Technical Memorandum

To: Ben Scharenbroich
From: Jen Koehler, Lulu Fang, and Karen Chandler
Subject: City of Plymouth Doran Apartments Plymouth Office Center Redevelopment - XP-SWMM Evaluation
Date: May 1, 2024 -DRAFT
Project: 23/27-2051

Certification
I hereby certify that this memorandum was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Jennifer Koehler
PE #: 47500
Date

1 Introduction

The City of Plymouth received a development submittal from Doran Architecture for the Plymouth Office Center. This includes redevelopment of a 6.0-acre existing office complex at the northwest intersection of Harbor Lane N and Fernbrook Lane N into a multifamily residential development. The developer is proposing to replace a segment of public storm sewer that currently crosses the property. The City is concerned with existing flooding in the area as well as with the impact of the proposed redevelopment project.

The City requested that Barr update the current Bassett Creek Watershed Management Commission (BCWMC) XP-SWMM model to:

1. Include additional detail in the watershed area around the Plymouth Office Center location.
2. Evaluate existing conditions to better understand current flooding in the area.
3. Develop a version of the model that can be utilized by the developer to evaluate the impact of their proposed project.

2 Existing Conditions Evaluation Summary

Barr utilized the most current version of the BCWMC XP-SWMM model (approved by the BCWMC in August 2022) to perform this analysis. To reduce the model run times, we clipped the XP-SWMM model down to include the portion of the watershed including the Plymouth Creek section from the wetland downstream of 37th Ave to the crossing of 28th Ave. We compared the upstream and downstream water surface elevations to the full model results, and the differences in the model results were negligible.

In the existing XP-SWMM model, subwatershed PCE-029 includes the redevelopment parcels for the Plymouth Office Center as well as some of the upstream and downstream contributing areas. To improve the model resolution and to better understand the existing flooding in this local area, the larger subwatershed was subdivided into 8 smaller subwatersheds, as shown in Figure 1 and Figure 2.

The model updates included revisions to the storage for each smaller subwatershed area along with the storm sewer conveyance and overland flows for each area. We used Minnesota Department of Natural Resources (MnDNR) 2011 LiDAR data to generate individual storage curves in the new subwatersheds

and set the elevation of the surface overland flows. We used the storm sewer network information, based on GIS data from the city, to add the hydraulic details, like the pipe inverts, size, materials, and shape.

The imperviousness of the subwatershed areas surrounding the redevelopment area remain unchanged from the original model. We used the same hydrology input data from the 2017 BCWMC Phase II model to generate the runoff parameters for each of the smaller subwatershed areas.

Once updated, we ran the XP-SWMM model to evaluate the Atlas 14 2, 10, and 100-year, 24-hour design storm events. Table 1 below summarizes the peak water surface elevations for each subwatershed.

Table 1 Summary of Peak Water Surface Elevations (WSE)for Atlas 14 2, 10, and 100-year, 24-hour Design Storm Events

Subwatersheds	2-year 24-hour Peak WSE	10-year 24-hour Peak WSE	100-year 24-hour Peak WSE
PCE-029A	950.75	951.88	954.35
PCE-029B	955.44	956.54	957.38
PCE-029C	953.83	954.81	956.63
PCE-029D	956.27	956.96	957.50
PCE-029E	955.96	956.59	956.98
PCE-029F	956.51	957.34	958.89
PCE-029G	957.83	959.17	960.83
PCE-029H	954.48	955.18	956.87

Based on the peak water surface elevations and the 2011 LiDAR data, we developed existing conditions inundation mapping for the subwatersheds within the proposed development area for the 10-year and 100-year, 24-hour design events. We also used the most current Microsoft Building footprint GIS data and high resolution Near Map Areal imagery information to identify any potentially impacted structures within the study area. We also evaluated the existing pipe capacity in the main storm sewer system surrounding the proposed redevelopment site for the Atlas 14 10-year, 24-hour design event.

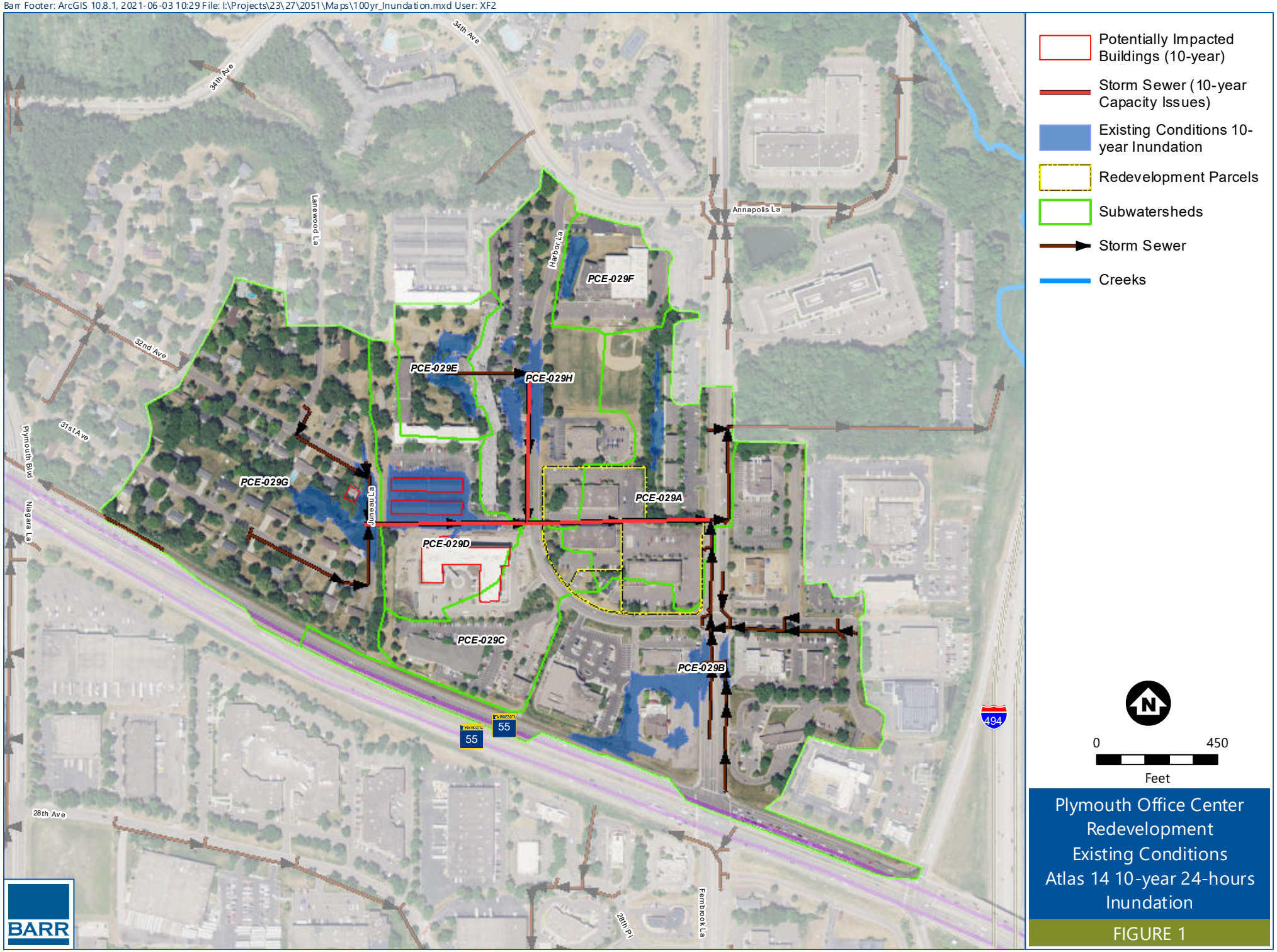
Figure 1 shows the approximate inundation areas, potentially impacted structures, and pipes with capacity concerns during the 10-year, 24-hour design storm event. We defined pipes with capacity concerns as those pipes that resulted in water coming out of manholes rims, catch basins, etc. during the 10-year event. Figure 2 shows the inundation mapping and identification of potentially impacted structures during the 100-year, 24-hour design event. Table 2 summarizes the number of potentially impacted structures for the 10-year and 100-year design storm events.

Table 2 Summary of Potentially Impacted Structures for Atlas 14 10, and 100-year, 24-hour Design Storm Events

Number of Impacted Structures (10-year 24-hour)	Number of Impacted Structures (100-year 24-hour)
4	9

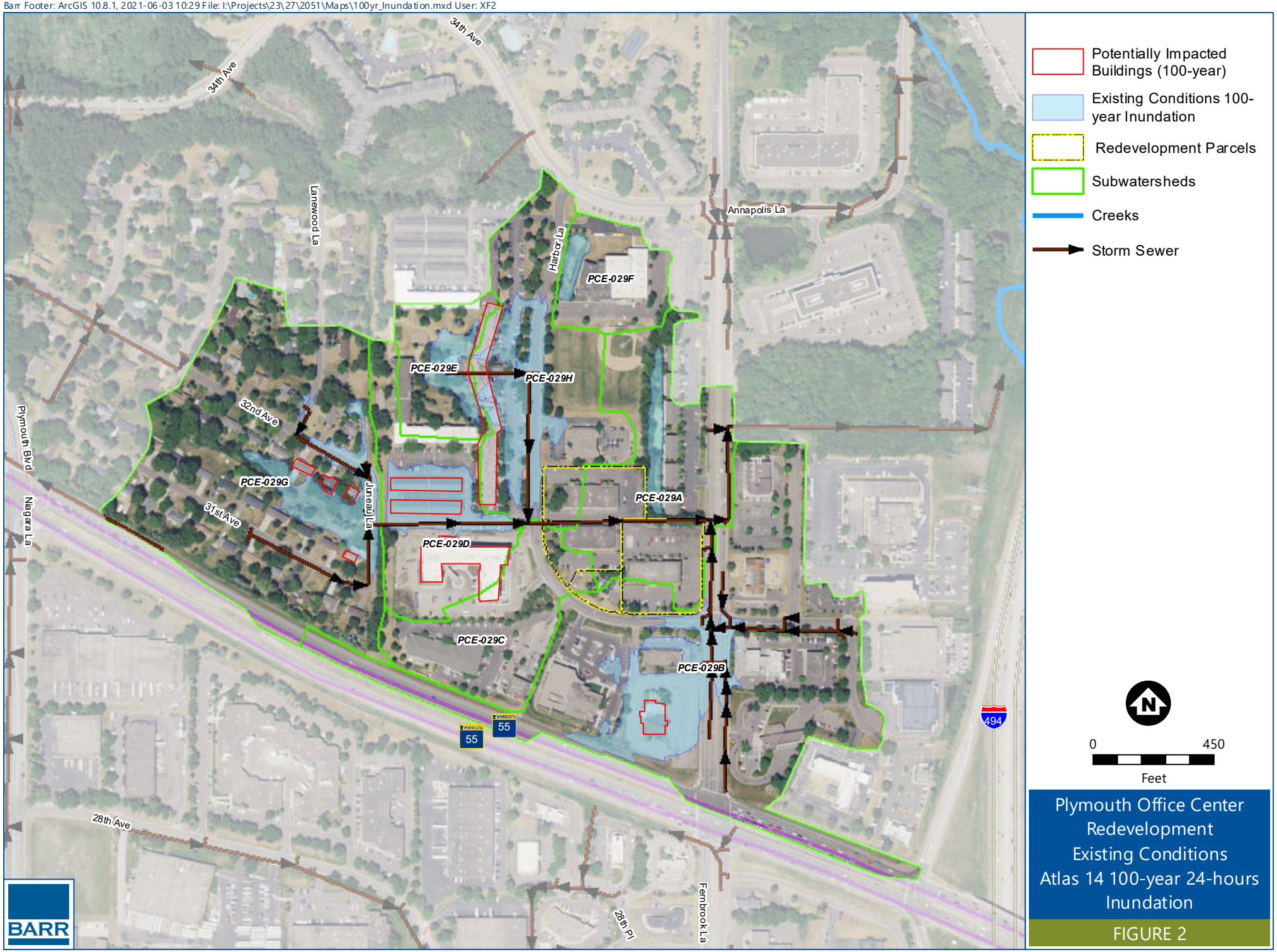
As shown in Figure 1, there are four potentially impacted structures upstream of the proposed redevelopment parcels during the 10-year design event. Additionally, we flagged several of the main storm sewer pipes in the area around the redevelopment parcels as having capacity issues during the 10-year event, including the pipe along Harbor Lane, the pipe from Juneau Lane to Harbor Lane, and the pipe through the redevelopment parcel. Given this, the city may want to consider increasing upstream storage and/or upsizing these storm sewer segments. For the segments along Harbor Lane and between Juneau Lane to Harbor Lane, this could be completed as part of future CIP/streets work to

reduce flood risk in the watershed area. However, if the developer will be replacing the public pipe segment through the Plymouth Office Center parcels as part of the redevelopment project, the City will want to work with the developer to appropriately size the pipe segment through the development to accommodate any future changes in the upstream storage and/or pipe sizes. It is worth noting that the downstream storm sewer system all the way to Plymouth Creek is a 48-inch equivalent storm sewer. Additionally, any modifications to storage and/or increases to the conveyance should be evaluated to understand impacts to the peak discharges to the Plymouth Creek.



Plymouth Office Center
Redevelopment
Existing Conditions
Atlas 14 10-year 24-hours
Inundation

FIGURE 1


34th Ave
34th Ave
Lanewood La
Harbor La
Annapolis La
PCE-029F
PCE-029E
PCE-029H
32nd Ave
Plymouth Blvd
PCE-029G
Juneau La
31st Ave
Niagara La
PCE-029A
PCE-029D
PCE-029C
PCE-029B
55
55
494
28th Ave
28th Pl
Fernbrook La
Potentially Impacted Buildings (100-year)
Existing Conditions 100-year Inundation
Redevelopment Parcels
Subwatersheds
Creeks
Storm Sewer
N
0
450
Feet
Plymouth Office Center
Redevelopment
Existing Conditions
Atlas 14 100-year 24-hours
Inundation
FIGURE 2
BARR