Release Rate Impacts Under Existing and Future Development in Collar Counties

WMO Article 208.3

Goals of Article 208.3 Study

Article 208.3 requests that impacts of release rates under existing and future development in collar counties are further studied. The goal of this study is to expand on the methodology used in Phases I and II of the Watershed Specific Release Rate Study to include an additional assessment of how watershed management decisions outside the Watershed Management Ordinance (WMO) regulatory area could impact potential future flood risks within Cook County. The analysis will include application of the Phase I and II methodology applied on areas outside of the WMO regulatory area that contribute flow to tributaries within the WMO regulatory area.

Methodology

The District proposes to contract an agreement with the Illinois State Water Survey to complete the analysis of this study. The methodology for selecting watershed specific release rates in Cook County was developed in Phase I and then broadly applied in Phase II. The Watershed Specific Release Rate Study resulted in release rates included in Appendix B of the May 16, 2019 Amendment to the WMO. The impact of the selection of release rates for future development was evaluated by comparing the results from the base models, which were established from the hydrologic and hydraulic models completed from the previous Detailed Watershed Plans (DWP), with results from the future scenario models. Future scenario model results using 40 percent development were compared to base model results to identify a release rate that meets the objective of mitigating increases in peak flood levels. In Phase II, the release rates used in the adjacent counties at the time of the analysis were unchanged for the future conditions analysis. In this study, the release rates in the areas of the watersheds that fall outside of the WMO jurisdiction will be varied to analyze the impacts to water surface elevations on streams within Cook County. The four release rates (0.15, 0.2, 0.25, and 0.3 cfs/acre) that were considered in Phase II will be analyzed for each collar county area tributary to the selected watersheds. The criteria identified in Phase I and II will be used to evaluate impacts to water surface elevation within Cook County due to alternative release rates used in adjacent counties. Analysis criteria will include the percentage of stream length with increases in peak water surface elevation greater than 0.1 foot, the maximum water surface increase at any cross section location, and the maximum water surface increase at any reservoir with model results showing an increased flood elevation.

Scope of Work

This study focuses on drainage areas considered as part of the Phase II analysis. Phase II carefully selected subwatersheds for analysis based on available data, known flood control projects, model stability, and which subwatersheds best represented the watershed. The subwatersheds identified in Phase II to have significant amounts of drainage areas outside of Cook County were considered for analysis in this study. While some portions of additional subwatersheds drain to Cook County, the study focuses on those subwatersheds with a significant amount of drainage area in an adjoining jurisdiction. Of those studied in Phase II, North Branch Watershed, Buffalo Creek Subwatershed, and Salt Creek Subwatershed include the highest percentages of drainage area in an adjoining jurisdiction and therefore would be most impacted by changes to management practices in the adjoining counties. Other subwatersheds were not included as they included a small percentage of drainage area falling within an adjoining jurisdiction, had ongoing

flood control projects expected to significantly alter subwatershed hydrology, or had models that were not available or compatible for incorporation into a base model. As such, North Branch Watershed, Buffalo Creek and Salt Creek Subwatersheds of the Lower Des Plaines Watershed will be studied.

North Branch Watershed

During Phase II, hydrologic and hydraulic modeling analyses were completed for modeled streams in the North Branch Watershed. While base runoff rates and elongated watershed shape were indicators that a more restrictive release rate may have helped mitigate future flood hazards in this watershed, Phase II results indicated that a more restrictive release rate was not necessary. As such, the release rate for the North Branch Watershed is 0.3 cfs/acre. The finding relied on the assumption that existing volume control and detention practices remained unchanged in Lake County.

For the North Branch Watershed, approximately 50 percent of the DWP drainage area is outside of Cook County. The area located outside of Cook County is included in the DWP hydrologic model. For this analysis, the same future development assumptions applied for Cook County in Phase II (40 percent development) will be applied to Lake County. The impacts of alternative release rates (0.2, 0.25, and 0.3 cfs/acre) in Lake County will be evaluated by observing the impacts to water surface elevations within the North Branch Watershed. The 0.15 cfs/acre release rate was previously analyzed for Lake County in Phase II. The 0.3 cfs/acre North Branch Watershed release rate will be used for the Cook County portion of the watershed for this study.

Lower Des Plaines Watershed

During Phase II, hydrologic and hydraulic modeling analyses were completed for modeled streams in the Lower Des Plaines Watershed. The Des Plaines DWP base conditions model includes separate models for each subwatershed draining to the Des Plaines River within Cook County. Buffalo Creek and Salt Creek subwatershed contain a significant amount of drainage area within Lake and DuPage Counties respectively.

For this analysis, the same future development assumptions applied for Cook County in Phase II (40 percent development) will be applied to Lake and DuPage Counties. The impacts of alternative release rates (0.2, 0.25, and 0.3 cfs/acre) in Lake County will be evaluated by observing the impacts to water surface elevations within Buffalo Creek Subwatershed. The 0.15 cfs/acre release rate was previously analyzed for Lake County in Phase II. The impacts of alternative release rates (0.15, 0.2, 0.25, and 0.3 cfs/acre) in DuPage County will be evaluated by observing the impacts to water surface elevations within Salt Creek Subwatershed. The 0.2 cfs/acre Lower Des Plaines Watershed release rate will be used for the Cook County portion of the watershed for this study.

Reporting

The impact of variation of release rates on peak flood levels will be documented for each area where hydrologic and hydraulic modeling is completed. A watershed exhibit comparing projected peak water surface elevations to the base condition peak water surface elevations will be completed for each future scenario. A final report will describe any variations in the methodology that was required based on available data and specific watershed attributes.