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**To:** Mike Staal and Carrie Rivette, City of Grand Rapids

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**From:** Dan Christian, Tetra Tech

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**Subject:** Subcatchments and Flow Paths

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One of the Stormwater Control Measures Design and Benefits Tools developed as part of the Stormwater, Wastewater (SAW) Grant Program was the delineation of subcatchments to all publicly owned catch basin (CB) inlets. The purpose of this analysis is to provide tributary drainage areas delineations to inlets to simplify future hydrologic calculations. Another tool developed was the overland flow path within each subcatchment. Overland flow paths within the subcatchment show the longest path for time of concentration calculations and illustrate the major drainage pathways and flow accumulation.

The analysis was conducted citywide using the digital elevation model (DEM) of the land surface and the ESRI Arc Hydro tools. The resultant information is too large and detailed to print. A GIS shapefile was provided as a deliverable. Figure 1 provides an example of the resulting subcatchment delineations and flow paths. The flow paths represent an accumulation of drainage area and are color coded by size. The analysis relies on known locations of CB inlets, which are typically limited to the City-owned CBs.

The subcatchment delineation information can be used to calculate stormwater runoff by combining the data with the impervious cover shapefile and using a volumetric runoff coefficient methodology or the Rational Method for peak flow. If using the Rational Method, the time of concentration may be estimated based on the length of the flow accumulation path. Alternatively, the impervious cover data files along with land use information may be converted to a Curve Number (CN) for use with the NRCS curve number hydrology approach.

Another possible application for this information is to intersect the flow accumulation lines with green infrastructure opportunity locations. This will provide an initial estimate of the tributary drainage area to potential green infrastructure practices. This helps in locating suitable green infrastructure by avoiding areas with little or no drainage, i.e., on top of a hill.

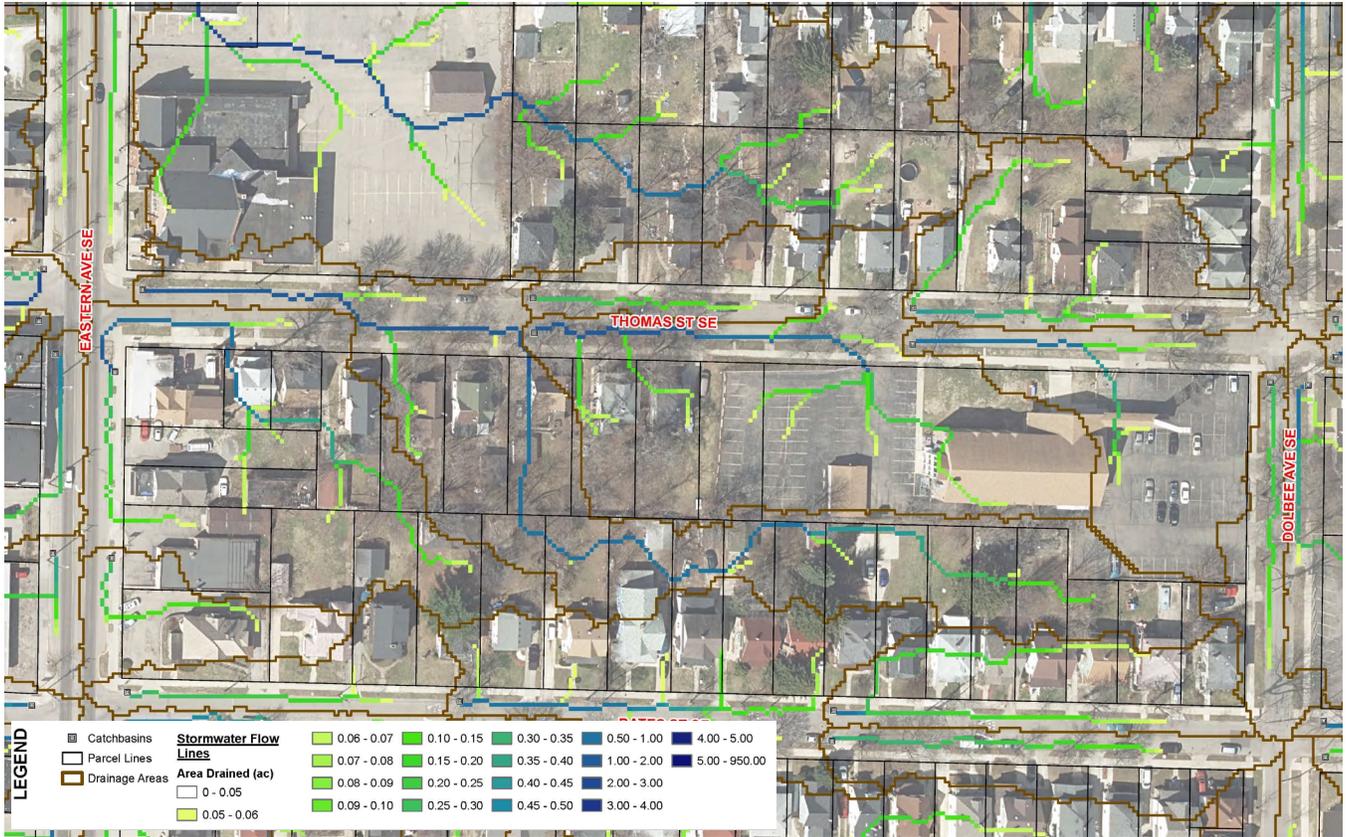


Figure 1 Example Subcatchment Delineation and Flow Paths