Comprehensive Watershed Plan Little Calumet River – Lake County Basin



Prepared for the:

Little Calumet River Basin Development Commission

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LIST OF ABBREVIATIONS

BMP	Best Management Practice
cfs	cubic feet per second
Commission	Little Calumet River Basin Development Commission
CN	Curve Number
DEM	Digital Elevation Model
DLZ	DLZ Indiana, LLC
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
ft	Feet
GIS	Geographic Information Systems
GPS	Global Positioning System
HSG	Hydrologic Soil Group
HUC	Hydrologic Unit Code
IDFM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
	Indiana Department of Transportation
ITR	Indiana Toll Road
	Little Calumet River Basin Development Commission
LCSO	Lake County Surveyor's Office
	Light Detection and Ranging
	Lake Michigan Coastal Program
	Lake Michigan Coastal Frogram
	Lake Michigan Coastal Glant Flogran
	Letter of Map Rovision
	Matropoliton Water Poolomation District of Croater Chicago
N	North
n n	Nonning 'n' volue
	Northwest Indiana Designal Dianning Commission
	Notional Land Cover Data
NDCS	Natural Resource Concernation Service (formerly SCS)
	National Resource Conservation Service (Ionneny SCS)
	Ordinary High Water Mark
	Dreiget Consultant Agreement
	Flow Rale (CIS)
	RaillOad
363 SDCF	Soli Conservation Service (currently NRCS)
SDCF	Save the Dunes Conservation Fund
	SER OI INUIANA, LLC
SK	State Road
SWDM	Storm Water Design Manual
	Time of Concentration
	lechnical Release
	United States
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
W	West
WWTP	Wastewater Treatment Plant

Preface "Blueprint to the Future"

The protection and enhancement of the Little Calumet River Watershed for those living within it is the principle charge of the Little Calumet River Basin Development Commission (Commission). The state legislature greatly expanded the Commission's responsibilities and opportunities with the authorization of House Bill 1264 last year. The Commission is no longer to be just the local sponsor of the Little Calumet River and its protective levee system, but the caretaker of the watershed within Lake



County. In the fulfillment its charge, the Commission has been entrusted with unique management and financial responsibilities not available to local units of government. These responsibilities are to be applied to ensure that water resource and other natural resource management decisions consider the impacts of the entire watershed, not constrained to political jurisdiction or community.

The Commission's foremost responsibilities include managing and protecting the quality and quantity of water located within the watershed. Furthermore, the Commission should understand and promote:

- Quality water in appropriate quantities is critical to the existence of a high quality of life among citizens residing within the watershed.
- The Watershed and its many resources must be managed in an integrated fashion so that the quality and quantity of all natural resources in the watershed is maintained and enhanced.
- The watershed and its related natural resources transcend ownership and political boundaries.
- Collaborative partnerships within and between the Commission and local jurisdictions are an especially important opportunity for managing and protecting watershed resources. The delivery of services holds priority over which entity delivers the services.
- Management and protection of watershed resources that involve more than one jurisdiction should generally be overseen by the Commission. Local units of government should generally be responsible for watershed resources that are contained within their jurisdiction.

- Local units of government should establish plans for addressing the consequences that land development may have on the quality and quantity of stormwater occurring within their jurisdiction and work collaboratively with the Commission on global watershed management.
- The watershed projects and programs that are funded by the special assessment be chosen in a fair and equitable way and implemented in efficient and effective manners.

With these ideals in mind, the Commission has moved to codify its goals by creating a Watershed Management Plan to help guide the Commission and its constituent communities. This plan might be better titled "Blueprint to the Future for the Little Calumet River Watershed".

This Plan has been developed as a holistic tool to assist the Commission in implementing programs and projects for the enhancement of the watershed. Section 1 discusses the Purpose and Need for the Plan by providing a look back at the why's and how's of the Commission and how the current legislation has changed from the originating legislation.



Section 2 provides an overview of the Little Calumet River watershed and subwatersheds, watershed planning efforts by the constituent communities and a discussion of the current hydraulic and hydrologic modeling for the river.

Section 3 discusses outreach efforts conducted with constituent communities and regulatory agencies regarding community watershed needs, challenges, opportunities and efforts. Outreach efforts included completing a watershed related questionnaire and interviews with municipal technical

personnel about their current efforts to manage stormwater from both a quantity and quality perspective. The questionnaire and interview helped develop a listing of watershed projects that were important to the community to manage their portions of the watershed. Projects from all of the communities together were grouped into opportunity categories. These opportunity categories included Regional, Semi-Regional, Local, Maintenance and Operational.

Regional Opportunities have the potential to positively impact water surface elevations of the Little Calumet River or its tributaries. These project locations include areas within the confines of the levee system or adjacent to a major tributary. Most of these projects consider conveyance improvements or creation or optimization of storage. A complete listing of the Regional Opportunities can be found in Table 3-1.

- Semi-Regional Opportunities have the potential to positively impact or reduce flooding along waterways through multiple jurisdictions. These projects were not confined to the Little Calumet River or its major tributaries. A complete listing of the Semi-Regional Opportunities can be found in Table 3-2.
- Local Opportunities have the potential to positively impact or reduce flooding within a single jurisdiction. These projects significantly reduce flooding locally, but do not necessarily affect the water surface elevations of the Little Calumet River. A complete listing of the Local Opportunities can be found in Table 3-3.
- Maintenance Opportunities consider wide ranging options from facilitating access

to hard to reach locations to culvert, bridge or waterway clearing. These projects are located throughout the watershed and were not confined to the levee system. A complete listing of the Maintenance Opportunities can be found in Table 3-4.

Operational Opportunities improve the operation of the flood control facilities as well as the understanding of the river's and watershed's behavior. These projects lead to more efficient operations and improved forecasting and planning efforts. A complete listing of the Operational Opportunities can be found in Table 3-5.



Section 4 of the Plan provides a summary of implementation strategies and opportunities identified in Section 3. Opportunities were further categorized into Commission-Lead Projects, Regional/Semi-Regional Commission Partnership Projects and Local Commission Partnership Projects.

- Commission-Lead Projects (Category 1 Projects) are those projects believed to be better lead by the Commission. These were global in nature, multijurisdictional and typically within the Little Calumet River proper. A complete listing of the Category 1 Projects can be found in Table 4-1.
- Regional/Semi-Regional Partnership Projects (Category 2 Projects) are those projects not necessarily focused on the Little Calumet River itself but are significant from a regional perspective. These projects could be lead by either the Commission or the local municipality with Commission participation in oversight and funding. A complete listing of the Category 2 Projects can be found in Table 4-2.
- Local Commission Partnership Projects (Category 3 Projects) are projects of a local nature within local watersheds. These projects are believed to be best managed, designed and constructed by local municipalities with the Commission

providing funding assistance. These projects could be selected by the Commission through an application and scoring process. Suggested questions and criteria for local projects can be found in Tables 4-3 through 4-5.

Section 4 of the Plan also brings attention to important "Quality of Life" opportunities. While safety from flood damage provides quality to properties along the waterways, these opportunities can go beyond flood control. Quality of Life opportunities focus on recreational; water quality and habitat enhancement; groundwater recharge; and sedimentation reduction. Many of the opportunities identified focused or included Quality of Life aspects. Quality of Life Opportunities are summarized in Table 4-6.

Section 5 of the Plan provides a discussion of budgetary considerations for implementing project opportunities. The section provides a review of the special assessment the Commission collects as a result of the current legislation, annual operational and maintenance budgets, pending capital projects the Commission is currently engaged in, funding options and a sample funding scenario.

The Commission was created out of need to fund and construct projects to protect people from flood damage. The project opportunities identified focus on needs arising out of development and reactionary watershed management efforts. One could say these projects attempt to fix "sins of the past". Municipal stormwater management efforts have greatly improved within the last decade; somewhat because of regulatory pressures, but also because of advancements in stormwater computation and management techniques. For the most part, the Commission's watershed municipal partners utilize best management efforts to control the quantity and quality of stormwater runoff within their political boundaries. These efforts, though, have been mostly limited to within their municipal boundaries.

What is/should be the big picture role of the Commission?

The Commission is in a unique position to take a leadership role in these independent efforts. The Commission can be the *"watershed champion"*; the regional catalyst that brings constituent communities together for proper watershed management. The Commission should be proactive to:

- Protect human live and permanent improvements that could be damaged by water from flood events.
- Seek to complete projects that are beneficial to the watershed and cost effective.
- Maintain the stability and capacity of watercourses; keeping them free of obstructions and pollution and maintained in as natural a condition as possible.
- Ensure appropriate consistency of stormwater management activities between municipalities in and adjacent to the Commission by increasing intergovernmental interaction and coordination.
- Increase public awareness, knowledge, consensus and involvement in improving water quality and natural resources within the watershed.

- Achieve a balance between protection and management of the watershed for continued economic growth and recreation.
- Understand the uniqueness of each sub-watershed and related water resources and to manage realistic water quality, quantity and ecological potential.
- Apply principles of land use and landscape design for minimizing stormwater runoff and maximizing water quality, wildlife and other amenities.

As a "Watershed Champion", how can the Commission encourage that these guidelines are being fairly and properly developed and embraced? The new legislation provides for the creation of a Project Advisory Board. This Board is to be comprised of stormwater technical personnel from each community. This Board can be useful in:

- > Developing proper stormwater guidelines by sub-watershed.
- > Vetting potential projects by reviewing and scoring funding applications.
- > Ensuring mutual cooperation between the Commission and the community.
- Ensuring transparency and accountability between the Commission and community.
- Provide a forum whereby watershed challenges and opportunities can be discussed and planned.

A number of recommendations are proposed in the Plan. In summary, the Plan recommends:

- The Commission becoming a watershed champion to facilitate and lead watershed efforts.
- Project opportunities to be considered by the Commission for reducing flooding and improving conveyances.
- > Creating an Asset Management Plan.
- > Updating Emergency Action Plans.
- Creating an application and vetting process for selecting projects for funding assistance.
- Requiring all projects receiving funding assistance from the Commission include water quality improvements to the maximum extent practicable.
- The Commission intensify its focus on efforts to complete its wetland mitigation requirements.
- Creating a short-term budget plan for developing projects and funding local opportunities until a long-term Capital Improvements Plan can be developed.
- > Develop budgets that:
 - Adequately fund annual maintenance and operational budgets.
 - Account for repayments to the RDA.

- Provide for funding Category 1, 2 and 3 opportunities at levels satisfactory to the Commission.
- Complete pending capital projects.
- Commit to a level of funding for large scale Category 2 projects so these projects can continue to move forward.
- Form and utilize the Project Advisory Board
- > Update the Plan as necessary to keep it current.

A stormwater management plan must be dynamic and ever changing just like the watershed itself. The Commission should continue to promote its goals and objectives through mutual interests in its partner communities to ensure a watershed with high-quality water, abundant and high-quality recreational facilities and diverse urban natural resources. This "Blueprint to the Future" helps strengthen the Commission as a resource to those within the watershed.

1 Purpose and Need

This section provides a brief overview of the Little Calumet River levee system and its history. Preparation of this document is a result of IC 14-13-2 (Appendix A). Accordingly, the plan focused on developing watershed opportunities in the Lake County, Indiana portion of the Little Calumet River (LCR) Watershed <u>only</u>.

1.1 History of the Levee System

The LCR watershed extends from the Cal-Sag Channel in Illinois eastward into LaPorte County, Indiana. It covers portions of Cook County and Will County, Illinois, and Lake, Porter, and LaPorte County, Indiana. See Figure 1-1. Its total drainage area is approximately 587 square miles. The river's main tributaries are Thorn Creek, Midlothian Creek, and Calumet Union Drainage Ditch in Illinois and Hart Ditch, Deep River, Salt Creek, and the East Branch of the LCR in Indiana. This plan will focus on the Hart Ditch and Deep River tributaries within Lake County, Indiana. Runoff west of the Hart Ditch confluence in Munster is carried westward to Illinois. Water within the LCR east of the Hart Ditch confluence is conveyed eastward to Burns Ditch in Portage. Further discussion regarding the LCR watershed is provided in Section 2 of this report.

In 1982, in response to flooding and the resulting damage along the LCR in Indiana, the US Army Corps of Engineers (USACE) was authorized under Section 101 of the Water Resources Development Act of 1976 to prepare a General Design Memorandum (an engineering and design report). Portions of the design in the Memorandum were authorized for construction under Section 401 of the Water Resources Development Act of 1986. The purpose of the project was to construct a system of structural levees and floodwalls along the river to help prevent flooding of commercial and residential areas as well as transportation corridors; and to create a system of recreational facilities to encourage the conservation and appreciation of the natural resources within the river corridor. The system would provide flood protection up to the 200 year level (0.5% chance of occurrence in any one year).

USACE projects include a local governmental sponsor. The LCR Basin Development Commission was created to act as the local sponsor. A Project Cooperation Agreement (PCA) was signed between the USACE and the Commission in 1990. According to the PCA the USACE is responsible for the planning, design and construction of the project while the Commission is responsible for providing the local share of the funds, securing land, utility relocations, and operating and maintaining the system once the project is complete. The project was funded by a 75 percent federal share and a 25 percent nonfederal share.



Figure 1-1: Little Calumet River Watershed

The project involved construction of 9.7 miles of levees in Gary and Griffith; 12.2 miles of flood protection in Hammond, Highland and Munster; a flow diversion structure at the Hart Ditch confluence; seven miles of channel modification; bridge modifications at Grant Street, Burr Street and Hohman Avenue; four pumping stations; and wetland mitigation. Construction of the project was divided into eight geographical stages totaling over 39 construction projects. See Figure 1-2. The first project was awarded in 1990. To date, 31 contracts have been awarded. The project is nearly complete.



Figure 1-2: Little Calumet River Levee System (Source: USACE)

1.2 Historical Rain Events

Flooding is not new to communities surrounding the LCR. During the period October 9-11, 1954 the 24-hour rainfall in the area was the greatest in 69 years. The 48-hour total was the greatest in 84 years. Damage from this period was estimated to be \$217 million (in 2011 dollars).

On November 28, 1990 the river reached a new historical crest at Munster of 17.03 feet. Nearly 400 people in the Wicker Park Estates subdivision, east of Indianapolis Boulevard in Highland, had to be evacuated. Damage from this event was estimated to be \$288 million (in 2011 dollars).

On September 13, 2006 torrential rainfall caused \$131 million (in 2011 dollars) in damages in the Towns of Highland and Griffith. The USACE estimated the amount of precipitation was nearly a 600 year event. This event was unusual in that it was localized to the eastern Highland area. Most of the damage was caused by the limitations of interior drainage system flooding and not the river.

The river crested to an elevation of 14.88 feet on August 25, 2007. Rains caused flooding at Indianapolis Boulevard in the area of Cabela's commercial development and even caused stretches of the Borman Expressway to be closed for three days. Estimated damages from this event are upwards of \$217 million (in 2011 dollars).

One of the more recent flooding events was that of September 12-15, 2008. The river crested at a historical elevation of 17.29 feet. Three day totals of the rainfall in the area were between 8 and 13 inches. Two important weather conditions combined to create this extreme rainfall event. Considerable rainfall on the 12th and 13th fell on already saturated soils. Additional rainfall fell on the 14th as remnants of Hurricane Ike moved into the region. Flooding was widespread, causing all six counties in northwest Indiana to be declared Federal Disaster Areas. The most severe damage occurred in the communities directly adjacent to the river. Damages were estimated at \$881 million (in 2011 dollars).

Most recently, on April 18, 2013 storms dumped over 2.5 inches of rain in Northwest Indiana. Flooding in the area was limited to streets. The river reached and elevation of 15.2. Calumet, Columbia and Northcote Avenues over the LCR were closed for preventative measures. No homes were reported to be flooded. It appears the recent efforts of the Commission and USACE have had positive results on the surrounding communities.

Figure 1-3 provides a chart of the 30 highest crest elevations recorded between 1959 and 2011 in Munster. Two events were at or above major flood stage and thirteen were above the moderate flood stage level. Action stage, flood stage, moderate flood stage, and major flood stage levels are plotted on the figure for reference.



Figure 1-3: Historical Crests for Little Calumet River at Munster (Source: water.weather.gov)

1.3 Current Legislation and Requirements

In March of 2012, Indiana Governor Mitch Daniels signed into law legislation changing the Commissions existing statute. The legislation (codified in IC 14-13-2) is included in this plan as Appendix A. The legislation:

- Modified the charge of the Commission from oversight over the LCR only to the entire LCR Watershed.
- > Added four additional Commission members.
- > Created a permanent funding source for the Commission.
- Created a project advisory board.

Funding for the repair, maintenance and completion of the system has always been a challenge for the Commission. The new law introduced an annual fee for all property owners within the LCR watershed. According to the non-partisan Legislative Services Agency, the fee should generate approximately \$7.3 million per year. The funds may

be used for expenses directly related to the operation, repair and maintenance of flood protection systems within the entire watershed with the USACE project areas. A portion of the funds for the first five years will repay an emergency loan provided by the Regional Development Authority following the 2008 flood.

The law also creates an advisory board consisting of one member appointed by the executive of each municipality located within the watershed and one member appointed by the Board of County Commissioners of Lake County. Members of the advisory board must have experience in designing, constructing, maintaining, or managing drainage or flood control facilities in the watershed. This advisory board can ensure mutual cooperation between the commission and their constituent communities as well as accountability and transparency.

2 Existing Conditions

The purpose of this section is to provide an overview of the LCR Watershed and to provide a general understanding of the sub-watersheds that comprise the overall watershed.

2.1 Overview

The LCR watershed extends from the Cal-Sag Channel in Illinois eastward into LaPorte County, Indiana. It covers portions of Cook County and Will County, Illinois, and Lake, Porter, and LaPorte County, Indiana. See Figure 1-1. Its total drainage area is approximately 587 square miles. The river's main tributaries are Thorn Creek, Midlothian Creek, and Calumet Union Drainage Ditch in Illinois and Hart Ditch, Deep River, Salt Creek, and the East Branch of the LCR. This plan will focus on the Hart Ditch and Deep River tributaries within Lake County, Indiana. Runoff west of the Hart Ditch confluence in Munster is carried westward to Illinois. Water within the LCR east of the Hart Ditch confluence is conveyed eastward to Burns Ditch in Portage.

The LCR drains approximately one-third of Lake County, Indiana, or 203 square miles. Fifteen Lake County municipalities plus portions of unincorporated Lake County drain to the LCR via over 280 miles of mapped open drains. Table 2-1 provides a listing of each municipality and unincorporated area and their respective percentages and total areas occupying the LCR watershed in Lake County. Unincorporated Lake County, followed by the Town of Merrillville and the City of Hobart comprise the greatest governmental jurisdictional areas that drain to the LCR.

Table 2-1 Area and Percentage of Municipality Occupying the Little Calumet River Watershed in Lake County						
Municipality	Percentage of Total Area	Area (square miles)				
Cedar Lake	0.3%	0.59				
Crown Point	7.7%	15.58				
Dyer	3.0%	6.05				
Gary	8.8%	17.86				
Griffith	3.5%	7.17				
Hammond	3.0%	6.17				
Highland	3.4%	6.96				
Hobart	13.1%	26.59				
Lake Station	4.1%	8.27				
Merrillville	16.4%	33.31				
Munster	3.8%	7.62				
New Chicago	0.3%	0.65				
Schererville	6.7%	13.63				

Table 2-1 Area and Percentage of Municipality Occupying the Little Calumet River Watershed in Lake County					
Municipality	Area (square miles)				
St. John	1.9%	3.78			
Winfield	5.3%	10.81			
Unincorporated	18.6%	37.79			
	Total	202.83			



Figure 2-1: Chart Representing Percentage of Municipality Area Comprising the LCR Watershed within Lake County

Five major waterway systems are located within the LCR watershed in Lake County. These include Beaver Dam Ditch, Cady Marsh Ditch, Deep River, Hart Ditch/Plum Creek, and Turkey Creek. A breakdown of major waterways and associated drainage area is provided in Table 2-2. Aside from areas draining directly to the LCR, Beaver Dam Ditch and Turkey Creek comprise the greatest area of the five major waterways.

Table 2-2 Percentage of Total Area of Watershed for Each Major Tributary						
Major Waterway	Percentage of Total Area	Area (square miles)				
Beaver Dam	25%	50.64				
Cady Marsh Ditch	8%	16.28				
Deep River	16%	32.76				
Hart Ditch	11%	22.39				
Little Calumet River	21%	42.52				
Turkey Creek	19%	38.21				
	Total	202.83				



Figure 2-2: Chart Representing Percentage of Area of Major Waterway Comprising the LCR Watershed within Lake County

Table 2-3 Percentage of Municipal Land that is in the LCR Watershed within Each Maior Tributary						
Municipality	Beaver Dam Ditch	Cady Marsh Ditch	Deep River	Hart Ditch	LCR	Turkey Creek
Lake County	52%	10%	8%	11%	2%	17%
Cedar Lake	100%	0%	0%	0%	0%	0%
Crown Point	99%	0%	0%	0%	0%	1%
Dyer	0%	0%	0%	100%	0%	0%
Gary	0%	4%	0%	0%	86%	10%
Griffith	0%	58%	0%	0%	18%	24%
Hammond	0%	0%	0%	0%	100%	0%
Highland	0%	53%	0%	6%	42%	0%
Hobart	0%	0%	72%	0%	19%	9%
Lake Station	0%	0%	0%	0%	100%	0%
Merrillville	16%	0%	28%	0%	0%	56%
Munster	0%	3%	0%	72%	26%	0%
New Chicago	0%	0%	0%	0%	100%	0%
Schererville	0%	28%	0%	34%	0%	38%
St. John	7%	0%	0%	47%	0%	46%
Winfield	86%	0%	14%	0%	0%	0%
Total	25%	8%	16%	11%	21%	19%

2.2 Western Watersheds of the LCR in Lake County

The western watersheds of the LCR within Lake County include Hart Ditch/Plum Creek, and Cady Marsh Ditch. See Figure 2-3. These watersheds have been studied significantly over the years by the Lake County Surveyor's Office (LCSO) and local communities primarily because many of the regulated drains are located within these watersheds and the watersheds are significantly populated.

These watersheds have also experienced significant recent flooding. In 2006 the Town of Highland experienced rainfall in excess of the statistical 600-year event (Source: USACE). Numerous houses suffered serious damage flooding due to interior drainage issues (behind the levee). Homes and roads within the Cady Marsh Ditch watershed were also affected. In 2008, widespread flooding occurred across the entire LCR basin from Portage west to Illinois due to a period of wet weather followed by storms generated by remnants of Hurricane Ike. Flows exceeded the capacity of many local streams banks in addition to flooding of properties adjacent to the LCR.

Communities generally in the western watersheds include Dyer, Munster, Highland, and parts of Griffith, Schererville, and St. John. There are also unincorporated Lake County areas in these watersheds.



Figure 2-3: Western Watersheds of the Little Calumet River in Lake County

2.3 Eastern Watersheds of the LCR in Lake County

The eastern watersheds of the LCR in Lake County include Beaver Dam Ditch, Turkey Creek, and Deep River. See Figure 2-4. These watersheds contain more rural properties and contain large areas of undeveloped farmland, wetlands, and forested areas.

The LCSO conducted studies on Turkey Creek and various laterals of Beaver Dam Ditch. However, much of the Deep River Watershed generally remains unstudied. Despite its size and importance for flow, much of Deep River is not in the Lake County inventory of regulated drains.

Lake George in Hobart lies in line with Deep River and is one of the largest stormwater impoundment areas within the LCR watershed. Lake George not only functions as a flood control and recreational facility, but it also tends to trap significant amounts of sediment from upstream areas of Hobart, Merrillville, Winfield, Crown Point, Schererville, and unincorporated Lake County. Significant areas of agricultural land drain to Lake George.



Figure 2-4: Eastern Watersheds of the Little Calumet River in Lake County

2.4 Direct Little Calumet River Watershed

Five communities have large contributing drainage areas draining directly into the LCR. These communities include Hammond, Gary, Munster, Highland, and Griffith. See Figure 2-5. These communities are directly impacted by the river levels within the levee system. The communities rely heavily on interior drainage components such as pump stations, slide gates, and flap gates. These communities have historically been prone to the most serious of flooding by the LCR. They are also on the receiving ends for flows from the major tributaries throughout the watershed.

Table 2-3 identifies the percentage of land for each municipality within each major tributary to the LCR.



Figure 2-5: Direct Little Calumet River Watershed in Lake County

2.5 Local Community Watershed Planning Efforts

From a philosophical planning perspective, the main goal of stormwater management planning would be to keep stormwater away from areas it is not wanted (development areas) and move it to areas it is wanted (conveyance systems and storage areas). Ideally development would be planned only on high ground, far enough away from waterways and flood plains to prevent flood damage.

Unfortunately for most of the LCR Watershed, this type of planning did not happen before development occurred. For the last twenty years or more the Commission has been working in reverse to protect development from floodwaters. Decades of development along the river and its tributaries have "eaten up" flood plain storage areas.

Stormwater detention in new developments is a relatively recent tool for management of

stormwater. Technological advances yielding better rainfall data, better topographic mapping information (aerial photography and LIDAR) and hydraulic modeling software has led to more accurate predictions of stormwater runoff and how the conveyance systems will react to rainfall. Areas in the southeastern portion of the watershed, upstream of Lake George, are still rural and can benefit from lessons learned from older communities (e.g. Beaver Dam Ditch, Turkey Creek).

One of the tasks for the development of this plan was to determine how the watershed communities were managing their stormwater. Do communities within the LCR watershed have Stormwater Management Plans? What ordinances or policies are in place to properly manage stormwater? What water quality policies and practices are utilized? Some of the key elements to a stormwater management plan include:

- > Delineated watershed boundaries.
- Identified land uses to understand development densities and project impervious areas.
- Methods to quantify stormwater runoff rates and volumes including understanding rainfall data, types of land cover and soil types.
- Confirmation that conveyance systems adequate to properly convey stormwater runoff.
- Requirements for stormwater storage and flood plains to store stormwater and to protect development during heavy rains.
- Identified water quality features to protect habitat and prevent scouring.
- Continued maintenance efforts to protect the stormwater system.
- Identified recreational opportunities that stormwater systems present.
- Emergency action plans.

By and large, most of the communities have adopted formal stormwater policies and/or ordinances. All have adopted IDNR's model stormwater ordinance allowing the communities to participate in the Federal Flood Insurance Program. Most have adopted compensatory storage requirements to maintain flood plain area. All are advancing their Municipal Separate Storm Sewer System (MS4) programs to prevent erosion and improve stormwater quality. Communities along the LCR have adopted Emergency Action Plans for preventing flood water from escaping the levee system.

The Commission should be encouraged by the advancements the watershed communities have made over the past decade to manage their stormwater. Table 2-5 summarizes the findings regarding Local Community Watershed Planning Efforts.

Current and future trends in stormwater management now include taking a broader, more regional perspective of stormwater management by looking outside the municipal boundaries. The Commission brings a unique opportunity for communities to do this in the future.

Table 2-4 Summary of Watershed Planning Efforts by Municipality									
Community	Mapped Watershed Boundaries	Mapped Land Uses	Stormwater Management Ordinance	Storage Requirements	Compensatory Storage Requirements	Water Quality Policy	Maintenance Policy	Recreational Opportunities	Emergency Action Plans
Cedar Lake	~	~	~	~	~	~	As needed	As available	
Crown Point	✓	~	✓	~	~	~	As needed	As available	
Dyer	~	~	✓	~	~	~	As needed	As available	
Gary	✓	✓	✓	Unknown	Unknown	~	As needed	As available	✓
Griffith	✓	~	✓	~	Unknown	~	As needed	As available	~
Hammond	~	✓	✓	~	V	~	As needed	As available	~
Highland	✓	✓	✓	~	✓	~	As needed	As available	~
Hobart	✓	✓	✓	~	✓	~	As needed	As available	
Lake County	✓	✓	✓	✓	V	~	As needed	As available	
Lake Station	✓	✓	✓	~		~	As needed	As available	
Merrillville	✓	✓	✓	~	✓	~	As needed	As available	
Munster	~	~	✓	~	~	~	As needed	As available	~
New Chicago	~	Unknown	~	Unknown	Unknown	~	As needed	As available	
Schererville	~	~	~	~	~	~	As needed	As available	
St. John	~	~	~	~	~	~	As needed	As available	
Winfield	~	~	~	~	~		As needed	As available	

2.6 Hydraulic Modeling

Hydraulic modeling is a tool of many stormwater management plans and programs and are in existence for many locations throughout the watershed. The process of hydraulic modeling tests rainfall and storm events against real world parameters of the stormwater management system (e.g. ditches, ponds, sewers). These tests produce outputs which can be used to predict the performance of and the way the stormwater management system operates under existing or proposed conditions.

All too often, hydraulic/hydrologic modeling is foregone and cast aside by communities because the decision makers have an easier time justifying the use of public money on tangible items such as the construction of storm sewers, detention basins, or culverts. They may also feel the money and time spent performing the hydrologic/hydraulic modeling is wasted. But in many cases, hydraulic/hydrologic modeling is a great tool to help ensure the public's money is spent wisely. Many times, modeling is the only tool that can be used to determine the selection of an alternative out of a pool of alternatives

that may be thousands, hundreds of thousands, and even millions of dollars different from one another. Considering this, modeling is a valuable and useful investment. Modeling can also:

- Provide a "what if" tool for training and scenario evaluation (levee breaches and/or failures, blockages, etc.);
- Provide a "what if" tool for understanding river response to various hydrologic conditions (hurricane remnants, heavy rainfall over part or all of the watershed, etc.);
- Provide a tool to understand impacts to the river and watershed related projects (regional storage, bridge replacements, etc.);

In the 1980s and 1990s, the USACE developed hydraulic models of the LCR. This model is a tool which predicts the 100-year and 200-year water elevations in the LCR. The model was recently upgraded to the USACE HEC-RAS and HEC-HMS software. These models are powerful tools that can be used to help predict "what if" scenarios such as those generated by common and uncommon rain events across portions of or the entire the watershed. The model can be used to predict the effects of proposed flood control projects within the watershed. According to the USACE, the model was last calibrated to a 1989 and 1990 storm event. Calibration to historical events increases the accuracy of the results of the model. It should be noted that the events this model has been tested against occurred prior to the construction of the majority of the LCR levee system. Figure 2-6 denotes the hydraulic profiles of the LCR in relation to the floodwall/levee.

Because the models have not been recently calibrated and/or verified, there are limitations. While un-calibrated, non-verified models may still provide a tool to understand relative differences between proposed alternatives, its results may be less reliable when trying to determine the true magnitude of the issue or result.



Figure 2-6: Hydraulic Profiles of the Little Calumet River in Lake County

3 Identification of Opportunities

A primary objective of this plan was to identify opportunities within the LCR watershed to improve the quality of life by reducing flooding and improving recreational and environmental aspects within the watershed. This section describes the process used to identify these opportunities. It also provides a description of each identified opportunity. Note that the order in which each opportunity is presented in this section is not of any particular significance or importance.

3.1 Identification Process

Interviews, collection of data, and data screening were used to develop the list of opportunities within the watershed.

3.1.1 Interviews with Municipalities

DLZ and SEH staff conducted separate meetings with each of the 15 municipalities within the watershed plus the Lake County Highway Department and the Lake County Surveyor's Office (LCSO). Technical staff (e.g. public works director, town/city engineer, town consultant, town manager) was invited to attend the meetings. They were provided an advance questionnaire containing questions relating to stormwater concerns and policy within and outside of their community.

Response to these initial questionnaires varied significantly by community. Some communities did not respond. Others provided detailed documentation. It was evident that stormwater management played varying roles in each of the different communities depending upon historical flooding experience and/or available resources (e.g. financial, manpower). In many cases, much of the information used to develop this plan was gathered during the interview(s) and follow up telephone/e-mail conversations.

The interviews were held over a several month period beginning in March 2013. Aerial mapping of the municipality was provided at each meeting and discussions ensued regarding watershed related issues. Locations of each area of concern or opportunity were marked on the map. Meeting minutes were prepared for each municipality, and forwarded to each of the municipalities to provide them with an opportunity make additions or corrections. Final meeting minutes are provided in Appendix B.

3.1.2 Interviews with Commission Personnel

Several meetings were conducted with Commission personnel. Topics reviewed ranged from known operational and maintenance concerns to possible

watershed improvement opportunities. Meeting minutes of the initial data gathering meeting with Commission personnel are provided in Appendix B.

3.1.3 Interview with the USACE

A telephone interview was conducted with USACE technical staff. The staff interviewed had extensive understanding of the hydraulics and hydrology of the LCR and its levee system as they were involved in many of the hydraulic studies over the course of the past couple decades. Items discussed included but were not limited to: the existing hydraulic and hydrologic model of the LCR and watershed; utilization of existing storage within the levee confines; and interaction of the LCR in Lake County, Indiana with its adjacent segments in Illinois and Porter County. The USACE provided technical documentation pertaining to the development of the model and even helped to establish connections with the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC) for obtaining a more complete and up to date hydraulic and hydrologic model of the LCR system. Meeting minutes of this interview are provided in Appendix B.

3.1.4 Data Organization/GIS

Meeting minutes were reviewed and each opportunity described by the municipality was given a unique identifier. The unique identifier consisted of the name of the municipality followed by the item number which described it in the municipality's respective meeting minutes. For example, the fifth item discussed in the Town of Dyer meeting was logged as item #5 in the meeting minutes. The unique identifier for that item is "Dyer 5". Not all items discussed received unique identifiers.

The unique identifier along with information about the opportunity such as watershed, name of opportunity, location, opportunity benefits, costs, etc. were input into a master spreadsheet. Physical locations of each opportunity were input into GIS on top of an aerial photography base map. The spreadsheet and the GIS were linked for further analysis. A plot of the resulting opportunities across the watershed is provided Appendix C.

3.1.5 Other Observations

During review of opportunities across the watershed, DLZ and SEH staff made other observations to determine additional opportunities within the watershed. These opportunities were given unique identifications of "General", followed by a unique numeral. Some of these opportunities do not appear on the GIS base map (described in the following subsection) as they are general, across the watershed operation or maintenance opportunities.

3.1.6 Field Reconnaissance

Field reconnaissance provided a means to understand not only the watershed, but the levee system, and how they function and operate. Field reconnaissance was conducted during the preparation of this plan in a variety of means (e.g. during rain events, from streets intersecting the levee, and even by bicycle along portions of the levee that could be traversed by bicycle).

One day of important reconnaissance occurred during the development of this plan on April 18, 2013. This was a day of significant rain occurring after a weeks of wet weather. During this reconnaissance, flood fighting precautions were observed at the Columbia Avenue Bridge as shown in the following photograph. More photographs taken during the April 18, 2013 storm event are provided in Appendix D.



Photograph 3-1 Closure Device Installed at Columbia Avenue Bridge (April 18, 2013)

3.2 **Opportunity Categories**

The LCR watershed is made up of many components that work together to convey and store stormwater. Both conveyances and storage play important roles in a watershed. They can both keep an area from flooding if managed properly. Conveyances play the important role of carrying stormwater to the outfall. Storage plays a vital role in the

attenuation of downstream flood flows, the recharge of groundwater, enhancement of water quality, and enhancement of wildlife habitat. Conveyances include streams, channels, waterways, culverts, sewers, and even overland routes (e.g. roadways, fields). Storage occurs in flood plains, depressional areas, detention basins, retention basins, and natural and constructed wetlands.

In an effort to enhance the performance of the watershed, opportunities to improve conveyance and storage of stormwater were solicited through the preparation of this report. They are further categorized into the following: regional, semi-regional, local, maintenance, and operational and are generally defined as follows:

<u>Regional Opportunity</u> – Regional opportunities have the potential to positively impact water surface elevations or operational characteristics of the LCR or its major tributaries (e.g. Deep River, Hart Ditch).

<u>Semi-Regional Opportunities</u> – Semi-Regional opportunities have the potential to positively impact or reduce flooding and/or maintainability along waterways through multiple jurisdictions and are not necessarily along the LCR, Deep River, or Hart Ditch. They may also be opportunities where significant benefit may be achieved in one jurisdiction.

<u>Local Opportunities</u> – Local opportunities have the potential to positively impact or reduce flooding and/or maintainability along waterways through a single jurisdiction.

<u>Maintenance Opportunities</u> – Maintenance opportunities are wide ranging from facilitating access in hard to reach locations within the river to culvert, bridge, or waterway clearing, cleaning, and dredging. Maintenance opportunities may be realized throughout the watershed from the upstream reaches to the LCR itself.

<u>Operational Opportunities</u> - Operational opportunities provide for improved operation of flood control facilities as well as understanding of the river and watershed and its behavior. Implementation of these opportunities can lead to more efficient operations and improved forecasting and planning for flood events. Operational opportunities may be realized throughout the watershed.

Locations of many opportunities identified in this report are shown in Appendix C.

3.3 Regional Opportunities

Regional opportunities have the potential to positively impact water surface elevations or operational characteristics of the LCR or its major tributaries (e.g. Deep River, Hart Ditch). These opportunities may be projects located within the confines of the levee system, or they may be projects located outside the confines of the levee system on a major tributary to the LCR (e.g. Deep River, Hart Ditch). The following table summarizes regional opportunities identified during development of this plan. Following the table, general descriptions are provided for each regional opportunity.
Table 3-1							
		Summary of Region		S Maion	N dia a a		
Unique ID	Community			Waj01	Wilnui Watershed		
Lake County 3	Lake County	Deep River - Storage Opportunity	Upper Beaver Dam Ditch Detention	Beaver Dam Ditch	Beaver Dam Ditch		
Dyer 1	Dyer	Hart Ditch - Storage Opportunity	Longwood Golf Course Regional Detention Facility	Hart Ditch	Hart Ditch		
Dyer 3	Dyer	Hart Ditch - Storage Opportunity	Hart Ditch Widening (EJ&E RR to Main Street)	Hart Ditch	Hart Ditch		
Dyer 6	Dyer	Hart Ditch - Storage Opportunity	Hart Ditch On-Line Floodwater Storage Alternative	Hart Ditch	Hart Ditch		
Dyer 7	Dyer	Hart Ditch - Storage Opportunity	Cook County Detention Facilities Alternatives	Hart Ditch	Hart Ditch		
Dyer 8	Dyer	Hart Ditch - Storage Opportunity	14-Acre Parcel Storage Project	Hart Ditch	Hart Ditch		
LCRBDC 1	LCRBDC	Little Calumet River - Conveyance Opportunity	Realignment of Hart Ditch at Confluence with LCR	Little Calumet River	Hart Ditch		
LCHWY 16	LCHWY	Little Calumet River - Conveyance Opportunity - Bridge Reconstruction	Harrison Avenue Bridge Reconstruction	Little Calumet River	Little Calumet River		
LCRBDC 6	LCRBDC	Little Calumet River - Conveyance Opportunity - Bridge Reconstruction	Kennedy Avenue Bridge Reconstruction	Little Calumet River	Little Calumet River		
Griffith 3	Griffith	Little Calumet River - Storage Opportunity	River Road Levee Project Completion	Little Calumet River	Little Calumet River		
General 8	General	Little Calumet River - Storage/Conveyance Opportunity	Thorn Creek Diversion Alternate Operation or Modifications Study	Little Calumet River	Little Calumet River		
LCRBDC 5	LCRBDC	Little Calumet River - Storage/Conveyance Opportunity	Conveyance Improvements from Hart Ditch to Kennedy Avenue	Little Calumet River	Little Calumet River		
General 2	General	Little Calumet River/Deep River - Confluence Improvement Opportunities	Storage Adjacent to LCR at I65/I80	Little Calumet River	Little Calumet River		
General 4	General	Little Calumet River/Deep River - Confluence Improvement Opportunities	Burns Ditch Conveyance Improvements	Little Calumet River	Little Calumet River		
General 5	General	Little Calumet River/Deep River - Confluence Improvement Opportunities	Deep River Deep Tunnel	Deep River	Deep River		
Lake Station 3	Lake Station	Little Calumet River/Deep River - Confluence Improvement Opportunities	Deep River Dam Rehabilitation Project	Deep River	Deep River		
Lake Station 7	Lake Station	Little Calumet River/Deep River - Confluence Improvement Opportunities	Lake George Dam Control Policy	Deep River	Deep River		

Table 3-1 Summary of Regional Opportunities								
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed			
LCRBDC 15	LCRBDC	Little Calumet River/Deep River - Confluence Improvement Opportunities	I-65/I-94 Interchange Storage Area Repairs	Little Calumet River	Deep River			
LCRBDC 18	LCRBDC	Little Calumet River - Conveyance Opportunity - Bridge Reconstruction	Georgia Street Approach	Little Calumet River	Little Calumet River			
LCRBDC 19	LCRBDC	Little Calumet River - Conveyance Opportunity - Bridge Reconstruction	Broadway Bridge and Approach	Little Calumet River	Little Calumet River			
LCRBDC 20	LCRBDC	Marshalltown Levee		Little Calumet River	Little Calumet River			

3.3.1 Deep River – Storage

Opportunity for regional storage and water quality enhancements in the Deep River watershed exists as there is a significant amount of undeveloped land.

3.3.1.1 Upper Beaver Dam Ditch Detention (Lake County 3)

The Upper Beaver Dam Ditch Detention project provides the opportunity to potentially store a volume of stormwater in excess of 1,400 acre-feet with relatively minor construction. To put this volume into perspective, 1,400 acre-feet is the equivalent of 2.2 square miles of water one-foot high.

Storage would be created by constructing a control structure with the culvert under the abandon railroad bed east of Clark Street located along tributaries of Beaver Dam Ditch, northwest of Crown Point. Temporary flooding of wetlands upstream could be confined to property mostly located on County property. Clark Street would need to be elevated to keep it above the new storage elevation. Smaller detention volumes could be achieved by constructing a control structure at Clark Street, but would still require elevating the roadway. See Figure 3-1.



Figure 3-1

Watershed Tributary to the Upper Beaver Dam Detention Project (Lake County 3)

The project would provide direct flood benefit to unincorporated Lake County and Crown Point with benefits potentially reaching further downstream in Merrillville, Hobart, and Lake Station. In addition to flood reduction, the project would also enhance water quality by settling suspended solids.

The project is in its conceptual phase at this time. Watershed and storage volume estimates have been computed. It is being pursued by the LCSO. No costs for construction have been estimated at this time, but the cost to benefit ratio of this project could prove significant.

3.3.2 Hart Ditch – Storage

Opportunity for regional storage in the Hart Ditch watershed within Indiana is limited due to existing high population density and limited land availability.

However, opportunities exist when looking beyond the County and State borders. This is evident by the Longwood Golf Course Regional Detention Facility located in Illinois just west of Dyer.

3.3.2.1 Longwood Golf Course Regional Detention Facility (Dyer 1)

The Longwood Golf Course Regional Detention Facility provides opportunity to store in excess of 1,000 acre-feet of stormwater. This project has been studied by the Town of Dyer for the last several years and was prompted by significant historical flooding, most notably the flood of 2007 which closed down St. Margaret Mercy Hospital for a several week period due to direct flooding by Hart Ditch.

This project would provide direct benefit to the Town of Dyer and the Hart Ditch/Plumb Creek watershed. Benefits may be observed along Dyer Ditch in the Town of Schererville, and along Hart Ditch in the Towns of Munster, Highland, and Hammond. Preliminary investigations conducted by Dyer conclude permitting will be minimal and that there are no archeological concerns with the property.

While the project is in the final study phases, partnerships are being developed between the Town of Dyer, St. Margaret Mercy Hospital, Cook County, and the Metropolitan Water Reclamation District of Greater Chicago. The addition of the Commission as a partner could further enhance this partnership.

The project is estimated at a cost of \$20.8 million (Costs provided by others and are in Year 2010 Dollars) and does not include land acquisition. It is likely this project will require funding from a multitude of sources. However, this project may provide the Commission the opportunity to match a percentage of funds contributed by other partnerships over the course of one or more years.

As with any storage facility, the potential exists for the development of water quality features within the facility. This aspect should be considered by Dyer and other partners if this project were to move forward.



Figure 3-2: Location of the Longwood Golf Course Regional Detention Facility (Dyer 1)

3.3.2.2 Other Hart Ditch Storage Opportunities (Dyer 3, Dyer 6, Dyer 7, and Dyer 8)

As part of their due diligence, the Town of Dyer reviewed several alternatives to the Longwood Golf Course Regional Detention Facility. These include:

- Hart Ditch Widening (Dyer 3);
- Hart Ditch On-Line Floodwater Storage Alternative (Dyer 6);
- Cook County Detention Facilities Alternative (Dyer 7)
- 14-Acre Parcel Storage Project (Dyer 8)

Each of these alternatives provided some local relief to flooding within the Town of Dyer limits, but significant effects were not realized downstream in other communities. Nor were the effects within the Town of Dyer as significant as with the Longwood Golf Course Regional Detention Facility. Costs for these projects ranged from \$2m to over \$20m.

These projects would more appropriately be placed within the local project discussion of this report; however, since they were evaluated by the Town of Dyer as alternatives to the Longwood project, they are mentioned in this section. Initial indications are that it would be more appropriate for the Commission to partner on the Longwood Regional Detention Basin project in-lieu of these projects as the Longwood Regional Detention Basin more appropriately meets the flood control needs.

3.3.3 Little Calumet River Conveyance

Opportunity for improved conveyance within the LCR confines exists at several locations. These opportunities include channel improvements, bridge reconstruction, storage improvements/construction, and confluence improvements.

3.3.3.1 Realignment of Hart Ditch at Confluence with Little Calumet River and Conveyance Improvements from Hart Ditch to Kennedy Avenue (LCRBDC 1 and 5)

Hart Ditch confluences with the LCR at an angle close to perpendicular. As the desired overall direction of water flow within the LCR is eastward from this location, it may be beneficial to realign the confluence of Hart Ditch and the LCR to promote this hydraulic condition. In addition, the waterway channel between Hart Ditch and Kennedy Avenue is very narrow and contains several sediment deposits that should be removed to promote more efficient water movement to the east.



Photograph 3-2 Hart Ditch at its Confluence with the Little Calumet River

The Commission developed a set of preliminary plans to address the realignment of Hart Ditch confluence and the removal of portions of these sediment deposits. As of the writing of this plan, this opportunity has not been advanced to the construction stage. More exploration into this opportunity is recommended to determine if more of the sediment deposits could be removed.

3.3.4 Little Calumet River – Conveyance – Bridge Reconstruction

Bridge reconstruction, particularly over the Little Calumet River, can have significant regional benefits. Not only can it improve water flow through the river by removing obstructions and potential blockage points, it can facilitate operations and maintenance activities by eliminating closures. The Commission is currently funding one such project with the Columbia Avenue bridge replacements/modifications project. The Commission is also contributing to the Monon Railroad bridge project which removes some of the piers. Four similar opportunities are described in the following sections.

3.3.4.1 Kennedy Avenue Bridge Reconstruction (LCRBDC 6)

Kennedy Avenue is a major thoroughfare connecting the Town of Highland, the City of Hammond and the surrounding communities to the Borman Expressway (I-The roadway has an 80/94). average daily traffic volume in excess of 35,000 vehicles per Kennedy Avenue crosses dav. over the LCR immediately south of the I-80/94 interchange. The bridge roadway and were overtopped during the heavy rains in September of 2008. The U.S. Army Corps of Engineers completed levee projects along the waterway on each side of the bridge in 2010. No improvements were made to raise the roadway to match the level of protection provided by the levees. Protection measures must be put in place to prevent flood waters from escaping behind the levee walls. These protection measures prevent travelers from traveling



across the bridge. Additionally, the waterway area is reduced beneath the bridge and debris is often trapped around the bridge piers. The Commission, Lake County Highway Department, and Town of Highland would like the bridge reconstructed to provide flood protection at or above the levee wall elevation and eliminate the need for the installation of protective measures that prohibit traffic from utilizing the bridge. Improvements to the substructure would reduce the possibility of debris collecting around the piers. Waterway improvements could be made to increase its area and improve flow.

3.3.4.2 Harrison Street Bridge Reconstruction (LCHWY 16)

Harrison Street is an important roadway that connects areas of Gary north of I-80/94 to areas south of I-80/94 including Indiana University Northwest. The roadway has an ADT in excess of 9,100 vehicles per day. Harrison Street was overtopped during the heavy rains of 2008. The bridge deck

and the south approach are at elevations slightly exceeding the 200 year storm event, but provide very little freeboard. The north approach and approximately 1,100 feet of roadway north of the bridge are at elevations below the 100 year storm. Recommendations to reduce flooding include reconstructing the roadway and the bridge at elevations that provide the same level of protection as the levees or constructing levee walls on each side of the roadway to isolate the roadway, keeping it from flooding.

3.3.4.3 Georgia Street Approach (LCRBDC 18)

The Gary South Levee at Georgia Street is located approximately 2,500 feet south of the LCR. According to the Indiana Department of Transportation, Georgia Street carries approximately 3,500 vehicles per day. During heavy rain events, Georgia Street becomes inundated with flood water and has to be closed at the levee to prevent flood waters from escaping.

Georgia Street could be raised at the levee to provide the same elevation of protection as the levee. This would eliminate the need to sandbag the roadway during times of flooding and save valuable man hours during flood fighting efforts. The roadway would still have to be temporarily closed to traffic until flood waters subside. A more expensive alternative would be to raise all of Georgia Street and place large culverts beneath it to allow floodwaters to pass under. In this case, Georgia Street could remain open during times of flooding.

3.3.4.4 Broadway Avenue Bridge and Approach (LCRBDC 19)

The Gary South Levee crosses Broadway Avenue just south of the Broadway Avenue Bridge over the LCR. According to the Indiana Department of Transportation, Broadway Avenue carries approximately 28,600 vehicles per day. Broadway Avenue has to be closed and sandbagged in anticipation of flood events.

The Broadway Avenue Bridge could be raised (like the Columbia Avenue Bridge) to the height of the levee wall to provide the same elevation of protection as the levee. This would provide for continuous use by the public despite flooding and eliminate the need for closures, saving valuable man hours during flood fighting efforts.



Figure 3-3: Locations of the Georgia Street Approach and Broadway Bridge and Approach (LCRBDC 18 and 19)

3.3.5 Little Calumet River – Storage

Storage within the confines of the LCR levee system provides opportunity for peak levels to "spread out" and attenuate river elevations. The greatest amount of storage potential is provided within the levee confines adjacent to Gary. Less storage is provided between the levee confines along its western reach (adjacent to Highland, Munster, and Hammond). The USACE believes that storage within the levee confines is already fully utilized at all locations. However, as noted in Griffith 3 below, there is opportunity to expand this storage.

3.3.5.1 River Road Levee Project Completion (Griffith 3)

The Burr Street levee system, east of Cline Avenue, stops at the EJ&E Railroad and leaves a portion of Griffith between Cline Avenue and the railroad unprotected. During heavy rain events, the Town of Griffith places

sand bags along River Drive to protect improved areas south of River Drive. Griffith has acquired lands northeast of the intersection of River Drive and Cline Avenue. The site used to be a golf course. The Town of Griffith is requesting that the levee system be completed between Cline Avenue and the railroad to protect improvements south of River Drive. They would like the levee situated north of River Drive in such a way that would allow areas immediately north of River Drive (on the old golf course land) to be developed commercially. Additionally, Griffith would like to construct a second equalization basin next to their existing one and have both protected from flooding. Development of this levee could also provide recreational opportunities (e.g. bicycle trail enhancement).



Figure 3-4: General Area of the River Road Levee Completion (Griffith 3)

3.3.6 Little Calumet River – Storage/Conveyance

Storage and conveyance functions of the LCR could be enhanced. This category provides an overview of an opportunity that will improve both functions.

3.3.6.1 Thorn Creek Diversion Alternate Operations or Modifications Study (General 8)

The Thornton Reservoir, located 4.5 miles west of the Indiana-Illinois Border at along I-80 may ultimately be capable of providing 10,000 acrefeet of storage. Put into perspective, this volume is equivalent to a volume of water stacked almost 2 miles high spread over one-acre. According to the USACE, this reservoir provides a 100-year flood reduction of approximately one foot at the state line.

Upon discussions with the USACE, it was felt that opportunities may exist to further reduce the water elevation of the LCR in Indiana, west of the Hart Ditch flow control structure, if operation changes or modifications of the Thorn Creek diversion structure were to occur. However further investigation into this concept would need to determine its feasibility. The Thornton Reservoir, Thorn Creek, and LCR within Illinois are maintained by the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC).



Figure 3-5: Thorn Creek/Little Calumet River Relationship (Map from Google Earth Pro)

3.3.7 Little Calumet River/Deep River – Confluence Improvements (General 2, General 4, General 5, Lake Station 3, Lake Station 7, LCRBDC 15)

Numerous concerns have been expressed regarding the Deep River/LCR confluence. Field observations by members of several communities suggest that flows from Deep River may "overpower" flows within the LCR. If these observations are true, one or more of several concepts may be applied to facilitate draining of the LCR. These concepts may consist of storage, conveyance, diversion through operational changes in the watershed. This section describes several concepts that are recommended to be reviewed concurrently.



Figure 3-6: General Map Showing Confluence Area of the Little Calumet River and Deep River (Map from Google Earth Pro)

3.3.7.1 Storage Adjacent to LCR at I-65/I-94 (General 2)

Being located in close proximity to the Deep River confluence with the LCR, the area identified as General 2 may have the potential to improve conveyance and the interaction between the LCR and Deep River. It may also provide additional floodplain storage and facilitate the draining of both the LCR and Deep River.

It is understood that portions of this area are owned by the City of Gary and the Commission. During discussions with Commission personnel, it was noted that the City of Gary historically denied requests by the Commission to purchase this property because of a potential development.

There is an area to the northeast of the intersection of I-65 and I-94 that may also be considered for floodplain storage. This location is right at the confluence of the LCR and Deep River.

Again, with any storage facility, the opportunity for water quality or wildlife enhancement should be explored.

3.3.7.2 Deep River Dam Rehabilitation Project (Lake Station 3)

The Deep River Dam, located along Deep River approximately 1,000 feet to the northeast of the Liverpool Road/Deep River bridge crossing and is reported to be in poor condition and in need of repairs. Currently, the dam serves recreational purposes (e.g. fishing and other water related activities).

An opportunity exists to rehabilitate or remove the dam and provide expanded operational capabilities for flood control. This dam is in close proximity to the Lake George dam.



Figure 3-7: Location of Deep River Dam

3.3.7.3 Burns Ditch Conveyance Improvements (General 4)

Deep River and the LCR join east of the I-65/I-94 interchange and becomes "Burns Ditch" which travels northeasterly toward Lake Michigan a distance of approximately 7 miles. This waterway is generally straight through this area. Widening of the Burns Ditch through this area was discussed with the USACE. It was minimally studied by the USACE during the design development of the levee system, but may still provide some potential opportunity to reduce flood levels within the levee confines and within Deep River.

3.3.7.4 Deep River Tunnel (General 5)

Deep River is a meandering waterway. This is evident just north of Hobart within Lake Station. The river flows northeast out of Lake George and makes a switchback almost 180 degrees to the southeast. This switchback results in a river flow path of almost an extra six miles and results in several feet of flood elevation change along the waterway.

If this flow path could be reduced by short circuiting with a diversion pipe, the opportunity to minimize flooding in Hobart and Lake Station could be realized. This would be similar to the Arbogast Tunnel Concept that "short-circuited" Cady Marsh Ditch in Griffith and reduced flooding in Griffith and Highland. If feasible, this concept could provide significant flood reduction benefit to Lake Station and some areas of Hobart.

Implementation of this concept would require extensive regulatory and public outreach as well as detailed engineering study.

3.3.7.5 Lake George Dam Control Policy (Lake Station 7)

Lake George drains approximately 79,000 acres (over 120 square miles) of watershed. While its legal elevation is controlled by regulatory agencies, there is a desire by local communities to offer flexibility in this elevation in advance of known significant storm events such as the September 2008 storm event. Lowering water levels in advance of major storm events could add storage to the system and therefore possibly reduce downstream stormwater flows and flooding.



Figure 3-8: Map of Lake George Watershed

Implementation of this opportunity will require extensive regulatory and public outreach as well as hydraulic modeling required as evidence to the regulatory agencies that this opportunity will provide benefit.

3.3.7.6 I-65/I-94 Interchange Storage Area Repairs (LCRBDC 15)

Areas around I-65 and I-94 interchange are not draining properly according to the Commission. Areas east of I-65 drain westward under I-65 toward Martin Luther King Drive, then northward under I-80/94, and finally westward under Martin Luther King Drive to the river. This issue may have and has the potential to create "dead" storage which is useless in flood control efforts. An investigation into improving the efficiency of this conveyance system is warranted.

3.3.8 Marshalltown Levee (LCRBDC 20)

The Marshalltown Levee was a "betterment" to the base project. Betterments are additional improvements wanted and paid for by the local sponsor (Commission) that can be incorporated into the base project provided they are related to and can be accommodated in the construction of the base project. The "betterment" levee was constructed to provide flood protection only to the 100 year storm event. The Commission wishes to reconstruct this levee to provide the same level of protection as the rest of the levee system (200 year).

3.4 Semi-Regional Opportunities

Semi-Regional opportunities were identified throughout the watershed. Semi-Regional opportunities have the potential to positively impact or reduce flooding and/or maintainability along waterways through multiple jurisdictions. They may also be opportunities where significant benefit may be achieved in one jurisdiction. The following table summarizes identified semi-regional opportunities. Following the table, general descriptions are provided for each semi-regional opportunity. Appendix C provides and overall map showing many of the opportunity locations.

Table 3-2 Summary of Semi-Regional Opportunities							
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed		
Lake County 7	Lake County	Beaver Dam Ditch - Storage Opportunity	Beaver Dam Ditch - Lateral 1 (Regional Detention Basin)	Deep River	Beaver Dam Ditch		
LCHWY 6	LCHWY	Cady Marsh Ditch - Conveyance Opportunity - Bridge Reconstruction	Bridge 360 Reconstruction	Cady Marsh Ditch			
LCHWY 7	LCHWY	Cady Marsh Ditch - Conveyance Opportunity - Bridge Reconstruction	Bridge 350 Reconstruction	Cady Marsh Ditch			

Table 3-2							
	Summa	ary of Semi-Regi	onal Opportuni	lies			
Unique ID	Community	Major Project	Minor Project	Major	Minor		
LCHWY 8	LCHWY	Name Cady Marsh Ditch - Conveyance Opportunity - Bridge Reconstruction	Name Bridge 362 Reconstruction	Cady Marsh Ditch	Watershed		
Highland 1	Highland	Cady Marsh Ditch - Storage Opportunity	Cady Marsh Ditch Detention Project	Hart Ditch	Cady Marsh		
Lake County 9	Lake County	Cady Marsh Ditch - Storage Opportunity	Cady Marsh Ditch Detention Project	Cady Marsh Ditch	Cady Marsh		
LCHWY 14	LCHWY	Deep River - Conveyance Opportunity - Bridge Reconstruction	Bridge 254 Reconstruction	Deep River	Lake George		
LCHWY 15	LCHWY	Deep River - Conveyance Opportunity - Bridge Reconstruction	Bridge 252 Reconstruction	Deep River			
LCHWY 18	LCHWY	Deep River - Conveyance Opportunity - Bridge Reconstruction	Bridge 89 Reconstruction	Deep River			
LCHWY 19	LCHWY	Deep River - Conveyance Opportunity - Bridge Reconstruction	Bridge 98 Reconstruction	Deep River			
LCHWY 20	LCHWY	Deep River - Conveyance Opportunity - Bridge Reconstruction	Bridge 92 Reconstruction	Deep River	Niles Ditch		
Winfield 1	Winfield	Deep River - Storage Opportunity	Hidden Creek Subdivision Regional Stormwater Project	Beaver Dam	Hidden Creek		
LCHWY 10	LCHWY	Hart Ditch - Conveyance Opportunity - Bridge Reconstruction	Bridge 264 Reconstruction	Hart Ditch			
LCHWY 11	LCHWY	Hart Ditch - Conveyance Opportunity - Bridge Reconstruction	Bridge 261 Reconstruction	Hart Ditch			
LCHWY 12	LCHWY	Hart Ditch - Conveyance Opportunity - Bridge Reconstruction	Bridge 260 Reconstruction	Hart Ditch			
LCHWY 13	LCHWY	Hart Ditch - Conveyance Opportunity - Bridge Reconstruction	Bridge 259 Reconstruction	Hart Ditch			
Highland 5	Highland	Spring Street Ditch - Conveyance Opportunity	Spring Street Ditch Culvert Replacements	Hart Ditch	Spring Street Ditch		
Schererville 10	Schererville	Spring Street Ditch - Storage Opportunity	Potential Increase in Hartsdale Pond Storage	Hart Ditch	Spring Street Ditch		

Table 3-2 Summary of Semi-Regional Opportunities						
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed	
LCHWY 3	LCHWY	Turkey Creek - Conveyance Opportunity - Bridge Reconstruction	Bridge 116 Reconstruction	Turkey Creek		
LCHWY 4	LCHWY	Turkey Creek - Conveyance Opportunity - Bridge Reconstruction	Bridge 113 Reconstruction	Turkey Creek		
Lake County 1	Lake County	Turkey Creek - Storage Opportunity	Upper Turkey Creek Stormwater Storage Project	Turkey Creek		
Lake County 4	Lake County	Turkey Creek - Storage Opportunity	Upper Turkey Creek Overbank Detention	Turkey Creek		
Lake County 5	Lake County	Deep River - Storage Opportunity	121st and Iowa Drainage Improvements with NRCS	Deep River	Niles Ditch	
Merrillville 1	Merrillville	Turkey Creek - Storage Opportunity	Lincoln Gardens and Southbrook Subdivision Drainage Project	Deep River	Kaiser Ditch	
Merrillville 2	Merrillville	Turkey Creek - Storage Opportunity	Country Club Heights & Meadowdale Subdivision Drainage Project	Deep River	Griffith Lateral 6	

3.4.1 Beaver Dam Ditch – Storage

The Beaver Dam Ditch watershed (e.g. areas around Merrillville, Crown Point, Winfield) provide great opportunity for storage and water quality improvements as it contains vast areas of undeveloped land.

3.4.1.1 Beaver Dam Ditch – Lateral 1 (Regional Detention Basin) (Lake County 7)

Flooding of Broadway (SR 53) at 101st Avenue in Crown Point has been an ongoing problem. Culverts under Broadway are inadequate to carry stormwater runoff from nearly 1,150 acres in Crown Point and Merrillville including the Ameriplex development. The LCSO has initiated preliminary engineering for culvert and ditch improvements and storage. Crown Point was awarded \$322,000 in Federal STP funds to put toward the project. The Lake County Surveyor has committed \$150,000. An opportunity for the Commission to partner in this endeavor exists. The project should provide a reduction in flooding on Broadway and areas downstream. The current preliminary engineering plan shows this project to incorporate water quality and recreational facilities.



Figure 3-9: Location of Upper Beaver Dam Detention Project (Lake County 7)

3.4.2 Cady Marsh Ditch – Conveyance – Bridge Reconstruction

In many cases bridges become locations where debris becomes trapped during heavy rain events. This trapped debris can lead to blockages and backups of water in the waterway. Many times bridges become "choking points" where the waterway necks down to travel beneath. Replacing these bridges provides the opportunity to eliminate the potential for blockages and waterway necking by reconstructing the bridge higher, wider and without piers in the waterway.

3.4.2.1 Reconstruction of Bridges 350, 360, and 362 (LCHWY 6, 7, 8)

Lake County Highway identified three bridges crossing over Cady Marsh Ditch that are in need of replacing - Bridge # 360 at Kleinman Road, Bridge # 350 at Liable Road, and Bridge # 362 at Colfax Street. General locations of these bridges are provided in Appendix C.

3.4.3 Cady Marsh Ditch – Storage

Cady Marsh Ditch watershed is generally fully developed with few opportunities

for stormwater storage. It covers portions of Highland, Griffith, Gary, and unincorporated Lake County. The Cady Marsh Ditch watershed received attention during the 2006 storm event that flooded significant portions of Highland. At the time, the Arbogast Tunnel project was not completed. Had this project been completed, some of the flooding experienced by the communities may have been less. Two opportunities for semi-regional stormwater detention have been identified in the Cady Marsh Ditch watershed. These are described as follows:

3.4.3.1 Cady Marsh Ditch Detention Project (Highland Park) (Highland 1)

The Town of Highland recently commissioned a study for stormwater storage adjacent to the Cady Marsh Ditch. Four alternatives ranging from \$5m to \$15m were reviewed that provided between 70 acre-feet and 170 acre-feet of stormwater storage (pump evacuated) adjacent to Cady Marsh Ditch near Kleinman Road. In conjunction with Cady Marsh Detention opportunities (e.g. Lake County 9), this project may improve flood control aspects within multiple communities including Griffith, Highland, and Munster.

3.4.3.2 Cady Marsh Ditch Detention Project (Whitcomb and 45th) (Lake County 9)

In 2007, the Lake County Surveyor's commissioned a preliminary study to provide additional flood plain storage on the north side and adjacent to the Cady Marsh Ditch on a 70 acre tract just east of Whitcomb Street. Preliminary modeling using the USACE Cady Marsh Ditch model indicated some reduction in water surface elevations between Calhoun and Cleveland. Opportunities may exist to build this storage and could be enhanced if it is constructed with other Cady Marsh Ditch semi-regional storage projects (e.g. Highland 1).



Figure 3-10: Location of Cady Marsh Ditch Detention Project (Lake County 9)

3.4.4 Deep River – Conveyance – Bridge Reconstruction

As described earlier with other bridges in other watersheds, bridges become locations where debris becomes trapped during heavy rain events. Bridges on Deep River are no exception.

3.4.4.1 Reconstruction of Bridges 89, 92, 98, 252, and 254 (LCHWY 14, 15, 18, 19, 20)

Lake County Highway identified three bridges crossing over Deep River that are in need of replacing - Bridge # 89 at 101st Avenue, Bridge # 98 at Clay Street and Bridge # 252 at Old Ridge Road. Also Bridge # 254 - Wisconsin Street through Lake George and Bridge # 92 - Colorado Street over Niles Ditch. General locations of these bridges are provided in Appendix C.

3.4.5 Deep River – Storage

Deep River watershed contains many undeveloped areas, making it desirable for regional detention and water quality improvement features. Two such opportunities were identified during development of this plan.

3.4.5.1 Hidden Creek Subdivision Regional Stormwater Project (Winfield 1)

Hidden Creek is a tributary to Deep River that flows through Winfield and Merrillville near 101st and Clay. The Hidden Creek Subdivision, located on 101st Avenue, experiences frequent flooding since its development during the time prior to Winfield becoming a Town. On occasion, homes are flooded as occurred in the photograph below. This flooding includes flooding of local streets in the Winfield subdivision as well as 101st and Clay Street in Merrillville which are important emergency access routes. The project includes the expansion of existing detention facilities and waterway improvements that will mitigate the flooding. The project was estimated to cost between \$2.5m and \$3.0m in 2008. Land acquisition and detailed engineering are required for this project prior to construction.



Photograph 3-4 Flooding of Residential Structures by Hidden Creek

3.4.5.2 121st and Iowa Regional Storage (Lake County 5)

The Lake County Soil and Water Conservation District in cooperation and the LCSO have identified the area at the headwaters of Niles Ditch for potential storage. The area is east of Iowa Street and South of 117th Avenue. The actual footprint for potential storage is the 100-year FEMA

floodplain and includes wetland areas per the National Wetlands Inventory map. The potential watershed served by this storage area is approximately 6100 acres, primarily agricultural land.

While this project provides runoff storage, it would also provide water quality improvement since it serves agricultural land (sediment is the major pollutant in Indiana streams) and potential opportunity to partner with two other governmental organizations, Lake County and the NRCS.



Figure 3-11: Watershed of 121st and Iowa Storage Project (Lake County 5)

3.4.6 Hart Ditch – Conveyance – Bridge Reconstruction

Hart Ditch watershed also contains bridges where replacement could facilitate conveyance through the waterway.

3.4.6.1 Reconstruction of Bridges 259, 260, 261, and 264 (LCHWY 13, 12, 11, and 10)

Lake County Highway identified four bridges crossing over Hart Ditch that are in need of replacing - Bridge # 259 at 45th Street and Bridge # 260 at Main Street in Munster; and Bridge # 261 at 213th Street and Bridge # 264 at Hart Street in Dyer. General locations of these bridges are provided on Appendix C.

3.4.7 Spring Street Ditch – Conveyance (Highland 5)

There are a series of culverts between Hart Road and the Cady Marsh Ditch that are undersized and may be potential failure issues. These culverts are in need of replacement according to the Town of Highland. At present, no construction cost has been completed for this work. Reconstruction of these culverts will increase the reliability of the waterway within the Spring Street Ditch watershed.

3.4.8 Spring Street Ditch – Storage (Schererville 10)

The Town of Schererville noted that an existing regional storage facility located adjacent to Spring Street ditch immediately southwest of Oak Street and Kennedy Avenue might possibly be expanded. The design of the detention facility was constructed with significant assistance by the LCSO over a decade ago. No known studies of further expansion exist and it is unknown if environmental issues could affect this expansion, or even if this expansion could provide additional benefit.

3.4.9 Turkey Creek – Conveyance – Bridge Reconstruction

Turkey Creek watershed also contains bridges where replacement could facilitate conveyance through the waterway.

3.4.9.1 Reconstruction of Bridges 113 and 116 (LCHWY 3, 4)

Lake County Highway identified two bridges crossing Turkey Creek that are in need of replacing - Bridge # 113 at Arbogast Avenue and Bridge # 116 at Hendricks Street in Schererville. General locations of these bridges are provided in Appendix C.

3.4.10 Turkey Creek – Storage

Of the major tributaries to Deer Creek, the most opportunities for semi-regional stormwater storage were identified during this review. These opportunities are described below:

3.4.10.1 Upper Turkey Creek Stormwater Storage Project (Lake County 1)

Lake County as well as the Town of Schererville identified an area south of 77th Avenue and west of Cline Avenue in the upper Turkey Creek watershed where additional detention storage could be constructed. This site is located between two branches of the Upper Turkey Creek and could be used to buffer peak flows from both branches. Immediately downstream on the north side of US 30 is a residential section of Schererville where development has taken place adjacent to the creek, increasing the potential impact of flooding for numerous commercial and residential structures. Recently, Lake County has completed a flood diversion and storage project on the eastern branch of the Turkey Creek above this site with assistance from the USACE.

This project is in the conceptual stage but has the potential to impact both flood control and water quality in the County as well as the Town of Schererville, especially in conjunction with the recently completed project by the County and the USACE. The potential storage of this project is approximately 44 acre feet in addition to the 78 acre feet of storage in the adjacent wetlands for a total of 122 acre feet. Wetland enhancement and/or creation are also possible for this project.



Figure 3-12: Location of Upper Turkey Creek Stormwater Storage Project (Lake County 1)

3.4.10.2 Upper Turkey Creek Overbank Detention (Lake County 4)

Turkey Creek east of Broad Street and continuing to the east side of Arbogast Street has been identified by Lake County as a good candidate for constructing a two-stage ditch. The bank areas are steep and wooded in some areas increasing the potential for erosion. Installation of a twostage ditch will provide a stable overbank for flood conveyance thereby reducing the sediment load downstream and increasing water quality. The overbank area will also provide some storage capabilities.

This project is in the conceptual stage and will require coordination with the USACE and IDEM since areas of the stream and overbank near Arbogast are listed as wetlands. The hydraulic capacity culvert under Arbogast Street will have to be evaluated as well.

3.4.10.3 Lincoln Gardens and Southbrook Subdivision Drainage Project (Merrillville 1)

Lincoln Gardens and Southbrook Subdivisions are located between US 30 and 73rd Avenue immediately west of Independence Street in Merrillville. Stormwater flows through these subdivisions making its way to Kaiser Ditch. Merrillville prepared a preliminary engineering report to develop alternatives to minimize flooding. Identified improvements include culvert replacement, waterway stabilization and construction of approximately 35 acre-feet of storage. The watershed area contributing to Kaiser Ditch at 73rd Avenue is approximately 1,400 acres.

3.4.10.4 Country Club Heights & Meadowdale Subdivision Drainage Project (Merrillville 2)

Country Club Heights and Meadowdale Subdivisions are generally located north of the Grand Trunk Railroad between Taft and Harrison Streets in Merrillville. The subdivisions flood during heavy rain events. Stormwater flows southward through the subdivisions via Griffith Lateral #6, under the railroad, to Turkey Creek. The contributing watershed at the railroad is approximately 4,500 acres. Merrillville prepared a preliminary engineering report to develop alternatives to minimize flooding. Identified improvements included culvert replacement/enlargement at 61st and 63rd Avenues, Cleveland Street and the railroad; construction of berms; construction of additional storage; and installation of flap gates on Griffith Lateral #6. Hundreds of homes will benefit from these improvements.

3.5 Local Opportunities

Local opportunities were identified throughout the watershed. Local opportunities have the potential to positively impact or reduce flooding and/or maintainability along waterways through a single jurisdiction. The following table summarizes identified local opportunities.

Table 3-3 Summary of Local Opportunities							
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed		
Hobart 13	Hobart	Deep River - Storage Opportunity	Maple Lake Storage	Deep River			
Hobart 19	Hobart	Deep River - Storage Opportunity	61st Ave and County Line Road Regional Detention Basin	Deep River	Duck Creek		

Table 3-3								
	Summary of Local Opportunities							
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed			
Hobart 20	Hobart	Deep River - Storage Opportunity	Northwinds Regional Detention Basin	Deep River				
Hobart 21	Hobart	Deep River - Storage Opportunity	Nob Hill Regional Detention Basin	Deep River				
Hobart 14	Hobart	Turkey Creek - Storage Opportunity	Evergreen Memorial Park Storage	Turkey Creek				
Schererville 6	Schererville	Turkey Creek - Storage Opportunity	Potential Stormwater Storage Project	Turkey Creek	Unknown			
Schererville 7	Schererville	Turkey Creek - Storage Opportunity	Potential Stormwater Storage Project	Turkey Creek	Unknown			
Schererville 8	Schererville	Turkey Creek - Storage Opportunity	Potential Stormwater Storage Project	Turkey Creek	Unknown			
Crown Point 3	Crown Point		Stillwater Subdivision Drainage Improvements	Beaver Dam	Crooked Creek			
Dyer 4	Dyer		Hart Ditch Flap Gate Project (Northgate Subdivision)	Hart Ditch	Hart Ditch			
New Chicago 4	New Chicago		Culvert Improvements under Wisconsin St. at Huber Blvd.	Deep River				
New Chicago 5	New Chicago		Twin Oaks Park Pond Improvements	Deep River				
Gary 6	Gary		Undersized Pipes at I-94/Grant Interchange	LCR	Not Applicable			
Gary 8	Gary		Black Oak Ditch Project					
Hammond 10	Hammond		Dowling Park Pump Station - Removal of Homes in Floodplain	LCR	Not Applicable			
Highland 2	Highland		Cady Marsh Ditch Pump Station and Storm Sewer Project	Hart Ditch	Cady Marsh			
Hobart 10	Hobart		Hillman Heights Drainage Improvements and Detention Creation	Deep River				
Hobart 11	Hobart		Eagle Plaza Detention	Deep River	Stinky Creek			
Hobart 12	Hobart		Mundell Field Storage	Deep River				
Hobart 17	Hobart		County Line Road Drainage Improvements	Deep River				
Hobart 18	Hobart		Crestwood Subdivision Drainage Improvements	Deep River				
Hobart 4	Hobart		"Stinky Creek"	Deep River	Stinky Creek			
Hobart 5	Hobart		Brickie Bowl Flooding	Deep River	Duck Creek			
Hobart 6	Hobart		Barrington Ridge Stormwater Drainage Improvements	Deep River	Duck Creek			
Hobart 7	Hobart		61st Ave. and Wisconsin Street Regional Storage	Deep River	Lake George			
Hobart 8	Hobart		Preserves Storage	Deep River	Turkey Creek			
Hobart 9	Hobart		Liverpool Road Constructed Wetland	Deep River				
Lake Station 6	Lake Station		Residential Drainage Improvements Between 27th and 29th Avenues	Deep River				
LCHWY 1	LCHWY		45th Avenue - Colfax to Grant	Cady Marsh Ditch				

Table 3-3 Summary of Local Opportunities							
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed		
LCHWY 2	LCHWY		Enclave Subdivision	Hart Ditch			
Schererville 4	Schererville		Sunset Boulevard Detention Modifications				
Schererville 5	Schererville		Shultz Drive and Harder Court Stormwater Detention Project				
St. John 3	St. John		Prairie West Park Drainage Improvements				
St. John 4	St. John		Golf Lake Dam Improvements				
St. John 5	St. John		Culvert Improvements under Conrail Railroad				

3.6 Low-Hanging Fruit Opportunities

A search was conducted for "low-hanging fruit" opportunities. However, none of the opportunities strongly fit the definition of the criteria of being able to be immediately implemented. Low-hanging fruit opportunities were considered to be easily implemented projects not requiring significant capital, design, permitting, or land acquisition expenses that will provide benefit to the residents of a community or multiple communities. Several opportunities fitting close to the definition were placed in the local opportunity category. Some examples may include the New Chicago opportunities (New Chicago 4, 5), Hart Ditch flap gates (Dyer 4), or the Crown Point Stillwater culvert replacements (Crown Point 3).

3.7 Maintenance Opportunities

Maintenance opportunities were identified throughout the watershed. Maintenance opportunities are wide ranging from facilitating access at hard to reach locations within the river to waterway clearing, cleaning, and dredging. The following table summarizes identified maintenance opportunities. Following the table, general descriptions are provided for each maintenance opportunity.

Table 3-4 Summary of Maintenance Opportunities							
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed		
Griffith 2	Griffith	Culvert Repair/Maintenance	Deep Tunnel Project	LCR			
LCRBDC 10	LCRBDC	Culvert Repair/Maintenance	Culvert Repair between Chase and Grant	Deep River			
LCRBDC 11	LCRBDC	Little Calumet River - Conveyance Opportunity	Aerial Sanitary Sewer East of Broadway	LCR	LCR		
Hobart 2	Hobart	Dredging	Lake George Dredging	Turkey Creek	Turkey Creek		

Table 3-4 Summary of Maintenance Opportunities						
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed	
Merrillville 3	Merrillville	General Waterway Stabilization and Sediment Control Opportunities	Turkey Creek Stabilization			
Hobart 15	Hobart	Stabilization and Sediment Control Opportunities	Sediment Control for Deep River and Turkey Creek	Deep River		
Hobart 16	Hobart	Stabilization and Sediment Control Opportunities	Lake George Shoreline Stabilization	Beaver Dam	Niles, Crooked Creek	
Crown Point 5	Crown Point	Waterway Clearing Opportunities	Beaver Dam Ditch Maintenance	Deep River	Deep River	
Lake County 6	Lake County	Waterway Clearing Opportunities	Unregulated Deep River Clearing	Hart Ditch	Hart Ditch	
Lake County 8	Lake County	Waterway Clearing Opportunities	Unregulated Hart Ditch Clearing	Hart Ditch	Unknown	
Schererville 11	Schererville	Waterway Clearing Opportunities	Pennsy Ditch Maintenance			

3.7.1 Aerial Crossing of Sanitary Sewer East of Broadway (LCRBDC 11)

A 36-inch combined (sanitary/storm) sewer crosses the LCR just east of Broadway. It is located aerially on piers and frequently catches debris in the river. Debris needs to be removed from this crossing twice a year by hand since equipment cannot access this location.

Relocation of the combined sewer to below the river is a costly project which can only be accomplished through construction of an inverted siphon, pump station, or reconfiguration of the area's combined sewer network. Each of these means involves significant engineering and construction resources.

A more likely scenario may be development of easier means to access this location so removal of debris can be facilitated by machinery.



Photograph 3-5 Aerial Sewer Crossing East of Broadway

3.7.2 Griffith Deep Tunnel Maintenance Improvements (Griffith 2)

The deep tunnel project along Arbogast Street in Griffith has been completed. The tunnel intercepts Cady Marsh Ditch before it reaches Hart Ditch and diverts water directly to the LCR. A manually operated trash rake was installed at the tunnel inlet. Griffith manually removes the trash and debris from the rake. Griffith would like the rake to be converted to an automatically operated rake so Griffith public works staff can be utilized elsewhere during heavy rain events. Also, Griffith maintains the tunnel – removes debris from inside the tunnel, maintains the rake and maintains the outlet. They would like to be reimbursed for the costs of this maintenance.



Photograph 3-6 Inlet Structure to Griffith Tunnel

3.7.3 Culvert Repair Between Chase Street and Grant Street (LCRBDC 10)

Storage areas were incorporated into the project between Chase Street and Grant Street. These areas are located between the Gary South Levee and the LCR on the river's south side. Stormwater from two pumping stations at Grant Street pump stormwater into these storage areas. Five culverts grouped together allow water to move from the storage areas to the river and back. These storage areas used to be dry enough to be farmed. They are now wet and don't appear to be draining. Storage is important to the overall operation of the levee system. A dry area will store more stormwater than a wet area. The Commission wishes to investigate these storage areas to determine why the areas no longer drain. The photographs below show these areas in 2003 versus 2013.



Figure 3-13: Photographic Comparison between 2003 and 2013 of Culverts Connecting the Storage Area and the Little Calumet River Between Chase Street and Grant Street

3.7.4 Dredging (Hobart 2)

Approximately 79,000 acres of watershed feed into Lake George from Turkey Creek and Deep River. This water is often heavy laden with suspended solids. Typical causes of these solids include:

- Roadside ditch and stream bank erosion.
- Runoff and erosion from construction sites.
- Runoff from farming activities.
- Runoff from sand and gravel used in roadway deicing activities.

These solids tend to settle out into low areas as the velocity of the water in the channels slows down. Lake George has been the recipient of a great deal of sedimentation.

Lake George was partially dredged in 2002. Extreme upstream areas were not dredged because of IDNR's fear of adversely affecting the marsh area at the headwaters to the lake. Current evidence shows that the lake is beginning to silt in once again. The City of Hobart is requesting funding assistance to remove the siltation and to install preventative measures to control future sedimentation. Because of the added expense and increased schedule, Hobart is not seeking federal funding assistance. Hobart is currently engaging a consultant to collect topographic information regarding the lake's current bottom. This information will be compared to the as-built information collected immediately after the 2002 dredging to determine the urgency of the next dredging and the potential volume of material to be removed.

The removal of sediments doesn't normally contribute to the storage volume since stormwater is stored above the normal water elevation. It could affect the

volume in the case of Lake George if the lake level is to be lowered to provide storage in anticipation of a heavy rain event.

3.7.5 Stabilization and Sediment Control (Merrillville 3, Hobart 15, Hobart 16)

Preventative measures and best management practices are essential to preventing sedimentation and siltation issues like those affecting Lake George. In 2002, the City of Hobart completed the Deep River/Turkey Creek Watershed Management Plan to establish initiatives to protect Lake George from sediment and water quality impairments as well as improving water quality in Deep River/Turkey Creek watersheds. Some of the initiatives proposed include:

- Reducing sedimentation by introducing best management practices (BMPs) that remove sediments and control erosion. These could be structural BMPs like catch basins, plunge pools and forebays or nonstructural BMPs like grass buffer strips and education.
- Improving water quality by introducing BMPs that remove sediments and nutrients. In many circumstances nutrients attach to sediments. Removing the sediments will remove the nutrients.
- Eliminate illegal discharges such as those from septic systems and drains from commercial or industrial facilities.
- Restoring stream and ditch banks to control erosion such as re-vegetation, installing scour protection and constructing dual stage channels.

Many of the recommendations in the plan have been implemented through MS4 legislation and ordinances. Both Merrillville and Hobart have requested financial assistance to implement portions of the plan like structural improvements that are more costly.

3.7.6 Waterway Clearing (Crown Point 5, Lake County 6 and 8, Schererville 11)

Most of the communities interviewed expressed the need to clear waterways. Clearing waterways generally includes snagging fallen trees, debris removal, beaver dam removal, tree clearing and excavation. Much of the work is accomplished using excavation equipment. Generally, tree clearing involves removing trees overhanging the waterway by cutting them at their base (leaving the stump) and removing them. Trees may also be removed in highly eroded areas to allow more sunlight to reach waterway's banks and encourage the growth of deep rooting grasses that could not grow because of the amount of shade trees provide. Beavers should be legally trapped and their dams removed. Excavation to remove debris, erosion and to reestablish the waterway is typically allowed without permit as a "one step removal process" provided no

fill is placed in wetlands.

3.8 **Operational Opportunities**

Operational opportunities were identified throughout the watershed. Operational opportunities provide for improved understanding of the river and watershed. Implementation of these opportunities can lead to improved forecasting and planning for flood events. The following table summarizes identified operational opportunities. Following the table, general descriptions are provided for each operational opportunity.

Table 3-5 Summary of Operational Opportunities						
Unique ID	Community	Major Project Name	Minor Project Name	Major Watershed	Minor Watershed	
General 13	General		Asset Management Plan			
General 10	General		Perpetual Review and Modification of Emergency Action Plan			
General 11	General		Establishment and Perpetuation of an Advisory Committee			
General 6	General		Perpetual Monitoring and Data Collection			
General 7	General		LCR Model Re-Calibration			
General 9	General		Real Time Notification			
General 12	General		Integrate Deep River, Turkey Creek, and Beaver Dam Ditch Models into the LCR Hydraulic Model	Deep River	Beaver Dam Ditch, Turkey Creek	
Hammond 6	Hammond		I-94 Penetration Investigation (Indianapolis Blvd to Maryland Avenue)	LCR		
LCHWY 21	LCHWY		Stormwater Equipment			

3.8.1 Asset Management Plan (General 13)

Asset management is generally the process whereby an organization collects and maintains a comprehensive list of items for which it is responsible, or it owns. For example, the Commission is responsible of pumping stations, outfalls, gates, duckbill end sections, levees, and many other items. A comprehensive listing of all its assets is necessary for operational purposes and for scheduling maintenance.

The Commission has engaged an engineering consultant to collecting data on Commission assets and assemble the data in a GIS format. GIS allows both geospatial and operational data to be collected in one convenient location. With a click of the mouse the Commission will not only be able to locate an asset's exact location, but also read all the information about the asset – pump size, outfall size, gate manufacturer, pump manufacturer, etc. This will greatly
increase the Commission's ability to properly track its assets.

3.8.2 Perpetual Review of Emergency Action Plan (General 10)

Each community the levee system passes through has an Emergency Flood Protection Handbook and has an Emergency Action Plan to comply with the handbook. The handbook contains important information about the levee system including:

- Important system information such as elevations of tops of levees, roadways requiring closures, mapping, etc.
- Locations and descriptions of critical system elements such as pumping stations and pipe penetrations
- What should be done in anticipation of a heavy rain event such as levee patrols
- What should be done during a heavy rain event such as road and gate closures and evacuation in the case of levee overtopping

These handbooks and action plans should be updated as new information is collected or improvements are made. For instance, Columbia Avenue over the LCR currently has to be closed and sandbagged to prevent floodwaters from escaping behind the levee walls. Columbia Avenue will be reconstructed this year and raised to eliminate the need for closing. The handbook and emergency action plan should be revised to account for this improvement.

Emergency action plan activities should be reviewed and practiced routinely. The Commission's Executive Director currently meets with the communities regularly to:

- Review action plans and discuss maintenance needs/activities and the statuses of current projects.
- Practice road closing activities by selecting a roadway in each community to practice closing.
- > Train new personnel on flood fighting efforts.
- Verify that flood fighting equipment is maintained and in proper working order.

It is essential that these emergency action plans are kept current and practiced and that municipal personnel are trained and available when needed. Protection to the community from the levee system cannot be guaranteed if the plan is not followed when called upon.

3.8.3 Establishment and Perpetuation of an Advisory Committee (General 11)

Section 32 of Indiana Code 14-13-2 establishes a LCR Basin Project Advisory Board. The Advisory Board is to consist of one member appointed by the executive of each municipality within the watershed and one member appointed by the county commissioners of Lake County. Each appointed member must have experience in designing, constructing, maintaining or managing drainage or food control facilities in the watershed.

The Advisory Board can be very useful to the Commission. Duties of the Advisory Board could include:

- > Helping the Commission develop/refine project funding assistance applications.
- Reviewing and scoring projects submitted for funding assistance by municipalities.
- Garnering and maintaining continuity among the communities within the watershed.
- Working to gain support for improvement projects that cross municipal boarders.
- Ensuring mutual cooperation, accountability and transparency between the Commission and the watershed communities.
- Providing professional advice to the Commission regarding proposed projects, maintenance concerns, regulatory issues and other watershed related issues.
- Complete work assigned by the Commission.

The Advisory Board should meet regularly and prepare written minutes or reports for the Commission on the status of their work.

3.8.4 Perpetual Monitoring, Data Collection, and Real Time Notifications (General 6, General 9)

The Commission and USGS monitor locations within the LCR watershed through the use of stream gages. Known locations include:

Table 3-6 Summary of Known Stream Gage Locations				
Waterway	Municipality	Nearest Street Crossing		
Deep River	Hobart	Lake George Outlet		
Hart Ditch	Munster	45 th Avenue		
Hart Ditch	Munster	Main Street		

Table 3-6 Summary of Known Stream Gage Locations					
Waterway	Waterway Municipality Nearest Street Crossin				
LCR	Gary	Burr Street			
LCR	Hammond	Indianapolis Boulevard			
LCR	Hammond	Cabela's			
LCR	Highland	Kennedy Avenue			
LCR	Lake Station	Liverpool Road			
LCR	Lake Station	I-65			
LCR	Munster	Hohman Avenue			
LCR	Munster	Calumet Avenue			
LCR	Munster	Northcote Avenue			

A graphical representation of each location is shown in the following map, courtesy of the USGS.



Figure 3-14: Location of Stream Gages along Little Calumet River Waterways in Indiana

These gages measure depth of stream in real time. Through the USGS website, anyone can sign up for notifications of current flood stage by phone or email. Notification frequency occurs either hourly or every four hours. The user can input the gage height threshold for notification.

This service is an important aspect of flood management and should be perpetuated. This data is also very useful for calibration of the LCR models and prediction of waterway gage heights during and after storm events. Data from several of the stream gages was used in the development of the hydraulic models used to design the current levee system. It improves quality of life, particularly to those adjacent to the levee system.

3.8.5 Little Calumet River Model Re-Calibration (General 7)

Significant time and resources have been put into the development of the LCR hydrologic and hydraulic model over the past several decades. The hydraulic model is of great importance in that it provides a tool to help predict river flood stages. The results of the model were used extensively during the design of the levee system.

The LCR hydraulic model was calibrated to storm events that occurred during 1989 and 1990. These events occurred approximately 25 years ago, before much of the existing levee infrastructure was in place.

Now that most of the LCR levee system is in place, and 25 years of additional flood stage and rainfall data have been collected, a need and opportunity exists to re-calibrate the LCR hydraulic model. Re-calibration of the model will:

- Provide a better understanding of as-built levee system performance (flood levels, timing of peak stages, etc.);
- Provide a "what if" tool for training and scenario evaluation (levee breaches and/or failures, blockages, etc.);
- Provide a "what if" tool for understanding river response to various hydrologic conditions (hurricane remnants, heavy rainfall over part or all of the watershed, etc.);
- Provide a tool to understand impacts to the river and watershed related projects (regional storage, bridge replacements, etc.)

It is important the Commission continue its direction and charge with an updated LCR model, particularly as it embarks on implementation of this plan.

3.8.6 Integrate Deep River, Turkey Creek, and Beaver Dam Ditch Models into the LCR Hydraulic Model (General 12)

Within the confines of Lake County portion of the LCR watershed, there are two main contributing watersheds: Hart Ditch and Deep River. The MWRGCD model already incorporated portions of Hart Ditch. However, minimal data is included in the model for Deep River and its major tributaries (Turkey Creek, Beaver Dam Ditch, Deep River (south of Lake George). FEMA has separate modeling completed for these three tributaries.

Benefits of the integration of these major tributaries into the LCR will:

> Provide a better understanding of the performance of Lake George under

various operational scenarios;

- Provide a "what if" tool for understanding watershed response to various hydrologic conditions (hurricane remnants, heavy rainfall over part or all of the watershed, etc.);
- Provide a tool to understand impacts to the watershed related projects (regional storage, bridge replacements, etc.) that may be implemented through this plan.

While the benefits of this opportunity are similar in nature to "LCR Model Re-Calibration (General 7)", execution of this opportunity will provide more refinement to the model and hence result in more accurate forecasting of flood stages, benefits, and costs within the watershed throughout implementation of this plan. And as communities present more projects to the Commission for consideration, this tool will provide the Commission the ability to compare projects and rank them by potential watershed impacts.

3.8.7 I-94 Penetration Investigation (Indianapolis Blvd to Maryland Avenue) (Hammond 6)

During the interview with Hammond, it was noted that there may not be a full understanding of what stormwater penetrations may exist along I-94 between Indianapolis Boulevard and Maryland Avenue. A full understanding of what may or may not exist is critical to the function and integrity of the levee system. Should a connection exist, areas north of the expressway in Hammond could be subjected to floodwaters by the LCR.

3.8.8 Stormwater Equipment (LCHWY 21)

Construction equipment such as excavators, loaders, trucks, chippers, tree removal equipment, vacuum trucks, etc. are necessary to maintain waterways. Overhanging trees, debris, beaver dams and other items that cause blockages need to be removed to prevent backups and flooding. Lake County Highway Department requested funding to acquire equipment that can be used for flood control. Other equipment such as sand bag filling machines, closure bladders, and other similar equipment are necessary to contain floodwaters to within the levee system. The Commission should consider establishing an annual budget for purchasing equipment and supplies for the municipalities for maintenance and flood fighting efforts.

3.9 Quality of Life Improvement Opportunities

Section 4 of the Indiana Code creating the Commission describes the purposes of the Commission as:

- > Promote the general health and welfare of the citizens of Indiana.
- Provide for the creation, development, maintenance, administration, and operation of park, <u>recreation</u>, marina, flood control and other public works projects, including levees.

This watershed is not just a conveyance system for stormwater. People like to live and play on or near water. A watershed management plan should not only be a plan to reduce flooding, it should:

- > Enhance the quality of life for those within the watershed.
- > Protect the natural features and habitat of the waterway.
- > Embrace the waterway by providing opportunities for recreation and education.
- > Realize the potential amenities the waterway offers.

Prior to the project, residents on the LCR were able to enjoy the natural features of the river; but worried about the safety of themselves and their home when the rains came. The levee system was constructed and reduced the possibility of flood damage; yet changed the natural features of the river forever. Despite the changes in the river's natural features, the Commission should remain committed to enhancing the quality of life of those living within the watershed by:

- Reducing the opportunity for flood damage and continuing to removing residences from the floodplain saving residents the cost of flood insurance.
- Maintaining a quality flood control system by keeping the levees mowed, trails maintained and trash and debris picked up.
- Removing debris and blockages that could cause backups and allows for the use of the waterway by paddlers.
- Providing an opportunity for additional trail and recreation amenities either atop the levees or in the waterway itself.
- Funding improvement projects that enhance mobility for travelers and at the same time habitat and water quality.

Construction of the project affected approximately 150 acres of wetland and habitat. The Commission has acquired hundreds of acres of land suitable for mitigation, enhancement and restoration in the Hobart Marsh area near Lake George. Another 204 acres within the project limits is available for mitigation. The Commission should continue to work toward meeting the mitigation requirements set forth in their construction permits.

Other quality of life improvements the Commission should consider are water quality projects identified by the constituent communities. These include dredging, stream bank and shoreline stabilization projects. Additionally, the Commission should consider including water quality BMPs in each of the projects it undertakes or provides funding

assistance.

Recent maintenance efforts including tree clearing and snagging have changed the look of the river. Even though the Commission limited their removal to downed, overhanging, infected and low quality trees; they have met with some push back from the residents adjoining the river. The Commission is considering a tree replacement program, but is reluctant to replace trees within the levee system. The Commission should consider developing a Waterway Enhancement Program to focus efforts on reestablishing the proper type and location of replacement vegetation.

Sedimentation not only reduces storage, it reduces habitat for aquatic life. Additionally, chemicals such as pesticides and herbicides attach to sediments. These chemicals degrade the water quality for aquatic life by creating unwanted algae growth which reduces the dissolved oxygen in the water. A number of water quality and enhancement projects were identified by the constituent communities. These included dredging, stream bank and shoreline stabilization projects. These projects will not only improve and protect conveyance and storage systems; they will provide benefit for habitat living along and within the system. The Commission should require all applicants receiving funding assistance to include water quality BMPs in each of their projects.

Some projects give rise to recreational opportunities. Lake County's Beaver Dam Ditch – Lateral 1 Regional Detention Basin (Lake County 7) not only provides stormwater storage, it provides an opportunity for the development of a new city park. Crown Point is proposing to transform a mere storage area into a park with an amphitheater, boat docks, accessible fishing areas and parking.



Figure 3-15: Preliminary Plan for Lake County 7

Recreational experiences on Lake George in Hobart can also be enhanced. The Third Street and Wisconsin Street bridges do not allow boaters beneath them. Improvements can be made to raise the bridges and allow Lake George to be more accessible boaters.

For many of the opportunities listed in this section, there is an opportunity to improve the quality of life beyond just flood control. As scopes of work are developed in section 4 of this plan for each of the opportunities, consideration is given to developing a project that provides a multitude of quality of life aspects. In Section 4, a table is presented that identifies the opportunity and its potential to improve the quality of life for residents within the watershed by means of reduction in flooding, enhancements to recreation, or enhancements to water quality and habitat.

4 **Prioritization and Implementation**

This section provides a summary of implementation strategies for the opportunities identified in the previous chapter of this report. Relative priorities are assigned to each recommended opportunity based on potential flood control or operational impact provided to the Commission.

4.1 Implementation Goals

It is understood that the first and primary goal of any opportunity supported by the Commission is to improve the quality of life within the LCR Watershed by providing flood reduction and mitigation within the watershed. Ancillary goals include:

- Improved water quality;
- Improved opportunities for wildlife and habitat; and
- Improved opportunities for recreation

With these goals in mind, it is recommended that implementation of several opportunities described in this report occur.

4.2 Commission as a Watershed Facilitator

The communities' stormwater management personnel know and understand how the stormwater systems work in their community. Their knowledge of the watershed itself, understandably, seems to be limited to their municipal borders. They also have no ability to create or affect legislation, manage or maintain systems outside of their borders. The Commission's influence is not limited to political boundaries or regulated drains.

The role of the Commission has changed from its recent activities. As the Commission embarks on its expanded role, it will be presented with opportunities to focus on organizing, coordinating, leading, and educating the watershed communities. The Commission is entrusted with unique management and financial powers not available to other units of government. These powers need to be applied to ensure that water resources and other natural resource management decisions consider the impacts on the entire watershed and not within any one community.

4.3 General Implementation Strategy

In the previous chapter of this report, opportunities were categorized as regional, semiregional, local, maintenance, and operational. In this chapter, implementation of these opportunities is further refined into implementation strategies. Also in this chapter, opportunities are refined to projects. Projects may be an individual opportunity or a collection of opportunities. In summary, the following general implementation strategies are recommended:

Commission-Lead Projects (Category 1)

These are opportunities that should be undertaken and managed by the Commission. The Commission should lead the majority of the scoping, financial, and implementation aspects for these projects. These opportunities are generally regional in nature and may provide significant benefit to the function of the LCR or impact regions with multiple communities within the watershed. That being said, it is still important to obtain input from benefitted communities as well as possible financial support.

Regional/Semi-Regional Commission Partnership Projects (Category 2)

These are opportunities that should be initiated jointly by a local sponsor (e.g. municipality, Lake County) and the Commission. These partnerships are regional/semiregional in nature (e.g. affecting one or more communities or a significant number of residents within the watershed). The Commission may wish to contribute a certain percentage of their budget on a one time basis or an annual basis for these opportunities.

Local Commission Partnership Projects (Category 3)

These are opportunities that should be initiated by a local sponsor (e.g. municipality, Lake County). They may are generally more local in nature (e.g. affecting one community). On an annual basis, applications could be requested by the Commission from constituent municipalities for planning, capital, operational, or maintenance projects related to watershed activities. The application would contain a series of questions that would be weighted and scored. This process would allow the Commission to make informed decisions on which opportunities to fund. Suggested questions and criteria for the application are described in a later section of this chapter.

4.4 Suggested Action Plans for Commission-Lead Projects (Category 1)

The following table summarizes Category 1 Opportunities that are recommended to be pursued.

	Table 4-1						
	Recommended C	Category	1 Projects	;			
Project ID	Opportunity	Relative Priority	Opportunity Category	Est. Cost Range	Est. Duration	Potential Partner- ships	
1-A	Little Calumet River/Deep River Confluence Improvements Master Plan	High	Regional	\$100k- \$300k (B,C)	6-9 mos.	LCSO, Lake Station, Hobart	
	Storage Adjacent to I-65/I-94 (General 2)						
	Deep River Dam Rehabilitation Project (Lake Station 3)						
	Burns Ditch Conveyance Improvements (General 4)						
	Deep River Tunnel (General 5)						
	Lake George Dam Control Policy (Lake Station 7)						
1-B	I-65/I-94 Interchange Storage Area Repairs Study (LCRBDC 15)	High	Regional	\$30k-\$45k (B,C)	3-6 mos.	INDOT, Gary	
1-C	River Road Levee Project Completion Design (Griffith 3)	High	Regional	\$100k- \$200k (B,D thru J)	9-12 mos.	Griffith	
1-D	I-94 Penetration Investigation (Indianapolis Blvd. to Maryland Avenue) (Hammond 6)	High	Operational	\$5k-\$10k (A)	2-3 mos.	INDOT, Hammond	
1-E	Culverts Between Grant and Chase (LCRBDC 10)	High	Operational	\$30k-\$45k (B, D thru J)	2-3 mos	Not Applicable	
1-F	Little Calumet River Conveyance Improvements Review	High	Regional	\$20k-\$40k (A,B)	1-2 mos.	Not Applicable	
	Realignment of Hart Ditch at Confluence with Little Calumet River (LCRBDC 1)						
	Conveyance Improvements from Hart Ditch to Kennedy Avenue (LCRBDC 5)						
1-G	Perpetual Review of Emergency Action Plan (General 10)	Medium	Operational	Minimal Admin. Costs	On-going	All Communiti es Adjacent to the LCR	
1-H	Marshalltown Levee Reconstruction (LCRBDC 20)	Medium	Operational	\$100k- \$200k (B,D thru J)	6-9 mos.	Gary	
1-1	Establishment and Perpetuation of an Advisory Committee (General 11)	Medium	Operational	Minimal Admin. Costs	On-going	All Communiti es within the Lake County LCR Watershed	
1-J	Thorn Creek Diversion Alternate Operations Study (General 8)	Medium	Regional	\$10k-\$20k (A) (Phase 1 Only)	1-2 mos.	MWRGCD	
1-K	Little Calumet River Model Re-Calibration (General 7)	Medium	Operational	\$75k-\$150k (K)	12-24 mos.	Not Applicable	
1-L	Perpetual Monitoring, Data Collection, and Real Time Notifications (General 6, General 9)	Medium	Operational	To be Determined	On-going	USGS, IDNR, USACE	

	Table 4-1 Recommended Category 1 Projects						
Project ID	Opportunity	Relative Priority	Opportunity Category	Est. Cost Range	Est. Duration	Potential Partner- ships	
1-M	Integrate Deep River, Turkey Creek, and Beaver Dam Ditch Models into LCR Hydraulic Model (General 12)	Medium	Operational	\$150k- \$300k (K)	12-24 mos.	Lake County, Hobart, Merrillville, Crown Point, Winfield, Schererville	
1-N	Aerial Crossing of Sanitary Sewer East of Broadway Alternate Access (LCRBDC 11)	Medium	Maint.	\$20k-\$30k (A,B,D,E)	1-3 mos.	Gary Sanitary District	
1-0	Asset Management Plan (General 13)	Medium	Operational	To be Determined	1-3 mos.	Not Applicable	
(A) (B) (C) (D) (E) (F)	Investigative Phase Feasibility and Planning Level Survey (Limited) Survey (Detailed) Design and Bid Documents Preparation Permitting		(G) (H) (J)	Geotechnical Plat/Legal De Land Acquisit Bid Phase Ser Construction Administratic	Investigation scriptions for ion vices on/Observatic	Easement/ n	

4.4.1 (1-A) Little Calumet River/Deep River Confluence Improvements Master Plan Scope of Work

This project involves the review of potentially significant storage development, storage enhancement, diversion, and conveyance improvements located at and/or near the confluence of the LCR and Deep River. Due diligence is required to determine feasibility, benefits, and costs of the following opportunities:

- Increased storage adjacent to I-65/I-94 (General 2)
- Deep River dam rehabilitation and operation modifications (Lake Station 3)
- Burns Ditch conveyance improvements (General 4)
- Deep Tunnel to "short circuit" Deep River (General 5)
- Lake George dam control policy (Lake Station 7)

The above opportunities may be interrelated and should be reviewed at the same time and summarized in the form of a master plan. Steps required for implementation of this master plan include:

- Review the current LCR hydraulic models
- Review existing plans for Lake George Dam, I-94/I-65 Interchange, and

any other applicable locations

- Meet with local municipalities to understand existing operational and control strategies
- Conduct preliminary meetings with regulatory agencies (IDNR, USCACE, IDEM, USF&W)
- Conduct supplemental field survey required for hydraulic/hydrologic model enhancement
- Enhance the hydraulic model with field surveyed information and addition of Burns Ditch sections
- Conduct "what if" analyses for various combinations of storage modifications, configurations and operational parameters of the Deep River Dam and Lake George Dam, configurations and operational parameters of a deep tunnel concept, and configurations of Burns Ditch conveyance improvements. Determine corresponding benefits in terms of water level reductions.
- Identify potential water quality, wildlife habitat, and/or recreational opportunities
- > Prepare opinions of probable cost for recommended alternatives
- > Review results with appropriate regulatory agencies and the Commission

Development of this master plan is estimated to range between \$100k and \$300k. This master plan could be completed in 6 to 9 months, depending upon availability of regulatory agencies and local communities. Note that this does not include design, land acquisition, legal, administrative, or construction related items. Potential local partners include: LCSO, Lake Station, and Hobart.

4.4.2 (1-B) I-65/I-94 Interchange Storage Area Repairs Study Scope of Work (LCRBDC 15)

This scope of work consists of only the investigative portion at this time. The investigation should reveal construction alternatives and potential design and construction costs. Steps required for implementation of the investigation scope of work would include:

- Obtaining and reviewing as-built or other plans from INDOT regarding locations and inverts of existing infrastructure.
- Conducting field survey to gather topographic information including locations, inverts and sizes of existing stormwater infrastructure; roadway and levee alignment and grades; locations and grades of existing NIPSCO facilities; locations of utilities and other similar information.

- Preparing a stormwater analyses to determine volumes, release rates and routing of stormwater for both existing and potential future conditions; culvert analyses; identification of potential water quality opportunities, and other analyses as necessary.
- Identifying alternative routes for moving stormwater toward the LCR, specifically investigating re-routing stormwater under MLK south of I-80/94.
- Investigating solutions to reduce the amount of water that remains in the area between MLK and I-65. The amount of water that sits in this area appears to be increasing from year to year.
- > Indentifying permitting and utility requirements.

This investigation is estimated to range between \$30k and \$45k and could be implemented in 60 to 90 days, depending upon availability of information from INDOT and weather conditions. Note that this does not include design, land acquisition, legal, administrative, or construction related items. INDOT could be a potential partner as they are investigating constructing a pumping station within the I-80/94 right-of-way to solve this problem.

4.4.3 (1-C) River Road Levee Project Completion Design Scope of Work (Griffith 3)

This scope of work consists of designing an extension of the Burr Street between the EJ&E Railroad to the Cline Avenue Tieback. Steps required for implementation of the investigation scope of work would include:

- Conducting field survey to gather topographic information including locations, inverts and sizes of existing stormwater infrastructure; roadway and levee alignment and grades; locations and grades of existing utilities; and other similar information.
- Determining alternate levee alignments for review and approval by the Town of Griffith, the Commission and the USACE. The Town of Griffith wishes to locate the levee far enough north of River Drive to allow for commercial development between River Drive and the proposed levee.
- Designing a levee system meeting the requirements of the USACE and other appropriate engineering standards to provide flood control to an elevation per the USACE.
- > Performing geotechnical investigations which will be extensive.
- Preparing legal descriptions, boundary surveys, title searches and other similar items as necessary for the construction of the levee system.
- > Preparing construction documents for bidding including plans,

specifications, special provisions, wage determinations, engineer's estimates, and other such items.

- Providing bid services including bid review, preparing bid tabulations and recommendations.
- Providing post biding services including reviewing shop drawings, construction inspection, project documentation and close out.
- Preparing O&M manuals.

This investigation is estimated to range between \$100k and \$200k (assuming all local funds) and could be implemented in 9 to 12 months depending upon timing of land acquisition and type of funding. The Town of Griffith would be a potential funding partner and could be the awarding agency if the Commission desires.

4.4.4 (1-D) I-94 Penetration Investigation Scope of Work (Hammond 6)

This scope of work consists of only the investigative portion at this time. Should penetrations be identified, study, design, or construction would be required to implement the removal of the penetration. Steps required for implementation of this scope of work include:

- Obtain and review plans from INDOT
- > Meet with City of Hammond engineering and maintenance personnel
- Perform visual field investigation

This investigation is estimated to range between \$5k and \$10k and could be implemented in 60 to 90 days, depending upon availability of information from INDOT and availability of Hammond personnel. Note that this does not include design, land acquisition, legal, administrative, or construction related items. Potential partners include INDOT and Hammond.

4.4.5 (1-E) Culverts between Grant and Chase Scope of Work (LCRBDC 10)

This scope of work consists of investigating the causes of stormwater that remains in the area between Grant and Chase Streets in Gary. The investigation should reveal construction alternatives and potential design and construction costs. Steps required for implementation of the investigation scope of work would include:

Obtaining and reviewing as-built or other plans from USACE regarding locations and inverts of existing infrastructure.

Conducting field survey to gather topographic information including locations, inverts and sizes of existing stormwater infrastructure; roadway and levee alignment and grades; river bank and water elevations; locations and grades of existing NIPSCO facilities; locations of utilities and other similar information.

- Preparing a stormwater analyses to determine volumes and release rates; culvert analyses; identification of potential water quality opportunities, and other analyses as necessary.
- Preparing design and construction plans and specifications; engineer's estimates and bid documents for the preferred corrective alternative.
- Indentifying permitting and utility requirements. Obtaining necessary permits.
- Providing bid services including bid review, preparing bid tabulations and recommendations.
- Providing post biding services including reviewing shop drawings, construction inspection, project documentation and close out.

This investigation is estimated to range between \$30k and \$45k and could be implemented in 60 to 90 days, depending upon weather conditions.

4.4.6 (1-F) Little Calumet River Conveyance Improvements Review (Hart Ditch to Kennedy Avenue) (LCRBDC 1 and 5)

The scope of work for this element involves revisiting the proposed plan and scope of work for the re-alignment of Hart Ditch at its intersection with the LCR and the removal of sediment from the LCR near Kennedy Avenue. The concern is not so much with respect to the re-alignment, but with the sediment removal. Upon a cursory review, the present plan does not call for the removal of the sediment in a manner which allows for the most efficient hydraulic section through the LCR. It is understood this was done in this manner to satisfy regulatory agencies. However, with such a large amount to be invested in this project, it is recommended a second look be performed. Steps required for implementation of this scope of work include:

- Update the LCR hydraulic model for this reach (Hart Ditch to Kennedy Avenue) with existing survey conditions already in the possession of the Commission and its consultant
- Input proposed (current design plan) information into the model and perform a hydraulic analysis
- Input a more efficient hydraulic section into the model and perform a hydraulic analysis as a comparison to the current design plan and existing conditions
- Should the more efficient hydraulic section provide reduction in flood levels, meet with regulatory officials to review results and develop a

favorable plan meeting requirements of the Commission and regulatory officials

Performance of this review is estimated to range between \$20k and \$40k and could be implemented in 30 to 60 days, depending upon availability of regulatory agencies. Note that this does not include design, land acquisition, legal, administrative, or construction related items.

4.4.7 (1-G) Perpetual Review of Emergency Action Plan Scope of Work (General 10)

The scope of work consist of updating information contained in the Emergency Action Plans as new information is obtained, construction projects are completed or existing infrastructure is updated. Performance of this work could be completed using Commission personnel with minor costs for printing.

4.4.8 (1-H) Marshalltown Levee Scope of Work (LCRBDC 20)

This scope of work consists of raising the Marshalltown Levee to provide an equal level of protection as the rest of the levee system. Steps required for implementation of the investigation scope of work would include:

- Conducting field survey to gather topographic information including locations of existing utilities; levee alignment and grades; and other similar information.
- Designing an elevated levee system meeting the requirements of the USACE and other appropriate engineering standards to provide flood control to an elevation per the USACE.
- Communicating with regulatory agencies to determine permitting requirements. Obtaining all necessary permits.
- Performing geotechnical, wetland and other necessary investigations. Geotechnical investigation will be extensive.
- Preparing legal descriptions, boundary surveys, title searches and other similar items as necessary for the construction of the levee system.
- Preparing construction documents for bidding including plans, specifications, special provisions, wage determinations, engineer's estimates, and other such items.
- Providing bid services including bid review, preparing bid tabulations and recommendations.
- Providing post biding services including reviewing shop drawings, construction inspection, project documentation and close out.

Preparing O&M manuals.

Performance of this scope is estimated to range between \$100k and \$200k (assuming all local funds) and could be implemented in 6 to 9 months depending upon land acquisition and permitting. This cost range does not include construction, mitigation, land acquisition, or legal consultation. It is anticipated that the project would be funded and awarded by the Commission.

4.4.9 (1-I)Establishment and Perpetuation of an Advisory Committee (General 11)

The scope of work consists of assembling a project advisory board per IC 14-13-2-32. The board could meet monthly or bi-monthly depending upon tasks at hand. Status reports/meeting minutes should be prepared and distributed to the Commission and the chief executives of each municipality. The advisory board could complete special assignments of the Commission, review local projects requesting funding assistance from the Commission, review maintenance needs, review quality of life needs, etc.

4.4.10 (1-J) Thorn Creek Diversion Alternate Operations Study (General 8)

The scope of this work is proposed in two phases. The first phase consists of a preliminary investigation into the feasibility of the opportunity. The second phase would involve a detailed analysis and development of an operational plan and schematic improvements should the first phase determine the opportunity is feasible and provides benefit to the Commission.

Steps toward implementation of the first phase of this opportunity include:

- Review of the existing LCR hydraulic model and its incorporation and relationship between the Thorn Creek Reservoir and the Indiana side of the LCR
- Site visit to the Thorn Creek Diversion structure with MWRGCD officials to observe its operation
- > Meet with MWRGCD officials to discuss the feasibility of the opportunity

Performance of this first phase of investigation is estimated to range between \$10k and \$20k and could be implemented in 30 to 60 days.

It is desirable that this effort benefit MWRGCD. A significant reach of the LCR exists between the Indiana border and Thorn Creek, which is under the MWRGCD's jurisdictional control.

The scope and amount of the second phase of this investigation would be determined during the first phase of investigation. It may include development of an operational plan, hydraulic model refinement, or schematic or design

drawings.

4.4.11 (1-K) Little Calumet River Model Re-Calibration (General 7)

Significant time and resources have been put into the development of the LCR hydrologic and hydraulic model over the past several decades. The hydraulic model is of great importance in that it provides a tool to help predict river flood stages. This model was last calibrated to storm events in the late 1980s and early 1990s well before much of the levee system was complete. It is therefore recommended to recalibrate the LCR Model in order to:

- Provide a better understanding of as-built levee system performance (flood levels, timing of peak stages, etc.).
- Provide a "what if" tool for training and scenario evaluation (levee breaches and/or failures, blockages, etc.).
- Provide a "what if" tool for understanding river response to various hydrologic conditions (hurricane remnants, heavy rainfall over part or all of the watershed, etc.).
- Provide a tool to understand impacts to the river and watershed related projects (regional storage, bridge replacements, etc.).
- Provide a base for past studies to be integrated into one comprehensive model.

It is recommended that the LCR model be recalibrated as it would provide a regional and benefit tool for future operations, maintenance, and decision making policies toward future capital projects within the watershed. The recalibrated process includes the following steps:

- Select significant historical storms that have occurred since parts the levee system were constructed and identify the stage of construction at the time of the storm event
- Collect data associated with the storm event including rainfall records, antecedent moisture conditions, physical data for the streams, river stage information from the USGS stations and other sources, including community officials/residents, and flood inundation data from communities/media
- Run the current model and check if it reproduces the events observed during the storm events.
- If the model results are significantly different from the observed events, recalibration is necessary.
- Calibrate the model parameters such as Manning's n, loss coefficients, and watershed parameters (such as antecedent moisture etc) to replicate

the observed events during the storm events. This must be done carefully and systematically so that unobserved phenomena such as debris blockage at bride piers do not skew the calibration.

Performance of this project is estimated to range between \$75k and \$150k and could take a minimum of 12 to 24 months depending upon occurrence of model verification weather events.

4.4.12 (1-L) Perpetual Monitoring, Data Collection, and Real Time Notifications (General 6 and 9)

Since periodic water level data on the LCR and possibly flow data/lake levels at Lake George Dam is already being collected by various agencies, it would be beneficial to coordinate and expand the data collection efforts such that it can be used for forecasting flood levels and producing inundation maps in real time. Such information would be invaluable to local emergency management officials as well as for local residents to prepare and plan for flood events. The data collection efforts could include rainfall data at selected locations and additional gage and flow data across the watershed which could be processed and transmitted to a data center where it would drive custom forecasting software that runs on well established hydrologic and hydraulic models such as HEC-HMS and HEC-RAS. A range of forecasting tools are available which range from simple models that rely on time variation of upstream water levels and rainfall to project downstream water levels or it could be complex mix of hydrologic and hydraulic models that continually update hydrologic/hydraulic information for the forecasting. The forecast levels and inundation areas can be disseminated to the local officials/residents using a variety of methods that include the internet and the media. The extent and complexity of the required effort will be determined based on discussions with the Board and other stakeholders.

4.4.13 (1-M) Integrate Deep River, Turkey Creek, and Beaver Dam Ditch Models into LCR Hydraulic Model (General 12)

The current LCR hydraulic model does not incorporate other critical stream reaches which may have a significant impact on the hydraulics of the entire system. These include the Deep River upstream of Lake George (Turkey Creek, and Beaver Dam Ditch segments). The expanded model would not only improve the modeling results for the current system but would also be required to evaluate the impacts of some of the opportunities upstream of Lake George. Integrating these stream segments would require some additional effort in terms of model expansion, development, and calibration and would need field survey of cross sections and stream crossings associated with the additional stream segments. Existing separate FEMA models would be utilized to the extent possible so as to not duplicate efforts. Again, while it may be difficult for decision

makers to spend money on modeling, the efforts would be worth it in terms of better evaluation of the current system and the proposed alternatives and will likely result in the savings of financial resources over time.

Performance of this project is estimated to range between \$150k and \$300k and could take 12 to 24 months.

4.4.14 (1-N) Aerial Sanitary Sewer East of Broadway

The presence of the aerial sewer over the LCR at this location is a maintenance issue. According to Commission personnel, this area needs to be cleaned of debris that gets trapped on the sewer and its piers several times per year. And many times, removal of debris is manual due to its hard to access location. Relocation of the sewer, while possible, may be very costly and would involve construction of a "siphon" or pump station.

If not already considered, the Commission should develop an alternative access plan for the removal of debris from the upstream side of the sewer. At this location, the river width at low water elevation is about 45 feet. In an emergency situation, where large equipment may not always be available, it would be desirable for access from both sides to facilitate use of smaller equipment.

Scope of this work may include working with adjacent land owners on the north side for easements and development of a paved surface to enable vehicles access to as close to the water and sewer as possible. On the south side, the levee top is paved to a distance approximately 300 feet east of Broadway. This paved area provides access to the levee past the floodwall. Development of an access ramp to the water might be considered in this case.

Should the Commission desire to pursue this alternative, the following steps toward implementation are suggested:

- Review existing debris removal procedures.
- Conduct required topographic survey to determine site slopes, property locations, easement locations, etc.
- Conduct a site analysis to determine the best possible access configurations.
- > Meet with property owners on the north side to discuss access options.
- Meet with Gary Sanitary District officials to discuss access and potential cost sharing arrangements.
- > Prepare plans, if required, for the development of the alternative access.
- Prepare easement documents, if required, for the development of the alternative access.

Performance of this scope of work is estimated to range between \$20k and \$30k and could be implemented in 30 to 90 days. This cost range does not include

construction, construction inspection, mitigation, land acquisition, or legal consultation.

4.4.15 (1-O) Asset Management Plan

The Commission has begun collecting asset data but should go even further and create an Asset Management Program so data is not just collected, but utilized to schedule equipment maintenance, replacement programs, mowing, etc. This Program could include using maintenance software integrated into the GIS to help manage maintenance activities. SCADA (supervisory control/data acquisition) software could also be integrated into the Program. SCADA could be set up to:

- > Track pump runtimes to calculate flows or maintenance schedules
- Provide pump station alarms to notify the Commission when doors are opened, power failures occur, high water levels are reached indicating that the pumps may not be running, etc.
- > Notify the Commission when key valves are open or closed
- > Track water levels in the Little Calumet River or any of its tributaries.
- Collect other data essential to the operation and maintenance of the system

The Commission's assets are going to continue to grow with the expansion of the Commission's oversight. An Asset Management Program will help reduce the stress on Commission personnel responsible for maintaining Commission assets.

4.5 Suggested Action Plans for Regional/Semi-Regional Commission Partnership Projects (Category 2)

The following table summarizes regional Commission Partnership Projects (Category 2). These are opportunities where efforts are not focused directly on the LCR, but are significant from a regional watershed perspective. They are best implemented through partnerships where a local municipality or the County may be the lead; however, the Commission may have significant input or financial contribution.

Table 4-2 Recommended Category 2 Projects						
Project ID Opportunity Opportunity Category Relative Copportunity Est. Cost Est. Potential Partner- Ships						
2-A	Kennedy Avenue Bridge Reconstruction Design (LCRBDC 6)	Medium	Regional	\$250k-\$300k (B, D thru J)	9-12 mos.	Lake County Highway, Highland, Hammond
2-B	Harrison Avenue Bridge Reconstruction	Medium	Regional	\$25k-\$35k	9-12 mos.	Lake

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	Table 4-2						
	Recommende	d Catego	ory 2 Proje	cts			
Project ID	Opportunity	Relative Priority	Opportunity Category	Est. Cost Range	Est. Duration	Potential Partner- ships	
	Preliminary Engineering Report (LCHWY 16)			(B,C)		County Highway, Gary	
2-C	Georgia Street Approach Design (LCRBDC 18)	Low	Regional	\$75k-\$125k (B, D thru J)	4-6 mos.	Lake County Highway, Gary	
2-D	Broadway Avenue Bridge and Approach Design (LCRBDC 19)	Low	Regional	\$175k-\$250k (B, D thru J)	12-18 mos. Or longer if INDOT is the Awarding Agency	INDOT, Gary	
2-E	Deep River Storage - Upper Beaver Dam Ditch Detention Study (Lake County 3)	Medium	Regional	\$40k-\$65k (B,C)	3-6 mos.	LCSO, Crown Point	
2-F	Hart Ditch Storage – Longwood Golf Course Regional Detention Facility (Dyer 1)	Medium	Regional	To be Determined	To be Determined	LCSO, Dyer, Munster	
2-G	Deep River Storage – Upper Turkey Creek Stormwater Storage Study (Lake County 1)	Medium	Regional	\$30k-\$50k (B,C)	3-6 mos.	LCSO, Schererville	
2-H	Deep River Storage – Upper Turkey Creek Overbank Detention Study (Lake County 4)	Medium	Semi- Regional	\$20k-\$40k (B, D thru H)	3-6 mos.	LCSO	
2-1	121st and Iowa Drainage Improvements with NRCS (Lake County5)	Medium	Semi- Regional	\$20k-\$40k (A,B)	3-6 mos.	LCSO, Lake County S&WCD	
2-J	Lincoln Gardens and Southbrook Subdivision Drainage Project (Merrillville 1)	Medium	Semi- Regional	To be Determined	To be Determined	Merrillville, LCSO	
2-К	Country Club Heights & Meadowdale Subdivision Drainage Project (Merrillville 2)	Medium	Semi- Regional	To be Determined	To be Determined	Merrillville, LCSO	
2-L	Cady Marsh Detention Project (Highland 1)	Medium	Semi- Regional	To be Determined	To be Determined	Highland	
2-M	Spring Street Ditch Culvert Replacements (Highland 5)	Medium	Semi- Regional	\$20k-\$40k	3-6 mos.	Highland, LCSO	
2-N	Beaver Dam Ditch – Lateral 1 (Regional Detention Basin) (Lake County 7)	Medium	Semi- Regional	To be Determined	To be Determined	LCSO, Crown Point, Merrillville, INDOT	
2-0	Potential Increase in Hartsdale Pond Storage (Schererville 10)	Medium	Semi- Regional	To be Determined	To be Determined	LCSO, Schererville , Highland	
2-P	Hidden Creek Subdivision Regional Stormwater Project	Medium	Semi- Regional	\$40k-\$80k	3-6 mos.	Winfield, Merrillville	
(A) (B) (C) (D) (E) (F)	Investigative Phase Feasibility and Planning Level Survey (Limited) Survey (Detailed) Design and Bid Documents Preparation Permitting			 (G) Geotechni (H) Plat/Legal Land Acqu (I) Bid Phase (J) Constructi Administra (K) Hydraulic I 	cal Investigation Descriptions for isition Services on ation/Observatic Modeling	Easement/	

4.5.1 (2-A) Kennedy Avenue Bridge Reconstruction Design (LCRBDC 6)

This scope of work consists of raising Kennedy Avenue bridge over the LCR. The project is located immediately south of the I-80/94 – Kennedy Avenue interchange in the Town of Highland. Steps required for implementation of the scope of work would include:

- Completing due diligence work including communicating with INDOT and the Federal Highway Administration regarding the effects of the construction project with the interchange and determining the wants and needs of the Town of Highland, City of Hammond and the Lake County Highway Department.
- Communicating with regulatory agencies to determine the permitting requirements. Obtain all necessary permits.
- Conducting field survey to gather topographic information including roadways, utilities, waterway, bridge, existing buildings, and other necessary items.
- Establishing horizontal and vertical alignments. Vertical alignment shall include raising the bridge to provide an equal level of flood protection as the adjoining levee walls.
- Designing a bridge structure with minimal obstructions within the waterway. Design shall follow current INDOT design standards.
- Preparing construction documents for bidding including plans and specifications following current INDOT standards, special provisions, wage determinations, engineer's estimates, and other such items.
- Preparing a traffic control plan minimizing obstructions to the businesses along the roadway and interstate highway.
- Administering sub-consultants and sub-consultant work including geotechnical, wetland, and environmental consultants.
- Preparing legal descriptions, boundary surveys, title searches and other similar items as necessary for the construction of the roadway.
- Providing bid services including bid review, preparing bid tabulations and recommendations.

Performance of this scope is estimated to range between \$250k and \$300k (assuming all local funds) and could be implemented in 9 to 12 months depending upon land acquisition and type of funding. Note that if federal funds are used, the right-of-way process could take 20 to 24 months. This cost range does not include construction, construction inspection, mitigation, land acquisition, or legal consultation. It is anticipated to that the project would be funded by the Commission. Lake County Highway Department could be a

potential funding partner and could be the awarding agency if the Commission desires.

4.5.2 (2-B) Harrison Avenue Bridge Reconstruction Preliminary Engineering Report (LCHWY 16)

This scope of work consists of investigating alternatives to prevent Harrison Street from flooding during heavy rain events. Steps required for implementation of the scope of work would include:

- Conducting field survey to gather topographic information including roadways, utilities, waterway, bridge, existing buildings, and other necessary items.
- Preparing alternatives for protecting the roadway during heavy rains. Alternatives might include elevating the roadway, bridge and approaches; and constructing levees or levee walls along the roadway to prevent flood waters from encroaching upon the roadway.
- > Preparing design and construction estimates for proposed alternatives.
- > Determining permit requirements for constructing alternatives.
- Coordinating with the City of Gary and the Lake County Highway Department to determine their wants and needs.
- Communicating with regulatory agencies to determine the permitting requirements. Obtain all necessary permits.
- Preparing preliminary geotechnical and environmental documentation. Administering sub-consultants and sub-consultant work including geotechnical, wetland, and environmental consultants.
- Conducting a review of existing rights-of-ways to determine the need for additional rights-of-way to support alternatives.

This investigation is estimated to range between \$25k and \$35k (assuming all local funds) and could be implemented in 60 to 90 days. This cost range does not include construction, construction inspection, mitigation, land acquisition, or legal consultation. It is anticipated to that the project would be funded by the Commission. Lake County Highway Department could be a potential funding partner and could be the awarding agency if the Commission desires.

4.5.3 (2-C) Georgia Street Approach (LCRBDC 18)

This scope of work consists of raising Georgia Street at the Gary South Levee to eliminate the need to sandbag the roadway to prevent floodwaters from escaping behind the levee. Closing the roadway to traffic temporarily during flooding events will still be required. Steps required for implementation of the scope of work would include:

- Conducting field survey to gather topographic information including roadways, utilities, waterway, bridge, existing buildings, and other necessary items.
- Establishing horizontal and vertical alignments. Vertical alignment shall include raising the bridge to provide an equal level of flood protection as the adjoining levee walls.
- Communicating with regulatory agencies to determine the permitting requirements. Obtaining all necessary permits.
- Preparing construction documents for bidding including plans and specifications following current INDOT and USACE standards, special provisions, wage determinations, engineer's estimates, and other such items.
- Preparing a traffic control plan.
- Administering sub-consultants and sub-consultant work including geotechnical, wetland, and environmental consultants.
- Preparing legal descriptions, boundary surveys, title searches and other similar items as necessary for the construction of the roadway.
- Providing bid services including bid review, preparing bid tabulations and recommendations.
- Providing post biding services including reviewing shop drawings, construction inspection, project documentation and close out.
- Preparing O&M manuals.

Performance of this scope is estimated to range between \$75k and \$125k (assuming all local funds) and could be implemented in 4 to 6 months depending upon acquisition, environmental issues and type of funding. This cost range does not include construction, mitigation, land acquisition, or legal consultation. It is anticipated to that the project would be funded by the Commission. Lake County Highway Department could be a potential funding partner and could be the awarding agency if the Commission desires.

4.5.4 (2-D) Broadway Avenue Bridge and Approach Design (LCRBDC 19)

This scope of work consists of raising the Broadway Avenue Bridge over the LCR at the Gary South Levee to eliminate the need to sandbag the roadway to prevent floodwaters from escaping behind the levee. Steps required for implementation of the scope of work would include:

> Communicating with INDOT, City of Gary and the Lake County Highway

Department regarding the requirements of the work.

- Communicating with regulatory agencies to determine the permitting requirements. Obtaining all necessary permits.
- Establishing horizontal and vertical alignments. Vertical alignment shall include raising the bridge to provide an equal level of flood protection as the adjoining levee walls.
- Designing a bridge structure with minimal obstructions within the waterway. Design shall follow current INDOT design standards.
- Preparing construction documents for bidding including plans and specifications following current INDOT standards, special provisions, wage determinations, engineer's estimates, and other such items.
- Preparing a traffic control plan minimizing obstructions to the businesses along the roadway.
- Administering sub-consultants and sub-consultant work including geotechnical, wetland, and environmental consultants.
- Preparing legal descriptions, boundary surveys, title searches and other similar items as necessary for the construction of the roadway.
- Providing bid services including bid review, preparing bid tabulations and recommendations.
- Providing post biding services including reviewing shop drawings, construction inspection, project documentation and close out.

Performance of this scope is estimated to range between \$175k and \$250k (assuming all local funds) and could be implemented in 12 to 18 months depending upon land acquisition, INDOT approvals, environmental issues and type of funding. Note that if federal funds are used, the right-of-way process could take 20 to 24 months. This cost range does not include construction, mitigation, land acquisition, or legal consultation. It is anticipated that the project would be funded by the Commission. INDOT could be a potential funding partner and would be the awarding agency since the bridge is on a state roadway.

4.5.5 (2-E) Deep River Storage – Upper Beaver Dam Ditch Detention Study (Lake County 3)

Based upon an initial review conducted by the LCSO, this project has the potential to store in excess of 1,400 acre-feet in the Beaver Dam Ditch watershed (part of the Deep River watershed). It is possible effects may be noticed in Crown Point, Merrillville, and Hobart. It is recommended the Commission participate in this project as it may have significant benefits to the watershed from both a flood

reduction and water quality aspect. Initial steps required for the implementation of this project include:

- Meet with Lake County Surveyor Office and Lake County Highway Department to review scope, coordination, and other partnership opportunities.
- Refine hydrology/hydraulics.
- > Review of impacts to adjacent properties and public infrastructure.
- Conduct preliminary geotechnical investigation at location of old railroad embankment and location where Clark Road is proposed to be raised.
- Investigate permit and regulatory requirements.
- Review ways to integrate flood control, water quality, recreation, and wild life habitat into this opportunity.
- > Develop alternatives and recommendations.
- > Prepare opinions of probable construction cost.

Performance of this scope is estimated to range between \$40k and \$65k and could be completed in 3 to 6 months. The cost range does not include final design, survey, construction, mitigation, permitting, land acquisition, or legal consultation.

4.5.6 (2-F) Hart Ditch Storage – Longwood Golf Course Regional Detention Facility (Dyer 1)

Of the opportunities identified during the preparation of this plan, this opportunity provides the greatest potential for flood reduction along Hart Ditch in Dyer and Munster. Reduction in flows also provides for the possible reduction in erosion along the banks of Hart Ditch through Dyer and Munster. It is recommended the Commission participate in this project as it may have significant benefits to the watershed from both a flood reduction and water quality aspect.

The project is advanced through many of the preliminary study and engineering steps. But there is apparently much more work to be done, particularly from a financial standpoint. It is the most costly opportunity identified in this report. Suggested involvement by the Commission at this time may include the following:

- Meet with Dyer and Lake County Surveyor Office representatives to review scope, schedule, and other partnership opportunities.
- Provide a commitment of some level of funding, contingent upon the commitment and execution of other potential partnership funding.
- > Monitor the progress of the project on an annual or semi-annual basis

and continue to provide partial funds to the project to a level that is comfortable to the Commission.

Because of the cost of the project and the many partnerships that could evolve from this project, it is difficult to determine the project's schedule without further coordination. Financial contribution by the Commission should be metered carefully.

4.5.7 (2-G) Deep River Storage – Upper Turkey Creek Stormwater Storage Study (Lake County 1)

This project can potentially store approximately 120 acre-feet of stormwater and reduce flooding along Turkey Creek in Schererville. There are also wetland enhancement opportunities as a result of this project. It is recommended the Commission participate in this project as it may have significant benefits to the watershed from both a flood reduction and water quality aspect.

Implementation steps for this opportunity include, but are not limited to:

- Meet with Schererville and Lake County Surveyor Office representatives to review scope, coordination, and other partnership opportunities.
- Refinement of hydrology/hydraulics.
- > Review of impacts to adjacent properties and public infrastructure.
- > Preliminary geotechnical investigation.
- > Investigate permitting and regulatory requirements.
- Review ways to integrate both flood control, water quality, recreation, and wild life habitat into this opportunity.
- > Develop alternatives and recommendations.
- > Prepare opinions of probable construction cost.

Performance of this scope is estimated to range between \$30k and \$50k and could be completed in 3 to 6 months. The cost range does not include final design, survey, construction, mitigation, permitting, land acquisition, or legal consultation.

4.5.8 (2-H) Deep River Storage – Upper Turkey Creek Overbank Detention (Lake County 4)

While this opportunity may not provide significant detention, it has been identified as a project that could provide a water quality and a reduction of erosion and downstream sedimentation opportunity in the Turkey Creek watershed through construction of a two stage ditch. The Commission may wish to consider this project for its potential water quality aspects. Implementation steps for this opportunity include, but are not limited to:

- Meet with Lake County Surveyor Office representatives to review scope, coordination, and other partnership opportunities.
- Conduct topographic and boundary survey of the project area.
- > Develop conceptual and final plans.
- > Prepare easement documentation, if required.
- Coordinate with regulatory agencies (IDEM, USACE, IDNR) and prepare permits as required.

Performance of this scope is estimated to range between \$20k and \$40k and could be implemented in 3 to 6 months. The cost range does not include construction, land acquisition, or legal consultation.

4.5.9 (2-I) 121st and Iowa Drainage Improvements with NRCS (Lake County 5)

Based upon an initial review conducted by the LCSO and the Lake County Soil and Water Conservation District, this project has the potential to provide storage for land in excess of 6,100 acres in the Niles Creek / Deep River watershed. It is possible benefits could be achieved in Winfield, Crown Point, and Merrillville from this project. It is recommended the Commission become part of the partnership that will investigate this opportunity.

Implementation steps for this opportunity include:

- Meet with representatives from the LCSO and Lake County Soil and Water Conservation District.
- Refinement of hydrology/hydraulics.
- > Review of impacts to adjacent properties and public infrastructure.
- > Investigation into permit requirements.
- > Development of alternatives and recommendations.
- > Preparations of opinions of probable construction cost.

Performance of this scope is estimated to range between \$20k and \$40k and could be implemented in 3 to 6 months. The cost range does not include final design, survey, construction, mitigation, permitting, land acquisition, or legal consultation.

4.5.10 (2-J) Lincoln Gardens and Southbrook Subdivision Drainage Project (Merrillville 1)

Preliminary engineering has been completed by the Town of Merrillville. It is

recommended that the Commission participated in this project as it may have significant benefits to those living in the Kaiser Ditch watershed. The Commission will need to meet with Merrillville to determine its level of participation. The Commission should also ensure that Merrillville includes opportunities for water quality.

4.5.11 (2-K) Country Club Heights & Meadowdale Subdivision Drainage Project (Merrillville 2)

Preliminary engineering has been completed by the Town of Merrillville. It is recommended that the Commission participated in this project as it may have significant benefits to those living in the Griffith Lateral 6 watershed. The Commission will need to meet with Merrillville to determine its level of participation. The Commission should also ensure that Merrillville includes opportunities for water quality.

4.5.12 (2-L) Cady Marsh Detention Project (Highland 1)

This opportunity is currently being driven by the Town of Highland. The project appears to provide benefit to the watershed, particularly from a flood control aspect. Schedule of this work and cost for implementation has not been determined. It is recommended the Commission investigate its participation role for opportunity by meeting with Highland to discuss scope, coordination, and other partnership opportunities.

4.5.13 (2-M) Spring Street Ditch Culvert Replacements (Highland 5)

The Spring Street Ditch Culvert Replacement opportunity will improve the reliability of the waterway by replacing aged and undersized culverts. Preliminary work has been completed by the LCSO with respect to sizing these facilities. Historically as a culvert was replaced in the segment between Hart Street and 45th Avenue, its size was predetermined by the size determined by the LCSO.

There is the potential to partnership with the LCSO and the Town of Highland. Implementation steps for this opportunity include:

- Meet with representatives from the LCSO and the Town of Highland to review scope, coordination, and other partnership opportunities.
- Conduct topographic survey for the project area.
- > Develop construction plans.
- Coordinate with regulatory agencies (IDEM, USACE, IDNR) and prepare permits, as required.

Performance of this scope is estimated to range between \$20k and \$40k and could be implemented in 3 to 6 months. The cost range does not include construction, special headwall or structural plans, and acquisition, or legal consultation.

4.5.14 (2-N) Beaver Dam Ditch – Lateral 1 (Regional Detention Basin) (Lake County 7)

Preliminary engineering has been completed by Crown Point. It is recommended that the Commission participated in this project as it may have significant benefits to those living in Crown Point and Merrillville. Some funding has already been committed by INDOT and the LCSO. The Commission will need to meet with the partners to determine its level of participation. The Commission should also ensure that the project includes opportunities for water quality.

4.5.15 (2-O) Potential Increase in Hartsdale Pond Storage (Schererville 10)

This opportunity was mentioned by the Town of Schererville, who jointly maintains this facility with Highland. The original project was funded in part by the LCSO. There may be opportunity to increase storage at this facility or adjacent to this facility. It is recommended that the Commission investigate this opportunity further through a site visit with representatives from the LCSO, Town of Schererville, and Town of Highland.

4.5.16 (2-P) Hidden Creek Subdivision Regional Stormwater Project (Winfield 1)

This opportunity benefits part of the watershed occupied by the Town of Winfield and the Town of Merrillville. Of the opportunities identified in the Deep River basin, this opportunity is one of the only opportunities known to reduce or eliminate residential structure flooding.

The project is advanced through the preliminary study phase. However, there is more work to be done, particularly from a design, financial, and land acquisition perspective. The Town of Winfield has a small population and is limited in its ability to fund, although they do collect a stormwater user fee. Suggested involvement by the Commission at this time may include the following:

- Meet with Winfield and Merrillville to review scope, schedule, and other partnership opportunities.
- Provide a commitment of some level of funding, contingent upon the commitment and execution of other potential partnership funding and land acquisition.

Design for this project is estimated to range between \$40k and \$80k and will take

3-6 months.

4.6 Suggested Action Plan for Local Commission Partnership Projects (Category 3)

Commission Partnership Opportunities could be subject to screening by an application process. The application should be developed while keeping in mind the primary goal of the Commission, which is to provide flood reduction within the watershed. However, the Commission is also interested in improving water quality, habitat and recreational opportunities. Several types of applications may be recommended (e.g. planning and design opportunities, construction opportunities, and maintenance opportunities). Some suggested questions and criteria for the application are provided in the following tables.

Table 4-3 Suggested Questions and Criteria (Planning and Design Projects)					
Question/Criteria	Weighted? (yes)	Relative Weighting			
GENERAL INFORMATION					
Project name	No	Not Applicable			
Project location	No	Not Applicable			
Project description/narrative (with aerial maps)	No	Not Applicable			
Community where project is located	No	Not Applicable			
Major watershed	No	Not Applicable			
Minor watershed	No	Not Applicable			
What are the funds requested of the Commission for the planning or design?	No	Not Applicable			
What funds are local matching funds to be provided?	Yes	High			
Is this project a result or recommendation of a community stormwater management plan?	Yes	Low			
Does your community have a stormwater management plan?	Yes	Low			
PROJECT BENEFITS					
Does the opportunity provide stormwater detention?	Yes	Medium			
If the opportunity provides stormwater detention, what is the ratio of the volume of stormwater detention (ac-ft) to watershed area (acres) served by the stormwater detention facility?	Yes	Medium			
Does the opportunity include stream bank stabilization?	Yes	Low			
Will opportunity provide a reduction in downstream sedimentation?	Yes	Low			
Will the opportunity reduce the number of houses (actual structures) or businesses (actual structures) that flood?	Yes	High			
If the opportunity reduces the number of houses or businesses (actual structures) that flood, how many will be impacted and where are these located?	Yes	High			
Will the opportunity reduce the number of roadway closings due to flooding?	Yes	Medium			
If the opportunity reduces the number of roadway closings due to flooding, how many, to what frequency, and what are the locations affected?	Yes	High			
Does the opportunity provide benefit to multiple communities?	Yes	Medium			
If the project provides benefit to multiple communities, list the communities.	No	Not Applicable			
Does the project provide for aspects that will improve water quality?	Yes	Medium			
Does the project provide for aspects that will improve wildlife habitat?	Yes	Low			
Does the project provide for aspects that will improve recreation?	Yes	Low			
PROJECT SPECIFICS					
Will easements be required for this opportunity?	Yes	Medium			
Will permanent land acquisition be required for this opportunity?	Yes	High			

Table 4-3 Suggested Questions and Criteria (Planning and Design Projects)		
Question/Criteria	Weighted? (yes)	Relative Weighting
Will wetland permitting be required for this opportunity?	Yes	High
Will construction in a floodway permit be required by the IDNR?	Yes	Low
Will archeological investigations be required for this activity?	No	Not Applicable
Is a funding source identified for the on-going operations and maintenance of this project when it is complete? Please provide details.	Yes	Medium

Suggestions for questions and criteria for construction opportunities include:

Table 4-4 Suggested Questions and Criteria (Construction Projects)					
Question/Criteria	Weighted? (yes)	Relative Weighting			
GENERAL INFORMATION					
Project name	No	Not Applicable			
Project location	No	Not Applicable			
Project description/narrative (with aerial maps)	No	Not Applicable			
Community where project is located	No	Not Applicable			
Major watershed	No	Not Applicable			
Minor watershed	No	Not Applicable			
What are the funds requested of the Commission for the construction?	No	Not Applicable			
What funds are local matching funds to be provided?	Yes	High			
Is this project a result or recommendation of a community stormwater management plan?	Yes	Low			
Does your community have a stormwater management plan?	Yes	Low			
PROJECT BENEFITS					
What is the project benefit to cost ratio?	Yes	High			
If the project provides stormwater detention, what is the ratio of the volume of stormwater detention (ac-ft) to watershed area (acres) served by the stormwater detention facility?	Yes	Medium			
Does the project involve stream bank stabilization?	Yes	Low			
Will the project reduce downstream sedimentation?	Yes	Low			
Will the project reduce the number of houses (actual structures) or businesses (actual structures) that flood?	Yes	High			
If the opportunity reduces the number of houses or businesses (actual structures) that flood, how many will be impacted and where are these located?	Yes	High			
Will the opportunity reduce the number of roadway closings due to flooding?	Yes	Medium			
If the opportunity reduces the number of roadway closings due to flooding, how many, to what frequency, and what are the locations affected?	Yes	High			
Does the opportunity provide benefit to multiple communities?	Yes	Medium			
If the project provides benefit to multiple communities, list the communities.	No	Not Applicable			
Does the project provide for aspects that will improve water quality?	Yes	Medium			
Does the project provide for aspects that will improve wildlife habitat?	Yes	Low			
Does the project provide for aspects that will improve recreation?	Yes	Low			
Does the project have an associated hydraulic/hydrologic study justifying the benefits of this project? Please provide.	Yes	High			
PROJECT SPECIFICS					

Table 4-4 Suggested Questions and Criteria (Construction Projects)		
Question/Criteria	Weighted? (yes)	Relative Weighting
Have all of the easements been obtained for this project?	Yes	Medium
Has all of the land acquisition been completed for this project?	Yes	High
Does the project have all the necessary regulatory permits?	Yes	High
Is a funding source identified for the on-going operations and maintenance of this project when it is complete? Please provide details.	Yes	High

Suggestions for questions and criteria for maintenance and operation opportunities include:

Table 4-5 Suggested Questions and Criteria (Maintenance and Operation Projects)		
Question/Criteria	Weighted? (yes)	Relative Weighting
GENERAL INFORMATION		
Project name	No	Not Applicable
Project location	No	Not Applicable
Project description/narrative (with aerial maps)	No	Not Applicable
Community where project is located	No	Not Applicable
Major watershed	No	Not Applicable
Minor watershed	No	Not Applicable
Project stage (planning, design, construction, maintenance, operation)	No	Not Applicable
What are the funds requested of the Commission for the maintenance?	No	Not Applicable
What funds are local matching funds to be provided?	Yes	High
Are these funds to be requested on a cycle (e.g. annually, semi-annually)? If so, what cycle?	No	Not Applicable
Is this project a result or recommendation of a community stormwater management plan?	Yes	Low
Does your community have a stormwater management plan?	Yes	Low
PROJECT BENEFITS		
Does the project involve stream bank stabilization?	Yes	Low
Will the project reduce downstream sedimentation?	Yes	Low
Does the opportunity provide benefit to multiple communities?	Yes	Medium
If the project provides benefit to multiple communities, list the communities.	No	Not Applicable
PROJECT SPECIFICS		
Have all of the easements been obtained for this maintenance project?	Yes	Medium
Has all of the land acquisition been completed for this maintenance project?	Yes	High
Does the maintenance project have all the necessary regulatory permits?	Yes	High
Is a funding source identified for the on-going operations and maintenance of this project when it is complete? Please provide details.	Yes	High

During the application process, it may make sense to move a project from Category 3 to Category 1 or 2. Over time, more projects/opportunities will become apparent and need to be added into the overall project/opportunity list.

It is recommended there be a call for projects on an annual or semi-annual basis. Too frequent calls for funding (e.g. monthly or bi-monthly) may affect budgets or may overload or overwhelm the system; thereby defeating the application process and the vetting of the projects.

4.7 Summary of Quality of Life Improvement Opportunities

Quality of life aspects were listed for many of the opportunities in the previous section. As the opportunities are developed, the Commission should be reminded of the quality of life aspects (other than just flood control) that could be implemented as part of the opportunity. These quality of life aspects come in many forms. The table below summarizes quality of life aspects that should be considered, including: flood control, operational enhancements, water quality enhancements, habitat enhancements, and recreation enhancements.

As discussed earlier, flood control includes improved conveyance and storage. Operational enhancements may include improvements that make flood fighting efforts easier for the worker. Water quality enhancements include: groundwater recharge or runoff filtering, or sediment reduction by means of two stage ditches, wetlands, or other similar items. Habitat enhancement comes with the creation of water quality enhancements. Recreational enhancements may be obtained through development of pedestrian, paddle, or biking facilities near or around flood control facilities.

The table below summarizes potential quality of life opportunities with respect to each Commission-lead (Category 1) or Regional/Semi-Regional Commission Partnership (Category 2) opportunities. A similar exercise could be conducted for local commission (Category 3) opportunities once further data is acquired through the application process.

Table 4-6 Summary of Quality of Life Opportunities							
Unique ID Flood Operations Water Habitat Recreat							
Little Calumet River/Deep River Confluence Improvements Master Plan	Х	Х	Х	х			
I-65/I-94 Interchange Storage Area Repairs Study (LCRBDC 15)	Х		Х	х			
River Road Levee Project Completion Design (Griffith 3)	Х	Х		х	Х		
I-94 Penetration Investigation (Indianapolis Blvd. to Maryland Avenue) (Hammond 6)	Х	Х					
Culverts Between Grant and Chase (LCRBDC 10)	Х			Х			
Little Calumet River Conveyance Improvements Review	Х						
Perpetual Review of Emergency Action Plan (General 10)	х	х					
Marshalltown Levee Reconstruction (LCRBDC 20)	Х	Х					
Establishment and Perpetual of an Advisory Committee (General 11)	х	Х	х	х	Х		
Thorn Creek Diversion Alternate Operations Study (General 8)	х						
Table 4-6 Summary of Quality of Life Opportunities							
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Unique ID	Flood Control	Operations	Water Quality	Habitat	Recreation		
Little Calumet River Model Re-Calibration (General 7)	х	Х					
Perpetual Monitoring, Data Collection, and Real Time Notifications (General 6, General 9)	х	Х					
Aerial Crossing of Sanitary Sewer East of Broadway Alternate Access (LCRBDC 11)		х					
Integrate Deep River, Turkey Creek, and Beaver Dam Ditch Models into LCR Hydraulic Model (General 12)	х	х					
Kennedy Avenue Bridge Reconstruction Design (LCRBDC 6)		Х					
Harrison Avenue Bridge Reconstruction Preliminary Engineering Report (LCHWY 16)	х	Х					
Georgia Street Approach Design (LCRBDC 18)		Х					
Broadway Avenue Bridge and Approach Design (LCRBDC 19)		х					
Deep River Storage - Upper Beaver Dam Ditch Detention Study (Lake County 3)	х		х	х	х		
Hart Ditch Storage – Longwood Golf Course Regional Detention Facility (Dyer 1)	х		х	х	х		
Deep River Storage – Upper Turkey Creek Stormwater Storage Study (Lake County 1)	х		х	х	х		
Deep River Storage – Upper Turkey Creek Overbank Detention Study (Lake County 4)	х		х	х	х		
121st and Iowa Drainage Improvements with NRCS (Lake County5)	х		х	х	Х		
Lincoln Gardens and Southbrook Subdivision Drainage Project (Merrillville 1)	х		х	х			
Country Club Heights & Meadowdale Subdivision Drainage Project (Merrillville 2)	х		х	х			
Cady Marsh Detention Project (Highland 1)	Х		Х	Х	Х		
Spring Street Ditch Culvert Replacements (Highland 5)	х						
Beaver Dam Ditch – Lateral 1 (Regional Detention Basin) (Lake County 7)	х		х	х	Х		
Potential Increase in Hartsdale Pond Storage (Schererville 10)	х		х				
Hidden Creek Subdivision Regional Stormwater Project	x		x				

4.8 Regulatory Coordination

As with the implementation of any project, regulatory coordination is an important part of flood control projects. Many times, flood control projects are located in environmentally sensitive areas (e.g. wetlands, fens) where wildlife and other habitat reside. Key agencies (and typical associated permits) requiring coordination is listed below with descriptions obtained from the Indiana Waterway Permit Manual:

Indiana Department of Natural Resources – Construction in a Floodway

The Flood Control Act (IC 14-28-1) regulates various development activities (e.g. structures, obstructions, deposits, and/or excavations) within the floodway of any state waterway by requiring IDNR approval prior to the beginning of the project. IDNR authority under the Flood Control Act is further defined in 312 IAC 10: Floodplain Management.



Figure 4-1: Relation between Floodplain, Floodway, and Channel (Source: Indiana Waterway Permits Manual)

Other less frequent permits with the IDNR include the Navigable Waterways, Dewatering Well Installation, Lakes Preservation Act,

US Army Corps of Engineers - Section 404

Section 404 of the CWA is jointly administered by USACE and EPA. USACE administers Section 404 through the authorization of discharge(s) of dredged and/or fill material into "Waters of the U.S." Authorization for projects that propose to impact "Waters of the U.S." is dictated by the 404 permit process, which includes 404 Nationwide Permits (NWPs) and 404 Individual Permits (IPs). Section 404(f) exempts some activities from regulation under Section 404. These activities include maintenance (but not construction) of drainage ditches.

Other less frequent permits with the USACE include Section 10 and Levee Permits.

Indiana Department of Environmental Management – Water Quality Certification

Section 401 of the CWA is administered by IDEM. Anyone who wishes to discharge dredge or fill material into the Waters of the U.S. must obtain a Section 401 Water Quality Certification issued by IDEM. The applicant must demonstrate that activities will comply with Indiana water quality standards and other provisions of federal and state law and regulations regarding conventional and non-conventional pollutants, new source performance standards, and toxic pollutants. This application process is triggered by a permit issued pursuant to Section 404 of the CWA.

IDEM also regulates isolated wetlands. Isolated wetlands are not subject to USACE jurisdiction.

Indiana Department of Environmental Management – Rule 5 (327 IAC 15-5)

The requirements of Rule 5 apply to construction activity (which includes clearing, grading, excavation and other land disturbing activities) that results in the disturbance of one (1) acre or more of total land area. If the land disturbing activity results in the disturbance of less than 1 acre of total land area, but is part of a larger project whose total land area of disturbance is greater than one acre, it is still subject to Rule 5 permitting. Since the NPDES general permit for storm water runoff associated with construction activity is a permit-by-rule, no actual permit is issued. The applicant receives either a Notice of Sufficiency or a Notice of Deficiency. If you receive a Notice of Deficiency, an amended Notice of Intent (NOI) must be submitted to IDEM before the initiation of land disturbing activities.

County Regulated Drains

The purpose of the Regulated Drain Permit is to notify Lake County of proposed construction that may impact a regulated drain. All construction projects that will impact regulated drains must have plans submitted for review/approval by the county drainage board.

INDOT or Railroad Right-of-Way Permit

When projects impact INDOT or railroad right-of-way, application must be filed with INDOT or the applicable railroad to perform the work.

5 Budgetary Considerations

A watershed plan typically identifies budgetary considerations for implementing projects outlined in the plan. This section provides information and possible ideas for implementation. Ultimately it is up to the Commission to decide the best and most effective use of funds as they are the stewards of the public.

5.1 Revenue Sources

5.1.1 Fee

As a component of the new legislation, a permanent funding source was established. The legislation requires the Commission to impose an annual special assessment against each parcel of real property within the watershed of the LCR and Burns Waterway in Lake County. The special assessment for each parcel is:

- For a residential parcel of real property, forty-five dollars (\$45).
- ➢ For an agricultural parcel of real property, ninety dollars (\$90).
- For a commercial parcel of real property, one hundred eighty dollars (\$180).
- For an industrial or public utility parcel of real property, three hundred sixty dollars (\$360).

Proceeds from the special assessment are to be placed in a LCR Project Development Fund. Special assessments collected are to be deposited into a segregated account within the fund. Special assessments within the account may not be transferred into other accounts within the fund. Money in the account may be used to pay expenses directly related to the acquisition, constitution, or improvement of real property, a facility, betterment or an improvement constituting part of a project of the Commission. Money within the fund at the end of the year is to remain in the fund and not revert to any other fund. The Commission collected its first assessment in June of this year. The amount collected was \$6.5 million. This amount represents a collection percentage of 83%.

5.1.2 Other Revenue Sources

In addition to the watershed fee, the Commission receives revenues from the lease of Commission owned property to local farmers, cell towers, and advertising bill boards.

5.2 Expenditures

The Commission is responsible for several types of expenditures including repayment of

existing loans, annual maintenance and operational costs, and pending capital projects.

5.2.1 Repayment of Existing Loans

In 2008, the Commission borrowed approximately \$6 million dollars from the Regional Development Authority (RDA) to complete work that was currently unfunded and to make repairs to existing infrastructure that was damaged as a result of the September, 2008 flooding. The new legislation also established a schedule for repayment of the funds borrowed from the RDA. The proposed repayment schedule is:

- > \$2,430,000 on July 1, 2013
- > \$1,460,000 on July 1, 2014
- > \$920,000 on July 1, 2015
- > \$690,000 on July 1, 2016
- > \$500,000 on July 1, 2017

5.2.2 Annual Maintenance and Operational Costs

The following are 2010 estimates of annual maintenance costs prepared by the USACE for the levee system. Maintenance costs include tasks such as mowing, tree removal, eliminating animal burrows, pump maintenance, inspections, and other such tasks. The Commission should set aside, annually, enough funds to maintain its existing infrastructure before committing funds to other watershed projects.

Table 5-1 Estimated Annual Maintenance Costs Per Levee Segment				
Segment	Estimated Annual Maintenance Cost*			
Burr Street	\$112,000			
Gary South	\$429,000			
Gary North	\$570,000			
Griffith	\$43,000			
Hammond	\$592,000			
Highland	\$402,000			
Marshalltown	\$74,000			
Munster	\$215,000			
Total:	\$2,437,000			
*Amounts are rounded to the nearest thousand dollars.				

The Commission's annual operational budget is typically covered by funds the Commission receives from the lease of land to other users. The Commission should set aside, annually, enough funds to cover any remaining operational needs before committing funds to other watershed projects.

5.2.3 Pending Capital Projects

The Commission has a number of pending capital projects. These projects include:

- Reconstruction of the Columbia Avenue Bridge over the LCR. The Commission is partnering with the City of Hammond, Town of Munster and Lake County to complete this project.
- Removal of unneeded piers at the Monon Railroad Trestle. The Commission is partnering with the City of Hammond to complete this project.
- Gary South Levee construction project. This project was recently awarded at a cost of approximately \$350,000.
- State Line Avenue flood control project. Engineering has been completed for this project. Materials have been ordered.
- Realignment of Hart Ditch at the confluence of the LCR (LCRBDC 1). Preliminary plans are currently being developed for this project.

The Columbia Avenue Bridge and Nothcote Bridge reconstruction projects and the Monon trestle pier removal are being paid for out of existing funds. The Gary South Levee, State Line Avenue and Hart Ditch Realignment projects will draw on funds generated by the special assessment.

Other projects will pressure the Commissions budget. According to the Conceptual Mitigation Plan prepared by USACE, approximately 156 acres of wetland and wildlife habitat was impacted by the project. A mitigation area of 488 acres was determined by USACE and IDNR. Of the 488 acres, 204 acres are within the project limits and 284 acres are outside. Mitigation areas outside of the project limits were found in the western part of the City of Hobart. To date, the Commission has acquired 446 acres of land for mitigation in Hobart.

5.3 Funding Options

After setting aside sufficient funds for both operational and maintenance needs, and capital projects already committed to, the Commission will have the opportunity to provide funding for projects within the watershed whether Commission projects or watershed community projects. The Commission will have several funding alternatives at their disposal.

One option is to "cash flow" projects. The Commission may wish to fund medium sized or smaller projects using on-hand cash. Larger projects such as Kennedy Avenue Bridge or Dyer's Longwood Golf Course Regional Detention Facility may be better funded by utilizing the bonding option per IC 14-13-2-20 through 26. This section of the legislation allows the Commission to issue revenue bonds to finance improvement

projects either in whole or in part. Bonding will allow the Commission to raise large sums of money to complete projects immediately while paying for them over a long period of time (max 40 years). These bonds would be issued in the name of the Commission and shall be payable solely from revenues pledged for their payment and not a debt of the state or any other political subdivision.

The Commission should look for ways to leverage their funds by seeking partnerships or grants. For instance, Dyer's Longwood Golf Course Regional Detention Facility has verbal financial support from the Town of Dyer, St. Margaret Mercy Hospital, Cook County and the Metropolitan Water Reclamation District of Greater Chicago. Congressional support could be sought to even further reduce the burden on the local municipalities and the Commission. Additionally, Lake County's Beaver Dam Ditch - Lateral 1 Regional Detention Basin currently has funds committed to it from INDOT (Federal STP funds) and from the LCSO.

5.3.1 Grant Funding/Partnerships

Water quality and recreational enhancement projects are often opportunities for funding partnerships. Lake Michigan Costal Grants are available through IDNR to protect and enhance natural and cultural resources. Section 319 grants are available from the federal government to reduce non-point source pollutants such as runoff and erosion. Many private environmental groups such as Shirley Heinz and Save the Dunes provide grant funding for waterway enhancement projects. Other partnering opportunities the Commission might encourage include local clean-up efforts by community organizations, partnering/sponsoring local paddling trips with the NWI Paddlers Association, and partnering/sponsoring bike rides with South Shore Trails or the Calumet Crank Club. These types of efforts build relationships and expand recreational uses of the river.

5.3.2 Chi-Cal Rivers Fund

The Chi-Cal Rivers Fund was established by a team of private and public organizations with the intent of restoring ecological, economic, and community values to the Calumet River Watershed. Projects within the Little Calumet River watershed are eligible for this funding. The grant is a competitive grant and it is estimated that approximately \$1.1 million is expected to be considered for the August 2013 funding cycle.

Preference for this grant is to be given to "shovel ready" projects that increase stormwater storage capacity through green infrastructure, enhance fish and wildlife habitat, and improve public-use opportunities.

As projects within the LCR watershed develop into "shovel ready" projects, this funding source should be explored by the Commission.

5.4 Sample Funding Scenario

In 2013 the Commission received approximately \$6.5 million dollars. The Commission immediately paid the RDA \$2.43 million. The projected annual maintenance cost of the existing levee system is approximately \$2.5 million. This would leave the Commission with about \$1.5 million to complete existing capital projects and/or new projects during the upcoming year. Assuming the Commission collects another \$6.5 million in 2014, the Commission would have about \$4.1 million available for existing capital projects and/or new projects after deducting 2014 payments to the RDA and 2014 levee system maintenance costs. What opportunities does the Commission have to move forward with implementing the watershed plan?

Many of the recommended Commission-Lead projects (Category 1) identified required further investigation or design. For instance, the LCR/Deep River Confluence Improvements Master Plan (LCRBDC 15) is an investigation that will yield projects requiring further design before they can be constructed. Estimated durations of these projects could last for a year or more. The same is true of the recommended Regional/Semi-Regional Commission Partnership Opportunities. The design of the Kennedy Avenue Bridge will most likely take a year to complete. A storage basin like that proposed by the Town of Dyer could take even longer to develop.

Different projects are at different stages of development. Dyer has completed preliminary analysis of their storage project. Preliminary analysis of Hart Ditch with the storage basin added yielded very positive results. Dyer has also identified several potential funding partners. Even with their partners, they may fall far short of having the necessary funds to complete this project. If the Commission was to commit to closing the funding gap, Dyer might be able to advance the project to construction in a year or two.

Lake County also completed preliminary engineering for the Beaver Dam Ditch – Lateral 1 Regional Detention Basin (Lake County 7). Like Dyer, Lake County and INDOT have committed substantial funding for the project with a possible commitment from Crown Point. Again, if the Commission was to commit to closing the funding gap, Lake County could advance this project to construction in a year or so.

Hobart is moving forward with preliminary engineering for dredging Lake George (Hobart 2). Hobart has experience with dredging Lake George having completed a previous project in 2002. If the Commission was to commit funds to Hobart, this project might also be ready for construction in two years.

Some of the Local Opportunities can be ready for construction in just a few months. Crown Point's Stillwater Subdivision Drainage Improvement Project (Crown Point 3) could be completed this year with funding assistance from the Commission. It's possible that the culvert replacement projects in the Town of New Chicago (New Chicago 4&5) could also be completed this year.

It is recommended that the Commission commit a portion of their 2013 and 2014 funds

to advance the Commission-Lead Projects (Category 1) to construction. Projected construction costs can be developed once these projects are fully designed. It is also recommended that the Commission commit another portion of their funds to provide gap funding to Regional/Semi Regional Partnership Projects (Category 2) and Maintenance Projects so final designs can be completed and construction costs developed. A third portion of the 2013 and 2014 funds can be committed to complete Local Projects (Category 3) that advance through the application process.

The first two years of Commission funding would be spent readying selected Commission-Lead Projects, Regional/Semi-Regional Partnership Projects and Maintenance Projects for construction and completing a number of Local Projects (early successes). Beginning in 2015, the Commission will be in a position to implement a plan for completing remaining watershed plan projects. The plan may include setting aside a portion of available funds each year for Local Funding; another portion for completing Maintenance and Operational Projects; and another for making payments on the issuance of bonds sold to complete larger projects.

This is only one possible funding scenario. The bottom line is that the Commission needs to develop a funding plan to complete projects identified in this plan while still providing the necessary operational and maintenance funding.

REFERENCES

The following information was collected reviewed for relevance as part of the preparation of this plan:

Crown Point

"Concept Plan for Flood Control Reservoir/Beaver Dam Ditch Lateral 1", Christopher B. Burke Engineering, Ltd., 5/11/10.

<u>Dyer</u>

"Town of Dyer, Compensatory Storage Comparison, Options and Benefits vs. Cost", CBBEL, 2/2/10.

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APPENDIX A

Indiana Code 14-13-2

Go

Information Maintained by the Office of Code Revision Indiana Legislative Services Agency IC 14-13-2

Chapter 2. Little Calumet River Basin Development Commission

IC 14-13-2-1

"Burns Waterway"

Sec. 1. As used in this chapter, "Burns Waterway" means the dredged channel in Porter County, Indiana, that connects the east and west arms of the Little Calumet River with Lake Michigan. *As added by P.L.1-1995, SEC.6.*

IC 14-13-2-2

"Commission"

Sec. 2. As used in this chapter, "commission" refers to the Little Calumet River basin development commission created by this chapter. *As added by P.L.1-1995, SEC.6.*

IC 14-13-2-3

"Fund"

Sec. 3. As used in this chapter, "fund" refers to the Little Calumet River project development fund created by this chapter. *As added by P.L.1-1995, SEC.6.*

IC 14-13-2-3.3

"Parcel"

Sec. 3.3. As used in this chapter, "parcel" has the meaning set forth in 50 IAC 26-2-31. *As added by P.L.160-2012, SEC.42.*

IC 14-13-2-3.5

"Taxable parcel"

Sec. 3.5. As used in this chapter, "taxable parcel" refers to a parcel that is not exempt from property taxation under IC 6-1.1-10. *As added by P.L.106-2012, SEC.4.*

IC 14-13-2-3.8

"Watershed"

Sec. 3.8. As used in this chapter, "watershed" refers to the watershed of the Little Calumet River and Burns Waterway in Lake County. *As added by P.L.106-2012, SEC.5.*

IC 14-13-2-4

Purposes of chapter

Sec. 4. The general purposes of this chapter are to do the following:

- (1) Promote the general health and welfare of citizens of Indiana.
- (2) Provide for the creation, development, maintenance,

administration, and operation of park, recreation, marina, flood control and other public works projects, including levees.

(3) Create a commission with the authority to carry out the purposes of this chapter.

(4) Create a commission capable of entering into and fulfilling the requirements of a nonfederal interest (as defined by 42 U.S.C. 1962d-5b).

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.6.

IC 14-13-2-5

Creation of commission

Sec. 5. The Little Calumet River basin development commission is created as a public body corporate and politic.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-6

Territorial jurisdiction of commission

Sec. 6. (a) Except as provided in subsection (b) and sections 18.5 and 18.6 of this chapter, the commission may operate in the manner provided in this chapter only in the geographic area within and extending one (1) mile from the bank of the west arm of the Little Calumet River and Burns Waterway in Lake County and Porter County. However, to address flooding issues within this geographic area, the commission may operate in the manner provided in this chapter in areas that include tributaries to the Little Calumet River and Burns Waterway, including the Deep River watershed, within Lake County.

(b) The commission does not have the power of eminent domain for the construction of marina facilities north of U.S. Highway 12 or south of that point where the west arm of the Little Calumet River meets Burns Waterway. The commission's activities north of U.S. Highway 12 and within and adjacent to Burns Waterway are restricted to those activities that the commission determines to be necessary for the following:

(1) Channeling and maintenance.

(2) Construction of breakwaters.

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.7; P.L.160-2012, SEC.43.

IC 14-13-2-7

Members

Sec. 7. (a) The commission has:

(1) before July 1, 2012, five (5) members appointed by the governor; and

(2) after June 30, 2012, nine (9) members appointed by the governor.

(b) The following requirements apply to the governor's appointments under subsection (a)(1):

(1) One (1) member must be a representative of the department of natural resources. The member may not be an employee or

elected official of a city, town, or county governmental unit.

(2) The remaining four (4) members must meet the following requirements:

(A) Four (4) members must reside in a:

(i) city;

(ii) town; or

(iii) township (if the member resides in an unincorporated area of the county); that borders the Little Calumet River.

(D) At least three (2) of the members must be

(B) At least three (3) of the members must have a background in:

(i) construction;

(ii) project management; or

(iii) flood control;

or a similar professional background.

(C) A member may not be an employee or elected official of a city, town, or county governmental unit.

(c) The following apply to the membership of the commission after June 30, 2012:

(1) Before August 1, 2012, the governor shall appoint four (4) additional members to the commission for four (4) year terms as follows:

(A) One (1) member nominated by the mayor of a city having a population of more than eighty thousand five hundred (80,500) but less than one hundred thousand (100,000).

(B) One (1) member nominated by the mayor of a city having a population of more than eighty thousand (80,000) but less than eighty thousand four hundred (80,400).

(C) Two (2) members nominated by the board of county commissioners of Lake County.

(2) Notwithstanding section 8 of this chapter, the term of the member described in subsection (b)(1) expires January 7, 2013. The governor shall appoint one (1) member nominated by the department of natural resources for a four (4) year term beginning January 7, 2013.

(3) Notwithstanding section 8 of this chapter, the terms of the members described in subsection (b) (2) expire January 1, 2014. The governor shall appoint for four (4) year terms beginning January 1, 2014, four (4) members, each of whom must have been nominated by the executive of a municipality located in the watershed other than a city described in subdivision (1).

(4) A member appointed to succeed a member appointed under subdivision (1) or (2) must be nominated by the nominating authority that nominated the member's predecessor, and a member appointed to succeed a member appointed under subdivision (3) must be nominated by the executive of a municipality located in the watershed other than a city described in subdivision (1).

(d) The following apply to a member appointed under subsection

(c) and to any member appointed to succeed a member appointed under subsection (c):

(1) After July 31, 2012, not more than five (5) members of the commission may belong to the same political party.

(2) Each member must have a background in:

(A) construction;

(B) project management;

(C) flood control; or

(D) a similar professional background.

(3) A member may not be an employee or elected official of a city, town, or county governmental unit.

(4) The members:

(A) appointed under subsection (c)(3); or

(B) appointed to succeed members appointed under subsection (c)(3);

must be from different municipalities.

(5) Neither the two (2) members appointed under subsection (c)(1)(C) nor any two (2) members appointed to succeed them may be from the same district created under IC 36-2-2-4(b). *As added by P.L.1-1995, SEC.6. Amended by P.L.181-2009, SEC.1; P.L.106-2012, SEC.8; P.L.160-2012, SEC.44.*

IC 14-13-2-8

Term of members; eligibility for reappointment

Sec. 8. (a) The term of each member of the commission is four (4) years. However, if an appointee is appointed to serve an unexpired term, the appointee serves only until the end of the unexpired term.

(b) A member is eligible for reappointment.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-9 Officers Sec. 9. (a) The commission shall elect the following officers:

(1) A chairman.

(2) A vice chairman.

(3) A secretary.

(4) A treasurer.

(b) The terms of the officers may not exceed one (I) year. Each officer is eligible for reelection.

(c) The commission may create and fill other offices that the commission determines necessary.

(d) Each of the officers shall perform the duties usually pertaining to the offices.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-10

Meetings

Sec. 10. (a) The commission shall meet:

(1) at least four (4) times per calendar year; and

(2) on call of any of the following:

(A) The chairman.

(B) The executive director.

(C) Any number of members that constitutes a quorum under subsection (b).

(b) The following number of members constitutes a quorum:

(1) Three (3) commission members before August 1, 2012.

(2) Five (5) commission members beginning August 1, 2012.

As added by P.L.1-1995, SEC.6. Amended by P.L.181-2009, SEC.2; P.L.106-2012, SEC.9.

IC 14-13-2-11

Per diem compensation and traveling expenses

Sec. 11. (a) Each commission member is entitled to reimbursement for traveling and other expenses as provided in the state travel policies and procedures established by the Indiana department of administration and approved by the budget agency.

(b) Each appointed commission member is entitled to the minimum salary per diem as provided in IC 4-10-11-2.1(b).

As added by P.L.1-1995, SEC.6.

IC 14-13-2-12

Acquisition of property by purchase or lease

Sec. 12. (a) The commission may acquire, by purchase or by lease:

(1) any land, property, rights, rights-of-way, franchises, easements, and other interests in real property, including land under water and riparian rights; and

(2) any existing facilities, betterments, and improvements;

that the commission considers necessary or convenient for the establishment, development, construction, improvement, or operation of any projects.

(b) The commission may also acquire land and other interest in real property by:

(1) gift; or

(2) bequest.

(c) The commission shall take and hold title to land and other interests in the name of the state of Indiana.

(d) When acquiring land under this section, the commission shall follow the procedures for the acquisition of land by the Indiana department of transportation. *As added by P.L.1-1995, SEC.6.*

IC 14-13-2-13

Eminent domain powers

Sec. 13. The commission may acquire by appropriation under Indiana eminent domain law:

(1) any land, property, rights, rights-of-way, franchises, easements, or other interests in real property, including land under water and riparian rights; or

(2) any existing facilities, betterments, and improvements, or

other property;

necessary and proper for the creation, development, establishment, maintenance, or operation of a project or any part of a project.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-14

Acquisition of property from political subdivisions or public entities

Sec. 14. Each:

(1) county, city, town, township, and other political subdivision of the state; and

(2) public agency, department, and commission;

may, upon the terms and conditions that the proper authorities of the entity and the commission consider reasonable and appropriate, lease, lend, grant, or convey to the commission, at the commission's request, real or personal property, including an interest in the property, owned by the entity that is necessary or convenient to achieving the purposes of this chapter.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-15

Property improvements

Sec. 15. In establishing and developing projects, the commission may:

(1) construct, reconstruct, establish, build, repair, remodel, enlarge, extend, or add to facilities, betterments, and improvements; and

(2) clear and prepare any site for construction;

that the commission considers appropriate in furtherance of the purposes of this chapter. *As added by P.L.1-1995, SEC.6.*

IC 14-13-2-16

Conveyance of property to political subdivisions or public entitics

Sec. 16. (a) The commission may sell, transfer, or convey to:

(1) a political subdivision of the state; or

(2) a public agency, department, or agency;

for the consideration and upon the terms that the commission considers appropriate real property, including a facility, a betterment, or an improvement, within the projects or acquired under this chapter, if the sale, transfer, or conveyance and ownership by the transferee furthers the purposes of this chapter.

(b) Transfer is subject to the restrictions that the commission considers appropriate in furtherance of the purposes of this chapter.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-17

Management of projects; maintenance training

Sec. 17. (a) The commission may provide for the construction, improvement, development, operation, and management of projects,

including any facilities, betterments, and improvements that are part of projects, in the manner that the commission considers appropriate in furtherance of the purposes of this chapter.

(b) The commission may enter into:

(1) a lease agreement as lessor or sublessor; or

(2) an operation or a license agreement;

with respect to all or part of a site, a facility, a betterment, or an improvement that is part of projects with at least one (1) public or private person or entity, including political subdivisions of the state and public agencies, departments, and agencies, on the terms and conditions that the commission considers appropriate in furtherance of the purposes of this chapter.

(c) The commission shall provide or provide for the training and instruction of persons who are responsible for maintaining any levees or other improvements related to flood control under this article. The training and instruction must be sufficient to enable those persons to properly maintain the levees or other improvements related to flood control.

As added by P.L.1-1995, SEC.6. Amended by P.L.181-2009, SEC.3.

IC 14-13-2-18

General powers of commission

Sec. 18. The commission may do the following:

(1) Adopt bylaws for the regulation of the commission's affairs and the conduct of the commission's business.

(2) Adopt an official seal, which may not be the seal of the state.

(3) Maintain a principal office and other offices that the commission designates.

(4) Sue and be sued in the name and style of "Little Calumet River Basin Development

Commission", with service of process being made upon the chairman of the commission by leaving a copy at the principal office of the commission.

(5) Acquire by grant, purchase, gift, devise, lease, eminent domain, or otherwise and hold, use, sell, lease, or dispose of:

(A) real and personal property of every kind and nature; and

(B) any right and interest;

necessary for the full exercise or convenient or useful for the carrying on of any of the commission's powers under this chapter.

(6) Exercise within Indiana and in the name of the state of Indiana the power of eminent domain under Indiana law governing the exercise of the power of eminent domain for any public purposes.

(7) Fix, collect, and review admission charges, entrance fees, tolls, and other user charges for the use of a facility within the projects owned or leased by the commission or dedicated to the commission by a political subdivision of the state or a public agency, department, or commission having jurisdiction of the facility.

(8) Acquire by fee or by lease, obtain option on, hold, and dispose of real and personal property reasonably necessary and proper to the exercise of the commission's powers and the performance of the commission's duties under this chapter.

(9) Make and enter into all contracts, undertakings, and agreements necessary or incidental to the performance of the commission's duties and the execution of the commission's powers under this chapter.

(10) Employ and fix the compensation of an executive director or manager, consulting engineers, superintendents, and other engineers, construction and accounting experts, attorneys, and other employees and agents necessary in the commission's judgment.

(11) Conduct studies of the financial feasibility of the flood control and park and recreational projects and facilities, betterments, and improvements within those projects.

(12) Avail itself of the services of professional and other personnel employed by an agency, a department, or a commission of the state for purposes of studying the feasibility of or designing, constructing, or maintaining the projects or a facility within those projects.

(13) Receive and accept:

(A) from the federal government or a federal agency or department grants for or in aid of the

acquisition, construction, improvement, or development of any part of the projects of the commission; and

(B) aid or contributions from any source of money, property, labor, or other things of value;

to be held, used, and applied only for the purposes, consistent with the purposes of this chapter, for which the grants and contributions may be made.

(14) Hold, use, administer, and expend money that is appropriated or transferred to the commission.

(15) Assist or cooperate with a political subdivision or public agency, department, or commission, including the payment of money or the transfer of property to the political subdivision or public agency, department, or commission by the commission if the commission considers the assistance or cooperation appropriate in furtherance of the purposes of this chapter.

(16) Accept assistance and cooperation from a political subdivision or public agency, department, or commission, including the acceptance of money or property by the commission from the political subdivision or public agency, department, or commission, if the commission considers the assistance or cooperation appropriate in furtherance of the purposes of this chapter.

(17) Do all acts and things necessary or proper to carry out the powers expressly granted in this chapter.

(18) Enter into and carry out the terms of a nonfederal interest (as defined by 42 U.S.C. 1962d-5b).

(19) Provide police protection for the commission's property and activities by:

(A) requesting assistance from state, city, or county police authorities; or

(B) having specified employees deputized as police officers.

(20) Make contracts and leases for facilities and services.

(21) Appoint the administrative officers and employees necessary to carry out the work of the commission, fix their duties and compensation, and delegate authority to perform ministerial acts in all cases except where final action of the commission is necessary.

(22) Engage in self-supporting activities.

(23) Contract for special and temporary services and for professional assistance.

(24) Invoke any legal, equitable, or special remedy for the enforcement of this chapter. *As added by P.L.1-1995, SEC.6.*

IC 14-13-2-18.5

Special assessments imposed

Sec. 18.5. (a) The area of the watershed described in subsection (b) is a political subdivision authorized by the general assembly to enable the commission to provide special benefits to taxpayers in the area by promoting public safety and economic development that is of public use and benefit.

(b) The commission shall impose an annual special assessment against each taxable parcel of real property that is within the watershed of the Little Calumet River and Burns Waterway in Lake County.

(c) The special assessment for each taxable parcel must be as follows:

(1) For a residential parcel of real property, forty-five dollars (\$45).

(2) For an agricultural parcel of real property, ninety dollars (\$90).

(3) For a commercial parcel of real property, one hundred eighty dollars (\$180).

(4) For an industrial or public utility parcel of real property, three hundred sixty dollars (\$360).

(d) The commission shall certify the list of assessments to the auditor of Lake County. *As added by P.L.106-2012, SEC.10.*

IC 14-13-2-18.6

Special assessment; uses; transfer to northwest Indiana regional development authority

Sec. 18.6. (a) Each year, the county treasurer shall add to the property tax statements of a person owning the taxable parcel affected by a special assessment imposed under section 18.5 of this chapter, designating the special assessment in a manner distinct from

general taxes, and indicating that the full annual assessment is due in the year the statement is sent.

(b) An assessment imposed under section 18.5 of this chapter shall be collected in the same manner as other special assessments are collected under IC 6-1.1, except for the following:

(1) An assessment is not the personal obligation of the owner of the taxable parcel affected by the assessment, and only the taxable parcel actually affected by an assessment shall be sold for delinquency.

(2) An annual assessment shall be paid in full on or before the date the first installment of property taxes is due.

(c) At the time of each annual tax settlement, the county treasurer shall certify to the county auditor the amount of the special assessments collected.

(d) The county auditor shall pay special assessments collected by the county treasurer under this section to the commission.

(e) Special assessments collected under this section shall be deposited into a segregated account within the fund. Special assessments deposited into the account may not be transferred into other accounts within the fund. Money in the account may be used only for the following purposes:

(1) To pay expenses directly related to the acquisition, construction, or improvement of real property, a facility, a betterment, or an improvement constituting part of a project of the commission, including acquisition of the site for a project.

(2) To pay expenses directly related to the operation, repair, and maintenance of flood protection systems within the watershed.

(3) To repay bonds issued for the purposes described in subdivision (1).

(4) To make the transfers required by subsection (f).

(f) Subject to subsection (g), the commission shall transfer money from the segregated account referred to in subsection (e) to the northwest Indiana regional development authority established by IC 36-7.5-2-1 as follows:

(1) Two million four hundred thirty thousand dollars (\$2,430,000) on July 1, 2013.

(2) One million four hundred sixty thousand dollars (\$1,460,000) on July 1, 2014.

(3) Nine hundred twenty thousand dollars (\$920,000) on July 1, 2015.

(4) Six hundred ninety thousand dollars (\$690,000) on July 1, 2016.

(5) Five hundred thousand dollars (\$500,000) on July 1, 2017.

(g) The commission may postpone or reduce the amount of a transfer required by subsection (f) by adopting a resolution, with at least two-thirds (2/3) of the members voting in the affirmative, declaring that an emergency exists. For purposes of this subsection, an emergency may include the following:

(1) A determination that the amount of assessments paid before July 1, 2013, is insufficient to make the transfer required under

subsection (f)(1) on July 1, 2013.

(2) A demand from the Army Corps of Engineers for payment in an amount that would prevent the commission from complying with the transfer schedule set forth in subsection (f).

(h) The total amount to be transferred to the northwest Indiana regional development authority under the schedule set forth in subsection (f), as amended for the reasons specified in subsection (g), is six million dollars (\$6,000,000).

As added by P.L.106-2012, SEC.11. Amended by P.L.160-2012, SEC.45.

IC 14-13-2-19

Creation of fund

Sec. 19. (a) The Little Calumet River project development fund is created. The commission shall make expenditures from the fund only to accomplish the purposes of this chapter.

(b) The commission shall do the following:

(1) Hold the fund in the name of the commission.

(2) Administer the fund.

(3) Make all expenditures from the fund.

(c) The money in the fund at the end of a fiscal year remains in the fund and does not revert to any other fund.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-20

Bonds payable from revenue and special assessments

Sec. 20. (a) The acquisition, construction, or improvement of real property, a facility, a betterment, or an improvement constituting part of a project of the commission, including acquisition of the site for a project, may be financed in whole or in part by the issuance of bonds payable:

(1) out of the net income received from the operation of the real property, facility, betterment, or improvement; or

(2) from special assessments collected under section 18.6 of this chapter.

(b) If the commission desires to finance an acquisition, a construction, or an improvement in whole or in part as provided in this section or sections 21 through 26 of this chapter, the commission must adopt a resolution authorizing the issuance of bonds. The resolution must set forth the following:

(1) The date on which the principal of the bonds matures, not exceeding forty (40) years from the date of issuance.

(2) The maximum interest rate to be paid on the bonds.

(3) Other terms and conditions upon which the bonds are issued.

(c) The commission shall take all actions necessary to issue the bonds in accordance with the resolution. The commission may enter into a trust agreement with a trust company as trustee for the bondholders. An action to contest the validity of any bonds to be issued under this chapter may not be brought after the fifteenth day

following the receipt of bids for the bonds.

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.12.

IC 14-13-2-21

Bonds; not debt of state or other political subdivisions; payable solely from money pledged

Sec. 21. (a) Bonds issued under this chapter or under IC 14-6-29.5 (before its repeal) do not constitute any of the following:

(1) A debt of the state or of any other political subdivision of the state.

(2) A pledge of the faith and credit of the state or any other political subdivision of the state.

(b) The bonds are payable solely from the revenues pledged for their payment as authorized in this chapter or in IC 14-6-29.5 (before its repeal).

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.13.

IC 14-13-2-22

Redemption and negotiability of bonds

Sec. 22. (a) Bonds issued under this chapter or under IC 14-6-29.5 (before its repeal) may be made redeemable before maturity at the option of the commission at the price and under the terms and conditions that are determined by the commission in the authorizing resolution. The commission shall do the following:

(1) Determine the form of the bonds, including any interest coupons to be attached to the bonds.

(2) Fix the denomination of the bonds.

(3) Fix the place of payment of principal and interest, which may be at any bank or trust company within or outside Indiana.

(b) Bonds have the qualities and incidents of negotiable instruments under Indiana law. Provision may be made for the registration of any of the bonds as to principal alone and also as to both principal and interest.

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.14.

IC 14-13-2-23

Requirements for issuing bonds

Sec. 23. (a) Bonds issued under this chapter shall be issued in the name of the commission and must recite on the face of each bond that the principal of and interest on the bond are payable solely from revenues pledged for their payment and are not an obligation of the state or of any other political subdivision of the state.

(b) The chairman of the commission shall execute the bonds, and the secretary of the commission shall affix and attest the seal of the commission.

(c) Coupons attached to the bonds must bear the facsimile signature of the chairman of the commission.

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.15.

IC 14-13-2-24

Authority to issue bonds; application of other laws

Sec. 24. (a) This subsection applies only to the issuance of revenue bonds. This chapter and IC 14-6-29.5 (before its repeal) constitute full and complete authority for the issuance of revenue bonds. A law, a procedure or proceeding, a publication, a notice, a consent, an approval, an order, an act, or a thing by the commission or any other officer, department, agency, or instrumentality of the state, county, or a municipality is not required to issue revenue bonds except as prescribed in this chapter or in IC 14-6-29.5 (before its repeal).

(b) This subsection applies only to the issuance of bonds payable from special assessments collected under section 18.6 of this chapter. All laws relating to the giving of notice of the issuance of bonds, the giving of notice of a hearing on the appropriation of the proceeds of the bonds, the right of taxpayers to appear and be heard on the proposed appropriation, and the approval of the appropriation by the department of local government finance apply to all bonds issued under this chapter that are payable from special assessments.

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.16.

IC 14-13-2-25

Bonds; legal investments; exempt from taxation

Sec. 25. (a) Bonds issued under this chapter or under IC 14-6-29.5 (before its repeal) constitute legal investments for the following:

(1) Private trust money.

(2) The money of banks, trust companies, insurance companies, building and loan associations, credit unions, banks of discount and deposit, savings associations, mortgage guaranty companies, small loan companies, industrial loan and investment companies, and any other financial institutions organized under Indiana law.

(b) Bonds issued under this chapter and the interest on the bonds are exempt from taxation as prescribed by IC 6-8-5-1.

As added by P.L.1-1995, SEC.6. Amended by P.L.106-2012, SEC.17.

IC 14-13-2-26

Revenue bonds; refunding bonds

Sec. 26. (a) The commission may issue refunding bonds in the commission's name for the following purposes:

(1) Refunding any bonds then outstanding and issued under this chapter or under IC 14-6-29.5 (before its repeal), including payment of redemption premium and interest accrued or to accrue to the date of redemption of the outstanding bonds.

(2) If considered advisable by the commission, constructing improvements, extensions, or enlargements of a facility, a betterment, or an improvement in connection with which the bonds to be

refunded have been issued.

(b) The issuance of the refunding bonds, the maturity dates and other details, and all rights, duties, and obligations of the holders of the refunding bonds and of the commission with respect to the

refunding bonds are subject to this chapter. As added by P.L. 1-1995, SEC.6.

IC 14-13-2-27

Public purpose

Sec. 27. The exercise of the powers granted by this chapter is for the benefit of the people of Indiana and for the increase of their commerce, health, enjoyment, and prosperity. The operation, creation, development, and maintenance of the projects by the commission constitutes the performance of essential governmental functions.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-28

Tax exemptions

Sec. 28. (a) The commission is not required to pay any taxes or assessments upon any of the following:

(1) A project of the commission.

(2) A facility, a betterment, or an improvement within a project.

(3) Property acquired or used by the commission under this chapter or under IC 14-6-29.5 (before its repeal).

(4) The income or revenue from the property.

(b) The:

(1) bonds issued under this chapter or under IC 14-6-29.5 (before its repeal);

(2) interest on the bonds;

(3) proceeds received by a holder from the sale of the bonds to the extent of the holder's cost of acquisition;

(4) proceeds received upon redemption before maturity or proceeds received at maturity; and (5) receipt of interest and proceeds;

are exempt from taxation in Indiana for all purposes except the financial institutions tax imposed under IC 6-5.5 or a state inheritance tax imposed under IC 6-4.1.

As added by P.L.1-1995, SEC.6. Amended by P.L.254-1997(ss), SEC.20.

IC 14-13-2-29

Little Calumet River basin

Sec. 29. (a) As used in this section, "Little Calumet River basin" means the area and subareas that:

(1) drain into the western arm of the Little Calumet River; and

(2) are certified by the department after consultation with the following:

(A) The county surveyors.

(B) The United States Army Corps of Engineers.

(b) If a regulated drain situated within the Little Calumet River basin is included in a flood control project approved by the department:

(1) the drain ceases to be subject to IC 36-9-27; and

(2) the agency that constructs and maintains the project on the date the flood control project is approved has the same right-of-entry and right-of-way powers over and upon private land that is given the county surveyor or drainage board under IC 36-9-27-33.

(c) The construction, reconstruction, and maintenance of a drain described in subsection (b) are the responsibility of the agency that constructs and maintains the project.

As added by P.L.1-1995, SEC.6.

IC 14-13-2-30

Deposits; audits

Sec. 30. The commission is responsible for the safekeeping and deposit of money the commission receives under this chapter. The state board of accounts shall:

(1) prescribe the methods and forms for the keeping of; and

(2) annually audit;

the accounts, rccords, and books of the commission and fund. *As added by P.L.181-2009, SEC.4.*

IC 14-13-2-31

Reports

Sec. 31. (a) Subject to subsection (c), before November 1 of each year, the commission shall make a report of the commission's activities to the following:

(1) The governor.

(2) The legislative council.

(3) The board of county commissioners of Lake County.

(b) A report made to the legislative council under this section must be in an electronic format under IC 5-14-6.

(c) The governor may require the commission to issue reports more frequently than would otherwise be required under subsection (a).

As added by P.L.181-2009, SEC.5. Amended by P.L.106-2012, SEC.18.

IC 14-13-2-32

Little Calumet River basin project advisory board

Sec. 32. (a) The Little Calumet River basin project advisory board is established.

(b) The advisory board consists of the following members:

- (1) One (1) member appointed by the executive of each municipality located in the watershed.
- (2) One (1) member appointed by the board of county commissioners of Lake County.

(c) Each member of the advisory board must have experience in:

- (1) designing;
- (2) constructing;
- (3) maintaining; or
- (4) managing;

drainage or flood control facilities in the watershed. *As added by P.L.106-2012, SEC.19.*

APPENDIX B

Meeting Minutes with Local Agency Technical Personnel

LITTLE CALUMET RIVER BASIN DEVELOPMENT COMMISSION

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 20, 2013
Location:	Cedar Lake Town Hall
Meeting Purpose:	Meeting with Cedar Lake Town Manager
Attended By:	Ian Nicolini (Cedar Lake Town Manager) Craig Hendrix (SEH)
Distributed To:	Those in attendance Dan Repay Anthony Kenning

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) Very little of the town is located in the Little Calumet River Watershed. Most of the town's problems are in the Cedar Creek Watershed.
- 3) Flooding issues were discussed in Henn's Addition (aka Wicker Meadows) approximately 127th Lane and Forrestdale located in the NW part of town, west of Wicker Blvd. Stormwater from the acreage to the south drains through the southwest corner of the subdivision and overwhelm the existing storm sewers and the detention pond. This area is not within the Little Calumet River Watershed.
- 4) Regional storage opportunities may be available in the Monastery North Subdivision, north of 129th. This area was once a golf course. Unfortunately, it does not appear that this area is within the Little Calumet River Watershed.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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LITTLE CALUMET RIVER BASIN DEVELOPMENT COMMISSION

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	April 11, 2013
Location:	Crown Point City Engineer's Office
Meeting Purpose:	Meeting with Crown Point Technical Staff
Attended By:	Tris Miles (Crown Point City Engineer) Tony Kenning (DLZ) Craig Hendrix (SEH)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) Discussed the Beaver Dam Ditch Lateral 1 flood control project. During heavy rain events Broadway overtops just north of 101st Avenue near the Ameriplex subdivision. The project proposes to enlarge culverts under Broadway and construct storage on the immediate west side of Broadway. Project was also proposed by Lake County Surveyor's Office. This is a regulated drain. A hydraulic study was completed by CBBEL.
- 3) Stillwater Subdivision has flooding issues associated with Crooked Creek. Stillwater Subdivision is located just southwest of the intersection of Broadway and US 231. The culverts carrying Crooked Creek beneath the local streets need to be enlarged to keep the roadways from being overtopped in heavy rain events.
- 4) Flooding occurs in the areas near West South Street, west of Main and Court Streets. Stormater conveyances need to be improved. There is the possibility for storage on the north side of South Street (Beazor Valley Detention Basin). This area is contributes to Main Beaver Dam Ditch.
- 5) All ditches need maintenance, specifically Beaver Dam Ditch and Niles Ditch. Tris believes the budget for these two ditches is approximately \$1.2M.

Other Items Discussed

- 1. Tris suggested the need for modeling for the entire Deep River Watershed.
- 2. Tris believes that the fee collected by the Little Calumet River Commission (after the Commission determines what it needs to maintain the levee system) should be shared

April 11, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with City of Crown Point

Page -2-

with municipalities based upon its pro-rata share. The municipalities could then determine the best use of the funds.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the April 11, 2013 Meeting with Technical Staff (City of Crown Point)

LITTLE CALUMET RIVER BASIN DEVELOPMENT COMMISSION

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 7, 2013
Location:	Dyer Town Hall
Meeting Purpose:	Meeting with Town of Dyer Technical Staff
Attended By:	Rick Eberly, Bryan Lane (Town of Dyer) Dan Repay (Little Calumet River Basin Development Commission) Thomas Burke (CBBEL) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- 1) Dyer studied the construction of a detention facility located on the Longwood Golf Course for the purposes of reducing flood elevations along Plum Creek/Hart Ditch. The site is a 200 acre site with the potential of 1,020 acre-feet of storage at an estimated cost of \$20.8 million (Year 2010 dollars and not including land acquisition). There is land acquisition involved in the project and numerous partnerships are being developed as part of the pursuit of the project. Partnerships include: Town of Dyer, St. Margaret Mercy Hospital, Cook County, and the Metropolitan Water Reclamation District of Greater Chicago. The project under current consideration includes stormwater storage with a pumped outlet. Current modeling suggests a reduction in flood elevations of 1.8 feet at Hart Street, 1 foot at 213th Street, and 0.2 feet at Ridge Road. Archeological studies have been conducted and there are no potential archeological issues at the Longwood Golf Course site. Mr. Burke from CBBEL provided a document entitled, "Town of Dyer Compensatory Storage Comparison Options and Benefits vs. Cost," dated February 2, 2010.
- 2) The Berens-Monaldi flood wall is complete. The wall separates the Berens-Monaldi Subdivision from the floodwaters of Plum Creek along the Indiana-Illinois border. The associated stormwater pump station will begin construction in the next couple months.
- 3) Widening of Hart Ditch between the EJ&E Railroad and Main Street was studied. Twenty foot and a 40 foot channel widening options were reviewed. In a November 5, 2008 memorandum provided by CBBEL, decreases in floodplain elevations throughout the section anywhere between 0.0 and 2.4 feet (40 foot width option). North of Main Street in Munster, there is no floodplain reduction.

March 7, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Town of Dyer

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Another memorandum was provided that was dated May 7, 2009 (Revised June 4, 2009). This memorandum provided the results of an analysis of the widening of Hart Ditch between US 30 and Dyer Ditch. Based on a review of this memorandum, it appears as if the 100-year flood elevation reduction benefits are less than the results outlined in the November 5, 2008 memorandum. The estimated cost provided in this memorandum ranged between \$2.93 million to \$5.04 million.

- 4) The Northgate Subdivision flap gate project will prevent backwater from backing into the Northgate Subdivision from Hart Ditch.
- 5) Dyer studied the potential impacts from stormwater detention between the CSX and EJ&E railroads immediately east of Calumet Avenue. Approximately 12 ac-ft could be achieved, but did not provide any significant benefit.
- 6) After the meeting, CBBEL provided a memorandum dated November 5, 2008 regarding the topic of "Hart Ditch Online Floodwater Storage". This memorandum discussed the development of approximately 390 ac-ft of stormwater storage and the results. Benefits were shown at 213th Street crossing with Hart Ditch, but reductions in flood elevations were not realized at or downstream of Main Street. No costs were provided in the memorandum.
- 7) Potential diversion of Hart Ditch and stormwater storage in Cook County was reviewed. The results are outlined in a memorandum dated November 23, 2013 by CBBEL. This memorandum was provided after the meeting. The goal of the study as outlined in the memorandum was to provide a similar flood reduction as the "Will County Reservoir" (Item #1 in these meeting minutes).
- 8) After the meeting, CBBEL provided a memorandum dated December 3,2008 (Revised December 29, 2008) regarding the topic "Hart Ditch Online Floodwater Storage 14 Acre Parcel for Northgate Subdivision". This memorandum discussed the development of approximately 14 acre parcel east of Calumet as stormwater detention to protect the Northgate Subdivision from backwater effects from Hart Ditch. The project consists of a floodwall along the west bank of Hart Ditch and a pump station. The project was estimated to cost anywhere from \$3.2 million to \$4.2 million.

Other Items Discussed

- A) Dyer monitors a rainfall gage in Crete, IL and a stream gage on Goodenow Road in Illinois. This provides approximaley 7 to 8 hours advance warning before peak flows cross the state line. The early warning system has been active for about a year.
- B) Hart Ditch flows tend to slow the outflow of Dyer Ditch.

March 7, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Town of Dyer

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Items for Follow Up

A) Not applicable.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 07, 2013 Meeting with Technical Staff (Town of Dyer)

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	April 11, 2013
Location:	Gary Sanitary and Storm Water Management District
Meeting Purpose:	Meeting with City of Gary Technical Staff
Attended By:	Dan Vicari, Kola Awosika (GSD/GSWMD) Bo Kemp (Consultant to the City of Gary) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

- 1) This crossing location collects fallen trees and results in log jams. It appears as if these jams can cause and have caused some undermining of the structures. This area is on the downstream neck of a widened floodplain location.
- 2) Harrison/Jefferson In 2008, flows spilled over to the south into the Gleason Golf Course.
- 3) Chase Street is closed. The channel is not defined through this area. There is a place for temporary closure gates on 35th Avenue, but the gates cannot be located and the installation channels for these gates are worn and likely not functional.
- 4) Gary has experienced issues with the Marshalltown gates and operation.
- 5) Continuation of #2 above. There is an old pipe penetration through the levee which used to provide a means to drain the golf course. It cannot be located.
- 6) It was noted that the pipe(s) crossing I80//I94 from the northeast quadrant of I80/I94 and Grant Street may be undersized to convey flow from the neighborhood to the northeast. This interchange was reconstructed in the last 10 years.
- 7) There is a subdivision located along US12 (Spencer, Sullivan, Tippecanoe, Union) that drain to the combined sewer system. The City is looking at options to disconnect them and possibly convey stormwater flows southeasterly to County Line Road to the Burns Ditch watershed.

April 11, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with City of Gary

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8) The City is presently working through ditch improvements along Black Oak between I80/I94 and the Little Calumet River. The City is currently dealing with easement acquisition issues. However, this ditch drains a large area northeast of the intersection of Cline Avenue and the Little Calumet River. And this watershed continually experiences flooding.

Other Items Discussed

- A) Historically, the USACE and LCRBDC indicated maintenance of all facilities along the river were Gary's responsibility.
- B) It was noted that Gary has almost always met IDEM's effluent water quality requirements along the Little Calumet River. It is only at its Burns Ditch confluence with the Little Calumet River that typically does not meet water quality requirements.
- C) The City has an inventory from 2002 of all of the known connections to the Little Calumet River.
- D) The City is not aware of any emergency closure plan for Little Calumet River activities.
- E) The City would like more interaction with the Little Calumet River Basin Commission.

Items for Follow Up

A) Obtain the 2002 inventory of known connections.

<u>Conclusion</u>

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the April 11, 2013 Meeting with Technical Staff (City of Gary)





COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	April 10, 2013
Location:	Griffith Town Hall
Meeting Purpose:	Meeting with Griffith Technical Staff
Attended By:	Rick Konopasek (Griffith Director of Public Works) Rick Ryfa (Town Council) Gorge Jerome (Griffith Clerk-Treasurer) Tony Kenning (DLZ) Craig Hendrix (SEH)
Distributed To:	Those in attendance Dan Repay

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) The deep tunnel project along Arborgast Street is complete. The tunnel intercepts Cady Marsh Ditch before it reaches Hart Ditch and diverts water directly to the Little Calumet River. A manually operated trash rake was installed at the tunnel inlet. Griffith operates the rake. Griffith would like the rake to be converted to an automatically operated rake so Griffith public works staff can be utilized elsewhere during heavy rain events. Also, Griffith maintains the tunnel removes debris from inside the tunnel, maintains the rake and maintains the outlet. They would like to be reimbursed for the costs of these maintenance services.
- 3) The River Road levee is not complete between Cline Avenue and the EJ&E Railroad. This levee needs to be completed and certified. Also, there are existing penetrations that need to be collected and possibly pumped through or over a new levee. During heavy rain events Griffith has to sandbag River Road near Cline to protect development on the south side of River Road. USACE and the River Basin Commission need to determine the location of the flowage easement across the old golf course. Griffith would like the easement and levee to be located far enough north of River Road to allow development at the NE corner of River and Cline. This area is possibly an opportunity for storage.
- 4) Griffith's sewage equalization basin is located on the east side of Cline Avenue, north of River Road. It was an island in 2008 after the heavy rains, but it did not flood. Griffith would like to construct additional equalization basin(s) at this same location. Access needs to be maintained during heavy rains.

April 10, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Town of Griffith

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Other Items Discussed

1. Griffith suggested finding opportunities for storage for Cady Marsh Ditch in Highland to help Griffith. Cady Marsh needs maintenance.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 28, 2013
Location:	Hammond City Hall
Meeting Purpose:	Meeting with City of Hammond Technical Staff
Attended By:	Stan Dostatni, Mark Gordish (City of Hammond) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

- 1) There is a gate structure on the north wall of the levee that is approximately 400 feet west of Northcote Avenue. The purpose of this structure was to drain River Drive, but it traps water. It was suggested that it traps water because it may be oversized. River Drive is schedule for reconstruction which may further decrease the water behind the gate; thereby further reducing its ability to operate properly.
- 2) A Super Wal-Mart is planned for the area adjacent to Cabelas. This will increase impervious area by an approximate equal amount to the area of Cabelas. The project will require stormwater detention in addition to the stormwater detention currently on the site.
- 3) The Monon Trail bridge is under design by NIES Engineering. It is likely that the will cross the Little Calumet River along the same alignment as the old rail way. There are three piers in the river which currently collect debris. These are planned to be removed. It was noted that the Little Calumet River Basin Commission may consider contributing to the removal cost of these piers. Approximate cost for the removal of the piers is \$50k.
- 4) River Drive Development Project: This is located immediately southeast of the I-80/Kennedy Avenue interchange. The area is prepped for development, but has sat unoccupied for several years. There is renewed interest in this area for development.
- 5) Interstate Plaza: This area is located immediately southeast of the I-80/Indianapolis Boulevard interchange. The area north of the plaza between it and I-80 is wetland. There is a control structure on the south side of this area that allows some overflow of the Little Calumet River into the wetland. Storage of more water in this area might be a possibility; however, an investigation into piping connections between this area and I-80

March 28, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with City of Hammond

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and north of I-80 should be conducted.

- 6) Related to Item #5 above, it was noted that there may not be a full understanding of all of the piping through the I-80 corridor. Concerns include the potential for Little Calumet River floodwaters backing up through I-80 and flooding locations in Hammond to the north through faulty flap gates or open pipes. The City provided a figure entitled "Kennedy & I-94 Storm Drainage 'Best Guess' (based on field work) August, 2005".
- 7) The area adjacent to Lyman Road between 173rd and Vine may be a potential for development. It is possible this area could also be developed as stormwater storage; however, the area between this area (south of 173rd) and the Little Calumet River may include contaminated soils.
- 8) It was questioned whether there were other closure storage options for Kennedy Avenue (e.g. non-sandbag options).
- 9) It was stated that asphalt trails on top of the levees instead of aggregate trails on top of the levees would be more advantageous. It would make flood fighting easier and would eliminate possibility of rutting.
- 10) Dowling Park Pump Station: The City is investigating the elimination of several homes from the floodplain. These homes are located along 174th between Kennedy Avenue and Parrish Avenue. They remain in the floodplain because of the Dowling Park Pump Station. Some of the options being investigated include redundant power supply and pumping capacity. The City's consultant is working with FEMA to determine what method and approach they would accept. The study is in its early stages. Other activities with this pump station include incorporation of more of Kennedy Avenue drainage into it.
- 11) Dowling Park: The City is developing an athletic complex on the Dowling Park Property. The fields will be artificial turf and will be drained to the existing pond on the park property. The fields will be raised above the level of local flooding. It is planned that there will be excavation on the park to "compensate" for the loss in potential stormwater storage that will occur when the field locations are raised.

Items for Follow Up

A) Not applicable.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.



Attachment A

Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 28, 2013 Meeting with Technical Staff (City of Hammond)



Attachment A

Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 28, 2013 Meeting with Technical Staff (City of Hammond)

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 28, 2013
Location:	Highland Town Hall
Meeting Purpose:	Meeting with Highland Technical Staff
Attended By:	John Bach (Town of Highland) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Items)

- 1) The Town is exploring stormwater detention on or adjacent to Cady Marsh Ditch. The project is on hold due to potential costs. This project may provide regional benefit to homes adjacent to Cady Marsh Ditch in both Highland and Griffith. Mr. Bach will provide a summary of the project and costs. The project is being studied by CBBEL.
- 2) A stormwater pump station and storm sewer project is under design in this area. This project was estimated to cost \$1.5 million. The project is being designed by CBBEL.
- 3) The Town of Highland would like to see Kennedy Avenue Bridge at the Little Calumet River raised to eliminate the need for closure.
- 4) Flows from Spring Street Ditch are generally problematic to Highland during flood events. The industrial park between 45th Avenue, Indianapolis Boulevard, and the two railroads have flooded in 2008. Buildings are generally elevated, but the streets flood.
- 5) There are a series of culverts between Hart Road and the Cady Marsh Ditch that are undersized and may be potential failure issues. The LCSO has determined that any replacement be of a specified size. These culverts are in need of replacement. No construction cost has been completed for this work.

Items for Follow Up

A) John Bach will provide an executive summary (costs, project scope, etc) for items #1 and #2 above. A copy of the report was submitted to DLZ/SEH after this meeting.

March 28, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Town of Highland

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Conclusion

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Attachment A

Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 28, 2013 Meeting with Technical Staff (Town of Highland)

Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 28, 2013 Meeting with Technical Staff (Town of Highland)

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 13, 2013
Location:	Hobart City Hall
Meeting Purpose:	Meeting with Hobart Technical Staff
Attended By:	Bob Fulton (Hobart Sanitary District President) Phil Gralik (Hobart City Engineer) Tim Kingsland (Hobart Sanitary/Stormwater District Coordinator) Jake Dammarell (BF&S) Dave Lahey (BF&S) Tony Kenning (DLZ) Craig Hendrix (SEH)
Distributed To:	Those in attendance Dan Repay

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) Discussed the opportunities and challenges of Lake George. Water level in Lake George is controlled by a dam. The lake level is controlled by the DNR. Lake George could be utilized better if Hobart was able to control the lake level. Hobart could lower the lake level in anticipation of upstream stormwater flow. This would provide storage that would provide benefit for downstream communities.
- 3) Lake George was dredged in 2002. It is beginning to fill with sediment already. Erosion control measures need to be enhanced upstream of Lake George. The lake will need dredging again in the near future.
- 4) Hobart discussed problems with "Stinky Creek" which travels through the golf course and eventually drains to Deep River. The creek does not flow very well.
- 5) The Brickie Bowl floods during heavy rain events. Hobart is interested in redeveloping the area to host outdoor events.
- 6) Hobart discussed needed improvements in the Barrington Ridge Subdivision, specifically the area near Randolph Street.
- 7) Hobart has identified the area south of 61st Avenue, across from Wisconsin Street, as a potential area for storage. Hobart is contemplating the parcel as part of the 61st Avenue Reconstruction Project.
- 8) Drainage issues exist east of the Preserves Development (east of Mississippi Street, behind the Westfield Mall).

March 13, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with City of Hobart

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- 9) Hobart discussed a proposed project to construct wetlands along Liverpool Road and 57th Avenue.
- 10) The Hillman Heights Drainage Improvement Project was discussed. The project will correct drainage problems and create storage.
- 11) Hobart discussed drainage problems that exist behind Eagle Plaza. There may be an opportunity for storage.
- 12) There may be an opportunity to create storage at Mundell Field. When dry, the storage basin could be utilized for recreational activities.
- 13) There may be storage opportunities near Maple Lake, on the north side of Ainsworth Road.
- 14) Hobart suggested that the area south of Evergreen Memorial Park, east of I-65, might provide an opportunity for storage.
- 15) Both Deep River and Turkey Creek have bank erosion issues. A program should be developed to stabilize the banks and control sedimentation.
- 16) The shoreline of Lake George needs stabilization to reduce the deposition of sediments in the lake.
- 17) Drainage improvements are needed in the area of County Line Road between US 6 and Cleveland. These are areas also identified for improvement in Porter County's and Portage's master plans.
- 18) Drainage improvements are needed in the Crestwood Subdivision.
- 19) Drainage improvements are needed in the County Line Road and 61^{st} Avenue area.
- 20) An opportunity exists in the Northwinds Subdivision to expand the existing storage basin.
- 21) An opportunity exists in the Nob Hill Subdivision to expand the existing storage basin.

Other Items Discussed

- 1. Hobart provided very detailed answers on the questionnaire. A number of additional projects with costs and schedules were indentified.
- 2. Hobart suggested that some entity needs to manage regional land acquisition activities for use in the watersheds. Sometimes opportunities for storage that might benefit a community lie outside the community. This entity could acquire and manage land acquisition activities to benefit the neighboring community.
- 3. There are very few regulated drains in Hobart. Hobart does not have the opportunity to obtain much funding from the Lake County Surveyor's office for ditch maintenance.
- 4. Hobart discussed the need for additional studies, maintenance and regional watershed policy for Deep River and Turkey Creek. Opportunities exist now that, when developed, will not exist. Opportunities include regional storage, erosion control efforts, enhanced developmental standards, etc.

March 13, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with City of Hobart

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Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	May 1, 2013
Location:	Lake County Highway Department
Meeting Purpose:	Meeting with Lake County Highway Technical Staff
Attended By:	Marcus Malczewski Duane Alverson Peggy Sierzputowski Tony Kenning (DLZ) Craig Hendrix (SEH)
Distributed To:	Those in attendance Dan Repay

- Discussed 45th Avenue Colfax to Grant project. Cleveland to Chase is fully funded. Chase to Whitcomb and Whitcomb to Colfax phases currently have some STP funds. Project provides a great deal of storage. County could use funds for acquiring right-ofway, construction and for local 20% match.
- 2) Enclave Subdivision (95th and Sheffield) drains west toward Illinois and Hart Ditch. Area has flooding problems due to inadequate conveyance to Hart Ditch.
- 3) County Bridge number 116 Fairbanks/Arborgast over Turkey Creek needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 4) County Bridge number 113 Hendricks over Turkey Creek needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 5) A regional storage opportunity exists near Clark Road and Beaver Dam Ditch.
- 6) County Bridge number 360 Kleinman over Cady Marsh Ditch needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 7) County Bridge number 350 Liable over Cady Marsh Ditch needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 8) County Bridge number 362 Colfax over Cady Marsh Ditch needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 9) A regional storage opportunity exists near the Shorewood Golf Course in Schererville.
- 10) County Bridge number 264 Hart Street over Hart Ditch needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 11) County Bridge number $261 213^{\text{th}}$ over Hart Ditch needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 12) County Bridge number 260 Main over Hart Ditch needs to be reconstructed and

May 1, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Lake County Highway Department

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enlarged to allow additional area for passing large storm events.

- County Bridge number 259 45th over Hart Ditch needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 14) County Bridge number 254 Wisconsin over Lake George needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 15) County Bridge number 252 Old Ridge Road over Deep River needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 16) County Bridge number 248 Harrison over Little Calumet River needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 17) County Line Road and 61st Avenue floods during heavy rain events.
- 18) County Bridge number $89 101^{st}$ and Mississippi needs to be reconstructed and enlarged to allow additional area for passing large storm events. Project is currently under design. Two parcel acquisitions remain.
- 19) County Bridge number 98 Clay over Deep River needs to be reconstructed and enlarged to allow additional area for passing large storm events.
- 20) County Bridge number 92 Colorado over Niles Ditch needs to be reconstructed and enlarged to allow additional area for passing large storm events.

Other Items Discussed

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) Lake County Highway is in need of miscellaneous equipment for flood fighting and ditch maintenance.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 20, 2013
Location:	Lake Station City Hall
Meeting Purpose:	Meeting with Lake Station Technical Staff
Attended By:	Mayor Soderquist Glen Campbell (American Structurepoint, Lake Station consultant) Craig Hendrix (SEH)
Distributed To:	Those in attendance Dan Repay Tony Kenning

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) Lake Station provided a copy of USACE's Section 506 Great Lakes Fishery and Ecosystem Restoration report. The report suggests that the dam be removed to naturalize stream hydraulics, resurge hydrology, re-establish riparian communities, provide fish passage, and other perceived benefits. Lake Station is not in favor of removing the dam at this time.
- 3) The dam is in poor condition and need rehabilitation. It provides for areas upstream to be utilized for fishing and water activities. Lake Station would like to see it modified to better control the release and still maintain the recreational opportunities it provides.
- 4) Deep river floods between its confluence with the Little Calumet River and areas south of I-94. Flooding also occurs in areas north of I-94 in and around Burns Ditch.
- 5) INDOT ditches along I-94 need to be maintained. Some maintenance has occurred.
- 6) During heavy rain events, areas east of the river between East 27th and East 29th Avenues flood. The existing stormwater pipes have backflow preventers installed on them at the river to prevent the river from backing up into the residential areas. As the river rises and pipe discharge is prevented, the pipes fill until they can hold any more. The residential areas then flood because there is no way to remove stormwater.
- 7) Would like to have a written policy or plan to control the dam at Lake George in Hobart during heavy rain events. There should be a way to drain the lake in anticipation of the rain so it can be stored to lessen the affects of the rain downstream in Lake Station.
- 8) The wetland area southwest of the ramp from eastbound I-94 to southbound I-65 appears to be holding more water. There may be some sort of blockage preventing them from draining properly.

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Little Calumet River Basin Development Commission Meeting Minutes from Meeting with City of Lake Station

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- 9) There may be a storage opportunity NIPSCO's site.
- 10) There may be a storage opportunity behind Riverview Park east of Ripley Street.
- 11) There may be a storage opportunity at the site of the old East Gary School football field.
- 12) There may be a storage opportunity at the Deep River Outdoor Education Center.

Conclusion

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 20, 2013 Meeting with Technical Staff (City of Lake Station)




COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	June 11, 2013
Location:	DLZ Hammond Office
Meeting Purpose:	Meeting with Little Calumet River Development Commission Staff
Attended By:	Dan Repay (LCRBDC Executive Director) Tony Kenning (DLZ) Craig Hendrix (SEH)
Distributed To:	Those in attendance

Items Discussed

- 1) During heavy rain events the diverter as placed does not restrict water going west. One solution might be to place a steel sheet in the diverter to make water flow east. A second option is to rechannel Hart Ditch to the east as to merge with the Little Calumet River rather than intersect perpendicularly. (Operational Component)
- 2) Wicker Park is an overflow area. Water flows to a pond on the northeast where it is pumped into the Little Calumet River.
- 3) INDOT designed and installed the pumping station at Indianapolis Blvd. This is maintained by Highland. It discharges to a ditch/swale to the west then north to the Little Calumet River. There is concern regarding its operation.
- 4) Cabela's pumping station is maintained by Hammond Sanitary District. It pumps the pond at Cabela's into the Little Calumet River.
- 5) The Commission has plans ready and is in the process of permitting to remove sediment and islands in the river between the railroad tracks and Kennedy Avenue. Dan will forward those plans to DLZ/SEH.
- 6) Debris gets caught under Kennedy Avenue Bridge. Would like bridge reconstructed to remove pile piers and raise the elevation above the 200 year plus three feet elevation.
- 7) Dan will get copies of maps of penetrations beneath I-94.
- 8) Need flowage easement from Griffith defined across the old golf course. Levee needs to be completed in this area.
- 9) Chase Street used to overflow because culverts beneath the roadway were not maintained. These pipes were recently removed and the roadway was closed between 35th Avenue and the river.
- 10) The area between Chase and Grant doesn't drain well. There are five small culverts that are supposed to drain area to the river that may need maintaining. A pumping station may be needed. This area used to be farmed.

June 11, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Day Repay

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- 11) A Gary sanitary main crosses the river just east of Broadway. It is exposed and should be buried to eliminate the chances of blockages.
- 12) Harrison Street bridge should be reconstructed.
- 13) INDOT built a pumping station at Broadway to rectify the flooding at IUN.
- 14) Many beaver dams between Broadway and Georgia Street.
- 15) Areas around I-65 and I-94 aren't draining. Areas east of I-65 drain westward under I-65 toward MLK then north under I-94 and finally west under MLK to the river. Why not have the water drain westward under MLK toward Georgia Street and connect to the river before it travels under I-94?
- 16) There are many storage opportunities in the Lake Station area that need to be investigated.
- 17) Lake George in Hobart will play an important role in controlling flooding. An operational plan needs to be developed to take advantage of this storage opportunity and dampen heavy rain events.

Other Items Discussed

- 1. The Commission would be happy to participate in aerial photography and LIDAR contouring and provide this information to their watershed communities.
- 2. Dan believes that the Commissions mitigation goals can be met within properties they already own without purchasing new properties.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 15, 2013
Location:	Merrillville Stormwater Utility
Meeting Purpose:	Meeting with Town of Merrillville Technical Staff
Attended By:	Matthew Lake (Town of Merrillville) Darren Olson (CBBEL) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- 1) The Town recently completed the study, "Drainage Investigation for Lincoln Gardens and Southbrook Subdivision" which outlined several alternatives to mitigate flooding of streets and residential structures from Kaiser Ditch. Alternative #1 and Alternative #3 were recommended. The opinion of probable construction cost for each project is \$4.5 million and \$1.8 million respectively. The project includes the addition of approximately 35 ac-ft of stormwater storage plus the replacement of several restrictive culverts.
- 2) The Town recently completed the study, "Country Club Heights & Meadowdale Subdivisions" which outlined several alternatives to mitigate flooding along Griffith Lateral #6. The recommended alternative included the creation of approximately 35 ac-ft of stormwater storage in the watershed at 3 locations along with the replacement of several culverts. The opinion of probable construction cost for the project is \$4.0 million.
- 3) Stabilization of the creeks within the Deep River Watershed is a concern of Merrillville. The banks of Turkey Creek require continuous maintenance. The Town submitted an application for Great Lakes Restoration Initiative (GRLI) funding for a two-stage ditch along approximately 2 miles of Turkey Creek. Merrillville hopes for positive outcome for this project as they believe it will benefit the entire watershed.
- 4) The Taft Street Regional Detention Pond project is in progress. There was cost sharing on this project with INDOT.

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Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Town of Merrillville

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Other Items Discussed

- A) Mr. Lake provided a thorough and very detailed municipal interview form which covered everything from ordinances and stormwater policy to project information.
- B) The Town is in the process of updating their stormwater master plan and will be completing hydrologic/hydraulic modeling of their storm network.
- C) There are a number of Town-owned properties that may provide opportunities to install upland storage. The location of these parcels was provided to DLZ after the meeting.

Items for Follow Up

A) Not applicable.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 15, 2013 Meeting with Technical Staff (Town of Merrillville)



Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 15, 2013 Meeting with Technical Staff (Town of Merrillville)

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 13, 2013
Location:	Munster Town Hall
Meeting Purpose:	Meeting with Munster Town Engineer
Attended By:	James Mandon (Munster Town Engineer) Tony Kenning (DLZ) Craig Hendrix (SEH)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) Munster has been working with the Lake County Surveyor's Office to complete erosion protection projects on Hart Ditch. Most of Hart Ditch north of Fran Lin Parkway has been completed. Will continue working south of Fran Lin. On average, one erosion project is completed every two years. Munster would like to complete this work and have the ditch become regulated and maintained by Lake County.
- 3) Munster is believes that constructing massive regional storage facilities upstream of Main Street will provide relief to the town during heavy rain events.
- 4) Maintenance is needed at the drainage ditches and culverts at the Lansing Airport. A portion of Munster flows towards the airport.
- 5) Reconstructing Columbia and Northcote bridges as well as removing some of the railroad bridge piers when the trail is constructed will benefit Munster. This work is already underway.
- 6) Munster has an agreement with Lansing to check and fix gates on four culverts under I-94 and provide manual backup to stop flood water north of I-94 from crossing and flooding Munster. Munster has agreed to pay the capital costs of these improvements. Lansing has agreed to operate the secondary closure devices and to deploy a bladder at Burnham if necessary.

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Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Town of Munster

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Conclusion

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 13, 2013 Meeting with Technical Staff (Town of Munster)



COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 27, 2013
Location:	New Chicago Town Hall
Meeting Purpose:	Meeting with New Chicago Technical Staff
Attended By:	Sis Williams (New Chicago Deputy Clerk Treasurer) Jeff Ban (DVG, New Chicago town consultant) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) New Chicago has older stormwater ordinances that may require updating.
- 3) New Chicago is nearly fully developed. New opportunities would be in the way of redevelopment. There are not many opportunities for new storage.
- 4) Wisconsin Street near Huber Blvd floods just north of the mobile home park. Culverts under Wisconsin may need to be enlarged.
- 5) The pond at Twin Oaks Park overtops at times. May need to replace outlet pipe under Lake Park Avenue.
- 6) The town has a lease on property abutting Deep River, east of Michigan Street. Would like to make it a recreational area. May provide access point to Deep River from recreation and maintenance.
- 7) The Water Front Lounge on the north side of Deep River at Michigan Street is out of business. Could provide additional opportunities for maintenance, recreation and storage.
- 8) Flooding occurs at 412 Arthur Street.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.



COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 11, 2013
Location:	Schererville Town Hall
Meeting Purpose:	Meeting with Town of Schererville Technical Staff
Attended By:	Robert Volkmann, Jeff Huet (Town of Schererville) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- The Town is in preliminary discussions with the County regarding stormwater storage on the parcel shown on Attachment A. There has been flooding of the segment of Turkey Creek between Knoxberry and Newcastle, and just north of 77th Avenue downstream of this location along this ditch just north of US30. This area flooded severely in 2008.
- 2) In 2008, the streets in the area in Schererville of Briar Ridge flooded. This area is adjacent to the "Suez" canal. There is not a significant amount of area here to provide regional benefit from additional storage.
- 3) The area west of central flows northwest around the tank farm and overtopps Division Road during heavy storm events.
- 4) NIES Engineering is presently conducting a study in this area looking at throttling the ditch for detention. Construction cost is estimated to be low. The Town expects the study to be complete in the next 30-60 days.
- 5) There is potentially 25 acres of potential stormwater storage in this location. Again, this area is being looked at to throttle stormwater back. NIES Engineering is performing this study and it is expected within 30-60 days.
- 6) This area is a potential for detention. Impacts are not determined.
- 7) This area is a potential for detention. Impacts are not determined.
- 8) This area is a potential for detention. Impacts are not determined.

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Little Calumet River Basin Development Commission Meeting Minutes from Meeting with Town of Schererville

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- 9) As a note, Save the Dunes owns this property.
- 10) The Hartsdale Pond pump station is maintained jointly by Schererville and Highland. There is the possibility that this could accommodate more storage.
- 11) The Town is concerned with blockages that have occurred and have the potential to occur on the Pennsy Ditch under Main Street. The crossing is a 120-inch CMP culvert. There are sediment traps within the Briar Ridge Subdivision along this ditch that were constructed during the development of the subdivision.

Other Items Discussed

- A) Stormwater is managed by the sanitary department in Schererville.
- B) Stormwater management ordinances are #1787 and #1787a and can be found online. Floodplain ordinance may be found in the zoning ordinance #1797. Mr. Volkmann provided this information following the meeting.
- C) There are no construction plans on the shelf at this time.
- D) Concerns of the Town include the Pennsy Ditch under Main Street. It is a 120-inch CMP culvert. There are sediment traps within the Briar Ridge Subdivision along this ditch that were constructed during the development of the subdivision.
- E) Schererville is concerned with the potential for flooding of Spring Street ditch and Plum Creek at Dyer Ditch.

Items for Follow Up

A) Obtain information regarding Items #4 and #5 when complete.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 11, 2013 Meeting with Technical Staff (Town of Schererville)



Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 11, 2013 Meeting with Technical Staff (Town of Schererville)



Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 11, 2013 Meeting with Technical Staff (Town of Schererville)

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	April 10, 2013
Location:	St. John Town Hall
Meeting Purpose:	Meeting with St. John Town Manager
Attended By:	Stephen Kil (St. John Town Manager) Craig Hendrix (SEH) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

- 1) Explained the goal of the Watershed Study and the role the watershed communities play in the study.
- 2) St. John is situated on the very upstream portion of the watershed and doesn't have serious flooding issues due to the inadequacies of the Little Calumet River watershed tributaries.
- 3) Flooding occurs in the low area along 93rd Avenue in the area of Prairie West Park. This area is basically in a "bowel".
- 4) Golf Lake discharges at Lake Hills Drive and travels along the south side of 85th Avenue. It eventually crosses 85th Avenue near Parish Avenue and flows to Turkey Creek. The elevation of Golf Lake is controlled by a dam at Lake Hills Drive. St. John would like to modify this dam.
- 5) Two culverts under the Conrail near 85th Avenue and 83rd Place in the NW corner of town need replacing.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the April 10, 2013 Meeting with Technical Staff (Town of St. John)

COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	June 5, 2013
Location:	Teleconference
Meeting Purpose:	Meeting with USACE
Attended By:	Rick Ackerson, Joel Schmidt (USACE) Craig Hendrix (SEH) Frank Stewart, Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

The following items were discussed:

A) The existing LCR model was discussed. There is limited drainage boundary mapping available. The USACE provided drainage basin pdf files for Indiana and a portion of Illinois. Synthetic event HEC-1 files are also available. The hydrologic parameters (CN, etc.) are unique to each synthetic event and were adjusted to calibrate to flow frequency analyses at the gages. The preliminary HEC-1 hydrologic parameters are documented in the Hydraulic and Hydrologic Appendix of Feature Design Memorandum 5 (FDM 5). (Note that the parameters and modeling were later recalibrated to reflect updated gage data several times after FDM 5) The UNET unsteady flow model was also updated to unsteady HEC-RAS. Tony Kenning will provide Joel Schmidt with an ftp site and the USACE will upload FDM5 to this site.

The current version of the model includes truncated reaches of Deep River and Burns Ditch. Previous versions of the model included Deep River, Lake George and Burns Ditch. The model extents were truncated to match the FIS profiles outside of the project limits.

- B) The USACE believes that storage within the levee confines is fully utilized at all locations. Additional excavated storage may be something to look into. Different locations along the river rise at different rates and are dependent upon storm event and location. During the heavy rain events in 2008, the river was generally at a level pool stage across the entire length in Lake County (rains fell equally across the watershed), with the likely higher stages observed in Gary. During many storm events the eastern side is slower rising because of storage and the fact that the tributary areas are mostly gravity drained. The western reaches are fed by large pump stations between the state line and the Hessville area.
- C) The Arborgast Tunnel is included as a diversion in the HEC-1 hydrology model. Several alterantives to the Arborgast Tunnel were looked at before the final configuration was determined.

June 5, 2013

Little Calumet River Basin Development Commission Meeting Minutes from Teleconference with the USACE

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- D) The unsteady flow model appears to behave in accordance with reported visual observations that Deep River backs up the LCR during certain storm events.
- E) Some preliminary modeling was performed to look at proposed changes at the Hart Ditch Confluence. Apparently preliminary plans have been provided to the USACE in recent months that illustrate this concept. Dan Repay should have a copy of these plans.
- F) Channel clearing along Burns Ditch was considered for mitigation for project stage impacts. Instead, Marshalltown Levee was constructed.
- G) Additional flow monitoring gages may be helpful for future calibrations and historical period of record analysis.
- H) The model was calibrated to the 1989 and 1990 historic flood events along with calibrating to flow and stage frequency analysis that were available at that time. Some calibration data was provided by the USACE. The model is calibrated to the gage at Lake George and Thorn Creek. Calibration was based on adjustment of CN.
- I) The Thornton Reservoir is ultimately capable of providing 10,000 acre-feet of storage. It results in approximately a 1-foot reduction at the Indiana State line. Effects may be seen up to Hart Ditch. Opportunities may exist to extend the elevation reduction effects past the diversions structure. The USACE is not really involved in the Thornton Reservoir. It is primarily a MWRGCD project. The MWRGCD has updated the model of the LCR watershed. They updated the Hart Ditch/Plumb Creek hydraulics as well as the hydrology in Indiana. Joel Schmidt will provide John Murray's contact information to Tony Kenning.
- J) There may be ways to improve conveyance between Hart Ditch and Kennedy Avenue. Implications of doing so should be studied.
- K) The possibility of a tunnel between Deep River and the LCR to "short circuit" the Lake Station area was discussed. With further study, this could be an option worth looking into.
- L) There may be some issues with the culvert sizing beneath I-65.
- M) Widening of Burns Ditch was discussed as a potential alternative.

Conclusion

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COMPREHENSIVE WATERSHED PLAN

MEETING MINUTES

Meeting Date:	March 21, 2013
Location:	DLZ (Hammond Office)
Meeting Purpose:	Meeting with Town of Winfield Technical Staff
Attended By:	Tim Clayton, Jim Simmons (Town of Winfield) Tony Kenning (DLZ)
Distributed To:	Those in attendance Dan Repay

Items Discussed (See Attachment A for Graphical Location of Representative Some Items)

1) The worst flooding in the Town occurs in the Hidden Creek Subdivision, located on the Winfield/Merrillville border at 101st Avenue and Clay Street. In 2008, the Town identified a project consisting of stormwater detention expansion, stormwater diversion and downstream channel clearing. The project was estimated at \$2.9 million (including land acquisition) in 2008. If implemented, the project would require coordination with the Town of Merrillville. It would reduce flooding of 101st Avenue and Clay Street (both of which are in the Town of Merrillville) as well as local streets in the Hidden Creek Subdivision. Several homes also flood in the Hidden Creek Subdivision. A reduction in flooding of these homes would be realized as a result of this project.

Other Items Discussed

A) Not Applicable.

Items for Follow Up

A) Not applicable.

Conclusion

Should the recipients of these meeting minutes wish to make additions or corrections to these meeting minutes, please contact Tony Kenning or Craig Hendrix within five (5) business days of the receipt of these meeting minutes.

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Attachment A Little Calumet River Comprehensive Watershed Plan Attachment to Meeting Minutes for the March 21, 2013 Meeting with Technical Staff (Town of Winfield)

APPENDIX C

Overall Opportunities Map





APPENDIX D

Photographs Taken During April 18, 2013 Storm Event



Photograph 1–175th Avenue near Cline, Highland



Photograph 2 – West Side of Colfax Street, Griffith



Photograph 3 – Columbia Avenue, Munster



Photograph 4 – Jefferson Steet, Gary



Photograph 5 – Kennedy Avenue, Highland



Photograph 6 – Colfax Street, Griffith



Photograph 7 – Arbogast Deep Tunnel Outfall, Griffith



Photograph 8 – 27th and Calhoun Street, Gary



Photograph 9 - Arbogast St. at Cady Marsh Ditch



Photograph 10 - Cady Marsh Ditch East of Argogast St.



Photograph 11 - Cady Marsh Ditch East of Argogast St.



Photograph 12 – Cady Marsh Ditch West of Arbogast, Highland



Photograph 13



Photograph 14 – Harrison Street Area, Gary



Photograph 15 – River Dr. East of Cline Avenue, Griffith



Photograph 16 - Twin Oaks Park, New Chicago


Photograph 17 – Gleason Golf Course, Gary



Photograph 18 – Gleason Golf Course, Gary



Photograph 19 – East Side of Colfax Avenue, Griffith



Photograph 20 – West Side of Colfax Avenue, Griffith



Photograph 21 – Marshaltown Levee, Gary



Photograph 22 – West Side of Marshalltown Levee, Gary



Photograph 23



Photograph 24