

NOTE: The North Branch Ecorse Creek Flood Risk Management Draft General Reevaluation Report, Volume I (Final Draft 100% Submittal, December 2011) has been submitted for final review and public notice by the U.S. Army Corps of Engineers and therefore is subject to change.

**ONLY THE EXECUTIVE SUMMARY IS
AVAILABLE FOR VIEWING AT THIS TIME.**

North Branch Ecorse Creek Flood Risk Management General Reevaluation Report

Wayne County, Michigan

Draft General Reevaluation Report (Volume I)



U.S. Army Corps of Engineers
Detroit District
Great Lakes and Ohio River Division
December 2011
Draft Final (100%) Submittal

Executive Summary

The Detroit District, U.S. Army Corps of Engineers (Corps) and Wayne County, Michigan have worked in partnership to reevaluate a previously authorized flood risk management project for the North Branch Ecorse Creek (NBEC) and prepare an Environmental Impact Statement. The previously authorized flood risk management study on Ecorse Creek is documented in the Corps report entitled, *Feasibility Report for Flood Protection in the Ecorse Creek Drainage Basin, Wayne County, Michigan, 1987(Revised 1988)*. The Selected Plan in the 1988 feasibility study would have provided a 10-year level of protection for a portion of the Ecorse Creek at an estimated cost of \$6.4 million (1998 dollars).

Construction of the Selected Plan was authorized by Section 101(a) (14) of the Water Resources Development Act (WRDA) of 1990. The project did not proceed to construction because during the Preconstruction Engineering and Design phase, constructability challenges were encountered, which increased construction cost, thereby reducing the overall benefit to cost ratio to an undesirable number below 1. Consequently, in WRDA of 2007, the project study authorization was extended, thus providing an opportunity for Wayne County to work cooperatively with the Federal government as the non-Federal sponsor to reevaluate NBEC and devise flood risk reduction for the afflicted areas. A Feasibility Cost Share Agreement (FCSA) was signed October 30, 2009 by the Corps and Wayne County, which allowed Wayne County to fulfill a required partnership role with the Corps to conduct the General Reevaluation Report (GRR) and the Draft Environmental Impact Statement (DEIS) for NBEC.

Project Scope and Study Area

The purpose of this GRR is reevaluation of the Federal Interest in authorized flood risk management (FRM) opportunities on NBEC. Using current planning criteria and policies, the reevaluation includes review and reformulation of the alternatives presented in the *Feasibility Report for Flood Protection in the Ecorse Creek Drainage Basin, Wayne County, Michigan* (Corps, 1988), the *North Branch of the Ecorse Creek Drain Flood Control Study* (Wayne County, 2008) and several other alternatives generated through the plan formulation process which occurred during the development of this GRR. The goal of the GRR is the development of an effective, complete FRM project that is desired by the communities in the NBEC watershed that is economically justifiable, engineeringly feasible, and environmentally and socially acceptable.

The implemented project would provide FRM benefits for the affected area in the NBEC watershed, which is in the south-central portion of Wayne County, located in southeastern Michigan southwest of the Detroit city limits. The watershed is approximately 19,200 acres (30 square miles) and includes parts of the following communities: Romulus, Westland, Inkster, Dearborn Heights, Taylor, Allen Park, Melvindale, Lincoln Park, and Ecorse. The City of Dearborn is also a part of this study, although it is not officially within the NBEC drainage basin delineation.

NBEC is one of three main tributaries of Ecorse Creek which include the LeBlanc Drain and the Sexton-Kilfoil Drain. It flows across central Wayne County generally eastward from the headwaters near Venoy Road, in the City of Romulus, for about 16.9 miles to its confluence with the Le Blanc Drain and Sexton-Kilfoil Drain, which forms Ecorse Creek. Ecorse Creek flows for less than one mile to its confluence with the Detroit River. The majority of NBEC is an open trapezoidal channel watercourse; however, two segments in the City of Romulus, approximately from river miles (RM) 14.4 to 15.3 and 16.8 to 16.9, are enclosed systems. The primary problem in NBEC watershed is repetitive flooding with associated flood damages. Other problems resulting from reoccurring NBEC flooding are bank erosion and instability, sediment and nutrient loading, trash and debris loading, degraded in-stream habitat, and loss of recreational/aesthetic value.

The study area for reanalysis is the portion of the NBEC watershed impacted by the estimated median 0.2 percent annual-exceedance-probability or 500-year flood event.

Alternative Plans

This section describes the development of alternative that address the planning objectives, the comparison of those alternatives and the selection of a Recommended Alternative. It also describes the Recommended Alternative and its implementation requirements.

Plan Formulation Rationale

The formulation of alternatives is an iterative process based on the Corps six-step planning process (structured approach to problem solving) developed for water resources development studies conducted by Federal agencies. The following are the six steps of the Corps planning process:

- Step 1 – Specify problems and opportunities
- Step 2 - Inventory and forecast conditions.
- Step 3 – Formulate alternatives.
- Step 4 – Evaluate effects of alternatives.
- Step 5 – Compare alternatives.
- Step 6 – Select recommended alternative.

The Corps six-step planning process was incorporated into four primary processes: 1) Initial Measures Selection and Screening, 2) Initial Alternative Formulation, 3) Alternative Analysis and Selection of Recommended Alternative, and 4) Recommended Alternative Evaluation. The processes, associated activities, and expected outcomes are presented in Table ES-1, below.

Table ES-1: Measures Selection and Alternatives Formulation and Evaluation Processes

Process	Initial Measures Selection and Screening		Initial Alternative Formulation	Alternative Analysis	Recommended Alternative Evaluation
Activities	<ul style="list-style-type: none"> • Problem identification • Identification of constraints • Review of past studies and available data • PDT* discussions • Brainstorming • Identification of screening criteria • Develop a list of flood risk management measures 	<ul style="list-style-type: none"> • Baseline conditions Hydrology &Hydraulics • Preliminary baseline economic analysis • Inputs from public meeting • Refine constraints • PDT discussions • Brainstorming • Revisit screening criteria • Reformulate/refine management measures 	<ul style="list-style-type: none"> • Hydrology &Hydraulics analysis of No Action Alternative - Alternative 1, Corps 1988 - Alternative 2, and Wayne County 2008 - Alternative 3 • Economic analysis the three alternatives • PDT discussions • Brainstorming • Revisit screening criteria • Formulate additional alternatives • Screening level cost estimate 	<ul style="list-style-type: none"> • Brainstorming • Refine/ optimize formulated alternatives • Inputs from stakeholder meeting • Hydrology &Hydraulics analysis of additional 3 alternatives • Economic analysis of 3 additional alternatives • Preliminary cost estimates 	<ul style="list-style-type: none"> • National Economic Development (NED) analysis of the Recommended Alternative • Final cost estimates • Environmental analysis • Potential National Ecosystem Restoration (NER) analysis
Outcomes	Management Measures Matrix		Initial Alternatives Identification	Final Array of Alternatives and Recommended Alternative Selection	Recommended Alternative Detailed Analysis

* Project delivery team.

The intent was to devise alternatives with benefit to cost ratios (BCR) greater than 1.0; a value of 1.0 signifies the break-even point (i.e. “unity”) where benefits equal costs; the higher the BCR, the more likely an alternative will be carried forward for further analysis. This process continues with a comparative analysis of a set number of alternatives that have positive BCR and the one that provides the greatest net benefits emerging as the Recommended Alternative. The fourth and final step, Recommended Alternative Evaluation, involve detailed National Economic Development (NED) analysis, preliminary engineering design, and feasibility level cost estimating of the Recommended Alternative.

Alternative Formulation

The alternatives were developed through an iterative (repetitive) process that further refined the alternatives with each iteration. The Project Delivery Team (PDT) developed the “No Action” alternative or “Alternative 1”, using the same key inputs as the Existing Conditions model, except with new water surface profile data which accounts for estimated future changes in land use and runoff coefficients from the NBEC basin. The No Action alternative serves as the baseline in the calculation of benefits for each of the subsequent alternatives. The PDT then developed updated hydrology and hydraulics, and economic models to reevaluate the Selected Plan from the Corps 1988 NBEC flood study (referred to as Alternative 2), and the Recommended Alternative from the Wayne County 2008 NBEC flood study (referred to as Alternative 3). The PDT reassessed the effectiveness and the performance of these alternatives in relation to the updated damage reaches and concentrated damage areas. Results from the reassessment of Alternatives 2 and 3 represent two ends of the spectrum as it relates to project cost and benefits. Alternative 2 has a low project cost with low benefits while Alternative 3 has a high project cost with high benefits. The information gleaned from the development and initial analysis of Alternatives 1, 2 and 3 guided the PDT on formulation of additional alternatives with cost-effective performance. Table ES-2 below presents the alternatives formulated. The alternatives below were screened to produce the final array of alternatives, which were further evaluated using detailed hydrology and hydraulics modeling and economic analysis.

**Table ES-2: North Branch Ecorse Creek
General Reevaluation Report Formulated Alternatives**

Alternatives	Element	Drop/Move Forward	Reason
<ul style="list-style-type: none"> • Use 2011 existing condition model • Maximize storage upstream of Madison Avenue with levees from Madison Ave to M-39 	<ul style="list-style-type: none"> • Basin 20 • Levees from Madison to Southfield Freeway (M- 39) • Improve roadway crossings 	Drop	<ul style="list-style-type: none"> • Preliminary Opinion of Cost to implement the alternative is \$146M. Not as cost effective as using a greenway channel (\$82M).
<ul style="list-style-type: none"> • Use 2011 existing condition model • Maximize storage upstream of Madison Avenue with floodwall from Madison Ave to M-39 	<ul style="list-style-type: none"> • Basin 20 • Floodwall from Madison to Southfield Freeway (M- 39) • Improve roadway crossings 	Drop	<ul style="list-style-type: none"> • Preliminary Opinion of Cost \$144M. Not as cost effective as using a greenway channel (\$82M).
<ul style="list-style-type: none"> • 2011 existing condition model • Maximize storage 	<ul style="list-style-type: none"> • Basin 20 • Levees or floodwalls from Telegraph Rd to Pelham St 	Drop	<ul style="list-style-type: none"> • Not cost effective when compared to other alternatives

Alternatives	Element	Drop/Move Forward	Reason
<p>upstream of Madison Avenue with levees or floodwalls from Pelham St to Detroit River</p>	<ul style="list-style-type: none"> • Levees or floodwalls from Pelham St to Detroit River • Improve roadway crossings 		
<ul style="list-style-type: none"> • Using the 2008 Plan as a starting point, scale back channel modification and include storage basins from the 2011 existing condition model, • Maximize storage upstream of Madison Avenue • Channel improvements upstream of Beech Daly 	<ul style="list-style-type: none"> • Basins 31, 22, 20, 19 • Basin upstream of the mouth of Ecorse creek • Off channel basin at the right angle of the channel (east side) between Middle Belt Rd and Ecorse Rd • Off channel basin on the west side of the channel, just north of Basin 22 • Narrow and raise channels – upstream of Beech Daly • Remove parallel drain enclosure which ties into Basin 31 	Drop	<ul style="list-style-type: none"> • The premise behind this alternative is to make the basins operational within the 2011 existing conditions hydrology and hydraulics model. • Basins 31, 22, and 9 are not as effective as the improved Basin 20
<ul style="list-style-type: none"> • Using the 2008 Plan as a starting point, scale back channel modification and include storage basins from the 2011 existing condition model, • Maximize storage upstream of Madison Avenue • Channel improvements along the entire channel 	<ul style="list-style-type: none"> • Basins 31, 22, 20, 19 • Basin upstream of the mouth of Ecorse creek • Off channel basin at the right angle of the channel (east side) between Middle Belt Rd and Ecorse Rd • Off channel basin on the west side of the channel, just north of Basin 22 • Narrow and raise channels – entire channel 	Drop	<ul style="list-style-type: none"> • The premise behind this alternative is to make the basins operational within the 2011 existing conditions hydrology and hydraulics model. • Basins 31, 22, and 9 are not as effective as the improved Basin 20
<ul style="list-style-type: none"> • Using the 2008 Plan as a starting point, scale back channel modification and include storage basins from the 2011 existing condition model, 	<ul style="list-style-type: none"> • Basins 31, 22, 20, 19 • Basin upstream of the mouth of Ecorse creek • Off channel basin at the right angle of the channel (east side) between Middle Belt Rd and Ecorse Rd • Off channel basin on the west side of the channel, 	Drop	<ul style="list-style-type: none"> • The premise behind this alternative is to make the basins operational within the 2011 existing conditions hydrology and hydraulics model. • Basins 31, 22, and 9 are not as effective as the improved Basin 20

Alternatives	Element	Drop/Move Forward	Reason
<ul style="list-style-type: none"> Maximize storage upstream of Madison Avenue Limited channel improvements Limited bridge modifications 	<ul style="list-style-type: none"> just north of Basin 22 Narrow and raise channels Reduce bridge modifications 		
<ul style="list-style-type: none"> Use the most effective flood risk management measure (greenway-Madison St to the Detroit River, floodwall/levee – Telegraph Rd to Pelham St, or tunnel – Pelham St to the Rouge River) as the starting point, Scale back channel modifications by adding levees and floodwalls 	<ul style="list-style-type: none"> Narrow and raise channels Basins 31, 22, 20, 19 Basin upstream of the mouth of Ecorse creek Off channel basin at the right angle of the channel (east side) between Middle Belt Rd and Ecorse Rd Off channel basin on the west side of the channel, just north of Basin 22 Levees and Floodwalls 	Drop	<ul style="list-style-type: none"> The premise behind this alternative is to make the basins operational within the 2011 existing conditions hydrology and hydraulics model. Basins 31, 22, and 9 are not as effective as the improved Basin 20
<ul style="list-style-type: none"> Paved Channels 	<ul style="list-style-type: none"> Concrete line the entire channel 	Drop	<ul style="list-style-type: none"> Not targeted to the primary damage center Environmental Concerns
<ul style="list-style-type: none"> Modify channel to 1950's Design 	<ul style="list-style-type: none"> Channel improvements: Restore to original (1950's) design channel. 	Drop	<ul style="list-style-type: none"> Not targeted to the primary damage center
<ul style="list-style-type: none"> Use 2011 existing condition model Maximize storage upstream of Madison Avenue with a greenway from Madison Ave to M-39 	<ul style="list-style-type: none"> Basin 20 Greenway channel from Madison to Southfield Freeway (M-39) Improve roadway crossings 	Drop	<ul style="list-style-type: none"> To further address the primary damage center in the cities of Dearborn Heights and Dearborn. Preliminary Opinion of Cost \$82 mil. When the alternative was evaluated using hydrology and hydraulic models, there were induced damages downstream of M-39.
<ul style="list-style-type: none"> Use 2011 existing condition model Maximize storage upstream of 	<ul style="list-style-type: none"> Basin 20 Greenway channel from Madison to Southfield Freeway (M- 39) 	Drop	<ul style="list-style-type: none"> To address any induced damages downstream. (Tunnel is approximately \$87 million)

Alternatives	Element	Drop/Move Forward	Reason
Madison Avenue with Tunnel from Pelham St to Rouge River	<ul style="list-style-type: none"> Improve roadway crossings and Tunnel from Pelham St to Rouge River 		<ul style="list-style-type: none"> Inter basin transfers were considered socially and politically unacceptable, mod-high cost and not environmentally sound
<ul style="list-style-type: none"> Optimize acquisitions 	<ul style="list-style-type: none"> Use the baseline FDA modeling results and the structure inventory Remove properties from the inundation area 	Drop	<ul style="list-style-type: none"> Although the BCR for this alternative was greater than 1. The buyouts required were socially or politically unacceptable.
<ul style="list-style-type: none"> Grouped acquisitions and storage in buyout locations 	<ul style="list-style-type: none"> Group acquisitions in damage centers Storage basins in areas where grouped acquisitions would occur 	Drop	<ul style="list-style-type: none"> Although the BCR for this alternative was greater than 1. The buyouts required were socially or politically unacceptable.
<ul style="list-style-type: none"> Use 2011 existing condition model Maximize storage upstream of Madison Avenue 	<ul style="list-style-type: none"> Basins 31, 22, 20, 19 Basin upstream of the mouth of Ecorse creek Off channel basin at the right angle of the channel (east side) between Middle Belt Rd and Ecorse Rd Off channel basin on the west side of the channel, just north of Basin 22 	Move forward	<ul style="list-style-type: none"> Improved Basin 20 is connected to Ecorse Creek, it has adequate capacity, and it is in the right hydrologic location. As a result the other basins were not considered. As a result of the hydrologic and hydraulic performance of this alternative it became part of the final array of alternatives, as alternative 4.
<ul style="list-style-type: none"> Use 2011 existing condition model Maximize storage upstream of Allen Road Greenway from Madison St to Allen Road 	<ul style="list-style-type: none"> Multiple detention facilities upstream of I-94 Greenway channel from Madison to Southfield Freeway (M- 39) Greenway channel from Southfield Freeway (M- 39) to Allen Road Improve roadway crossings 	Move forward	<ul style="list-style-type: none"> To further address the primary damage center in the cities of Dearborn Heights and Dearborn and potential induced damages downstream of M-39 As a result of the hydrologic and hydraulic performance of this alternative it became part of the final array of alternatives, as alternative 5.
<ul style="list-style-type: none"> 2011 existing condition model maximize storage upstream of Madison Avenue greenway from 	<ul style="list-style-type: none"> Basin 20 Greenway channel from Madison to Southfield Freeway (M- 39) Greenway channel from Southfield Freeway (M- 39) 	Move forward	<ul style="list-style-type: none"> To further address the primary damage center in the cities of Dearborn Heights and Dearborn and potential induced damages downstream of M-39.

Alternatives	Element	Drop/Move Forward	Reason
M-39 to Detroit River	<ul style="list-style-type: none"> to Detroit River Improve roadway crossings 		<ul style="list-style-type: none"> Channel improvements were considered which maximize benefit while keeping implementation costs low. As a result of the hydrologic and hydraulic performance of this alternative it became part of the final array of alternatives, as alternative 6.

Final Array of Alternatives and the Recommended Alternative

Alternative 1: The No Action Alternative

The Corps is required by the NEPA to consider the “No (Federal) Action” alternative for every project, or the option to do nothing, as one of the alternatives to be considered in the planning process. The “No Action” alternative does not preclude the non-Federal sponsor or another entity from developing their own flood risk management project. The No Action condition forms the “base condition” against which all other alternatives are evaluated.

The No Action Alternative is described as the likely scenario for land use and related conditions in the study area in the absence of a flood risk management project. The increment of change between an alternative project and the “No Action” baseline provides the basis for evaluating the beneficial or adverse economic, environmental, and social effects of each subsequent alternative under consideration.

The No Action Alternative would also consider ongoing maintenance (such as cleanout of all the crossings), and flows from future build-out. Future build-out takes into consideration the Wayne County Stormwater Ordinance which requires on-site detention to alleviate downstream impacts.

Alternative 2: The Corps 1988 Retention Basin Alternative

The Corps 1988 selected plan was to construct a basin just east of the Butler Drain confluence with North Branch of Ecorse Creek along Powers Road in Dearborn Heights, MI. The basin would collect and store floodwaters in excess of the bankfull capacities of North Branch Ecorse Creek. This basin would be constructed of earth with side slopes of 3 horizontal to 1 vertical. The basin would have a depth of 30 feet and a storage volume of 275 acre-feet.

Alternative 3: The Wayne County 2008 Greenway Alternative

The Wayne County 2008 selected alternative was to reconstruct the open channel; replace undersized bridges and culverts; install a parallel drain enclosure near Merriam Road; relocate portions of the drain; and construct three regional storm water detention basins. Channel improvements consisting of a vegetated trapezoid or a two-shelf vegetated greenway were

included along the entire length of NBEC. There are 81 drain crossings (bridges or culverts) improvements proposed consisting of 50 public roads, 8 railroads, 13 footbridges, 9 private drive and one enclosure. Six storm water detention basins (three regional and three smaller and shallower) would be located throughout the NBEC watershed and a new parallel enclosure would be located along Smith Road.

Alternative 4: The Optimized Powers Basin Alternative

This alternative consists of a single detention facility located just northeast of Powers Avenue and Inkster Road, in the same general vicinity as Alternative 2. This facility would provide approximately 250 acre-feet of storage volume, with an approximate depth of eight feet and a bottom elevation slightly above the NBEC streambed. The facility will be gravity-drained to the NBEC and will provide detention of flood flows from both the NBEC and Butler Drain. A multi-stage weir structure along the NBEC will be configured to divert flood flows towards the facility, thereby diverting approximately 75 percent of all flood flows up to the 2-year event into the detention facility. An outflow conduit will connect the facility to the NBEC downstream of the weir structure.

Alternative 5: The Detention Basins with Limited Channel Improvements Alternative

This alternative consists of a single detention facility located just northeast of Powers Avenue and Inkster Road, as presented in Alternative 4, with five additional detention storage facilities through the cities of Dearborn Heights and Allen Park, and greenway channel improvements with varying widths. The channel improvements entail constructing a 35-foot wide greenway channel from Madison Street to westbound Interstate-94 and a 15-foot wide greenway channel from westbound I-94 to Allen Road. As part of the channel improvements, five bridges will be replaced to accommodate improved conveyance. Three bridges will be removed to accommodate detention basins. The detention basins in Dearborn Heights and Allen Park will provide a total storage volume of 360 acre-feet. The total storage volume of this alternative is approximately 600 acre-feet.

Alternative 6: The Optimized Powers Basin with Channel Improvement Alternative

This alternative consists of a single detention facility located just northeast of Powers Avenue and Inkster Road, as presented in Alternative 4, with greenway channel improvements with varying widths. The channel improvements entail constructing a 35-foot wide greenway channel from Madison Street to westbound I-94 and a 15-foot wide greenway channel from westbound I-94 to Allen Road. Downstream of Allen Road to the Detroit River, the channel improvements vary in width. As part of the channel improvements, five bridges will be replaced and one bridge will be removed to accommodate improved conveyance.

Selection of the National Economic Development (NED) Plan (Recommended Alternative)

As described in Corps Planning Guidance, “the Recommended Alternative must contribute to national economic development (NED). Such contributions are increases in the net value of the national output of goods and services, expressed in monetary units. Contributions to NED are the direct benefits that accrue in the planning area and the rest of the nation. Contributions to NED include increases in the net value of those goods and services that are marketed, and also of those that may not be marketed. Net benefits are defined as average annual equivalent benefits minus average annual equivalent costs. Economic feasibility requires that net NED benefits be non-negative.” Thus, the NED Alternative becomes the Recommended Alternative, which is the alternative that maximizes these net benefits.

Detailed NED analysis was performed on the Recommended Alternative. The results from the HEC-FDA analysis of flood damages in the study area are summarized below in Table ES-3. Under Alternative 1: the No Action Alternative, annual damages would be \$21.6 million. Alternative 3: Wayne County 2008 Greenway Alternative was found to eliminate almost 100 percent of the damages. Alternative 4: Optimized Powers Basin Alternative was found to have better performance than Alternative 2: Corps 1988 Retention Basin Alternative. Both Alternative 5: Detention Basins with Limited Channel Improvements Alternative, and Alternative 6: Optimized Powers Basin with Channel Improvement Alternative were designed to increase the damage reduction at a lower cost than Alternative 3.

Based on the plan formulation process, Alternative 5, with its costly detention basins, was found not to be cost effective (BCR of less than 1) and was dropped from further analysis. Alternatives 2, 3, 4, and 6 are cost-effective and were evaluated based on calculations of net benefits. As described above, the Recommended Alternative is the alternative that maximizes net benefits; in this case, from flood damage reduction. Alternative 6: Optimized Powers Basin with Channel Improvement Alternative delivers the greatest net benefits and is the NED plan. As such, Alternative 6 is the Recommended Alternative for the NBEC GRR.

Table ES-3: Comparison of Benefits and Preliminary Costs (2010 \$s) for the Final Array of Alternatives

	No Action	Alternative 2	Alternative 3	Alternative 4	Alternative 5	Alternative 6
Project Benefits						
Annual Equivalent Damages	21,558,000	20,248,000	202,000	14,451,000	8,643,000	7,099,000
Damages Reduced	0	1,310,000	21,355,000	7,107,000	12,915,000	14,459,000
Preliminary Project Costs						
Estimated Design and Construction Cost	0	12,661,000	283,776,000	15,846,000	241,628,000	134,502,000
Operations and Maintenance	0	97,000	2,468,000	122,000	1,859,000	1,035,000
Annual Equivalent Cost	0	699,000	15,961,000	875,000	13,349,000	7,430,000
Benefit/Cost Ratio	0	1.87	1.34	8.12	0.97	1.95
Annual Net Benefits	0	611,000	5,395,000	6,232,000	-434,000	7,028,000

Notes:

1) Based on Discount Factor 4.125% and 50 year project life.

Description of the Locally-Preferred Plan

Prior to the initiation of the GRR process, the Wayne County 2008 Greenway Alternative (which carried forth as Alternative 3 in this GRR) represented the non-Federal sponsor’s approach to address. In proceeding with the Corps' GRR afterward, Wayne County aligned with the Corps' planning process and the NED approach to plan selection. However, because the 2008 Wayne County Greenway Alternative was heavily supported by the NBEC watershed communities, both Wayne County and the Corps felt obligated to include the Greenway Alternative in the list of alternatives formulated, screened and evaluated as part of the current GRR planning process. The Greenway Alternative was developed as part of the 2008 Wayne County study to address specific flood risk management goals, priorities and objectives identified by the local entities in the watershed. In proceeding with the GRR, the non-Federal sponsor recognized the Corps planning process and the NED approach to plan selection, and chose to partner with the Corps and initiate the GRR process. In proceeding with the GRR, Wayne County aligned with the

Corps' planning process and the NED approach to plan selection. Since the Wayne County 2008 Greenway Alternative was heavily supported by communities in the NBEC watershed, both Wayne County and the Corps felt it necessary to include the Greenway Alternative in the list of alternatives formulated, screened and evaluated as part of the this GRR planning process. As presented in Table ES-3, Alternative 3 (Wayne County 2008 Greenway Alternative) would eliminate almost 100 percent of the damages in the NBEC watershed. However, this alternative does not deliver the greatest net benefits when compared to the other five alternatives evaluated as part of the final array of alternatives. As the non-Federal sponsor of this general reevaluation report, Wayne County has worked in close partnership with the Corps to ensure that the study and this report fairly and accurately reflect its views. This partnership has led to ongoing collaboration and support toward the development of the Recommended Alternative, which would be adopted by Wayne County as the Locally Preferred Plan (LPP).

Description of the Recommended Alternative

The Recommended Alternative consists of a single optimized detention basin located just northeast of Powers Avenue and Inkster Road, with greenway channel improvements of varying widths. For planning purposes, the detention basin would use the same general location identified in the Corp's 1988 NBEC study. Since the land has remained vacant, the assumption is that the parcel remains in consideration for a detention basin to reduce flood flows. During stakeholder meetings related to the development of this GRR, the mayor of Dearborn Heights stated that there was another potential (commercial) use being considered for that vacant site, and that the eventual location of the detention basin may need to be adjusted to a nearby site. Yet, the need remains to locate the basin in this immediate area because of the hydraulic effectiveness of doing so, while causing the least disruption to existing residences and businesses. This basin would be located adjacent to the confluence of the NBEC and Butler Drain, a key tributary of NBEC drainage system.

The channel improvements entail constructing a 35-foot wide greenway channel from Madison Street to westbound I-94 and a 15-foot wide greenway channel from westbound Interstate-94 to Allen Road. Downstream of Allen Road to the Detroit River, the channel improvements vary in width. As part of the channel improvements, five bridges will be replaced and one bridge will be removed to accommodate improved conveyance. All locations of project features are considered "tentative" until the development of preconstruction engineering and design, and specifications, when project real estate acquisitions are to occur. The Corps must remain sensitive to the needs of the non-Federal sponsor and local communities where the Corps plans to construct projects, and will need to come to agreement with Wayne County, the non-Federal sponsor (in coordination with the NBEC communities, including Dearborn Heights), before any such features are constructed. Stormwater management planning and flood warning systems are two non-structural flood management measures that the non-Federal sponsor would implement as part of the Recommended Alternative.

The Recommended Alternative affirms that a single optimized detention basin and associated conveyance improvements can effectively manage and reduce flood risks and associated damages, hazards and inconveniences associated with repetitive flooding experienced for the affected communities. The Recommended Alternative meets the planning criteria of being technically effective, environmentally sound, socially and politically acceptable, cost effective, and engineeringly feasible.

Cost Estimate

The estimated cost of the Recommended Alternative, shown in Table ES-4 is \$106,826,000. The Federal portion of the estimated cost is 50 percent of the total project cost or \$53,413,000; the non-Federal portion is 50 percent of the total project cost or \$53,413,000.

Table ES-4: Total Project Cost Summary

Account	Project Total
Lands and Damages	\$46,419,000
Roads, Railroads & Bridges	\$ 8,693,000
Channels and Canals	\$19,795,000
Floodway Control & Diversion Structures	\$15,104,000
Planning, Engineering & Design	\$ 8,579,000
Construction Management	\$ 8,236,000
Total	\$106,826,000
Cost Share Apportionments	
Federal (50% of the Total Project Cost)	\$53,413,000
Non-Federal Sponsor(50% of the Total Project Cost)	\$53,413,000
Total	\$106,826,000

Operation and Maintenance

Annual operation and maintenance (O&M) costs were estimated for the constructed features of the Recommended Alternative. The O&M costs were determined by extrapolation from operational cost histories supplied by Wayne County. O&M activities include such items as erosion control, and channel inspection and maintenance. The annual O&M costs are estimated to be \$89,000. The non-Federal sponsor is responsible for 100 percent of the O&M cost.

Economic Summary**Summary of National Economic Development (NED) Benefits and Costs of the Recommended Alternative**

The results of the NED analysis for the Recommended Alternative are summarized below in Table ES-5.

Table ES-5: Summary of Project Annual Equivalent Costs and NED Benefits (2010 \$s)

Total Project Cost	\$4,040,000
Flood Damage Reduction(FDR) Benefit	\$12,504,000
BCR FDR	3.10
Net Benefits FDR	\$8,464,000
Vehicle User Cost Reductions	\$191,900
Reductions in Wastewater Treatment Costs	\$164,300
Total Project NED Benefit	\$12,812,000
NED BCR	3.18
NED Total Net Benefits	\$8,802,000

Notes:

1) Based on Discount Factor 4.125% and 50 year project life.

Summary of Regional Economic Development (RED) Benefits

Implementation of the Recommended Alternative would provide RED benefits through direct and indirect economic activity, employment, and income increases through construction and maintenance activities. The results from the analysis of construction activities and O&M impacts are shown below in Table ES-6.

Table ES-6: Regional Economic Benefits from Construction and O&M Activities

	Total Impact from Construction Activities	Total Annual Impact from O&M
Wayne County		
Economic Output	\$260,108,000	\$169,000
Income	\$101,082,000	\$66,000
Employment	2,008	1
State of Michigan		
Economic Output	\$411,158,000	\$268,000
Income	\$142,359,000	\$93,000
Employment	2,862	2

Summary of Environmental and Social Effects

The Recommended Alternative will have minimal impacts on the following resources: geology, sediment quality, climate, coastal zone, wetlands, threatened and endangered species, and aesthetic values. Temporary impacts due to construction of this alternative will be incurred on local air quality, noise, soils, floodplains, land use, infrastructure, and utilities. The proposed action would have benefits to area roads and freeways, as area roads would experience minimal or no flooding during the 100-year event. Positive effects of this alternative include improvements to public health and safety in the NBEC area through the reduction of flooding.

The Recommended Alternative will have a positive effect on groundwater resources by allowing detained flood water to infiltrate into the ground. Additionally, it will greatly improve the character of the surface water of NBEC by providing flood detention, improving water quality, and supporting more stable hydrology within the NBEC. The Recommended Alternative will have a positive effect on fish resources and associated habitat through improved water quality and a more stable hydrologic character. The Recommended Alternative will also benefit wildlife by replacing altered/disturbed land with the creation of emergent wetland habitat within the riparian areas of the improved channel. This type of habitat will benefit aquatic-reliant organisms including birds, amphibians, and reptiles. Controlling the spread of exotic and invasive species in areas of earth disturbance along the NBEC channel will be a challenge and management measures to prevent invasive species will be necessary.

No known cultural resources are expected to be affected by construction of the basin. Between Madison Road and westbound Interstate -94, four previously recorded archaeological sites have been identified. Another archaeological site had been identified; however, that site most likely will not be affected. The NBEC study area is situated in a mostly urban/suburban residential area, containing cut and fill soils along approximately 50 percent of the creek-course, and with the creek being significantly channelized, the banks and associated landscape have been largely altered from its natural state. The probability of identifying new, noteworthy, cultural resources during construction downstream of Allen Road is considered extremely low, especially since the improvements would be confined to the width of the top of the creek banks.

Impacts to socioeconomics under this plan, including land use and populations, would consist of both temporary and permanent impacts of 86 acres. Temporary impact would be in the form of construction disruptions, possible business closures, and traffic detours. Recreation impacts would be both temporary and permanent to approximately 11 acres of creek-side land. Twenty-six (26) properties are potential sites of concern for hazardous, toxic and radiological waste which may impact construction activities.

Clean Water Act of 1972 Findings

The Clean Water Act (CWA) governs water pollution and established the goals of eliminating releases of high amounts of toxic substances into water and ensuring that surface waters would meet standards necessary for human sports and recreation. Section 401 of the CWA requires that an applicant for a Federal permit provide a certification that any discharges will comply with the Act and water quality standard requirements. Consultation was initiated with the Michigan Department of Natural Resources (MDNR) on March 15, 2011 through a letter submitted to the Corps Review Committee and with the EPA through a letter submitted on March 15, 2011.

State water quality standards will be met for this project; however, a Section 401 water quality certification has not yet been requested from the MDNR. Section 404 of the CWA was established to regulate the discharge of dredged and fill material in waters of the U.S., including waterbodies and wetlands. Under Section 404(b)(1) guidelines, the Corps may only permit discharges of dredged or fill material into waters of the U.S. that represent the least damaging practicable alternative, so long as the alternative does not have other noteworthy adverse environmental consequences. A Section 404(b) (1) alternatives analysis was completed in August 2011 for the project alternatives and is included as Appendix F to the DEIS.

Endangered Species Act of 1973 Findings

Section 7 of the Endangered Species Act requires Federal agencies to consult with the United States Fish and Wildlife Service (FWS) to ensure that actions they authorize, fund, or carry out will not jeopardize the continued existence of species or adversely modify their critical habitats. Consultation with the FWS has been initiated through the Fish and Wildlife Coordination Act. To date, consultations with the FWS are ongoing and the project is in compliance with this Act.

National Historic Preservation Act of 1966 Findings

The purpose of National Historic Preservation Act (NHPA) is to preserve historical and archaeological sites and it requires Federal agencies to evaluate the impact of all Federal funded or permitted projects on sites listed on, or eligible for listing on, the National Register of Historic Places. Archival research for the project area has been completed at the Michigan State Historic Preservation Office (SHPO) and consultations with the SHPO were completed in August 2011. Consultations to determine the appropriate level of cultural resources field surveys for the project are ongoing and, to date, the project is in compliance with this Act.

Clean Air Act of 1972 Findings

Under the Clean Air Act (CAA), consultation with the EPA was initiated through a letter submitted on March 15, 2011 and the Recommended Alternative is expected to be in compliance with Section 309 of the Act. The review findings of the EPA will be published in the Federal Register.

Executive Orders

The Recommended Alternative is in compliance with the following applicable executive orders: Executive Order 11988 Floodplain Management, Executive Order 11514 Protection of Environment, Executive Order 119990 Protection of Wetlands, Executive Order 13186 Migratory Bird Habitat, Executive Order 12898 Environmental Justice, and Executive Order 13112 Invasive Species.

Additional Required Consultation

FWS - A request for the FWS to complete a Coordination Act Report was submitted on December 22, 2010. Coordination is ongoing with the FWS. Incorporated in the DEIS is a A Draft Coordination Act Report from the FWS.

EPA - Under the CAA, consultation with the EPA was initiated through a letter submitted on March 15, 2011 and the Recommended Alternative is expected to be in compliance with Section 309 of the Act. A follow up consultation letter was submitted in August 2011 describing the final array of alternatives and the Recommended Alternative; consultation responses from that letter will be included in the Final EIS.

MDNR - Consultation was initiated with the MDNR on March 15, 2011 through a letter submitted to the Corps Review Committee. State water quality standards will be met for the Recommended Alternative and a Section 401 water quality certification will be requested from the MDNR.

Public Views and Comments

The draft general reevaluation report and draft environmental impact statement will be circulated to interested Federal, state and local agencies, organizations, and interested groups and citizens for review. A notice of availability of the document will be sent to concerned agencies, organizations, and members of the public known to have an interest in the project.

Recommendations

The Detroit District recommends approval of this General Reevaluation Report and approval of the Recommended Alternative for preconstruction engineering design and construction. Upon approval, the General Reevaluation Report will be the basis for a Project Partnership Agreement between the Federal government and Wayne County.

The recommendations contained herein reflect the information available at this time and current Corps policies governing formulation of individual projects. They do not reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to the Congress as proposals for implementation funding. However, prior to transmittal to the Congress, the non-Federal sponsor,

the States, interested Federal agencies, and other parties will be advised of any modifications and will be afforded an opportunity to comment further.