

## 5. Summary and Conclusions

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The NBCR and LM DWP were developed in coordination with the North Branch of the Chicago River WPC. The coordination focused on integrating community knowledge of stormwater problems and ideas for feasible solutions into the District's regional stormwater plan. All stormwater problem data received from stakeholders was recorded in a spatial database, and classified as local or regional according to the criteria defined in Section 1. Hydrologic and hydraulic models were developed to estimate flow and stage along regional waterways and assess the frequency and depth of flooding problems for a range of modeled recurrence intervals. Inundation mapping was developed for the 2-, 5-, 10-, 25-, 50-, 100-year, and 500-year modeled storm events, identifying areas estimated to be at risk of flooding. Modeled water depths and inundation mapping were used to help estimate damages due to flooding within each tributary.

Stormwater improvements were developed to address regional problems throughout the NBCR watershed. Appropriate tributary-specific technologies were screened considering their applicability for addressing problem areas, constructability in the area required, and regulatory feasibility. H&H models were modified to represent possible future conditions. Damage estimates for proposed alternatives were performed to evaluate the alternative's effectiveness at reducing regional stormwater damages. The difference in damages between existing and alternative conditions was quantified as the alternative's benefit. In addition to numeric (monetary) benefits, several other criteria were noted for each alternative, such as the number of structures protected, water-quality benefit, and wetland/riparian areas affected. Conceptual level opinions of probable costs were developed to estimate the construction and maintenance cost of proposed alternatives over a 50-year period. The estimated benefits were divided by the conceptual costs to develop a B/C ratio for each alternative.

Figure 5.1 summarizes the extent to which recommended alternatives address existing regional financial damages within each stream reach, ordered by increasing existing conditions damages. The two line series illustrated on the graph represent existing condition damages and benefits, respectively, for each stream reach. The columns indicate the extent to which recommended alternatives address estimated damages, while the red B/C symbols indicate the combined benefit-cost ratio for alternatives associated with each stream reach. As an example, the recommended West Fork alternatives, WF-03 and WF-06, address roughly 65 percent of estimated damages along the West Fork (indicated by the column), which corresponds to a benefit of approximately \$148,034,000. In contrast, the recommended alternative that benefits the Skokie River, MS-14, addresses over 90 percent of the estimated damages along the Skokie River, but this project results in only about \$46,996,000 of benefit for the Skokie River reach.

In Figure 5.1, the Skokie River stream reach only reports the MS-14 project's benefits, project costs, and percent damages addressed on the Skokie River. MS-14 is the only project reported for the Skokie River stream reach since the Skokie River subwatershed benefits provided by this project are more comprehensive than the SR-08 project. However, due the low B/C ratio of MS-14, the SR-08 project has been included as a recommended project to serve

as an alternative feasible solution to the I-94 at Winnetka Road overbank flooding problem should the MS-14 project not be implemented. SR-08 is an alternative targeted specifically for overbank flooding only at I-94 and Winnetka Road, while MS-14 addresses overbank flooding of I-94 at Winnetaka Road, Willow Road, and Skokie River crossing, and provides additional benefits along the Middle Fork, Skokie, and Mainstem reaches; therefore, the SR-08 alternative is only recommended if MS-14 is not implemented. It should be noted that SR-08 addresses overbank flooding only at I-94 and Winnetka Road; however, this project does not address overbank flooding along I-94 at Willow Road and Skokie River crossing.

Figure 5.1  
North Branch of the Chicago River Watershed Alternative Summary

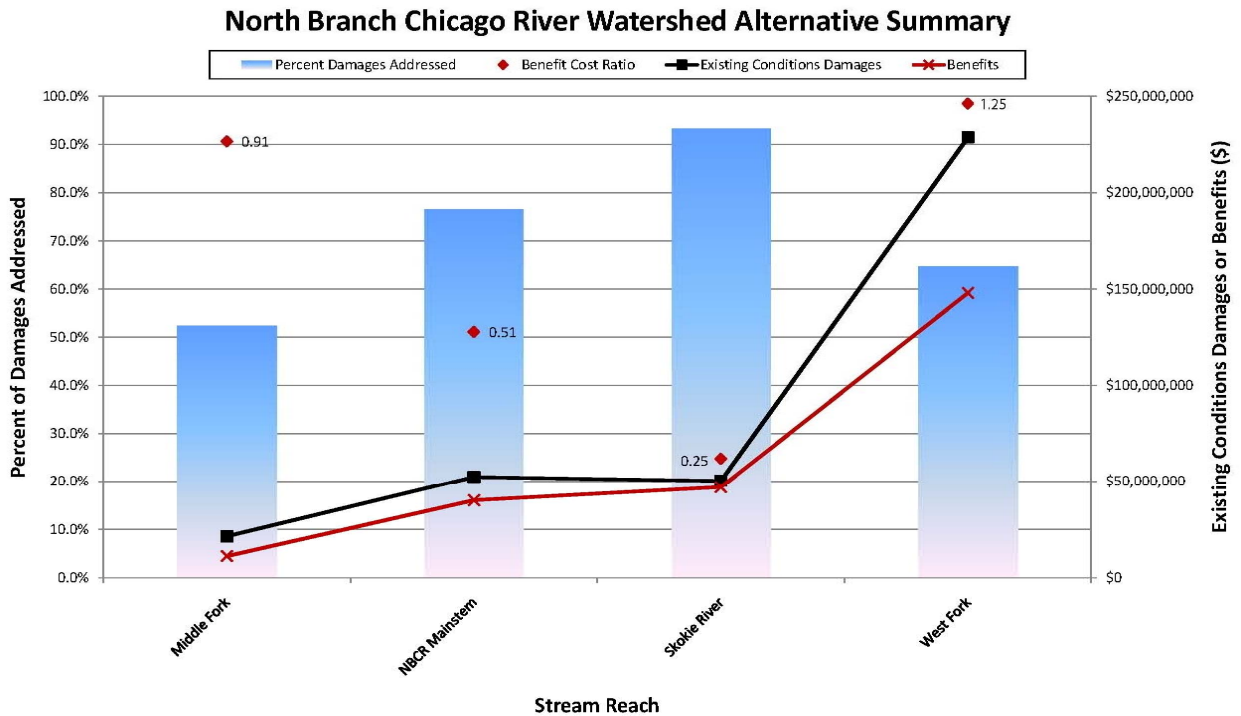


Figure 5.1 Notes:

1. Skokie River stream reach only includes benefits and damages addressed for the MS-14 project due to overlapping benefit with the SR-08 benefit.
2. Benefits, project costs, and damages addressed for the Middle Fork, NBCR Mainstem, and Skokie River stream reaches include results from the MS-14 project. Project costs have been prorated among the three reaches based on benefit percentage to each respective stream reach.

Because the MS-14 project provides benefits to the Middle Fork, Skokie, and NBCR Mainstem stream reaches, the benefits provided by MS-14 for each stream reach were incorporated into the percent damages addressed and B/C ratio for each stream reach. Distribution of project costs for MS-14 between the associated stream reaches was estimated by prorating the MS-14 project costs among the three reaches based on benefit percentage provided by MS-14 to each respective stream reach.

In general, the recommended alternatives listed in Table 4.2.1 can be constructed independently. However, in the case of SR-08 and MS-14, the alternatives and associated benefits are not independent. In this case, the SR-08 alternative is only recommended if MS-14 is not implemented. Because of the interaction of impacts between alternatives, the benefits associated with constructing several alternatives in a reach or subwatershed may exceed the sum of the benefits of the individual alternatives, or vice versa. Furthermore, by the nature

that streambank stabilization projects completely protect structures at imminent risk, all potential erosion damages are addressed with this type of project.

Estimated damage reductions result from proposed stormwater improvements that increase stormwater storage in the watershed, thereby reducing peak flows and stage, increasing conveyance to receiving systems (only if increased flows do not cause downstream damages), or channel protection measures to reduce erosion damages. Floodproofing alternatives, though feasible for addressing isolated shallow flooding issues, are not included in the summary statistics below due to the individualized way in which such measures would be implemented.

Benefits from proposed project alternatives are not distributed evenly throughout the NBCR watershed, but are generally concentrated in subwatersheds with greater existing conditions damages where capital improvement projects address these damages. Differences in the amount of available open land for stormwater alternatives also contribute to uneven distribution of benefits among subwatersheds. Recommended project alternatives do not generally address all existing damages from the 100-year design inundation areas, as sufficient open land is not always present in locations that can reduce floodwaters to the level that eliminates inundation of structures along regional waterways. In particular, it is noted that the enabling legislation (70 ILCS 2605/7h (g)) for the District's stormwater management program states "the District shall not use Cook County Forest Preserve District land for stormwater or flood control projects without the consent of the Forest Preserve District of Cook County (FPDCC)"; therefore proposed projects involving FPDCC property cannot be implemented without FPDCC's permission. The District will work collaboratively with FPDCC to develop multi-objective projects beneficial to both agencies along with our constituents and also consistent with our individual missions.

At the time of this report, the FPDCC and Wilmette Park District have indicated their unwillingness to provide land for the MS-14 alternative. It is also noted that, while MS-10 yields a higher B/C ratio, the City of Chicago supports the MS-07 alternative (Foster Avenue tunnel) in lieu of MS-10. The City of Chicago supports MS-07 because the tunnel would reduce flooding without buyouts, relocations, or construction of a wall through the neighborhood.

Regional stormwater problems, whether identified by stakeholders or identified by modeling of intercommunity waterways, indicate a need for regional stormwater management solutions throughout the NBCR watershed. Although regional stormwater problems are concentrated in more extensively developed and flatter areas of the NBCR watershed, significant regional stormwater problems are present throughout the watershed. If selected and constructed, the recommended capital improvement projects in Table 4.2.1 are expected to significantly reduce existing stormwater damages, although damages are expected to persist within the watershed even following construction of recommended projects. However, implementation of the recommended projects should reduce the number of homes and businesses adversely impacted by flooding and minimize severity of existing damages.

The regional stormwater management solutions recommended in this report have the potential to provide regional benefit to the watershed by reducing overbank flooding for a range of storm events. While current and recommended stormwater management focuses on providing protection for larger storm events, such as the 100 year frequency event, many of the recommended alternatives would provide a level of protection for more frequent smaller storm events. Reduction in overbank flooding would not only provide benefits by reducing damages to infrastructure, but may also provide benefits of increased mobility to the general public and opportunities for enhancing water quality and recreation. Communi-

ties and regulatory agencies can continue to work toward mitigation of stormwater damages by ensuring development is responsibly managed with special consideration given to potential stormwater impacts and the existing stormwater problems present within the watershed.