends over several years. The combination of information obtained through detailed stream studies and long term monitoring can be valuable when proposing methods to prevent repeated flood events as well as reducing the impacts of flooding to water quality and personal property. Areas sensitive to repeated flooding, property damages and the locations of existing are identified on Exhibit 4.

Excessive Nutrients

Excessive nutrient inputs to the land often lead to phosphorus and nitrogen entering the waterways through surface and subsurface runoff. Phosphorus in excess of crop needs becomes soluble in subsurface runoff, whereas phosphorus bound to soil particles is lost to surface runoff. Managing the quantity and transport of phosphorus fertilizer reduces the loss to waterways. Nitrogen is often lost to surface and subsurface runoff due to its solubility in runoff. Locally, nitrate nitrogen is

commonly lost due to leaching and denitrification. Managing quantity and timing of nitrogen fertilizer application reduces the probability of nitrate loss to these processes.

Livestock manure may also contribute to excess nutrients in the watershed. Manure placement and timing is important for crop production, yet excess manure is lost to waterways. Nutrients that exceed crop use and soil holding capacity increase the likelihood of polluting waterways. Manure generated at approximately 39 facilities in the watershed is managed by IDEM regulations. However, there are approximately 384 hog operations, 904 cattle, and 224 poultry operations in Adams, Jay, and Wells Counties in addition to the regulated facilities. These facilities may not utilize manure management practices and are a priority for nutrient management programs.

The critical areas are those where applications have not been managed by amount, source, placement, form, timing or cover and lead to non-point source pollution. Reducing, trapping and/or avoiding excess nutrients entering waterways from agricultural lands can be accomplished by best management practices, including but not limited to, nutrient management, comprehensive nutrient management, conservation tillage, cover crops, buffer strips, or riparian buffers. Avoiding excess nutrients and controlling nutrient transport on agricultural fields is preferred for surface and subsurface runoff, while best management practices adjacent to waterways are preferred for surface runoff.

GULLY, SHEET AND RILL EROSION

Erosion occurs when wind or water runoff carries soil particles from one area to another. Sedimentation occurs when these soil particles are deposited into a receiving waterbody, such as a stream or a lake. These mobilized soil particles may become suspended within the water column, clouding the water which reduces the amount of sunlight reaching aquatic vegetation and obstructs the gills of aquatic organisms. Particles of silt and sand may eventually precipitate out of the water column settling on the streambed, effectively covering fish spawning areas, and smothering food supplies. Activities involving land disturbance such as conventional tillage methods, intensive livestock grazing with stream accessibility and removal of wooded areas are likely to increase sediment loadings to the watershed.

Gully formations on agricultural lands contribute to sedimentation problems in waterways. There are two classes of gully formation, ephemeral and classical. Gullies are considered classical when channels are too deep or wide to be tilled or filled; ephemeral erosion is defined as sheet and rill formation. The critical gully formations in the watershed are those that form on a positive gradient to a waterway equal to or greater than one percent and significantly contribute sediment to the waterway. The determination of this critical area will be made by evaluating soil, slope, gully dimensions, and proximity to the waterway. A diverse group of conservation practices, including but not limited to grassed waterways, conservation tillage, cover crops and critical area plantings are available to address these formations.