# 2. Watershed Characteristics

## 2.1 General Watershed Description

The NBCR watershed is located in northeastern Cook County, Illinois. The headwaters of the three major tributaries, the West Fork, the Middle Fork, and the Skokie River, are located in Lake County. These tributaries flow south and combine with the NBCR at two separate confluence points. Another tributary, the NSC, enters the system near Albany Avenue in Chicago. Twenty municipalities are located entirely, or in part, in the watershed, and the entire watershed is approximately 141 square miles. The downstream limit of the NBCR is at the confluence with the Chicago River and South Branch near West Lake Street. This reach has been widened and dredged, with widths up to 300 feet and depths of 10 to 15 feet. For the next seven miles upstream to the North Branch Dam, the river is about 90 feet wide with a depth of 10 feet.

The NSC flows into the NBCR near Albany Avenue. The channel is a nearly 8-mile long manmade canal constructed in the early 1900s to carry wastewater from the northern suburbs away from LM. With a depth of 15 feet, and a width of 30 feet, its conveyance capacity was 2,000 cfs when constructed. The flow and water surface elevation in the NSC are controlled by the Wilmette Pumping Station at the upstream end.

The Skokie River flows from Waukegan south to its confluence with the NBCR just south of Winnetka Road. Near the county line, the Botanical Garden Diversion, about 1 mile in length, diverts flow around the Chicago Botanic Gardens located north of Dundee Rd. Proceeding south to Willow Road, the river is divided into several parallel components: the Skokie Lagoons, the Skokie River, the Skokie River West Diversion Ditch, and the Skokie River East Diversion Ditch. The east and west diversion ditches were first created in the 1930s to help keep impure water in the Skokie River from flowing into the Skokie Lagoons, a group of 7 lagoons created by the dam at Willow Road. The Skokie Lagoons were created in 1933 by the Civilian Conservation Corps as an effort to drain the Skokie Marsh. The Skokie Marsh was converted to the Skokie Lagoons to minimize flooding in the western part of town.

The Middle Fork begins in Libertyville and flows south through Northbrook and Northfield to the confluence with the NBCR. The Middle Fork and the Skokie River combine about a ¼ mile downstream of Happ Road to form the NBCR.

The West Fork flows from Everett Road in Lake County through portions of Deerfield, Northbrook, and Glenview. Tributaries include: the Underwriters Tributary, the South and North Forks of the Techny Drain, the Techny Drain, and the North and South Navy Ditches. The West Fork combines with the NBCR just upstream of Beckwith Road in Niles.

The LM watershed includes areas tributary to LM in Wisconsin, Illinois, Indiana, and Michigan. The portion of the watershed included in this report is located in eastern Cook County south of Lake-Cook Road and north of the Chicago River. The watershed is generally less than 1¼ miles wide and in some locations is about ½ mile wide.

The NSC connects LM to the NBCR watershed. During normal operation, the channel is an outlet for local stormwater flows, which flow downstream to the confluence with the North Branch. The channel also provides diversion of Lake Michigan flows at Wilmette Pumping Station. The controlling works regulate the amount of Lake Michigan flows diverted to the North Branch through a vertical lift gate. During large storm events, when the combined sewer system capacity is exceeded, flows may be diverted into Lake Michigan at this location.

Figure ES.1 shows the municipal boundaries and the major streams within the NBCR and LM watersheds. Figure ES.1 also shows the subwatershed divides for the major streams within the NBCR watershed. Table 2.1.1 lists the municipalities within the NBCR and LM watersheds. Table 2.1.2 lists the stream lengths of major streams and tributaries to the NBCR.

TABLE 2.1.1
Municipalities in the NBCR and LM Watersheds within Cook County

| Municipality | % of Municipality Area within NBCR & LM Watershed | % of NBCR & LM Watershed Area by Municipality | Municipality | % of Municipality Area within NBCR & LM Watershed | % of NBCR & LM Watershed Area by Municipality |
|---|---|---|---|---|---|
| Chicago | 26 | 43.5 | Niles | 74 | 3.1 |
| Deerfield | 9 | 0.5 | Norridge | 31 | 0.4 |
| Evanston | 100 | 5.4 | Northbrook | 87 | 7.8 |
| Glencoe | 100 | 2.7 | Northfield | 100 | 2.0 |
| Glenview | 88 | 7.5 | Park Ridge | <1 | <0.1 |
| Golf | 100 | 0.3 | Skokie | 100 | 7.1 |
| Harwood Heights | 48 | 0.3 | Wilmette | 100 | 3.8 |
| Kenilworth | 100 | 0.4 | Winnetka | 100 | 2.7 |
| Lincolnwood | 100 | 1.9 | Unincorporated | 2 | 4.5 |
| Morton Grove | 100 | 3.6 | | | |

TABLE 2.1.2
NBCR and LM Watersheds Open Channel Stream Lengths

| Open Channel Name | Length (miles) |
|---|---|
| North Branch | 24.6 |
| North Shore Channel | 7.7 |
| West Fork | 9.5 |
| Underwriter's Tributary | 0.3 |
| Techny Drain | 2.2 |
| South Fork Techny Drain | 0.6 |
| North Navy Ditch | 0.5 |
| North Navy Ditch Diversion | 0.2 |
| South Navy Ditch | 0.5 |
| Skokie River | 3.6 |
| Skokie Lagoons | 6.4 |
| Skokie River West Ditch | 3.3 |
| Skokie River East Ditch | 3.9 |
| Skokie River Botanic Garden Diversion | 2.0 |
| Middle Fork | 6.5 |
| Ravine 1 | 0.7 |

TABLE 2.1.2
NBCR and LM Watersheds Open Channel Stream Lengths

| Open Channel Name | Length (miles) |
|---|---|
| Ravine 2 | 0.7 |
| Ravine 3 | 0.1 |
| Ravine 4 | 0.6 |
| Ravine 5 | 0.9 |
| Ravine 6 | 0.3 |
| Ravine 7 | 0.3 |
| Ravine 8 | 1.8 |
| **Total** | **75.5** |

NOTE: Stream Lengths given are only for Cook County portions of the individual reaches

Table 2.1.3 lists the subwatersheds each municipality drains to, with subwatersheds listed in decreasing order based upon the area within the municipality. Although municipalities contribute stormwater to the listed subwatersheds, the actual stream may not be included within the municipality's boundaries.

TABLE 2.1.3
Municipality and Subwatersheds within the Municipality Boundary

| Municipality | Subwatersheds within Municipality Boundary (square miles) |
|---|---|
| Chicago | Mainstem (49.21), Lake Michigan(7.81), North Shore Channel(7.11) |
| Deerfield | West Fork(0.51), Middle Fork[b] |
| Evanston | North Shore Channel(4.91), Lake Michigan (2.60), Skokie River (0.13) |
| Glencoe | Skokie River(1.91), Lake Michigan(1.82) |
| Glenview | West Fork(9.39), Mainstem (1.97), Middle Fork(0.34), Skokie River[b] |
| Golf | West Fork(0.34), Mainstem(0.11) |
| Harwood Heights | Mainstem(0.38) |
| Kenilworth | Lake Michigan(0.60), Skokie River[b] |
| Lincolnwood | North Shore Channel(2.68) |
| Morton Grove | Mainstem(4.99), West Fork[b], North Shore Channel[b] |
| Niles | Mainstem(4.06), North Shore Channel(0.28), West Fork[b] |
| Norridge | Mainstem(0.56) |
| Northbrook | West Fork(7.77), Middle Fork(2.16), Skokie River(1.38) |
| Northfield | Middle Fork(1.95), Skokie River(1.08), West Fork(0.19) |
| Park Ridge | Mainstem[b] |
| Skokie | North Shore Channel(8.68), Skokie River(1.34), Mainstem[b] |
| Wilmette | Skokie River(3.03), North Shore Channel(1.32), Lake Michigan(0.83), Mainstem(0.15) |
| Winnetka | Skokie River(2.49), Lake Michigan(1.34) |
| Unincorporated | Skokie River(2.05), West Fork(1.08), Mainstem(0.81), Middle Fork(0.56), Lake Michigan[b] |

[b]Less than 0.1 square miles within municipality contributes to subwatershed

## 2.2 Stormwater Problem Data

To support DWP development, the District solicited input from stakeholders within the watershed. Municipalities, townships, and countywide, statewide, and national agencies such as Cook County Highway Department (CCHD), Illinois Department of Natural Resources (IDNR), Illinois Department of Transportation (IDOT), and the USACE, for example, were asked to fill out two forms with information to support DWP development. Organizations such as ecosystem partnerships were also contacted by the District as part of this information-gathering effort. Form A included questions on stormwater data and regulations, Form B questions on known flooding, erosion, and stream maintenance problem areas. In addition to problem areas reported by municipalities, townships, public agencies and other stakeholders, results of H&H modeling performed as a part of DWP development identified stormwater problem areas. The H&H modeling process is described in general in Section 1.3 and specifically for each modeled reach in Section 3.

Figure 2.2.1 and Table 2.2.1 summarize the responses to Form B questions about flooding, erosion, and stream maintenance problem areas. Table 2.2.1 also includes the problem areas identified during the workshops with the WPC. As noted, the scope of the DWP addresses regional problems along open channel waterways. The definition of regional problems was provided in Section 1.

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-NBCD-CH-FL-01 | City of Chicago | Intracommunity (local) flooding | Citywide | Basement flooding, storm water sewer flow restriction. City sewer improvements are often focused towards areas of the most complaints. | Local | 5 |
| NB-NBCD-CH-FL-02 | City of Chicago | Intracommunity (local) flooding | Illinois Rt 19 at Ravenswood Pkwy (both sides) | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-03 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at California Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-04 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Edens Junction (Montrose to Wilson) | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-05 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Addison St (NWB & SEB) | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-06 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Fullerton Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-07 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Ogden Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-08 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Augusta Blvd (Lane 3) NB | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-09 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at IL Rt 50 (Cicero Ave) Lane 3 | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-10 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Damen Ave (Lane 1) NB | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-11 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Division St | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-12 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at IL Rt 64 (North Ave) Lane 1 NB | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-13 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Diversey Ave | IDOT Pavement flooding | Local | 5 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-NBCD-CH-FL-14 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Kimball (Exit 4) | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-15 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Ashland Ave (Lane 1) NB | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-16 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Montrose Ave | IDOT Pavement flooding | Local | 6 |
| NB-NBCD-CH-FL-17 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Kostner Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-18 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Logan Blvd | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-19 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Armitage Ave (Lane 1) NB | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-20 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at IL Rt 19 (Irving Park Rd) Lane 1 SB | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-21 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Pulaski Rd entrance ramp | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-22 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Willow St (W/O) | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-23 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 94 (Edens) at Wilson Rd (N/O Kennedy) | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-24 | City of Chicago | Intracommunity (local) flooding | Illinois Route 43 at IL Rt 72 (Higgins Rd) Lane 2 | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-25 | City of Chicago | Intracommunity (local) flooding | Lawrence Ave at C, M & St. Paul Rd (viaduct) W/O I-94 | IDOT Pavement flooding | Local | 5 |
| NB-NBCD-CH-FL-26 | City of Chicago | Intracommunity (local) flooding | Lawrence Ave at Milwaukee Ave | IDOT Pavement flooding | Local | 5 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-NBCD-CH-WQ-27 | City of Chicago | Intracommunity (local) flooding | Citywide | Basement flooding, storm sewer flow restriction, water quality (pollution). The City sewer improvements are often focused towards areas of the most complaints. | Local | 5 |
| NB-NBCU-CH-ER-28 | City of Chicago | Streambank erosion on intercommunity waterways | LaBagh Woods - Bryn Mawr & Kostner Ave | FPDCC reported off-site stormwater volumes are causing downcutting in a ditch, thereby lowering the water table in the adjacent natural wetland areas. | Regional | 1 |
| NB-NBCU-CH-FL-29 | City of Chicago | Intracommunity (local) flooding | Citywide | Basement flooding, storm water sewer flow restriction throughout area. City sewer improvements are often focused towards areas of the most complaints. | Local | 5 |
| NB-NBCU-CH-FL-30 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Central Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-31 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Milwaukee Ave (Lane 3) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-32 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90/94 at Jefferson, Park Tunnel (NR Ainslie St) Lane 3 | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-33 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 94 (Edens) at N Elston Ave (SB) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-34 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90 at Austin Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-35 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90 at Lawrence Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-36 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90 at Bryn Mawr Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-37 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 90 at Nagle Ave (NB ramp) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FR-38 | City of Chicago | Intercommunity (regional) flooding | Albany Park | FPDCC reported off-site stormwater volumes are causing downcutting in a ditch, thereby lowering the water table in the adjacent natural wetland areas - (ponding checked on form B) | Regional | 1 |
| NB-NBCU-CH-WQ-39 | City of Chicago | Intracommunity (local) flooding | Citywide | Basement flooding, storm sewer flow restriction, water quality (pollution) throughout area. The City sewer improvements are often focused towards areas of the | Local | 5 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| | | | | most complaints | | |
| NB-NBCU-CH-WQ-40 | City of Chicago | Intracommunity (local) flooding | Throughout Chicago wetland areas | FPDCC reported off-site stormwater volumes are causing downcutting in a ditch, thereby lowering the water table in the adjacent natural wetland areas - (wetland issue considered WQ) | Local | 4 |
| NB-NSCH-CH-FL-41 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 94 at Peterson/Caldwell Ave | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-CH-FL-42 | City of Chicago | Intracommunity (local) flooding | Interstate Rt 94 at US Rt 14 | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-CH-FL-43 | City of Chicago | Intracommunity (local) flooding | Devon Ave @ 2570 Devon Ave | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FL-44 | City of Chicago | Intracommunity (local) flooding | Central Avenue at South of Devon Avenue | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-CH-FR-45 | City of Chicago | Intercommunity (regional) flooding | Albany Park | Overbank flooding throughout the community | Regional | 1 |
| LM-EV-SM-01 | City of Evanston | Streambank erosion on intracommunity waterways | Lake Michigan Beachfront | Erosion at outfall at beach - maintenance | Local | 6 |
| NB-NSCH-EV-FL-02 | City of Evanston | Intracommunity (local) flooding | Various locations in Evanston | Map of the pavement flooding for the September 2008 storm. | Local | 5 |
| NB-NSCH-EV-FL-03 | City of Evanston | Intracommunity (local) flooding | Various locations in Evanston | Map of the basement flooding for the September 2008 storm. | Local | 5 |
| NB-NSCH-EV-FL-04 | Village of Skokie, City of Evanston | Intracommunity (local) flooding | McCormick Blvd at Golf Rd (1/4 mile N/O) | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-EV-FL-05 | City of Evanston | Intracommunity (local) flooding | McCormick Boulevard at Bridge Street (Northwest Corner) | IDOT Pavement flooding | Local | 5 |
| LM-GC-EL-01 | Village of Glencoe | Streambank erosion on intracommunity waterways | Ravines | Erosion in ravines | Local | 6 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-SKED-GC-FL-02 | Village of Glencoe | Intracommunity (local) flooding | Dundee Rd storm sewer (60" dia Sewer) | Dundee Road storm sewer Most flooding localized to intersections and private properties | Local | 3,5 |
| NB-NBCU-GV-FL-01 | Village of Glenview | Intracommunity (local) flooding | Sunset Ridge Rd - East Lake Ave to Skokie Rd | Pavement flooding | Local | 5 |
| NB-NBCU-GV-FL-02 | Village of Glenview | Intracommunity (local) flooding | East of Harm Road South of Lake Avenue | Pavement flooding | Local | 5 |
| NB-NVDN-GV-ER-03 | Village of Glenview | Streambank erosion on intracommunity waterways | John's Drive at Willow Rd | Stream bank destabilization, erosion and sedimentation, and wetland/riparian areas at risk. Trees along channels continually contribute to log jams. Invasive species degrade habitat. | Regional | 1 |
| NB-NVDN-GV-SM-04 | Village of Glenview | Stream maintenance | North Navy Ditch beginning at John's Dr. Navy Ditch confluence with West Fork | Following removal of buckthorn/brush from North Navy Ditch, remaining large cottonwood/box elder trees exposed to greater wind force, causing limb breakage/tree failure and minor re-blockage of channel | Regional | 1 |
| NB-NVDS-GV-ER-05 | Village of Glenview | Streambank erosion on intercommunity waterways | Lehigh Road and Chestnut | Stream bank destabilization, erosion and sedimentation, and wetland/riparian areas at risk. Trees along channels continually contribute to log jams. Invasive species degrade habitat. | Regional | 1 |
| NB-NVDS-GV-FR-06 | Village of Glenview | Intercommunity (regional) flooding | Tall Trees Subdivision | Overbank Flooding | Regional | 1 |
| NB-NVDS-GV-SM-07 | Village of Glenview | Stream maintenance | South Navy Ditch beginning at LeHigh Rd. South Navy Ditch confluence with West Fork | South Navy Ditch beginning at Lehigh Rd, Ongoing aging and breakage of trees along the South Navy Ditch eventually contributes to small log jams. | Regional | 1 |
| NB-NBCU-GV-FL-08 | Village of Glenview | Intracommunity (local) flooding | Village of Glenview - Villagewide | Ponding and storm sewer flow restriction village-wide. Numerous areas in the Village developed prior to the 1980s have inadequate storm water conveyance and detention | Local | 5 |
| NB-WFNB-GV-FR-09 | Village of Glenview | Intercommunity (regional) flooding | Techny Basin 32C Glenview | Overbank flooding - Techny Basin 32C provides bulk of the Village's upstream storm water protection storage within the West Fork NBCR watershed. Recent storms brought risk of extreme flooding. | Regional | 1 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-WFNB-GV-SM-10 | Village of Glenview | Stream maintenance | Willow Rd & Ravine Ave, Techny Basin 32C | Maintenance necessary at the MWRD maintained spillway that has been identified for years at the biannual inspections. | Regional | 1 |
| NB-WFNB-GV-FL-11 | Village of Glenview | Intracommunity (local) flooding | Illinois Tool Works Detention Pond | Local overbank flooding of existing detention pond due to debris collection at restrictor. Problem causing overbank flooding of local residents backyards and local power outages. | Local | 6 |
| NB-WFNB-GV-ER-12 | Village of Glenview | Streambank erosion on intercommunity waterways | River between Glenview Rd and Waukegan Rd | Stream bank destabilization, erosion and sedimentation, wetland/riparian areas at risk. Significant erosion and undermined turf on East bank of West Fork (400 linear ft). | Regional | 1 |
| NB-WFNB-GV-ER-13 | Village of Glenview | Streambank erosion on intercommunity waterways | Village of Glenview -Lot 16 Bank Stabilization | Stream bank destabilization, erosion and sedimentation, wetland/riparian areas at risk. Channel clogged primarily by woody debris. Banks unstable/choked with invasive species, particularly buckthorn. | Regional | 1 |
| NB-WFNB-GV-ER-14 | Village of Glenview | Streambank erosion on intercommunity waterways | 1201 Long Valey Road | Regional erosion occurring within 30 ft of residence on the west streambank. | Regional | 1 |
| NB-NBCU-GV-FL-15 | Village of Glenview | Intracommunity (local) flooding | Village of Glenview | Ponding/storm sewer flow restriction in ~30% Village that is completely/partially non-storm-sewered. Village Storm Water Study: inadequate storm water detention/conveyance, inlet capacity. | Local | 5 |
| NB-NBCU-GV-FL-16 | Village of Glenview | Intracommunity (local) flooding | Illinois Rt 43 at C, M, & St Paul RR | IDOT Pavement flooding | Local | 5 |
| NB-WRNB-GV-FL-17 | Village of Glenview | Intracommunity (local) flooding | Greenwood Ave at S/O West Lake Ave | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-GV-FL-18 | Village of Glenview | Intracommunity (local) flooding | Pfingston Rd North of Glenview Road, South of Knollwood Lane | Pavement flooding | Local | 5 |
| NB-WFNB-GV-FL-19 | Village of Glenview | Intracommunity (local) flooding | Shermer Rd North of Central Road, South of Robincrest Lane | Pavement flooding | Local | 5 |
| NB-WFNB-GV-FL-20 | Village of Glenview | Intracommunity (local) flooding | Harlem Ave North of Lake Street, West of Robincrest Lane | Pavement flooding | Local | 5 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-WFNB-GV-FL-21 | Village of Glenview | Intracommunity (local) flooding | Spruce Drive South of Lake St, West of LeHigh Ave | Pavement flooding | Local | 5 |
| NB-WFNB-GV-FL-22 | Village of Glenview | Intracommunity (local) flooding | Locust Lane and Rolwind Road | Pavement flooding | Local | 5 |
| NB-WFNB-GV-FL-23 | Village of Glenview | Intracommunity (local) flooding | Country Lane and North Branch Rd | Pavement flooding | Local | 5 |
| NB-WFNB-GV-FL-24 | Village of Glenview | Intercommunity (regional) flooding | Tall Trees Subdivision | Overbank flooding along West Fork | Regional | 1 |
| NB-WFNB-GV-SM-25 | Village of Glenview | Stream maintenance | West Fork at Willow Rd & Ravine Wayand at Chestnut Ave | Log jam flow obstruction, continuing onwards to river S of Loyola Academy athletic campus. Trash/woody debris in dry former river channel to N of Lot 16. | Regional | 1 |
| NB-WFNB-GV-ER-26 | Village of Glenview | Streambank erosion on intercommunity waterways | East side of West Fork NBCR, South of Glenview Rd; East side of West Fork NBCR, North of Waukegan Rd | Streambank Erosion | Regional | 1 |
| NB-WFNB-GV-WQ-27 | Village of Glenview | Streambank erosion on intercommunity waterways | Village of Glenview | Stream bank destabilization, erosion and sedimentation, water quality affected by pollution, wetland/riparian areas at risk. East bank (400 linear ft) shows significant erosion and undermined turf. | Regional | 1 |
| NB-WFNB-GV-FL-28 | Village of Morton Grove, Village of Glenview, Village of Golf | Intracommunity (local) flooding | Golf Rd E/O IL Rt 43 (Metra Viaduct) | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-GV-FL-29 | Village of Golf, Village of Glenview, Village of Morton Grove | Intracommunity (local) flooding | Golf Rd/Simpson St at C, M, & St Paul RR (viaduct) | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-GV-ER-30 | Village of Glenview | Streambank erosion on intercommunity waterways | Raleigh Road from York Road to Baffin Road | Streambank Erosion | Regional | 1 |
| NB-WFNB-GV-FL-31 | Village of Glenview | Intracommunity (local) flooding | Illinois Route 43 at S/O Lake Avenue (Block 1200) | IDOT Pavement flooding | Local | 5 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| LM-KW-SM-01 | Village of Kenilworth | Stream maintenance | Green Bay Road at Metra North Line | 48" culvert silted up and deteriorating - no flooding | Local | 5 |
| LM-KW-SM-02 | Village of Kenilworth | Stream maintenance | Sheridan Road - North of Kenliworth | Concrete pad surrounding MWRD interceptor is cracked and deteriorating | Local | 5 |
| NB-NSCH-LW-FL-01 | Village of Lincolnwood | Intracommunity (local) flooding | Various locations throughout the Village of Lincolnwood | Basement flooding/ponding/water quality pollution. Sewer/floor drain back ups, street flooding, overland flooding entering through window wells, etc. Insufficient capacity of combined sewer system. | Local | 5,6 |
| NB-NSCH-LW-FL-02 | Village of Lincolnwood | Intracommunity (local) flooding | Interstate Rt 94 (Edens) at Pratt Ave | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-LW-FL-03 | Village of Lincolnwood | Intracommunity (local) flooding | US Rt 41 at Crawford Ave | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-LW-FL-04 | Village of Lincolnwood | Intracommunity (local) flooding | Touhy Ave at Crawford Ave | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-LW-WQ-05 | Village of Lincolnwood | Intracommunity (local) flooding | Various locations throughout the Village of Lincolnwood | Basement flooding/ponding/water quality pollution. Sewer/floor drain back ups, street flooding, overland flooding entering through window wells, etc. Insufficient capacity of combined sewer system. | Local | 5,6 |
| NB-NSCH-LW-FL-06 | City of Chicago, Village of Lincolnwood | Intracommunity (local) flooding | McCormick Blvd at Devon Ave (50 ft north) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-MG-ER-01 | Village of Morton Grove | Streambank erosion on intercommunity waterways | Linne Woods, Village of Morton Grove | Tree impeding flow, failing streambank stabilization | Regional | 1 |
| NB-NBCU-MG-FL-02 | Village of Morton Grove, Village of Glenview | Intracommunity (local) flooding | Illinois Rte 43 at IL Rt 58 | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-MG-FL-03 | Unincorp Cook County, Village of Morton Grove, Village of Golf | Intracommunity (local) flooding | Golf Rd at West of Harms Rd | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-NB-ER-01 | Village of Northbrook | Streambank erosion on intercommunity waterways | Middle Fork adjacent to properties on Red Coach Lane | Red Coach Lane - Bank erosion and sedimentation. There is severe erosion along the east bank of the Middle Fork NBCR adjacent to the properties on Red Coach Lane. | Regional | 1 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-WFNB-NB-FR-02 | Village of Northbrook | Intercommunity (regional) flooding | Il Rt 68 at Waukegan Rd to Lee St/Shermer Rd | IDOT Pavement flooding due to overbank flooding of Middle Fork | Regional | 1 |
| NB-WFNB-NB-FR-03 | Village of Northbrook | Intercommunity (regional) flooding | Dundee at Timber Ln, Northbrook | IDOT Pavement flooding | Regional | 1 |
| NB-WFNB-NB-FL-04 | Village of Northbrook | Intracommunity (local) flooding | Illinois Rt 68 at Interstate Rt 94 (E/O @ Skokie Blvd) | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-NB-FL-05 | Village of Northbrook | Intracommunity (local) flooding | Interstate Rt 94 (Edens) at Il Rt 68 (Dundee Rd) | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-NB-FR-06 | Village of Northbrook | Intercommunity (regional) flooding | From Fieldwood Dr and Techny Rd to Techny Drain near its confluence with West Fork | Flooding within backwater influence of West Fork NBCR extending approx 2000ft upstream along Techny Drain. Property/structure flooding within the backwater influence for short localized storms | Regional | 1 |
| NB-WFNB-NB-ER-07 | Village of Northbrook | Streambank erosion on intercommunity waterways | Between Dundee Rd & Cherry Ln | Bank erosion and sedimentation. Severe bank erosion along both sides of West Fork NBCR | Regional | 1 |
| NB-WFNB-NB-ER-08 | Village of Northbrook | Streambank erosion on intercommunity waterways | Fair Lane near Dundee Road/Western Ave. intersection | Banks along the West Fork of the North Branch are severely eroded behind Fair Lane. | Regional | 1 |
| NB-WFNB-NB-FR-09 | Village of Northbrook | Intercommunity (regional) flooding | Somme Prairie Grove Forest Preserve - Dundee & Waukegan Rd | FPDCC reported that the West Fork often overtops its banks and spills warm urban runoff into preserve degrading wetland and native habitats adjacent to the river. | Regional | 1 |
| NB-WFNB-NB-WQ-10 | Village of Northbrook | Intercommunity (regional) flooding | Somme Prairie Grove Forest Preserve - Dundee & Waukegan Rd | FPDCC reported that the West Fork often overtops its banks and spills warm urban runoff into preserve degrading wetland and native habitats adjacent to the river. | Regional | 1 |
| NB-MFNB-NB-FR-11 | Village of Highland Park, Village of Northbrook, Village of Deerfield | Intercommunity (regional) flooding | Northbrook Court, Deerfield, Highland Park | Overbank flooding, storm sewer flow restriction, insufficient river capacity. Regional detention at Northbrook Court fills and backs up river to overflowing. Stream rises into street inlets, street floods | Regional | 1 |
| NB-WFNB-NB-FR-12 | Village of Northbrook | Intercommunity (regional) flooding | Techny Basin 32A (Meadowhill Park) | Overbank flooding, storm sewer flow restriction. Diversion culverts (triple elliptical pipes) prone to clogging during high flow events and do not allow a sufficient amount of water to pass through. | Regional | 1 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-WFNB-NB-FR-13 | Village of Northbrook, Unincorp Cook County | Intercommunity (regional) flooding | Techny Basin 32A (Meadowhill Park) | Overbank flooding. The Village of Northbrook's major storm sewer outfalls are submerged and conveyance problems result. | Regional | 1 |
| NB-WFNB-NB-FR-14 | Village of Glenview | Intercommunity (regional) flooding | Techny Basin 32B | Overbank flooding | Regional | 1 |
| NB-WFNB-NB-FR-15 | Unincorp Cook County, Village of Northbrook | Intercommunity (regional) flooding | Village of Northbrook, Unincorporated Cook Co | Overbank flooding, and storm sewer flow restriction. Overbank flooding and reduced conveyance capacity of sewers that get submerged. | Regional | 1 |
| NB-WFNB-NB-SM-16 | Unincorp Cook County, Village of Northbrook | Stream maintenance | Techny Rd – Western Ave to Waukegan Rd | CCHD reported that structure number 016-3234 over West Fork NBCR - some debris accumulation at the center pier. | Regional | 1 |
| NB-WFNB-NB-FR-17 | Northbrook, Unincorporated Cook County | Intercommunity (regional) flooding | Northbrook, Unincorporated Cook Co | Overbank Flooding | Regional | 1 |
| NB-SKRV-NB-FL-18 | Village of Northbrook | Intracommunity (local) flooding | Interstate Rt 94 (Edens) at Lake Cook Road | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-NB-FL-19 | Village of Northbrook | Intracommunity (local) flooding | Illinois Route 43 at Techny Road to Sherman Road | IDOT Pavement flooding | Local | 5 |
| NB-WFNB-NB-FL-20 | Village of Northbrook | Intracommunity (local) flooding | Willow Road, East of Sherman Road (railroad Viaduct) | IDOT Pavement flooding | Local | 5 |
| NB-MFNB-NB-ER-21 | Village of Northbrook | Streambank erosion on intercommunity waterways | Pebblebrook Rd | Regional erosion occurring greater than 30 ft from residences on west and east streambanks | Regional | 1 |
| NB-MFNB-NF-FR-01 | Village of Northfield | Intercommunity (regional) flooding | N Bristol & Robinhood Ln | Willow Hill Condos - Basement and local road flooding due to overbank flooding | Regional | 1 |
| NB-MFNB-NF-ER-02 | Village of Northfield | Intercommunity (regional) flooding | Robin Hood Ln | Complaints about bank erosion/scouring on Middle Fork along Robin Hood Lane. Bank erosion threatening to wash away road. | Regional | 1 |
| NB-MFNB-NF-ER-03 | Village of Northfield | Streambank erosion on intercommunity waterways | Meadowbrook Drive to Sunset Lane | Regional erosion occurring within 30 ft of residences and utility poles on west and east streambanks. | Regional | 1 |
| NB-MFNB-NF-ER-04 | Village of Northfield | Streambank erosion on intercommunity waterways | 2094 Middle Fork Road, Northfield, IL | Regional erosion occurring within 30 ft of residence on the west stream bank. | Regional | 1 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-MFNB-NF-ER-05 | Village of Northfield | Streambank erosion on intercommunity waterways | Willow Road to Abbot Court | Regional erosion occurring within 30 ft of residences on the west and east streambank of Middle Fork from Willow Road to Abbot Court. | Regional | 1 |
| NB-MFNB-NF-FL-06 | Village of Northfield | Intracommunity (local) flooding | East of Wagner Road, South of Willow Road | Pavement flooding | Local | 5 |
| NB-MFNB-NF-FR-07 | Village of Northfield | Intercommunity (regional) flooding | Interstate Rt 94 at Winnetka Ave to Skokie Rd (NB & SB) | IDOT Pavement flooding | Regional | 1 |
| NB-MFNB-NF-FR-08 | Village of Northfield | Intercommunity (regional) flooding | S side of Willow Rd over Middle Fork | Basement and local flooding due to Overbank flooding | Regional | 1 |
| NB-MFNB-NF-FR-09 | Village of Northfield | Intercommunity (regional) flooding | N side of Willow Rd over Middle Fork | Basement and local flooding due to Overbank flooding | Regional | 1 |
| NB-SKRV-NF-FR-10 | Village of Northfield | Intercommunity (regional) flooding | Interstate Rt 94 (Edens) at Skokie River | IDOT Pavement flooding | Regional | 1 |
| NB-SKWD-NF-FL-11 | Village of Northfield | Intracommunity (local) flooding | Willow Rd from Happ Rd to Interstate Rt 94 | IDOT Pavement flooding | Local | 5 |
| NB-SKWD-NF-FL-12 | Village of Northfield | Intracommunity (local) flooding | Willow Rd at Central Ave Pavement flooding | IDOT Pavement flooding | Local | 5 |
| NB-SKWD-NF-FR-13 | Village of Northfield | Intercommunity (regional) flooding | Interstate Rt 94 (Edens) at Willow Rd (NB & SB) | IDOT Pavement flooding | Regional | 1 |
| NB-MFNB-NF-FL-14 | Village of Northbrook, Village of Northfield, Village of Glenview, Unincorp Cook County | Intracommunity (local) flooding | Sunset Ridge Rd - East Lake Ave to Skokie Rd | CCHD reported that the 36" corrugated metal pipe West Side, 36" C.P. East Side, 1/4 mile North of Rolling Ridge Rd - some debris accumulation at the East end. | Local | 2, 6 |
| NB-MFNB-NF-FR-15 | Village of Northfield, Unincorp Cook County | Intercommunity (regional) flooding | Winnetka Rd - Wagner Rd to Happ Rd | CCHD reported that the creek floods the surrounding property in this area. | Regional | 1 |
| NB-SKRV-NF-FR-16 | Unincorp Cook County, Village of Northfield | Intercommunity (regional) flooding | Village of Northfield, Unincorporated Cook County | Unincorporated Cook County on Skokie River Downstream overbank flooding due to inefficient use of storage. | Regional | 1 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-MFNB-NF-ER-17 | Village of Northfield | Streambank erosion on intercommunity waterways | North of Winnetka Road along West side of Northfield Road | Streambank Erosion within 30ft of Northfield Road | Regional | 1 |
| NB-WFNB-NF-FL-18 | Village of Northfield | Intracommunity (local) flooding | Illinois Route 43 at Willow Road to Winnetka Road | IDOT Pavement flooding | Local | 5 |
| NB-SKRV-NF-FR-19 | Village of Northfield | Intercommuntity (regional) flooding | Willow heading East to I-94 | Overbank Flooding | Regional | 1 |
| NB-NBCU-NL-FL-01 | Village of Niles | Intracommunity (local) flooding | US Rt 14 at Illinois Rte 21 (Milwaukee Area) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-NL-FL-02 | Village of Niles | Intracommunity (local) flooding | Illinois Route 21 at Main St (S/O US Rt 14) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-NL-FL-03 | Village of Niles | Intracommunity (local) flooding | Illinois Rte 43 at Oakton St | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-NL-FL-04 | Village of Niles | Intracommunity (local) flooding | Dempster Street East of Harlem Avenue | Pavement flooding | Local | 5 |
| NB-NBCU-NL-FR-05 | Village of Niles | Intercommunity (regional) flooding | Tam Golf Course | During major storm events, overbank flooding of the adjacent golf course - Tam Golf Course and/or its buildings owned by the Niles Park District. | Regional | 1 |
| NB-NBCU-NL-FR-06 | Village of Niles | Intercommunity (regional) flooding | Harts Rd & Riverside Drive, Niles | Overbank flooding in areas of the intersection during severe storm events. | Regional | 1 |
| NB-NBCU-NL-FL-07 | Village of Niles | Intracommunity (local) flooding | IL Route 58 at Washington | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-NL-FL-08 | City of Chicago, Village of Niles | Intracommunity (local) flooding | Illinois Rte 43 at Howard St (N/O) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-NL-FL-09 | Village of Skokie, Village of Niles | Intracommunity (local) flooding | Gross Point Rd at 7500 Gross Point Rd | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-NL-ER-10 | Village of Niles | Streambank erosion on intercommunity waterways | Wood River Drive | Severe erosion problem along the NBCR for the townhouses located at 6620, 6622, 6624, 6626, 6628, 6630, 6632, 6634, 6636, 6638, and 6640 Wood River Drive. | Regional | 1 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-NBCU-SK-FL-01 | Village of Skokie | Intracommunity (local) flooding | Interstate Rt 94 at IL Rt 58 | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-02 | Village of Skokie | Intracommunity (local) flooding | US Rt 41 at Gross Point Rd | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-03 | Village of Skokie | Intracommunity (local) flooding | Gross Point between Emerson & Kenton | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-04 | Village of Skokie | Intracommunity (local) flooding | Church Rd at Gross Point Rd | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-05 | Village of Skokie | Intracommunity (local) flooding | Harms Flatwoods Forest Preserve -Old Orchard Rd and Harms Rd | FPDCC reported that off-site stormwater volumes from adjacent properties modifies the hydrology in this ecologically significant flatwoods community with endangered and threatened plant species. | Local | 6 |
| NB-NBCU-SK-WQ-06 | Village of Skokie | Intracommunity (local) flooding | Harms Flatwoods Forest Preserve -Old Orchard Rd and Harms Rd | FPDCC reported that off-site stormwater volumes from adjacent properties modifies the hydrology in this ecologically significant flatwoods community with endangered and threatened plant species. | Local | 6 |
| NB-NBCU-SK-FL-07 | Village of Skokie | Intracommunity (local) flooding | US Rt 41 at Skokie Swift (S/O Oakton St) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-08 | Village of Skokie | Intracommunity (local) flooding | Church Rd at Central Park (construction zone) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-09 | Village of Skokie | Intracommunity (local) flooding | Church St at E/O US Rt 41 (Skokie Blvd) | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-10 | Village of Skokie | Intracommunity (local) flooding | Oakton St at Skokie Blvd to McCormick Blvd | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-SK-FL-11 | City of Evanston, Village of Skokie | Intracommunity (local) flooding | US Rt 41 @ Old Orchard Rd to Golf Rd | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-SK-FL-12 | Village of Skokie, Village of Lincolnwood | Intracommunity (local) flooding | Interstate Rt 94 (Edens) at Touhy Ave (NB & SB) | IDOT Pavement flooding | Local | 5 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-NSCH-SK-FL-13 | Village of Skokie, Village of Lincolnwood | Intracommunity (local) flooding | McCormick Blvd at Touhy Ave to Howard Street | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-SK-FL-14 | Village of Skokie, City of Evanston | Intracommunity (local) flooding | McCormick Blvd at Emerson St | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-SK-FL-15 | Village of Skokie, City of Evanston | Intracommunity (local) flooding | McCormick Blvd at Oakton St (S/O) | IDOT Pavement flooding | Local | 5 |
| NB-NSCH-SK-FL-16 | Village of Skokie, City of Evanston | Intracommunity (local) flooding | Crawford Ave at N/O Golf Rd | IDOT Pavement flooding | Local | 5 |
| NB-NBCU-UC-ER-01 | Unincorporated Cook County | Streambank erosion on intercommunity waterways | Harms Flatwoods Forest Preserve -West of Old Orchard Rd and Harms Rd | FPDCC reported that properties on the west side of the preserve discharge stormwater directly to forest preserve with impacts of erosion, sedimentation, and habitat degradation. | Regional | 1 |
| NB-NBCU-UC-WQ-02 | Unincorporated Cook County | Intracommunity (local) flooding | Harms Flatwoods Forest Preserve -West of Old Orchard Rd and Harms Rd | FPDCC reported that properties on the west side of the preserve discharge stormwater directly to forest preserve with impacts of erosion, sedimentation, and habitat degradation. | Regional | 1 |
| LM-WK-EL-01 | Village of Winnetka | Streambank erosion on intracommunity waterways | Ravines | General streambank erosion ravines | Local | 6 |
| NB-SKRV-WK-FL-02 | Village of Winnetka | Intracommunity (local) flooding | Skokie Ditch | Flooding due to poorly defined overflow routes and inadequate capacity of Skokie Ditch storm sewers. | Local | 6 |
| LM-WK-ER-03 | Village of Winnetka, Village of Glencoe | Streambank erosion on intercommunity waterways | Lake Michigan Waterfront | Bluff erosion | Regional | 1 |
| NB-NBCU-WM-FL-01 | Village of Wilmette | Intracommunity (local) flooding | Various locations west of Ridge Rd in the Village of Wilmette | Ponding/storm sewer flow restriction after rain events in isolated low areas/storm restrictions. Storm sewer surcharging by high river water levels results in yard ponding/depressed driveways/garages | Local | 5 |
| NB-NBCU-WM-FL-02 | Village of Wilmette | Intracommunity (local) flooding | US Rt 41 at N/O Hibbard Rd | Pavement flooding | Local | 5 |
| NB-NBCU-WM-FL-03 | Village of Wilmette | Intracommunity (local) flooding | Interstate Rt 94 (Edens) at Glenview Rd | Pavement flooding | Local | 5 |

TABLE 2.2.1
Summary of Responses to Form B Questionnaire

| Problem ID | Municipality | Problem as Reported by Local Agency | Location | Problem Description | Local/ Regional | Reason for Classification |
|---|---|---|---|---|---|---|
| NB-NBCU-WM-FL-04 | Village of Wilmette | Intracommunity (local) flooding | Various locations in Wilmette | Map of the local ponding for the September 2008 Storm | Local | 5 |
| NB-NBCU-WM-FL-05 | Village of Wilmette | Intracommunity (local) flooding | Various locations in Wilmette | Map of the local basement flooding for the September 2008 storm | Local | 5 |
| NB-NBCU-WM-FR-06 | Village of Wilmette | Intercommunity (regional) flooding | Wilmette Golf Course | Flooding and ponding at the Wilmette Golf Course after rain events. High water levels in the river causes stormwater to back up within the golf course. | Regional | 1 |
| LM-MM-ER-01 | Village of Winnetka, Village of Glencoe | Streambank erosion on intercommunity waterways | Lake Michigan Waterfront | Bluff erosion | Regional | 1 |

Reasons for Regional / Local Classifications:
1. Located on an open channel waterway with greater than 0.5 square mile drainage area
2. Roadway culvert (two-lane road)
3. Roadway culvert (greater than two-lane road)
4. Located in headwater area (less than 0.5 square mile drainage area)
5. Located with storm sewer system (regardless of drainage area)
6. Located beyond immediate area of regional waterway and/or problem occurs on a local waterway

# 2.3 Watershed Analysis Data

## 2.3.1 Monitoring Data

### 2.3.1.1 USGS Gage Data

The U.S. Geological Survey (USGS) owns and maintains a nationwide network of stream gages used to record real-time measurements of the monitored stream's water surface elevations. Rating curves developed through periodic paired stage and flow measurements are used to develop rating curves for the stream, relating estimated flow to measured stage.

There are five primary USGS stream gages that were used for stage and flow calibration and verification. The West Fork gage at Dundee Road (05535500), Middle Fork gage at Lake-Cook Road (05534500), and Skokie River gage at Clavey Road (05535070) were used to hydrologically calibrate the flows entering the Cook County portion of the watershed from Lake County. Stage and flow comparisons were made at the Mainstem of the North Branch gages at Touhy Avenue (05536000) and Albany Avenue (05536105) for the calibration and verification events to ensure that they met District criteria for flow, volume, and stage.

For the NSC and Mainstem downstream of the North Branch Dam, the USACE used a number of USGS and MWRD elevation gages to calibrate and verify the CAWS model. More detail on this gage data usage can be found within the USACE report entitled, "Chicago Downtown Flooding Study Final Report."

TABLE 2.3.1
USGS Gage Data in the NBCR Watershed

| **Description** | **Stream Gage Site Data** | | **Stream Gage Site Data** | |
|---|---|---|---|---|
| **USGS GAGE #** | 05534500 | | 05535500 | |
| Location | North Branch Chicago River at Deerfield, IL | | WF of NB Chicago River at Northbrook, IL | |
| Latitude | 42°09'10" | | 42°08'18" | |
| Longitude | 87°49'07" NAD83 | | 87°50'05" NAD83 | |
| | Lake County, Hydrologic Unit 07120003 | | Cook County, Hydrologic Unit 07120003 | |
| Contributing drainage area: | 19.7 square miles | | 11.5 square miles | |
| Datum of gauge: | 638.88 ft above sea level NGVD29 | | 637.98 ft above sea level NGVD29 | |
| **Data Type** | **Begin Date** | **End Date** | **Begin Date** | **End Date** |
| Real-time | This is a real-time site. | | This is a real-time site. | |
| Peak stream flow | 03/15/1953 | 12/27/2008 | 03/14/1953 | 03/08/2009 |
| Daily Data | | | | |
| Discharge, $ft^3$/sec | 08/01/1952 | Current | 08/08/1952 | Current |
| Gage height, ft | 11/30/1993 | Current | 04/14/1994 | Current |
| Daily Statistics | | | | |
| Discharge, $ft^3$/sec | 08/01/1952 | 09/30/2009 | 08/08/1952 | 09/30/2009 |
| Gage height, ft | 11/30/1993 | 09/30/2009 | 04/14/1994 | 09/30/2009 |

| | | | | |
|---|---|---|---|---|
| Monthly Statistics | | | | |
| Discharge, $ft^3$/sec | 08/1952 | 09/2009 | 08/1952 | 09/2009 |
| Gage height, ft | 11/1993 | 09/2009 | 09/1994 | 09/2009 |
| Annual Statistics | | | | |
| Discharge, $ft^3$/sec | 1952 | 2009 | 1952 | 2009 |
| Gage height, ft | 1994 | 2009 | 1994 | 2009 |
| Field/lab water quality samples | 10/02/1974 | 04/29/1997 | 10/02/1974 | 08/09/1983 |

TABLE 2.3.1
USGS Gage Data in the NBCR Watershed

| **Description** | **Stream Gage Site Data** | | **Stream Gage Site Data** | |
|---|---|---|---|---|
| **USGS GAGE #** | 05536000 | | 05536105 | |
| Location | North Branch Chicago River at Niles, IL | | NB Chicago River at Albany Avenue at Chicago, IL | |
| Latitude | 42°00'44" | | 41°58'27" | |
| Longitude | 87°47'45" NAD83 | | 87°42'21" NAD83 | |
| | Cook County, Hydrologic Unit 07120003 | | Cook County, Hydrologic Unit 07120003 | |
| Contributing drainage area: | 100 square miles | | 113 square miles | |
| Datum of gauge: | 601.99 ft above sea level NGVD29 | | 580.67 ft above sea level NGVD29 | |
| **Data Type** | **Begin Date** | **End Date** | **Begin Date** | **End Date** |
| Real-time | This is a real-time site. | | This is a real-time site. | |
| Peak stream flow | 05/11/1951 | 06/19/2009 | 05/10/1990 | 06/19/2009 |
| Daily Data | | | | |
| Discharge, $ft^3$/sec | 10/01/1950 | Current | 10/01/1989 | Current |
| Gage height, ft | 10/01/1991 | Current | 10/01/1993 | Current |
| Daily Statistics | | | | |
| Discharge, $ft^3$/sec | 10/01/1950 | 09/30/2009 | 10/01/1989 | 09/30/2009 |
| Gage height, ft | 10/02/1991 | 09/30/2009 | 10/01/1993 | 09/30/2009 |
| Monthly Statistics | | | | |
| Discharge, $ft^3$/sec | 10/1950 | 09/2009 | 10/1989 | 09/2009 |
| Gage height, ft | 10/1991 | 09/2009 | 10/1993 | 09/2009 |
| Annual Statistics | | | | |
| Discharge, $ft^3$/sec | 1951 | 2009 | 1990 | 2009 |
| Gage height, ft | 1992 | 2009 | 1994 | 2009 |
| Field/lab water quality samples | 10/03/1974 | 04/29/1997 | none | none |

TABLE 2.3.1
USGS Gage Data in the NBCR Watershed

| Description | Stream Gage Site Data | |
|---|---|---|
| **USGS GAGE #** | 05535070 | |
| Location | Skokie River near Highland Park, IL | |
| Latitude | 42°09'35" | |
| Longitude | 87°47'53" NAD83 | |
| | Lake County, Hydrologic Unit 07120003 | |
| Contributing drainage area: | 21.1 square miles | |
| Datum of gauge: | 622.83 ft above sea level NGVD29 | |
| **Data Type** | **Begin Date** | **End Date** |
| Real-time | This is a real-time site. | |
| Peak stream flow | 06/10/1967 | 12/27/2008 |
| Daily Data | | |
| Discharge, $ft^3$/sec | 08/21/1967 | Current |
| Gage height, ft | 10/01/1993 | Current |
| Daily Statistics | | |
| Discharge, $ft^3$/sec | 08/21/1967 | 09/30/2009 |
| Gage height, ft | 10/01/1993 | 09/30/2009 |
| Monthly Statistics | | |
| Discharge, $ft^3$/sec | 08/1967 | 09/2009 |
| Gage height, ft | 10/1993 | 09/2009 |
| Annual Statistics | | |
| Discharge, $ft^3$/sec | 1967 | 2009 |
| Gage height, ft | 1994 | 2009 |
| Field/lab water quality samples | 10/01/1974 | 08/08/1983 |

### 2.3.1.2 Rainfall Data

Numerous sources of rain gage data were evaluated in order to build a gage network that would allow for complete coverage of the NBCR and LM watersheds. The final gage network consisted of four Cook County Precipitation Network (CCPN) gages and one Lake County Stormwater Management Commission (LCSMC) gage. The CCPN is a series of six mile grid spaced gages recorded at a 10-minute interval; the LCSMC gage network is a series of five mile grid spaced gages recorded at a 5-minute interval. Figure 2.3.1 shows locations where rainfall gage data was available to support the DWP. The subbasins for all four main reaches are shown on Figure 2.3.1 color-coded to indicate which subbasins were associated with which rainfall gages during the calibration process, which is discussed in detail in Section 3.

Information on the precipitation data used to calibrate the USACE CAWS model can be found in the report referenced in section 2.3.1.1.

#### 2.3.1.3 Stage Data

No additional stage data, outside of the USGS gage data was used to calibrate the NBCR models or LM models. Information on the stage data used to calibrate the USACE CAWS model can be found in the report referenced in section 2.3.1.1.

### 2.3.2 Subwatershed Delineation

The NBCR watershed and LM watershed was divided into subwatersheds representing areas tributary to the waterways in the study area. Elevation data provided by Cook County, described further in Section 2.3.4, was the principal data source used for subwatershed delineation. Drainage divides were established based upon consideration of the direction of steepest descent from local elevation maxima. Occasionally, Cook County elevation data contains constructed structures that do not represent surface hydrology, for instance, raised roadways that do not restrict overland flow. The delineation in these areas was modified to best represent surface hydrology. The storm-sewer network was also considered in the delineation of some areas, particularly in the low gradient areas of the lower Mainstem of the NBCR where ground slope was slight or inconclusive. Finally, reference of previous studies and consultation with community representatives helped resolve subwatershed boundaries in areas of question.

Following the definition of subwatersheds, tributaries studied in detail were divided into smaller subbasins, represented in the hydrologic model as having a unified response to rainfall. The size of subbasins varied based upon the drainage network density and proximity to the hydraulically modeled waterway. Subbasin boundaries were modified to generally encompass areas with similar development patterns. Boundaries were defined to most accurately represent the actual area tributary to specific modeled elements, such as constrictions caused by crossings, and reservoirs.

Figure 2.3.2 shows the subwatersheds and subbasins developed for the DWP. Subbasins were not defined for areas that were not modeled in detail. Subbasins in the NSC and Mainstem downstream of the North Branch Dam watersheds are part of the USACE CAWS model, and are not included in Figure 2.3.2. The subbasin delineations for these reaches can be found in the USACE report referenced in section 2.3.1.1.

### 2.3.3 Drainage Network

The principal waterways of the NBCR watershed and LM watershed were defined during Phase A of the watershed study. Initial identification of the stream centerline was made using planimetry data obtained from Cook County. Stream centerlines were reviewed against aerial photography and Cook County contour data at a 1:500 scale, and modified to best represent existing conditions. These streamlines were included in the topographic model of the NBCR watershed and LM watershed (see Section 2.3.4), and collect runoff from upland drainage areas. Secondary drainage ways that were not modeled were identified based upon review of contour data. In flat, heavily sewered areas, consultation of sewer atlases and discussion with community representatives helped to identify significant drainage paths. Secondary drainage ways were used to help define flow paths in the hydrologic models for individual tributaries.

Figure 2.3.3 shows the major drainage ways within the NBCR watershed and LM watershed superimposed upon an elevation map of the watershed.

### 2.3.4 Topography and Benchmarks

The NBCR watershed is generally defined by areas of high relief at the tributary headwaters in Lake County, and areas of very low relief as the NBCR combines with the North Shore Channel. The areas of low relief primarily occur in the City of Chicago, which is a heavily storm-sewered municipality.

Topographic data for the NBCR and LM watersheds were developed from Cook County light detection and ranging (LiDAR) data generated from a 2003 LiDAR mission (Cook County, 2003). The LiDAR data was obtained along with break lines from Cook County. A digital elevation model (DEM) was developed for the NBCR and LM watersheds based upon a subset of filtered elevation points. Figure 2.3.3 shows elevations within the watershed.

Stream channel cross section and stream crossing structure (such as bridge and culvert) topographic data was collected during field survey work conducted primarily between November 2008 and June 2009 to support the DWP. Additional field survey was performed in February 2010 and June 2010.

The reference benchmarks created during the Cook County aerial mapping project completed in 2003 were used to establish first-order control for field survey work. One hundred thirty-five control points were established during the mapping project. Of those, 25 are National Geodetic Survey (NGS)/High Accuracy Reference Network (HARN) control stations within Cook County and environs. The remaining points were either existing or new points identified as photo control specifically for the mapping project. 71NGS monuments within the region surrounding the NBCR and LM watersheds were observed, referenced to HARN, and used to establish first-order control, meeting the horizontal and vertical accuracy standards specified in FEMA's *Guidelines and Specifications for Flood Hazard Mapping,* "Guidance for Aerial Mapping" (FEMA 2003). The horizontal ground control was established by GPS technology, and horizontal positioning accuracy meets the specifications of the Federal Geodetic Control Subcommittee (FGCS) Second Order Class One.

### 2.3.5 Soil Classifications

NRCS soil data representative of 2002 conditions was obtained for Cook County. The NRCS soil data includes hydrologic soil group, representing the minimum infiltration rate of the soil after wetting. Table 2.3.2 summarizes the hydrologic soil groups. The NRCS provides two types of soil datasets for the area. One type is the Soil Survey Geographic, or SSURGO, dataset[1]. The SSURGO dataset is available for select areas and is a detailed soil survey. The City of Chicago is not included in the SSURGO dataset, although portions of the North Branch upper basin are included.

A second type of soils dataset developed by the NRCS is the U.S. General Soil Map (formerly the State Soil Geographic dataset), also known as STATSGO or STATSGO2[2]. STATSGO is more general than SSURGO and is based on a wide range of available soil literature. The City of

[1] http://soils.usda.gov/survey/geography/ssurgo/

[2] http://soils.usda.gov/survey/geography/statsgo/

Chicago and portions of the North Branch lower basin are mapped in the STATSGO dataset. The SSURGO dataset areas in the upper basin (the Skokie River, Upper North Branch, and a portion of the West Fork) are at a smaller, more refined scale than STATSGO. While SSURGO is the preferred dataset, the additional use of STATSGO in the lower basin shows soils with HSG ranging from "A" (low runoff potential) to "C" (moderately high runoff potential). The STATSGO soil dataset will be used to supplement SSURGO data, rather than assuming a uniform soil type. The STATSGO and SSURGO datasets can both be classified under the A-D hydrologic soil groups shown in Table 2.3.2.

TABLE 2.3.2
Hydrologic Soil Groups

| Hydrologic Soil Group | Description | Texture | Infiltration Rates (in./hr) |
|---|---|---|---|
| A | Low runoff potential and high infiltration rates even when wetted | Sand, loamy sand, or sandy loam | > 0.30 |
| B | Moderate infiltration rates when wetted | Silt loam or loam | 0.15–0.30 |
| C | Low infiltration rates when wetted | Sandy clay loam | 0.05–0.15 |
| D | High runoff potential and very low infiltration when wetted | Clay loam, silty clay loam, sandy clay, silty clay, or clay | 0–0.05 |

All data from *Technical Release 55, Urban Hydrology for Small Watersheds*, NRCS, June 1986

Soil groups with drainage characteristics affected by a high water table are indicated with a "/D" designation, where the letter preceding the slash indicates the hydrologic group of the soil under drained conditions. Thus, an "A/D" indicates that the soil has characteristics of the A soil group if drained but the D group if not. Because of the difficulty of establishing the extent of drainage of these soils for each mapped soil polygon, it was assumed that 50 percent (by area) of the soil types are drained. Table 2.3.3 summarizes the distribution of hydrologic soil type throughout the NBCR and LM watersheds. Figure 2.3.4 shows the distribution of soil types throughout the watersheds.

TABLE 2.3.3
Hydrologic Soil Group Distribution

| Hydrologic Soil Group | % of NBCR & LM Watershed |
|---|---|
| Unmapped | 0.5 |
| A/B | 17.8 |
| B | 0.8 |
| B/C | 57.7 |
| B/D | 1.6 |
| C | 19.4 |
| D | 2.2 |

## 2.3.6 Land Use

Land use has a significant effect on basin hydrology, affecting the volume of runoff produced by a given area and the speed of runoff delivered to the receiving system. Impervious areas restrict infiltration and produce more runoff, which is often delivered to receiving systems more rapidly through storm sewer networks. Land use was one of two principal inputs into the calculation of CN for the NBCR and LM watersheds, detailed more extensively in Section 1.3.2.

A 2001 land use inventory for the Chicago metropolitan area was received from CMAP in GIS format. The data was used to characterize existing conditions land use within the NBCR and LM watersheds. The data include 49 land use classifications, grouped into seven general categories for summarizing land use within the DWP. Table 2.3.4 summarizes the land use distribution within the NBCR and LM watersheds. Figure 2.3.5 shows the distribution of general land use categories throughout the watersheds.

TABLE 2.3.4
Land Use Distribution within the NBCR & LM Watersheds

| Land Use Type | Area ($mi^2$) | Area (%) |
|---|---|---|
| Residential | 82.2 | 58.4 |
| Forest/Open Land | 21.5 | 15.3 |
| Commercial/Industrial | 24.8 | 17.6 |
| Water/Wetland | 1.3 | 1 |
| Agricultural | 0.3 | 0.2 |
| Transportation/Utility | 3.7 | 2.6 |
| Institutional | 6.9 | 4.9 |

## 2.3.7 Anticipated Development and Future Conditions

Anticipated development within the NBCR and LM Watershed was analyzed using population projection data. Projected future conditions land use data for the NBCR and LM watersheds are unavailable from CMAP or other regional agencies. Projected 2030 population data for Cook County was obtained from CMAP. Population data was overlaid upon subwatershed boundaries to identify the potential for increases in subwatershed populations. Table 2.3.5 shows subwatersheds with a projected population increase from the year 2000 population. Projected increases in population along with current subwatershed land use conditions make it likely that there will also be a corresponding increase in impervious surface area. This potential change in impervious surface area could contribute to higher flow rates and volumes of stormwater runoff drained by those tributaries.

TABLE 2.3.5
Projected Population Increase by Subwatershed

| Name | 2000 Population | 2030 Population | Population Change | % Increase |
|---|---|---|---|---|
| West Fork | 101,441 | 112,691 | 11,250 | 11 |
| Middle Fork | 50,747 | 57,273 | 6,526 | 13 |
| Skokie River | 131,887 | 135,499 | 3,612 | 3 |
| Mainstem | 205,077 | 218,931 | 13,854 | 7 |
| Lake Michigan | 441,175 | 486,120 | 44,945 | 10 |

Management of future development may be regulated through both local ordinances and the Cook County Watershed Management Ordinance (WMO) as described below in Section 2.3.9. This regulation would be an effort to prevent an increase in peak flows, via the construction of site-specific stormwater controls. The impact of the modified hydrologic and hydraulic characteristics of the subwatersheds due to changing land use over time may require the recommended projects to be re-evaluated under the conditions at the time of implementation to refine the details of the final design. To accomplish this, it is recommended that at the time projects are implemented, if updated land use and topographic information is available, the H&H models be rerun incorporating this new data.

### 2.3.8 Wetland and Riparian Areas

Wetland areas within the NBCR and LM Watershed were identified using National Wetlands Inventory (NWI) mapping. NWI data includes approximately 2.6 square miles of wetland areas in the NBCR and LM Watershed. Riparian areas are defined as vegetated areas between aquatic and upland ecosystems adjacent to a waterway or body of water that provide flood management, habitat, and water quality enhancement. Identified riparian areas defined as part of the DWP offer potential opportunities for restoration. Figures 2.3.6 and 2.3.7 contain
mapping of wetland and riparian areas in the NBCR and LM Watershed, respectively.

### 2.3.9 Management of Future Conditions through the Regulations of Site Stormwater Management

The District regulates the discharge of stormwater runoff from development projects located within separate sewer areas within the District's corporate boundaries through its Sewer Permit Ordinance. Currently, development projects meeting certain thresholds must provide stormwater detention in an effort to restrict the post-development flow rate to the pre-development flow rate. A number of communities enforce standards beyond the District's currently required standards and thresholds. This DWP supports the continued regulation of future development through countywide stormwater management.

The Cook County WMO is under development and is proposed to provide uniform minimum countywide standards for site stormwater runoff for events up to and including the 100-year event that are appropriate for Cook County. This effort seeks to prevent post-development flows from exceeding pre-development conditions. The WMO is proposed to be a comprehensive ordinance addressing site runoff, floodplains, floodways, wetlands, soil erosion and sedimentation, water quality, and riparian environments.

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