3.4 Midlothian Creek

The Midlothian Creek subwatershed encompasses approximately 21 square miles (20.57 in Cook County and 0.09 in Will County) within the Little Calumet River watershed. There are seven tributaries within the subwatershed, including Midlothian Creek, totaling over 23 stream miles. **Table 3.4.1** lists the communities that lie within the subwatershed and the associated drainage area for each community contained within the subwatershed.

Table 3.4.1: Communities Draining to Midlothian Creek Subwatershed Within Cook County

Community	Tributary Area (mi^2)
Blue Island	0.64
Country Club Hills	0.50
Cook County Forest Preserve/ Unincorporated Cook County	4.79
Crestwood	0.72
Midlothian	1.88
Oak Forest	3.25
Orland Hills	0.20
Orland Park	0.93
Posen	0.97
Robbins	1.15
Tinley Park	5.53

Table 3.4.2 lists the land use breakdown by area within the Midlothian Creek subwatershed. **Figure 3.4.1** provides an overview of the tributary area of the subwatershed. Reported stormwater problem areas and proposed alternative projects are also shown on the figure, and are discussed in the following subsections.

Table 3.4.2: Land Use Distribution for Midlothian Creek Subwatershed Within Cook County

Land Use	Acres	%
Commercial/Industrial	1,364	10.4
Forest/Open Land	2,507	19.1
Institutional	590	4.5
Residential	7,720	58.7
Transportation/Utility	285	2.1
Water/Wetland	216	1.6
Agricultural	484	3.6

Within the Midlothian Creek subwatershed, a total of 23 stream miles were studied among the seven tributaries: Midlothian Creek, Midlothian Creek Western Branch, Midlothian Creek Western Tributary, 76th Avenue Ditch, Filsen Park Ditch, Twin Lakes Tributary, and Natalie Creek.

- Midlothian Creek Western Branch (MCWB) – extends from the intersection of Long Avenue and 163rd Street to the confluence with the Midlothian Creek main tributary.

- Midlothian Creek Western Tributary (MCWT) – headwaters start near the intersection of 88th Avenue and 168th Street with the channel extending to the confluence with the Midlothian Creek main tributary.

- 76th Avenue Ditch (76DT) – extends from the intersection of 159th Street and 77th Avenue to the confluence with the Midlothian Creek main tributary.

- Filsen Park Ditch (FPDT) – headwaters start near north of Harlem Avenue and 166th Street (extended) with the channel extending to the confluence with the 76th Avenue Ditch tributary.

- Twin Lakes Tributary (TLTY) – extends from the Dan Ryan expressway to the confluence with the Twin Lakes Reservoir.

- Natalie Creek (NTCR) – extends from the intersection of 159th Street and Central Avenue to the confluence with the Natalie Creek Diversion Conduit at Pulaski Road.

- Midlothian Creek Main Tributary (MTCR) – headwaters start near west of 84th Avenue and 175th Street extending to the confluence with the Little Calumet River.

- All of the tributaries drain to Midlothian Creek Main Tributary except for the Natalie Creek tributary in the northwest portion of the subwatershed which drains to the Calumet-Sag Channel through the Natalie Creek Diversion Conduit. Midlothian Creek Main Tributary splits at 137th Street and Kedzie Avenue; one split flows through the Midlothian Creek Diversion conduit which drains to the Calumet-Sag Channel, and the other split flows into the Little Calumet River.

The Midlothian Creek subwatershed contains five major flood control facilities: Fernway Detention Basin, Tinley Park Reservoir, Twin Lakes Reservoir, Midlothian Creek Diversion Conduit and Natalie Creek Diversion Conduit, all of which are located on the Midlothian Creek main tributary except for the Natalie Creek Diversion Conduit, which is on Natalie Creek.

- Fernway Detention Basin (Pond G) – Pond G is in Tinley Park, southwest of 171st Street and 80th Avenue. Construction of the pond was completed in the late 1990s by Illinois Department of Natural Resources, Office of Water Resources. It provides a total storage volume of 110 acre-feet.

- Tinley Park Reservoir (Structure 32) - Tinley Park Reservoir, also called Structure 32, is in Tinley Park northeast of the intersection of 80th Avenue and 170th Street. This reservoir provides a storage volume of 616 acre-feet and was built by the District and the Tinley Park District in 1989, and is now maintained by the District. It was constructed to provide flood relief to Tinley Park, Orland Park and Oak Forest.

- Twin Lakes Reservoir (Midlothian) - The Illinois Department of Natural Resources, Office of Water Resources (IDNR-OWR) constructed Midlothian Reservoir in 1974 to provide 950 acre-feet of storage, attenuating the flood stages to the downstream areas of Oak Forest and Midlothian. The storage facility is in an unincorporated area of Cook County between 163rd Street and 167th Street, northwest of the intersection of 167th and Cicero Avenue.

- Midlothian Creek Diversion Conduit - The Midlothian Creek Diversion Conduit diverts flow from Midlothian Creek Main Tributary to the Calumet-

Sag Channel. It was constructed in 1980 by the Cook County Highway Department in the Village of Robbins, near the intersection of 137th Street and Kedzie Avenue. The diversion conduit is a 12-foot x 7.5-foot box culvert approximately 1,200 feet in length that runs along Kedzie Avenue.

- Natalie Creek Diversion Conduit – The Natalie Creek Diversion Conduit conveys flows from Natalie Creek to the Calumet-Sag Channel. The inlet to the conduit is at 146th Street and Pulaski Road. Two 96- and 48- inch conduits run along Pulaski Road for a total length of 9,200 feet and connect to a 102-inch pipe for 700 feet before discharging into the Calumet-Sag Channel.

3.4.1 Sources of Data

3.4.1.1 Previous Studies

Previous studies have been performed for the Midlothian Creek subwatershed for assessing stormwater flooding problems and developing solutions. Below is a list of studies that were identified for the Midlothian Creek subwatershed:

- Interim Review Report of Little Calumet River, U.S. Army Corps of Engineers, December 1973

- *Little Calumet River Watershed Engineering Design Report (Revised),* U.S. Department of Agriculture, Metropolitan Sanitary District of Greater Chicago and the Illinois Department of Conservation, January 1977

- Little Calumet River Watershed Tinley Park Retention Reservoir Design Folder Contract #77.237.AF

- Natalie Creek Flood Damage Reduction Study, U.S. Army Corps of Engineers, August 2004

The above studies were used to supplement the development of the Midlothian Creek hydraulic model developed for this DWP. During Phase A of DWP development, additional survey, topography, precipitation, stream flow, land use and soils data needed for the development of the Midlothian Creek subwatershed model were identified and collected.

3.4.1.2 Water Quality Data

Water quality for the Midlothian Creek subwatershed is monitored by two agencies: the Illinois Environmental Protection Agency (IEPA) and the United States Geological Survey (USGS). IEPA monitors water quality at one location in the Midlothian Creek subwatershed as part of the Ambient Water Quality Monitoring Network (AWQMN). This water quality monitoring station (HBA-01) is at the Dixie Highway crossing in the Village of Blue Island. USGS monitors water quality at the USGS 5536340 gage located near 151st Street and Kilbourn Avenue in Oak Forest.

The IEPA's *2008 Integrated Water Quality Report*, which includes the Clean Water Act (CWA) 303(d) and the 305(d) lists, does not identify Midlothian Creek tributaries as having water quality impairments. No Total Maximum Daily Loads (TMDLs) have been developed for Midlothian Creek tributaries.

There are no National Pollutant Discharge Elimination System (NPDES) permits issued by IEPA for discharge into Midlothian Creek tributaries. Municipalities discharging to Midlothian Creek or its tributaries are regulated by IEPA's NPDES Phase II Stormwater Permit Program, which was created to improve the quality of stormwater runoff from urban areas, and requires that municipalities obtain permits for discharging stormwater and implement six minimum control measures for limiting runoff pollution to receiving systems. Also as part of the Phase II Stormwater Permit Program, construction sites disturbing greater than 1 acre of land are required to get a construction permit.

3.4.1.3 Wetland and Riparian Areas

Figures 2.3.6 and **2.3.7** contain mapping of wetland and riparian areas in the Little Calumet River Watershed. Wetland areas were identified using National Wetlands Inventory (NWI) mapping. NWI data includes roughly 216 acres of wetland areas in the Midlothian Creek subwatershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provides flood management, habitat, and water quality enhancement. Identified riparian environments offer potential opportunities for restoration.

3.4.1.4 Floodplain Mapping

The floodplain boundaries for the Midlothian Creek subwatershed were revised in 2008 as part of the FEMA's Map Modernization program. Floodplain boundaries were revised based on the recent Cook County topographic data and an updated downstream boundary condition for the Midlothian Creek effective model. The entire Midlothian Creek subwatershed was mapped as Zone AE study (detailed) except for the Twin Lakes Tributary which was mapped as Zone A (approximate) study.

Appendix A contains a comparison of FEMA's effective floodplain mapping from updated DFIRM panels with inundation areas developed for the DWP.

3.4.1.5 Stormwater Problem Data

Table 3.4.3 summarizes reported problem areas reviewed as a part of DWP development. The problem area data was obtained primarily from Form B questionnaire response data provided by watershed communities to the District. Problems are classified in **Table 3.4.3** as regional or local. This classification is based on a process described in Section 2.2.1 of this report.

3.4.1.6 Near-Term Planned Projects

No near-term planned major flood control projects have been identified for the Midlothian Creek subwatershed; however, there is minor local conveyance

improvement projects and stream maintenance that takes place throughout the subwatershed.

Table 3.4.3: Community Response Data for Midlothian Creek Subwatershed

Problem ID	Municipality	Problems as Reported by Local Municipality	Location	Problem Description	Local/ Regional	Resolution in DWP
BLI1	Blue Island	Flooding, culvert blockages	Western Avenue and 139th Street	Stream maintenance	Channel maintenance	Removal of debris to be addressed by stream maintenance
BRE2	Bremen Township	Debris at culvert	167th Street from Harlem Avenue to Cicero Avenue	Stream maintenance	Channel maintenance	Removal of debris to be addressed by stream maintenance
BRE6	Bremen Township	Debris and siltation	Central Avenue from 183rd Street to Midlothian Turnpike	Stream maintenance	Channel maintenance	Removal of debris to be addressed by stream maintenance
BRE7	Bremen Township	Debris and siltation	Ridgeland Avenue from 147th Street to 135th Street	Stream maintenance	Channel maintenance	Removal of debris to be addressed by stream maintenance
MID1	Midlothian	Flooding at intersection and houses	149th Street and Kilpatrick Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID2	Midlothian	Natalie Creek flooding	149th Street and Kenton Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID3	Midlothian	Natalie Creek flooding	147th Street and Kolmar Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID4	Midlothian	Street flooding	147th Street and Kilbourn Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID5	Midlothian	Flooding due to culvert size	146th Street and Keeler Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID6	Midlothian	Street and basement flooding	146th Street and Karlov Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)

Table 3.4.3: Community Response Data for Midlothian Creek Subwatershed

Problem ID	Municipality	Problems as Reported by Local Municipality	Location	Problem Description	Local/ Regional	Resolution in DWP
MID7	Midlothian	Flooding due to culvert size	146th Street and Keystone Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID9	Midlothian	Pavement flooding	IL 50 at 151st Street	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID10	Midlothian	Pavement flooding	US 6 at Crawford Avenue to Cicero Avenue	Overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID11	Midlothian	Pavement flooding	IL 83 at Kostner Avenue (W/O)	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID12	Midlothian	Restriction from intersection to drainage ditch system	151st Street and Kilbourn Avenue	Natalie Creek overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
MID13	Midlothian	Lack of proper grade to Calumet Union Drainage Ditch	153rd Street and Lawndale Avenue	Storm sewer flow restriction	Local	Problem not located on a regional waterway. This is a local storm sewer system problem
OKF2	Oak Forest	Natalie Creek flooding	Natalie Creek, 159th Street to 151st Street	Overbank flooding	Regional	Detention pond, diversion conduit and culvert improvements (Alternative NTCRG1-A4)
OKF3	Oak Forest	Pavement flooding	IL 50 at 158th Street (Metra viaduct)	Pavement flooding	Local	Local drainage issue related to flooding of an underpass
OKF4	Oak Forest	Pavement flooding	US 6 at Central Avenue to Oak Park Avenue	Pavement flooding	Local	Pavement flooding related to local drainage system
OKF5	Oak Forest	Overgrowth, falling trees, culvert need maintenance	North of 155th Street and Long Avenue	Culverts need maintenance	Channel maintenance	Removal of debris to be addressed by stream maintenance
ORH2	Orland Hills	Street flooding	88th Court Detention Pond (near 167th Street and 88th Avenue)	Pavement flooding from a local detention basin	Local	Local drainage issue related to local detention facility

Table 3.4.3: Community Response Data for Midlothian Creek Subwatershed

Problem ID	Municipality	Problems as Reported by Local Municipality	Location	Problem Description	Local/ Regional	Resolution in DWP
ORP5	Orland Park	Stream and culvert blockages	167th Street and 88th Avenue	Stream maintenance on Midlothian Creek	Channel maintenance	Removal of debris to be addressed by stream maintenance
ORT2	Orland Township	Debris and siltation	80th Avenue from 183rd Street to 151st Street	Stream maintenance on Midlothian Creek	Channel maintenance	Removal of debris to be addressed by stream maintenance
ROB1	Village of Robbins	Shallow flooding, few first floors flooded	137th Street and 139th Street from Kedzie Avenue 3 blocks east	Overbank flooding	Regional	Channel improvements (Alternative MTCRG6-A1)
ROB2	Village of Robbins	Flooding, culvert blockage and erosion	Kedzie Avenue and 139th Street	Overbank flooding	Regional	Channel improvements (Alternative MTCRG6-A1)
TIN1	Tinley Park	Erosion on 2.7 mile of Midlothian Creek	Midlothian Creek (near Central Avenue and 167th Street)	Erosion on 2.7 miles of Midlothian Creek	Local	Local drainage issue, structure are not within 30 ft from the active erosion
TIN2	Tinley Park	Inadequate drainage	Oak Park Avenue and 167th Street	Ponding and basement flooding	Local	Local drainage issue pertaining to local conveyance system.
TIN3	Tinley Park	Pavement flooding	Route 43 at 159th Street to 165th Street	Pavement flooding	Local	Local drainage issue pertaining to local storm sewer system
TIN4	Tinley Park	Pavement flooding	Route 43 at 175th Street railroad underpass	Pavement flooding	Local	Local drainage issue pertaining to roadway underpass drainage
TIN5	Tinley Park	Pavement flooding	US 6 at IL 43 (Harlem Avenue)	Pavement flooding	Local	Local drainage issue related to local storm sewer system
TIN6	Tinley Park	Pavement flooding	IL 43 at Rock Island railroad	Pavement flooding	Local	Local drainage issue related to local storm drainage system
TIN7	Tinley Park	Ponding	Ridgeland Avenue and 167th Street	Ponding	Local	Local drainage issue related to local conveyance system
TIN8	Tinley Park	Ponding	Oak Park Avenue on the west, 179th Street to the North, 183rd Street to the south and 1/4 mi east of Ridgeland Avenue	Ponding	Local	Local drainage issue related to local storm sewer system

Table 3.4.3: Community Response Data for Midlothian Creek Subwatershed

Problem ID	Municipality	Problems as Reported by Local Municipality	Location	Problem Description	Local/ Regional	Resolution in DWP
TIN9	Tinley Park	Streambank erosion	17251 66th Court	Streambank erosion	Regional	Stabilization of stream banks (Alternative MTCRG2-A1)
TIN10	Tinley Park	Streambank erosion	17147 South Oak Park Avenue	Streambank erosion	Regional	Stabilization of stream banks (Alternative MTCRG2-A1)

3.4.2 Watershed Analysis

3.4.2.1 Hydrologic Model Development

3.4.2.1.1 Subbasin DelineationThe Midlothian Creek subwatershed was delineated based upon LiDAR topographic data developed by Cook County in 2003. There are 47 subbasins ranging in size from 0.051 to 1.31 square miles with an average size of 0.397 square miles.

3.4.2.1.2 Hydrologic Parameter CalculationsCurve numbers (CN) were estimated for each subbasin based upon NRCS soil data and 2001 CMAP land use data. This method is further described in Section 1.3.2, with lookup values for specific combinations of land use and soil data presented in **Appendix C**. An area-weighted average of the CN was generated for each subbasin.

Clark's unit hydrograph parameters were estimated using the method described in Section 1.3.2. **Appendix G** provides a summary of the hydrologic parameters used for the subbasins in each subwatershed.

3.4.2.2 Hydraulic Model Development

3.4.2.2.1 Field Data, Investigation, and Existing Model DataDuring Phase A, the available existing models for the Midlothian Creek subwatershed were collected and analyzed to determine if any model data could be used for developing the comprehensive model for Midlothian Creek. Only existing models that were less than 10 years old were reviewed.

The FEMA effective hydraulic model was developed by IDNR-OWR in the early 1990s using HEC-2 and was updated in 2001 by Patrick Engineering. Also, an FEQ model was developed by IDNR-OWR in the late 1990s, which extends between 171st Street below Harlem Avenue to the Midlothian Creek Diversion Conduit. The 76th Avenue Ditch model was updated by Robinson Engineering and submitted to FEMA in 2004. All the models met the criteria identified in the CCSMP and were used to support the development of the hydraulic model.

The models listed above were reviewed to determine if any of the cross-sectional data and hydraulic structure information could be reused. If any information regarding

location, date, and vertical datum was not available, the cross-sectional data was not used. For cross sections with this data available, the cross section was compared to the current channel conditions to ensure that the cross section was still representative of current conditions. The hydraulic structure dimensions were compared to 2007 field reconnaissance data and also to bridge/culvert dimensions data provided by Cook County Highway Department (provided data for only state/county highways). Based on the existing model analysis additional cross sections and hydraulic structures to be surveyed were determined. Any data used from the existing models were geo-referenced to represent true physical coordinates.

After review of existing models, field reconnaissance data and hydraulic structures dimensions data, a field survey plan for Midlothian Creek was developed. Field survey was performed under the protocol of FEMA's *Guidelines and Specifications for Flood Hazard Mapping partners, Appendix A: Guidance for Aerial Mapping and Surveying.* Field survey was performed in early 2008. Cross sections were generally surveyed between 500 and 1,000 feet apart. The actual spacing and location was determined based on the variability of the channel shape and roughness and slope of the channel. To supplement the model, 56 hydraulic structures throughout the subwatershed, including immediate upstream and downstream cross sections, were surveyed, as well as 66 additional cross sections along Midlothian Creek Main Tributary, Midlothian Creek Western Branch, Midlothian Creek Western Tributary, Twin Lakes Tributary, Filsen Park Ditch, and Natalie Creek.

The Manning's n-values at each cross section were estimated using a combination of aerial photography and photographs from field survey and field reconnaissance. The horizontal extent of each type of land cover and the associated n-value for each cross section were manually entered into the HEC-RAS hydraulic model. All the n-values were manually adjusted using the HEC-RAS cross-sectional data editor. The n-values were increased where buildings are located within the floodplain to account for conveyance loss. The n-values in these areas may range from 0.06 for areas with few buildings to 0.15 for fully developed areas. If significant blockage was caused by buildings in the flood fringe, the developed areas were modeled as ineffective flow. **Table 3.4.4** lists the channel and overbank ranges of n-values that were used for the subwatershed model.

Table 3.4.4: Channel and Overbank Associated Manning's n-Values[1]

Tributary	Range of Channel n-Values	Range of Overbank n-Values
MCWB	0.03 – 0.06	0.05 – 0.10
MCWT	0.03 – 0.06	0.05 – 0.10
76DT	0.03 – 0.05	0.05 – 0.12
FPDT	0.03 – 0.06	0.05 – 0.10
TLTY	0.03 – 0.06	0.05 – 0.10
NTCR	0.04 – 0.06	0.05 – 0.12
MTCR	0.03 – 0.06	0.05 – 0.12

[1]**Source**: Open Channel Hydraulics, Chow 1959

3.4.2.2.2 Boundary Conditions

There were three downstream locations where boundary conditions were required to run the hydraulic model: the confluence of Midlothian Creek with Little Calumet River, the confluence of the Midlothian Creek Diversion Conduit with the Calumet-Sag Channel, and the confluence of the Natalie Creek Diversion Conduit with the Calumet-Sag Channel. Normal depth was used as the downstream boundary condition for the Midlothian Creek confluence with the Little Calumet River and FEMA's Cook County FIS 100-year elevations were used as boundary conditions at the remaining two locations.

3.4.2.3 Calibration and VerificationA detailed calibration was performed for the Midlothian Creek subwatershed using historic gage records under the guidelines of the Cook County Stormwater Management Plan (CCSMP). Three historical storms: July 1996, April 2006 and September 2008 were evaluated based on the stream gage flows, precipitation totals and records of flooding in the Midlothian Creek subwatershed and were found to be acceptable for calibration and verification.

For the calibration storms, Illinois State Water Survey (ISWS) Cook County precipitation gages, National Weather Service (NWS) recording and non-recording gages, and Community Collaborative Rain, Hail & Snow Network (CoCoRAHS) precipitation amounts were used. Theissen polygons were developed for each storm based on the rain gages available for that storm. The gage weightings for the recording and non-recording gages were computed in ArcGIS for each subbasin. USGS Gage 05536340 on Midlothian Creek at Oak Forest, Illinois (the only stream gage in the Midlothian Creek subwatershed) was used for calibration. This gage is at latitude 41°36'51" longitude 87°43'46" (NAD27), on the downstream side of the Kilbourn Avenue Crossing, near the intersection of Kilbourn Avenue and 151st Street. The datum of the gage is 620.41 feet NGVD29 (620.12 NAVD88). Instantaneous data is available at this gage from 5/1/1989 through 9/30/2007.

Runoff hydrographs were developed using HEC-HMS and routed through the Midlothian Creek hydraulic model. The stages and flows produced for each

calibration storm were compared to the observed stream gage data. During calibration of the Midlothian Creek subwatershed model, the CN, directly connected impervious area percentage, and storage coefficient were adjusted so that the peak flow rate, hydrograph shape and timing, and total volume matched the observed hydrographs within the CCSMP's criteria.

During calibration, the CN and directly connected impervious percentage were reduced by -10% and -10%, respectively. The Clark's storage coefficient R was increased by 25%. After the final adjustments to the HEC-HMS and HEC-RAS models, the flow and stage comparisons to the observed data were within the CCSMP's criteria. **Table 3.4.5** shows the comparison of the flows and stages for all calibration storms. **Figures 3.4.2**, **3.4.3** and **3.4.4** show the calibration results for the July 1996, April 2006, and September 2008, respectively.

Table 3.4.5: Midlothian Creek Subwatershed Calibration Results

	Observed		Modeled		CCSMP's Criteria[1]	
Storm Event	**Flow (cfs)**	**Stage (ft)**	**Flow (cfs)**	**Stage (ft)**	**Percentage Difference in Peak Flow**	**Difference in Stage (ft)**
July 1996	473	626.27	446	626.37	-6%	0.1
April 2006	126	622.65	128	622.80	1%	0.1
September 2008	325	625.24	383	625.49	15%	0.3

[1]Flow within 30% and stage within 6 inches.

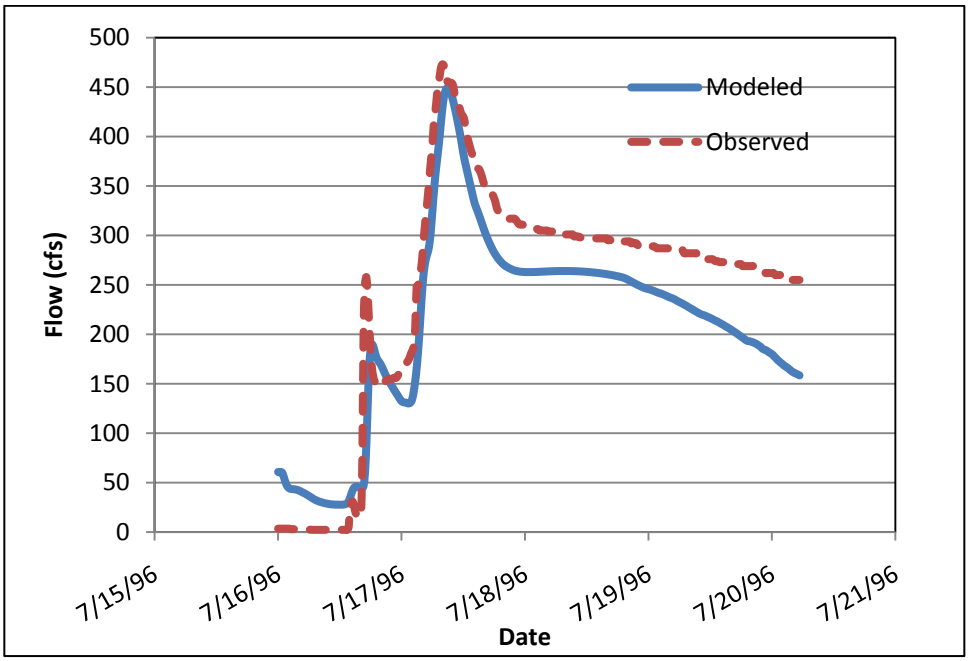

Figure 3.4.2: Midlothian Creek Subwatershed Calibration Results, July 1996 Storm Event

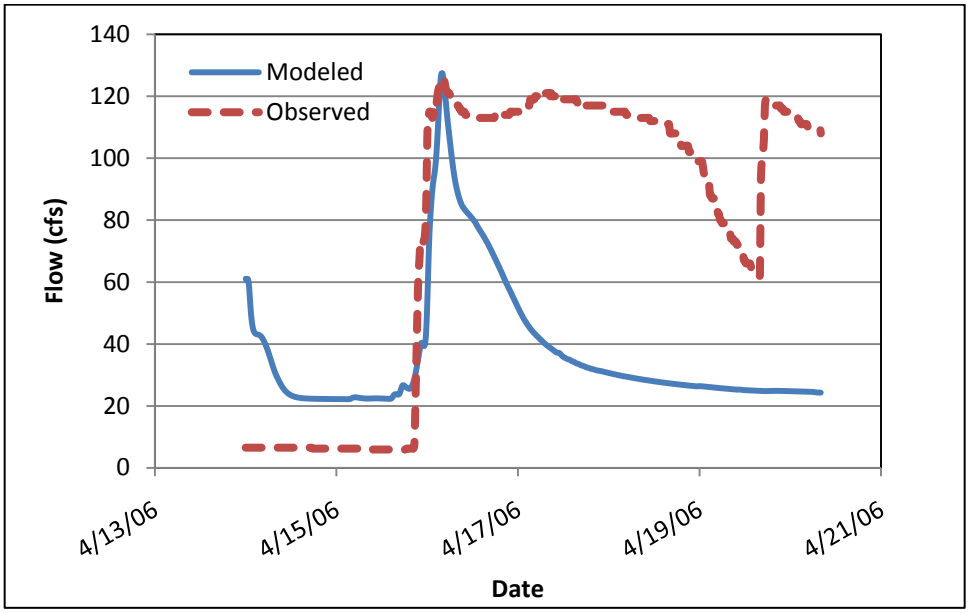

Figure 3.4.3: Midlothian Creek Subwatershed Calibration Results, April 2006 Storm Event

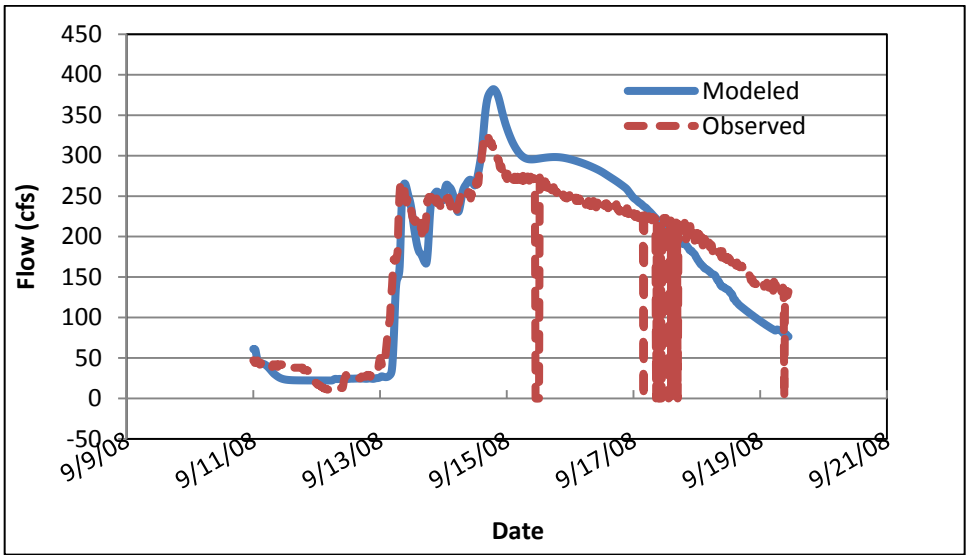

Figure 3.4.4: Midlothian Creek Subwatershed Calibration Results, September 2008 Storm Event

The receding limbs for April 2006 storm event do not correlate between the observed and modeled hydrographs; this may be due to operation of the reservoir pump stations. In the Midlothian Creek subwatershed model, the reservoir pump stations are not simulated and this excess volume shown in the observed graph may be due to the draining of the flood control facilities.

3.4.2.4 Existing Conditions Evaluation

3.4.2.4.1 Flood Inundation AreasA critical duration analysis was run for the Midlothian Creek subwatershed hydraulic model. The 100-year, 1-, 3-, 6-, 12-, 24- and

48-hour storm events were run to determine the critical duration. The 48-hour storm event was found to be the critical duration for the majority of the watershed, including all reaches downstream of the Tinley Park and Twin Lakes Reservoirs. The 12-hour duration was found to be the critical duration storm event for three of the tributaries, 76th Avenue Ditch, Twin Lakes Tributary and Midlothian Western Tributary. **Figure 3.4.1** shows inundation area produced for the 100-year critical duration storm event.

*3.4.2.4.2 **Hydraulic Profiles***Hydraulic profiles for Midlothian Creek and its tributaries are shown in **Appendix H**. Profiles are shown for the 2-, 5-, 10-, 25-, 50-, 100- and 500-year recurrence interval design storm events.

3.4.3 Development and Evaluation of Alternatives

Hydraulic model results were reviewed with inundation mapping to identify locations where property damage due to flooding is predicted. **Table 3.4.6** summarizes problem areas identified through hydraulic modeling of the Midlothian Creek subwatershed.

Problem areas that were hydraulically interdependent or otherwise related were grouped for alternatives analysis. Each problem group is addressed in terms of combined damages and alternatives/solutions.

Table 3.4.6: Modeled Problem Definition for the Midlothian Creek Subwatershed

Problem ID	Group ID	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP
MTCR1	MTCR-G1	Midlothian Creek, subdivision east of the Tinley Park Reservoir, Tinley Park	100	n/a	MTCRG1-A1
MTCR2	MTCR-G2	17147 South Oak Park Avenue, Tinley Park	n/a	TIN10	MTCRG2-A1
MTCR3	MTCR-G2	17251 66th Court, Tinley Park	n/a	TIN9	MTCRG2-A1
MTCR4	MTCR-G3	Midlothian Creek, near 160th Street and Forest Avenue, Oak Forest	100	n/a	MTCRG3-A4
MTCR5	MTCR-G3	Midlothian Creek, 159th Street and Cicero Avenue, Oak Forest	100	n/a	MTCRG3-A4
MTCR6	MTCR-G4	Midlothian Creek, Metra railroad tracks to Waverly Avenue, Oak Forest	2, 5, 10, 25, 50, & 100	n/a	MTCRG4-A4
MTCR7	MTCR-G4	Midlothian Creek, near 155th Street and Kilpatrick Avenue, Oak Forest	2, 5, 10, 25, 50, & 100	n/a	MTCRG4-A4
MTCR8	MTCR-G5	Midlothian Creek, Kenton Avenue to Pulaski along the creek, Oak Forest	100	n/a	MTCRG5-A4
MTCR9	MTCR-G6	Midlothian Creek, 137th Street and Kedzie Avenue, Blue Island	2, 5, 10, 25, 50, & 100	ROB1 & ROB2	MTCRG6-A1
MTCR10	MTCR-G7	Isolated structures near Twin Lakes Tributary, Oak Forest	100	n/a	Floodproofing/ acquisition
NTCR1	NTCR-G1	Natalie Creek, Laramie Avenue to 159th Street, Oak Forest	2, 5, 10, 25, 50, & 100	OKF2	NTCRG1-A4

Table 3.4.6: Modeled Problem Definition for the Midlothian Creek Subwatershed

Problem ID	Group ID	Location	Recurrence Interval (yr) of Flooding	Associated Form B	Resolution in DWP
NTCR2	NTCR-G1	Natalie Creek, 149th Street to Keystone Avenue, Midlothian	2, 5, 10, 25, 50, & 100	MID1 thru MID7, and MID9 thru MID12	NTCRG1-A4

Damage assessment, technology screening, alternative development and alternative selection were performed by problem group, since each group is independent of the other. Each problem group is evaluated in the following sections by Problem Group ID.

3.4.3.1 MTCR-G1 – Midlothian Creek Problem Group 1

3.4.3.1.1 Problem Definition, MTCR-G1

The MTCR-G1 problem group consists of overflowing of the Tinley Park Reservoir, resulting in flooding near Dorothy Lane and Overhill Avenue in Tinley Park. At Tinley Park Reservoir, the 100-year stage of 693.4 feet inundates approximately 25 building structures. This problem area was shown on the recent DFIRM floodplain maps. The flood protection elevation near this problem area would be 690.4 feet. Flood protection elevations were developed based on field reconnaissance of the area based on typical residential structures.

3.4.3.1.2 Damage Assessment, MTCR-G1

Damages were defined following the protocol defined in the CCSMP. Critical duration analysis was performed to determine the highest flood stages for Midlothian Creek and its tributaries. These stages were used to calculate the depth of flooding and then to estimate damages at each flooding problem area. The District's Stormwater Planning Database Tool was used to estimate the damages. Property damages for each building structure were calculated and transportation damages were estimated at 15 percent of the property damages, unless otherwise noted. Recreational damages were estimated based on depth and duration of flooding. **Table 3.4.7** lists the estimated damages for the problem group.

Table 3.4.7: Estimated Damages for MTCR Subwatershed, Problem Group MTCR-G1

Problem Group ID	Damage Category	Estimated Damage ($)	Description
MTCR-G1	Property	$117,000	Structures at risk of flooding
	Transportation	$18,000	Assumed as 15% of property damage due to flooding
	Recreation	$0	

3.4.3.1.3 Technology Screening, MTCR-G1

Several combinations of technologies were analyzed to address the flooding problems at this location. Flood control technologies from Chapter 6 of the CCSMP were considered as potential solutions for the regional flooding problems. **Table 3.4.8**

summarizes the evaluation of these technologies in terms of their potential feasibility for this problem group.

Table 3.4.8: Evaluation of Flood Control Technologies for MTCR Subwatershed, Problem Group MTCR-G1

Flood Control Option	Feasibility
Detention Facilities	Feasible but not preferred given alternative
Conveyance Improvement – Culvert/Bridge Replacement	Feasible but not preferred given alternative
Conveyance Improvement – Channel Improvement	Feasible but not preferred given alternative
Conveyance Improvements – Diversion	Feasible but not preferred given alternative
Flood Barriers, Levees/Floodwalls	Feasible given that the problem is not due to high stages in the reservoir, but that a low ground area exists

3.4.3.1.4 Alternative Development, MTCR-G1

Flood Control Alternatives. Alternative solutions to regional flooding problems were developed and evaluated consistent with the methodology described in Section 1.4 of this report. **Table 3.4.9** summarizes flood control alternatives developed for Problem Group MTCR-G1.

Table 3.4.9: Flood Control Alternatives for Problem Group MTCR-G1

Alternative	Location	Description
MTCRG1-A1	Overhill Avenue and Dorothy Lane	Construct a 700 LF, 4-ft high earthen levee adjacent to the flooded properties along Overhill Avenue and Oleander Avenue

Streambank Stabilization Alternatives. No streambank stabilization alternatives were developed for the MTCR-G1 Problem Group.

3.4.3.1.5 Alternative Evaluation and Selection, MTCR-G1

The alternative in **Table 3.4.9** was evaluated to determine its effectiveness and produce data required for the countywide prioritization of watershed projects. The flood control alternative was modeled to evaluate its impact on water elevations and flood damages. **Table 3.4.11** provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data for the preferred alternative.

Alternative MTCRG1-A1 in **Table 3.4.9** is the preferred alternative for this problem group. An earthen levee was the only solution considered to be feasible, given that the flooding is due to the low ground elevation adjacent to Overhill Avenue. An earthen levee would protect homes while maintaining a reasonable stage in the reservoir. A 1,600 linear-foot, 4-foot-high earthen levee adjacent to the flooded properties would prevent overbank flooding during the 100-year event. At 4 feet high, the levee would provide approximately 3 feet of freeboard. This alternative also includes interior drainage for the drainage area behind the levee.

Table 3.4.10 provides a comparison of the modeled water surface elevation and modeled flow at the time of peak for MTCR-G1.

Table 3.4.10: Alternative Condition Flow & WSEL Comparison for Problem Group MTCR-G1

Location	Station	Existing Conditions		Alternative MTCRG1-A1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Tinley Park Reservoir	SA 288	693.40	1,087	693.40[1]	1,087

[1]Levee provides protection.

3.4.3.1.6 Data Required for Countywide Prioritization of Watershed Projects, MTCR-G1

Appendix I presents conceptual level cost estimates for the recommended alternative. **Table 3.4.11** lists the alternative analyzed in detail. The recommended alternative consists of constructing an earthen levee adjacent to flooded properties. **Figure 3.4.5** shows the location of the recommended alternative and a comparison of the inundation area for existing conditions with the reduced inundation area resulting from the recommended alternative.

Table 3.4.11: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization for Problem Group MTCR-G1

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures & Roadways Protected	Water Quality Benefit	Involved Community
MTCR-G1	MTCRG1-A1	Earthen levee and Interior drainage	0.08	$134,000	$1,710,000	25 Structures	No Impact	Tinley Park

Note: Net Benefits values do not include local benefits or non-economic benefits.

3.4.3.2 MTCR-G2 – Midlothian Creek Problem Group 2

3.4.3.2.1 Problem Definition, MTCR-G2

The MTCR-G2 problem group consists of stream bank erosion at two locations in Tinley Park. One problem area is located near Oak Park Avenue and 172nd Street and the second location is near Hickory Street and 66th Court. A total of 4 building structures and one parking lot are within the 30 feet from an actively eroding creek segment.

3.4.3.2.2 Damage Assessment, MTCR-G2

Damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. The District's Stormwater Planning Database Tool was used to estimate the damages. Erosion damages for each building structure were calculated. There are no transportation or recreational damages at this location. **Table 3.4.12** lists the estimated damages for the problem group.

Table 3.4.12: Estimated Damages for MTCR Subwatershed, Problem Group MTCR-G2

Problem Group ID	Damage Category	Estimated Damage ($)	Description
MTCR-G2	Property	$1,110,000	Structures at risk of flooding
	Transportation	$0	
	Recreation	$0	

3.4.3.2.3 Technology Screening, MTCR-G2

Streambank stabilization technologies from Chapter 6 of the CCSMP were considered as potential solutions for the problem area. Several combinations of technologies were analyzed to address the problems at this location.

3.4.3.2.4 Alternative Development, MTCR-G2

Flood Control Alternatives. No flood control alternatives were developed for the MTCR-G2 Problem Group.

Streambank Stabilization Alternatives. Table 3.4.13 summarizes streambank stabilization alternatives developed for Problem Group MTCR-G2.

Table 3.4.13: Streambank Stabilization Alternatives for Problem Group MTCR-G2

Alternative	Location	Description
MTCRG2-A1	Oak Park Avenue and 172nd Street; Hickory Street and 66th Court	Stabilize using hard armoring or other acceptable technology to prevent erosion problems that threaten structures at Oak Park Avenue and 172nd Street and Hickory Street and 66th Court

3.4.3.2.5 Alternative Evaluation and Selection, MTCR-G2

The alternative in **Table 3.4.13** was evaluated to determine its effectiveness and produce data required for the countywide prioritization of watershed projects. **Table 3.4.15** provides a summary of the B/C ratio, net benefits, total project costs, number of structures protected, and other relevant data for the alternative. A preliminary conceptual level analysis was performed for these erosion problem areas due to limited available data.

Alternative MTCRG2-A1 from **Table 3.4.13** is the proposed alternative for this problem group. The proposed alternative will provide hard armoring of the banks were erosion is occurring. For the location at Oak Park Avenue and 172nd Street, 300 feet of hard armoring of both banks is proposed from Oak Park Avenue to 67th Court. At Hickory Street and 66th Court, 300 feet of hard armoring is proposed along the both banks adjacent to three townhomes. For both locations, traditional approaches to armoring using concrete walls have been conceptually developed to determine project cost estimates. As an alternative to using concrete, there are other hard-armoring erosion protection techniques available to stabilize creek banks that may give a more natural appearance.

Table 3.4.14 provides a comparison of the modeled water surface elevation and modeled flow at the time of peak for MTCR-G2.

Table 3.4.14: Alternative Condition Flow & WSEL Comparison for Problem Group MTCR-G2

Location	Station	Existing Conditions		Alternative MTCRG2-A1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Midlothian and Oak Park Avenue	52452	688.80	549.46	688.80[1]	549.46
Footpath northeast of 67th Avenue and 172nd Street	51584	686.80	550.67	686.80[1]	550.67

[1]Streambank stabilization provides protection.

3.4.3.2.6 Data Required for Countywide Prioritization of Watershed Projects, MTCR-G2

Appendix I presents conceptual level cost estimates for the recommended alternative. **Table 3.4.15** lists the alternative analyzed in detail. The recommended alternative consists of streambank stabilization. **Figure 3.4.6** shows the location of the recommended alternative.

Table 3.4.15: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization for Problem Group MTCR-G2

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures & Roadways Protected	Water Quality Benefit	Involved Community
MTCR-G2	MTCRG2-A1	Stream bank stabilization near Oak park Avenue and 172nd Street and also near Hickory Street and 66th Court	0.71	$1,110,000	$1,569,000	4 Structures	No Impact	Tinley Park

Note: Net Benefits values do not include local benefits or non-economic benefits.

3.4.3.3 MTCR-G3 – Midlothian Creek Problem Group 3

3.4.3.3.1 Problem Definition

The MTCR-G3 problem area consists of overbank flooding at two locations: 160th Street and Forest Avenue, and 159th Street and Cicero Avenue. The flooding is due to the restriction from the 159th and 160th Street culvert crossings. The 100-year flow (518 cfs) exceeds the capacity of the existing culverts. The existing culvert crossing consists of two (2), 6-foot circular culverts at 160th Street and one 6.3-foot circular culvert at 159th Street. MTCR-G3 consists of approximately 23 building structures and overtopping of one local and one arterial roadway crossing. This area is also inundated on the FEMA DFIRM map.

3.4.3.3.2 Damage Assessment, MTCR-G3

Damages were defined following the protocol defined in the CCSMP. Critical duration analysis was performed to determine the highest flood stages for Midlothian Creek and its tributaries. These stages were used to calculate the depth of flooding and to estimate damages at each flooding problem area. The District's Stormwater

Planning Database Tool was used to estimate the damages. Property damages for each building structure were calculated and transportation damages were estimated at 15 percent of the property damages, unless otherwise noted. Recreational damages were estimated based on depth and duration of flooding. **Table 3.4.16** lists the estimated damages for the problem group.

Table 3.4.16: Estimated Damages for Midlothian Creek Subwatershed, Problem Group MTCR-G3

Problem Group ID	Damage Category	Estimated Damage ($)	Description
MTCR-G3	Property	$32,000	Structures at risk of flooding
	Transportation	$4,800	Assumed as 15% of property damage due to flooding
	Recreation	$0	

3.4.3.3.3 Technology Screening, MTCR-G3

Several combinations of technologies were analyzed to address the flooding problems associated with MTCR-G3. Flood control technologies from Chapter 6 of the CCSMP were considered as potential solutions for the regional flooding problems. **Table 3.4.17** summarizes the evaluation of these technologies in terms of their potential feasibility for this problem group.

Table 3.4.17: Evaluation of Flood Control Technologies for Midlothian Creek Subwatershed, Problem Group MTCR-G3

Flood Control Option	Feasibility
Detention Facilities	Not feasible. Limited space available
Conveyance Improvement – Culvert/Bridge Replacement	Feasible. Increase openings at 160th Street and 159th Street
Conveyance Improvement – Channel Improvement	Not feasible. Limited right-of-way available for regrading the channel
Conveyance Improvements – Diversion	Not feasible. No available outfall downstream
Flood Barriers, Levees/Floodwalls	Not feasible. Limited right-of-way available

3.4.3.3.4 Alternative Development, MTCR-G3

Flood Control Alternatives. Alternative solutions to regional flooding problems were developed and evaluated consistent with the methodology described in Section 1.4 of this report. **Table 3.4.18** summarizes flood control alternatives developed for Problem Group MTCR-G3.

Table 3.4.18: Flood Control Alternatives for Problem Group MTCR-G3

Alternative	Location	Description
MTCRG3-A1	160th Street	Upgrade existing crossing from 2, 6-ft circular culverts to a twin, 9-ft x 6-ft elliptical culvert
MTCRG3-A2	159th Street	Upgrade existing crossing from 6.3-ft circular culvert, to 13-ft x 6.5-ft elliptical culvert
MTCRG3-A3	160th Street and Oak Avenue	Minor channel improvements needed for regrading the channel to return grade to a positive slope

Table 3.4.18: Flood Control Alternatives for Problem Group MTCR-G3

Alternative	Location	Description
MTCRG3-A4	159th Street, 160th Street and Oak Avenue	Upgrade culverts at 159th and 160th Streets; channel improvements (combination of Alternatives MTCRG3-A1, MTCRG3-A2 and MTCRG3-A3)

Streambank Stabilization Alternatives. No streambank stabilization alternatives were developed for the MTCR-G3 Problem Group.

3.4.3.3.5 Alternative Evaluation and Selection

Alternatives included in **Table 3.4.18** were evaluated to determine their effectiveness and produce the data required for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water elevations and flood damages. **Table 3.4.20** provides the B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data for the preferred alternative for Problem Group MTCR-G3. Alternatives that did not produce a significant change in inundation areas are not listed as benefits were negligible, thus costs were not calculated for these alternatives.

Alternative MTCRG3-A4 from **Table 3.4.18** is the preferred alternative for Problem Group MTCR-G3. By increasing the opening area of the 160th Street crossing with a twin 9-foot x 6-foot elliptical culvert, the 100-year water surface elevation will be reduced to 644.02 feet which is approximately 2 feet below the ground elevation and 5.81 feet below the existing 100-year elevation. The 100-year elevation at 159th Street is reduced to 640.73, which is 5.40 feet below the 100-year elevation. With the preferred alternative, the 23 building structures and the roadways will be protected from flooding.

Table 3.4.19 provides a comparison of the modeled water surface elevation and modeled flow at the time of peak for MTCR-G3.

Table 3.4.19: Alternative Condition Flow & WSEL Comparison for Problem Group MTCR-G3

Location	Station	Existing Conditions		Alternative MTCRG3-A4	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of 160th Street Culvert	30545	649.83	518.12	644.90	534.61
Upstream of 159th Street Culvert	29591	646.13	518.09	643.22	534.58

3.4.3.3.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternative. **Table 3.4.20** lists the alternative analyzed in detail. **Figure 3.4.7** shows the location of the recommended alternative and a comparison of the inundation area for existing conditions with the reduced inundation area resulting from the recommended alternative.

Table 3.4.20: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization for Problem Group MTCR-G3

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures & Roadways Protected	Water Quality Benefit	Involved Community
MTCR-G3	MTCRG3-A4	Replace crossings, channel improvements	0.01	$37,000	$3,455,000	23 Structures, 2 Roadways	No Impact	Oak Forest

Note: Net Benefits values do not include local benefits or non-economic benefits.

3.4.3.4 MTCR-G4 – Midlothian Creek Problem Group 4

3.4.3.4.1 Problem Definition

The MTCR-G4 problem area consists of overbank flooding at two locations: building structures between Waverly Avenue and the Metra railroad tracks, and upstream and downstream of 155th Street and Kilpatrick Avenue. The flooding is due to the restriction from the 155th Street crossing and also the low grade along the banks. The 100-year flow (495 cfs) exceeds the capacity of the existing crossing at 155th Street. The existing bridge crossing at 155th Street has an opening of 16.5 feet wide and 6 feet high. MTCR-G4 consists of flooding of approximately 12 building structures and overtopping of two local roadway crossings. This area is also inundated on the FEMA DFIRM map.

3.4.3.4.2 Damage Assessment, MTCR-G4

Damages were defined following the protocol defined in the CCSMP. Critical duration analysis was performed to determine the highest flood stages for Midlothian Creek and its tributaries. These stages were used to calculate the depth of flooding and to estimate damages at each flooding problem area. The District's Stormwater Planning Database Tool was used to estimate the damages. Property damages for each building structure were calculated and transportation damages were estimated at 15 percent of the property damages, unless otherwise noted. Recreational damages were estimated based on depth and duration of flooding. **Table 3.4.21** lists the estimated damages for the problem group.

Table 3.4.21: Estimated Damages for Midlothian Creek Subwatershed, Problem Group MTCR-G4

Problem Group ID	Damage Category	Estimated Damage ($)	Description
MTCR-G4	Property	$995,000	Structures at risk of flooding
	Transportation	$149,000	Assumed as 15% of property damage due to flooding
	Recreation	$0	

3.4.3.4.3 Technology Screening, MTCR-G4

Several combinations of technologies were analyzed to address the flooding problems associated with MTCR-G4. Flood control technologies from the CCSMP were considered as potential solutions for the regional flooding problems. **Table 3.4.22** summarizes the evaluation of these technologies in terms of their potential feasibility for this problem group.

Table 3.4.22: Evaluation of Flood Control Technologies for Midlothian Creek Subwatershed, Problem Group MTCR-G4

Flood Control Option	Feasibility
Detention Facilities	Not feasible. Limited space available
Conveyance Improvement – Culvert/Bridge Replacement	Feasible. Increase openings at 155th Street
Conveyance Improvement – Channel Improvement	Not feasible. Limited right-of-way available
Conveyance Improvements – Diversion	Not feasible. No available outfall downstream
Flood Barriers, Levees/Floodwalls	Feasible. Need a floodwall due to the limited right-of-way available

3.4.3.4.4 Alternative Development

Flood Control Alternatives. Alternative solutions to regional flooding problems were developed and evaluated consistent with the methodology described in Section 1.4 of this report. **Table 3.4.23** summarizes flood control alternatives developed for Problem Group MTCR-G4.

Table 3.4.23: Flood Control Alternatives for Problem Group MTCR-G4

Alternative	Location	Description
MTCRG4-A1	155th Street and Kilpatrick Avenue	Upgrade both the existing 155th crossing16.5 ft x 6 ft and Kilpatrick Avenue crossing 26 ft x 5.2 ft to one crossing (3) – 12-ft x 6-ft box culvert
MTCRG4-A2	Upstream of Waverly Avenue	Construct a 350 LF, 3-ft high floodwall adjacent to the flooded properties along both the banks from Metra railroad tracks to Waverly Avenue
MTCRG4-A3	Downstream of Kilpatrick Avenue	Construct a 700 LF, average 7-ft high floodwall adjacent to the flooded properties along the north bank of the channel from downstream of Kilpatrick Avenue
MTCRG4-A4	Vicinity of 155th Street, Kilpatrick Avenue and Waverly Avenue	Upgrade crossing at Kilpatrick Avenue, construct floodwall from Metra railroad tracks to Waverly Avenue, and construct floodwall near Kilpatrick Avenue (combination of Alternatives MTCRG4-A1, MTCRG4-A2 and MTCRG4-A3)

Streambank Stabilization Alternatives. No streambank stabilization alternatives were developed for the MTCR-G4 Problem Group.

3.4.3.4.5 Alternative Evaluation and Selection

Alternatives included in **Table 3.4.23** were evaluated to determine their effectiveness and produce the data required for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water elevations and flood damages. **Table 3.4.25** provides the B/C ratio, net benefits, total project costs, number of structures protected, and other relevant data for the preferred alternative for Problem Group MTCR-G4. Alternatives that did not produce a significant change in inundation areas are not listed as benefits were negligible, thus costs were not calculated for these alternatives.

Alternative MTCRG4-A4 from **Table 3.4.23** provides the preferred alternative for Problem Group MTCR-G4. By increasing the opening area of the 155th Street and Kilpatrick Avenue crossings and combining the culverts into one (3) 12-foot x 6-foot box culvert, the 100-year water surface elevation will be reduced to 633.52 feet which is approximately 1.4 feet below the existing 100-year elevation at the upstream of the 155th Street crossing, which is 1.2 feet below the lowest elevation on the road. The floodwall near Waverly and Kilpatrick Avenues provides 3 feet of freeboard to the building structures. With the preferred alternative, the 12 building structures and the roadways will be removed from the flooding.

Table 3.4.24 provides a comparison of the modeled water surface elevation and modeled flow at the time of peak for MTCR-G4.

Table 3.4.24: Alternative Condition Flow & WSEL Comparison for Problem Group MTCR-G4

Location	Station	Existing Conditions		Alternative MTCRG4-A4	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Railroad Tracks	26901	636.36	495.31	636.19	505.54
Upstream of Waverly Avenue	26528	635.79	495.10	635.08	505.43
Upstream of 155th Street Culvert	25892	635.28	495.05	634.07	505.38

3.4.3.4.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternative. **Table 3.4.25** lists the alternative analyzed in detail. **Figure 3.4.8** shows the location of the recommended alternative and a comparison of the inundation area for existing conditions with the reduced inundation area resulting from the recommended alternative.

Table 3.4.25: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization for Problem Group MTCR-G4

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures & Roadways Protected	Water Quality Benefit	Involved Community
MTCR-G4	MTCRG4-A4	Replace crossings and construct floodwall	0.04	$1,143,000	$27,700,000	12 Structures, 2 Roadways	No Impact	Oak Forest

Note: Net Benefits values do not include local benefits or non-economic benefits.

3.4.3.5 MTCR-G5 – Midlothian Creek Problem Group 5

3.4.3.5.1 Problem Definition, MTCR-G5

The MTCR-G5 problem group consists of overbank flooding along the left bank of Midlothian Creek from Kenton Avenue to Pulaski Road. The flooding is due to inadequate capacity of the channel and the low ground elevation along the left bank. The 100-year flow (525 cfs) exceeds the capacity of the channel at many locations. MTCR-G5 consists of approximately 25 inundated building structures near Kenton Avenue, 151st Street and upstream of Pulaski Road.

3.4.3.5.2 Damage Assessment, MTCR-G5

Damages were defined following the protocol defined in Chapter 6.6 of the CCSMP. Critical duration analysis was performed to determine the highest flood stages for Midlothian Creek and its tributaries. These stages were used to calculate the depth of flooding and then to estimate damages at each flooding problem area. The District's Stormwater Planning Database Tool was used to estimate the damages. Property damages for each building structure were calculated and transportation damages were estimated at 15 percent of the property damages, unless otherwise noted. Recreational damages were estimated based on depth and duration of flooding. **Table 3.4.26** lists the estimated damages for the problem group.

Table 3.4.26: Estimated Damages for MTCR Subwatershed, Problem Group MTCR-G5

Problem Group ID	Damage Category	Estimated Damage ($)	Description
MTCR-G5	Property	$50,000	Structures at risk of flooding
	Transportation	$7,500	Assumed as 15% of property damage due to flooding
	Recreation	$0	

3.4.3.5.3 Technology Screening, MTCR-G5

Several combinations of technologies were analyzed to address the flooding problems at this location. Flood control technologies from Chapter 6 of the CCSMP were considered as potential solutions for the regional flooding problems. **Table 3.4.27** summarizes the evaluation of these technologies in terms of their potential feasibility for this problem group.

Table 3.4.27: Evaluation of Flood Control Technologies for MTCR Subwatershed, Problem Group MTCR-G5

Flood Control Option	Feasibility
Detention Facilities	Feasible. Needed to reduce the stage increases from earthen embankment or channel improvements
Conveyance Improvement – Culvert/Bridge Replacement	Feasible, but not preferred given alternative
Conveyance Improvement – Channel Improvement	Feasible. Needed to reduce the stages
Conveyance Improvements – Diversion	Feasible, but not preferred given alternative
Flood Barriers, Levees/Floodwalls	Feasible, given that the problem is low ground on the left bank

3.4.3.5.4 Alternative Development, MTCR-G5

Flood Control Alternatives. Alternative solutions to regional flooding problems were developed and evaluated consistent with the methodology described in Section 1.4 of this report. **Table 3.4.28** summarizes flood control alternatives developed for Problem Group MTCR-G5.

Table 3.4.28: Flood Control Alternatives for Problem Group MTCR-G5

Alternative	Location	Description
MTCRG5-A1	Kilbourn Avenue and Waverly Avenue	Construct a 25 ac-ft pumped detention facility at downstream of Kilbourn and Waverly crossings to prevent the stage increases from the channel improvements. Not adequate storage to solve all the downstream problems
MTCRG5-A2	From 151st Street to Pulaski Road	Approximately 5900 LF of earth work, including channel improvements, earthen berm along the left bank and a floodwall near upstream of Pulaski Road. This alternative Increases stages downstream
MTCRG5-A3	From Kenton Avenue to Kilbourn Avenue	Widen the cross sections to increase the hydraulic capacity of the channel. This alternative did effectively reduce water surface elevations in the flooding problem area between Kenton and Kilbourn Avenues and was not providing any benefits to the downstream problem areas
MTCRG5-A4	Kilbourn Avenue and Waverly Avenue, 151st Street to Pulaski Road, and Kenton Avenue to Kilbourn Avenue	Construct 25 ac-ft pumped detention facility downstream of Kilbourn Avenue and Waverly Avenue, earthwork including channel improvements and floodwall, and widened cross section width (combination of Alternatives MTCRG5-A1, MTCRG5-A2 and MTCRG5-A3)

Streambank Stabilization Alternatives. No streambank stabilization alternatives were developed for the MTCR-G5 Problem Group.

3.4.3.5.5 Alternative Evaluation and Selection, MTCR-G5

The alternatives included in **Table 3.4.28** were evaluated to determine their effectiveness and produce data required for the countywide prioritization of watershed projects. The flood control alternatives were modeled to evaluate their

impacts on water elevations and flood damages. **Table 3.4.30** provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data for the preferred alternative.

Alternative MTCRG5-A4 from **Table 3.4.28** is the preferred alternative for Problem Group MTCR-G5. With the 5,900 linear feet of channel improvements and the earthen berm, the building structures between 151st Street and Pulaski Road are protected during the 100-year event. Due to the limited availability of the right-of-way, a 100 linear-foot floodwall on the upstream side of Pulaski Road is needed to control the flooding. A 25 acre-foot pumped detention facility downstream of Kilbourn Avenue and Waverly Avenue is needed to control the stage increases from the channel improvements. With the preferred alternative, the 25 building structures will be protected from flooding.

Table 3.4.29 provides a comparison of the modeled water surface elevation and modeled flow at the time of peak for MTCR-G5.

Table 3.4.29: Alternative Condition Flow & WSEL Comparison for Problem Group MTCR-G5

Location	Station	Existing Conditions		Alternative MTCRG5-A4	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of Waverly Avenue	23028	626.24	517	625.70	521
Upstream of Pulaski Road	18642	618.82	616	620.38[1]	616

[1]Levee provides protection.

3.4.3.5.6 Data Required for Countywide Prioritization of Watershed Projects, MTCR-G5

Appendix I presents conceptual level cost estimates for the recommended alternative. **Table 3.4.30** lists the alternative analyzed in detail. The recommended alternative consists constructing an earthen levee adjacent to flooded properties. **Figure 3.4.9** shows the location of the recommended alternative and a comparison of the inundation area for existing conditions with the reduced inundation area resulting from the recommended alternative.

Table 3.4.30: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization for Problem Group MTCR-G5

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures & Roadways Protected	Water Quality Benefit	Involved Community
MTCR-G5	MTCRG5-A4	Detention Pond and Earthen Levee	< 0.01	$58,000	$21,000,000	25 Structures	No Impact	Tinley Park

Note: Net Benefits values do not include local benefits or non-economic benefits.

3.4.3.6 MTCR-G6– Midlothian Creek Problem Group 6

3.4.3.6.1 Problem Definition, MTCR-G6

The MTCR-G6 problem group consists of overbank flooding downstream of 139th and 137th Streets along Kedzie Avenue in the Village of Robbins. The flooding is due to the low ground elevation on the right overbank and causes inundation of approximately 25 properties. The 100-year flow (810 cfs) exceeds the capacity of the channel at this location and the critical elevation is 598.6 feet. This problem area was shown on the recent DFIRM floodplain maps. The flood protection elevation near this problem area would be 597.5 feet. Flood protection elevations were developed based on field reconnaissance of the area based on typical residential structures.

3.4.3.6.2 Damage Assessment, MTCR-G6

Damages were defined following the protocol defined in the CCSMP. Critical duration analysis was performed to determine the highest flood stages for Midlothian Creek and its tributaries. These stages were used to calculate the depth of flooding and then to estimate damages at each flooding problem area. The District's Stormwater Planning Database Tool was used to estimate the damages. Property damages for each building structure were calculated and transportation damages were estimated at 15 percent of the property damages, unless otherwise noted. Recreational damages were estimated based on depth and duration of flooding. **Table 3.4.31** lists the estimated damages for the problem group.

Table 3.4.31: Estimated Damages for MTCR Subwatershed, Problem Group MTCR-G6

Problem Group ID	Damage Category	Estimated Damage ($)	Description
MTCR-G6	Property	$96,000	Structures at risk of flooding
	Transportation	$14,500	Assumed as 15% of property damage due to flooding
	Recreation	$0	

3.4.3.6.3 Technology Screening, MTCR-G6

Several combinations of technologies were analyzed to address the flooding problems at this location. Flood control technologies from the CCSMP were considered as potential solutions for the regional flooding problems. **Table 3.4.32** summarizes the evaluation of these technologies in terms of their potential feasibility for this problem group.

Table 3.4.32: Evaluation of Flood Control Technologies for MTCR Subwatershed, Problem Group MTCR-G6

Flood Control Option	Feasibility
Detention Facilities	Feasible but not ideal preferred alternative
Conveyance Improvement – Culvert/Bridge Replacement	Feasible but not preferred given alternative
Conveyance Improvement – Channel Improvement	Feasible. Needed to lower the peak stages
Conveyance Improvements – Diversion	Not feasible. There is already a diversion conduit near this problem location
Flood Barriers, Levees/Floodwalls	Feasible. There may be some stage increases downstream

3.4.3.6.4 Alternative Development, MTCR-G6

Flood Control Alternatives. Alternative solutions to regional flooding problems were developed and evaluated consistent with the methodology described in Section 1.4 of this report. **Table 3.4.33** summarizes flood control alternatives developed for Problem Group MTCR-G6.

Table 3.4.33: Flood Control Alternatives for Problem Group MTCR-G6

Alternative	Location	Description
MTCRG6-A1	Between 139th and 137th Streets	Widen the channel to increase the hydraulic capacity of the channel. This alternative effectively reduces water surface elevations in the flooding problem area

Streambank Stabilization Alternatives. No streambank stabilization alternatives were developed for the MTCR-G6Problem Group.

3.4.3.6.5 Alternative Evaluation and Selection, MTCR-G6

The alternative included in **Table 3.4.33** was evaluated to determine its effectiveness and produce data required for the countywide prioritization of watershed projects. The flood control alternative was modeled to evaluate its impact on water elevations and flood damages. **Table 3.4.35** provides a summary B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data for the preferred alternative.

Alternative MTCRG6-A1 from **Table 3.4.33** is the preferred alternative for this problem group. 1,200 linear feet of channel improvements is recommended including widening of the channel from 22 feet to 39 feet and lowering the bottom of the channel by 0.5 foot. The 100-year water surface elevation will be reduced to 596.8 feet which is approximately 1.8 feet below the existing 100-year elevation near the problem area. With the preferred alternative, the channel flow will be contained within the banks and 25 building structures will be protected from flooding.

Table 3.4.34 provides a comparison of the modeled water surface elevation and modeled flow at the time of peak for MTCR-G6.

Table 3.4.34: Alternative Condition Flow & WSEL Comparison for Problem Group MTCR-G6

Location	Station	Existing Conditions		Alternative MTCRG6-A1	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Upstream of 139th Street	9889	599.15	809	597.85	810
Downstream of 139th Street	9547	598.95	809	597.49	810
Upstream of 137th Street	8447	595.32	947	595.32	951

3.4.3.6.6 Data Required for Countywide Prioritization of Watershed Projects, MTCR-G6

Appendix I presents conceptual level cost estimates for the recommended alternative. **Table 3.4.35** lists the alternative analyzed in detail. The recommended alternative consists of approximately 1,200 linear feet of channel improvements. **Figure 3.4.10** shows the location of the recommended alternative and a comparison of the inundation area for existing conditions with the reduced inundation area resulting from the recommended alternative.

Table 3.4.35: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization for Problem Group MTCR-G6

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures & Roadways Protected	Water Quality Benefit	Involved Community
MTCR-G6	MTCRG6-A1	Channel improvements	0.23	$110,000	$479,000	25 Structures	No Impact	Robbins

Note: Net Benefits values do not include local benefits or non-economic benefits.

3.4.3.7 MTCR-G7– Midlothian Creek Problem Group 7

3.4.3.7.1 Problem Definition, MTCR-G7

The MTCR-G7 problem group consists of overbank flooding of two isolated structures along the Twin Lakes Tributary in Oak Forest. One building structure is a commercial building located near southwest corner of 167th Street and Cicero Avenue, and the other building structure is a residential structure located approximately 2,000 feet upstream of the 167th Street culvert.

3.4.3.7.2 Damage Assessment, MTCR-G7

Damages were not calculated since the proposed alternative for MTCR-G7 is a non-structural measure such as floodproofing or acquisition only.

3.4.3.7.3 Technology Screening, MTCR-G7

Several combinations of technologies were analyzed to address the flooding problems at this location. Flood control technologies from Chapter 6 of the CCSMP were considered as potential solutions for the regional flooding problems. **Table 3.4.36** summarizes the evaluation of these technologies in terms of their potential feasibility for this problem group.

Table 3.4.36: Evaluation of Flood Control Technologies for Midlothian Creek Subwatershed, Problem Group MTCR-G7

Flood Control Option	Feasibility
Detention Facilities	Not feasible for the isolated structures
Conveyance Improvement – Culvert/Bridge Replacement	Not feasible for the isolated structures
Conveyance Improvement – Channel Improvement	Not feasible for the isolated structures
Conveyance Improvements – Diversion	Not feasible for the isolated structures
Flood Barriers, Levees/Floodwalls	Not feasible for the isolated structures

3.4.3.7.4 Alternative Development, MTCR-G7

Flood Control Alternatives. No flood control alternatives were developed for isolated structures.

Streambank Stabilization Alternatives. No streambank stabilization alternatives were developed for the MTCR-G7 Problem Group.

3.4.3.7.5 Alternative Evaluation and Selection, MTCR-G7

Since the building structures are isolated, relatively small in number, and their risk of flooding cannot be feasibly mitigated by structural measures, the structures are candidates for protection using non-structural flood control measures such as floodproofing or acquisition. The decision to acquire vs. floodproof should be taken on a case-by-case basis and be based on actual surveyed first floor elevations.

3.4.3.7.6 Data Required for Countywide Prioritization of Watershed Projects, MTCR-G7

None of the structural alternatives considered was effective in reducing flood damages for the two isolated building structures; therefore, benefits and costs are not presented for this alternative. No structural measures are recommended for Problem Group MTCR-G7.

3.4.3.8 NTCR-G1 – Natalie Creek Problem Group 1

3.4.3.8.1 Problem Definition, NTCR-G1

The NTCR-G1 problem group consists of overbank flooding in Oak Forest and Midlothian along Natalie Creek from Laramie Avenue to Keystone Avenue. In this reach, 100-year flows ranging between 410 cfs at Lavergne Avenue, 515 cfs at 149th and Kilpatrick Avenue and 280 cfs at Keystone Avenue exceed the capacity of the channel. The combined Oak Forest and Midlothian flooding includes approximately 130 building structures. These problem areas are shown on the recent DFIRM floodplain maps. The flood protection elevation varies between 645.8 feet at Laramie Avenue to 613.0 feet at Karlov Avenue.

3.4.3.8.2 Damage Assessment, NTCR-G1

Damages were defined following the protocol defined in the CCSMP. Critical duration analysis was performed to determine the highest flood stages for Natalie Creek and its tributaries. These stages were used to calculate the depth of flooding and then to estimate damages at each flooding problem area. The District's

Stormwater Planning Database Tool was used to estimate the damages. Property damages for each building structure were calculated and transportation damages were estimated at 15 percent of the property damages, unless otherwise noted. Recreational damages were estimated based on depth and duration of flooding. **Table 3.4.37** lists the estimated damages for the problem group.

Table 3.4.37: Estimated Damages for Calumet Union Drainage Ditch Subwatershed, Problem Group NTCR-G1

Problem Group ID	Damage Category	Estimated Damage ($)	Description
NTCR-G1	Property	$12,790,000	Structures at risk of flooding
	Transportation	$1,920,000	Assumed as 15% of property damage due to flooding
	Recreation	$0	

3.4.3.8.3 Technology Screening, NTCR-G1

Several combinations of technologies were analyzed to address the flooding problems at this location. Flood control technologies from Chapter 6 of the CCSMP were considered as potential solutions for the regional flooding problems. **Table 3.4.38** summarizes the evaluation of these technologies in terms of their potential feasibility for this problem group.

Table 3.4.38: Evaluation of Flood Control Technologies for MTCR Subwatershed, Problem Group NTCR-G1

Flood Control Option	Feasibility
Detention Facilities	Feasible and necessary
Conveyance Improvement – Culvert/Bridge Replacement	Not adequate to address flooding, but needed at few locations
Conveyance Improvement – Channel Improvement	Not adequate to address flooding
Conveyance Improvements – Diversion	Feasible and necessary
Flood Barriers, Levees/Floodwalls	Impractical given other technologies

3.4.3.8.4 Alternative Development, NTCR-G1

Flood Control Alternatives. Alternative solutions to regional flooding problems were developed and evaluated consistent with the methodology described in Section 1.4 of the DWP. **Table 3.4.39** summarizes flood control alternatives developed for Problem Group NTCR-G1.

Table 3.4.39: Flood Control Alternatives for Problem Group NTCR-G1

Alternative	Location	Description
NTCRG1-A1	153rd Street and Leclaire	New detention facility to detain the peak flows
NTCRG1-A2	149th Street and Kilpatrick Diversion Conduit	Construct new diversion conduit to divert peak flows
NTCRG1-A3	Between Laramie and Karlov Avenue	Culvert improvements to increase hydraulic capacity
NTCRG1-A4	153rd Street and Leclaire, 159th Street and Kilpatrick Avenue and Laramie to Karlov Avenue	New detention facility, new diversion conduit and culvert improvements (combination of Alternatives NTCRG1-A1, NTCRG1-A2, and NTCRG1-A3)

Streambank Stabilization Alternatives. No streambank stabilization alternatives were developed for the NTCR-G1 Problem Group.

3.4.3.8.5 Alternative Evaluation and Selection

Alternatives included in **Table 3.4.39** were evaluated to determine their effectiveness and produce data required for the countywide prioritization of watershed projects. Flood control alternatives were modeled to evaluate their impact on water elevations and flood damages. **Table 3.4.41** provides a summary of the B/C ratio, net benefits, total project costs, number of structures protected, and other relevant alternative data for the preferred alternative. Alternatives that did not produce a significant change in inundation areas are not listed, as benefits were negligible, and thus costs were not calculated for these alternatives.

Alternative NTCRG1-A4 from **Table 3.4.39** consists of the preferred alternative for this problem group. The project components for this alternative include:

- A new pumped detention facility (190 acre-feet) at Leclaire Avenue and 153rd Street with a control structure at Lavergne Avenue
- Culvert improvements to increase the hydraulic capacity of Leclaire Avenue. Increase the existing opening from a twin - 7-foot x 4.6-foot box culvert to a twin - 10-foot x 5-foot box culvert
- A new 6,600 linear-foot diversion conduit (6-foot x 4-foot) from 149th Street and Kilpatrick along 149th Street up to Keystone Avenue and north on Keystone Avenue up to the existing diversion conduit on Natalie Creek near Pulaski Road
- Culvert improvements to increase the hydraulic capacity of Karlov Avenue. Increase the existing opening from (3) 4-foot x 2.83-foot culverts to one box culvert of 14-foot x 3.5-foot

- Construct an enclosed 270 linear-foot concrete lined channel from Keystone Avenue to Pulaski Road to tie the new diversion conduit with the existing diversion conduit

- Construct a 600 linear-foot floodwall upstream of Leclaire Avenue to protect the inundated properties along both the banks

With the above project components, the modeled peak flow at Lavergne Avenue is reduced from 410 cfs to 167 cfs, at Kilpatrick Avenue the peak flow is reduced from 514 cfs to 77 cfs, and at Keystone Avenue the peak flow is reduced from 278 cfs to 188 cfs. Approximately 130 properties are protected from flooding and a non-structural measure such as floodproofing or acquisition is recommended for five properties that would be subject to flooding should the recommended alternative be implemented.

Table 3.4.40 provides a comparison of the modeled water surface elevation and modeled flow at the time of peak for NTCR-G1.

Table 3.4.40: Alternative Condition Flow & WSEL Comparison for Problem Group NTCR-G1

Location	Station	Existing Conditions		Alternative NTCRG1-A4	
		Max WSEL (ft)	Max Flow (cfs)	Max WSEL (ft)	Max Flow (cfs)
Downstream of Lavergne Avenue	17646	640.52	410	639.27	210
Upstream of 151st Street	16239	638.99	435	636.74	242
Upstream of 149th Street	14538	633.64	514	631.73	84
Upstream of Kenton Avenue	13666	630.75	462	628.53	98
Upstream of Karlov Avenue	9225	614.31	291	613.48	186
Upstream of Keystone Avenue	8972	614.07	279	612.93	190

3.4.3.8.6 Data Required for Countywide Prioritization of Watershed Projects

Appendix I presents conceptual level cost estimates for the recommended alternative. **Table 3.4.41** lists the alternative analyzed in detail. The recommended alternative consists of a new reservoir in Oak Forest, a new diversion conduit in Midlothian and culvert improvements along Natalie Creek. **Figure 3.4.11** shows the location of the recommended alternative and a comparison of the inundation area for existing conditions with the reduced inundation area resulting from the recommended alternative.

Table 3.4.41: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization for Problem Group NTCR-G1

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Cumulative Structures Protected	Water Quality Benefit	Involved Community
NTCR-G1	NTCRG1-A4	New detention facility, new diversion conduit and culvert improvements	0.24	$14,700,000	$61,940,000	132 Structures	No Impact	Oak Forest and Midlothian

Note: Net Benefits values do not include local benefits or non-economic benefits.

3.4.4 Recommended Alternatives, Midlothian Creek Subwatershed

Table 3.4.42 summarizes the recommended alternatives for the Midlothian Creek subwatershed. The District will use data presented here to support prioritization of a countywide stormwater CIP.

Table 3.4.42: Midlothian Creek Project Alternative Matrix to Support District CIP Prioritization, All Problem Groups

Group ID	Alternative ID	Description	B/C Ratio	Net Benefits ($)	Total Project Cost ($)	Structures & Roadways Protected	Water Quality Benefit	Involved Community
MTCR-G1	MTCRG1-A1	Earthen levee and Interior drainage	0.08	$134,000	$1,710,000	25 Structures	No Impact	Tinley Park
MTCR-G2	MTCRG2-A1	Stream bank stabilization at Oak Park Avenue and 172nd Street and also at Hickory Street and 66th Court	0.71	$1,110,000	$1,569,000	4 Structures	No Impact	Tinley Park
MTCR-G3	MTCRG3-A4	Replace crossings	0.01	$37,000	$3,455,000	23 Structures, 2 Roadways	No Impact	Oak Forest
MTCR-G4	MTCRG4-A4	Replace crossings and construct floodwall	0.04	$1,143,000	$27,700,000	12 Structures, 2 Roadways	No Impact	Oak Forest
MTCR-G5	MTCRG5-A4	Detention pond and earthen levee	< 0.01	$58,000	$21,000,000	25 Structures	No Impact	Tinley Park
MTCR-G6	MTCRG6-A1	Channel Improvements	0.23	$110,000	$479,000	25 Structures	No Impact	Robbins
NTCR-G1	NTCRG1-A4	New detention facility, new diversion conduit and culvert improvements	0.24	$14,700,000	$61,940,000	132 Structures	No Impact	Oak Forest and Midlothian

Note: Net Benefits values do not include local benefits or non-economic benefits.