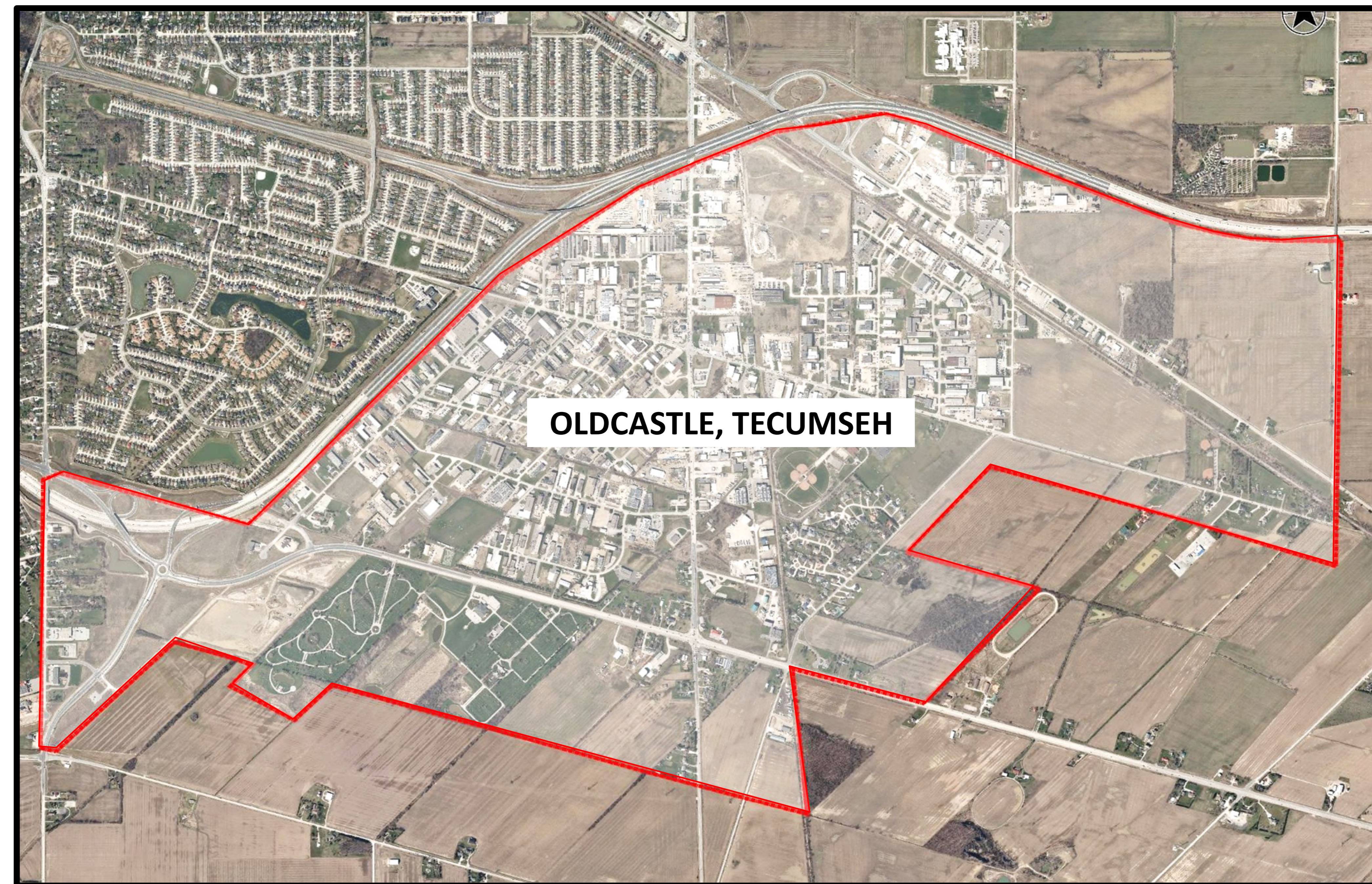


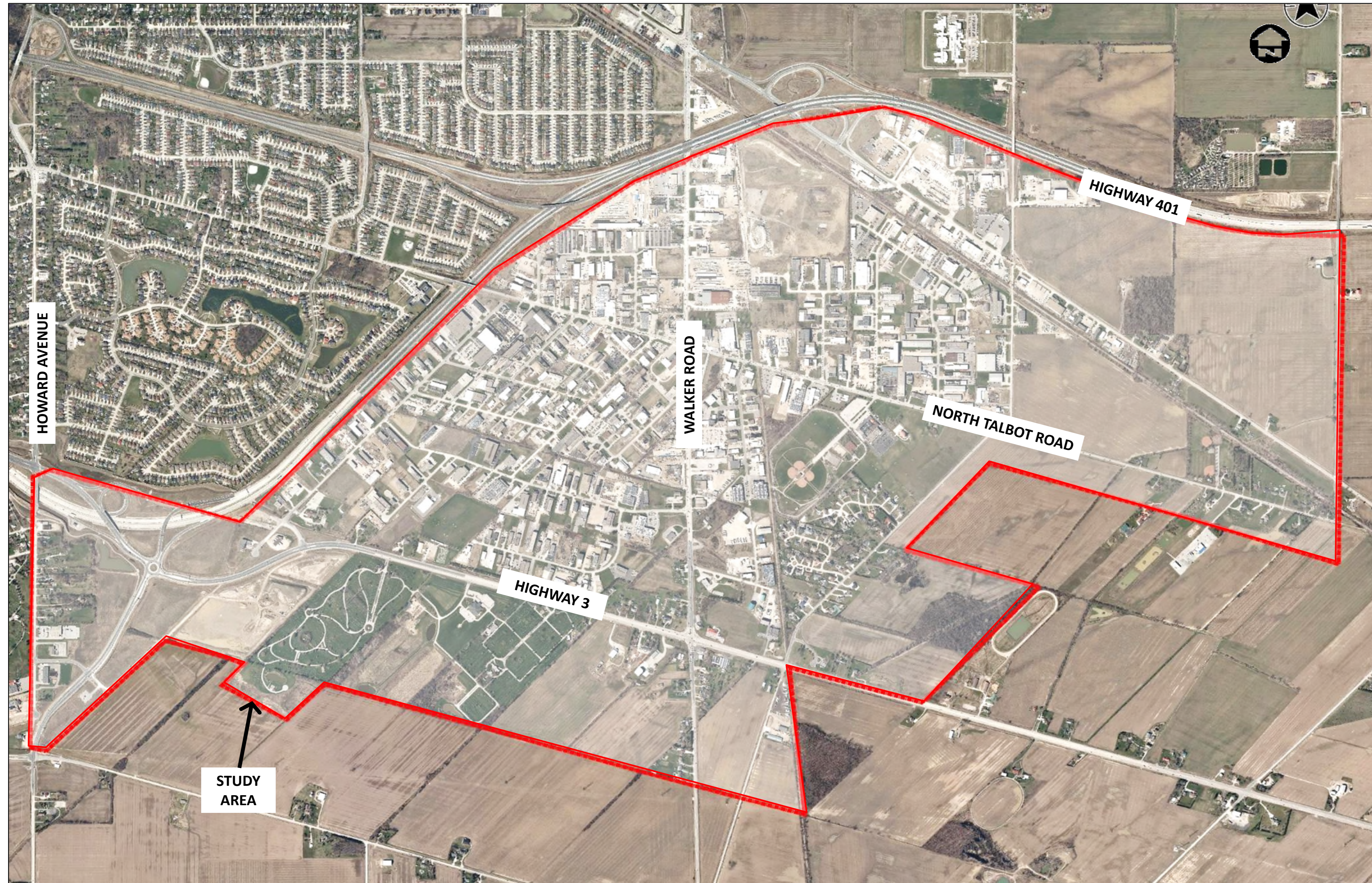
Oldcastle Stormwater Master Plan



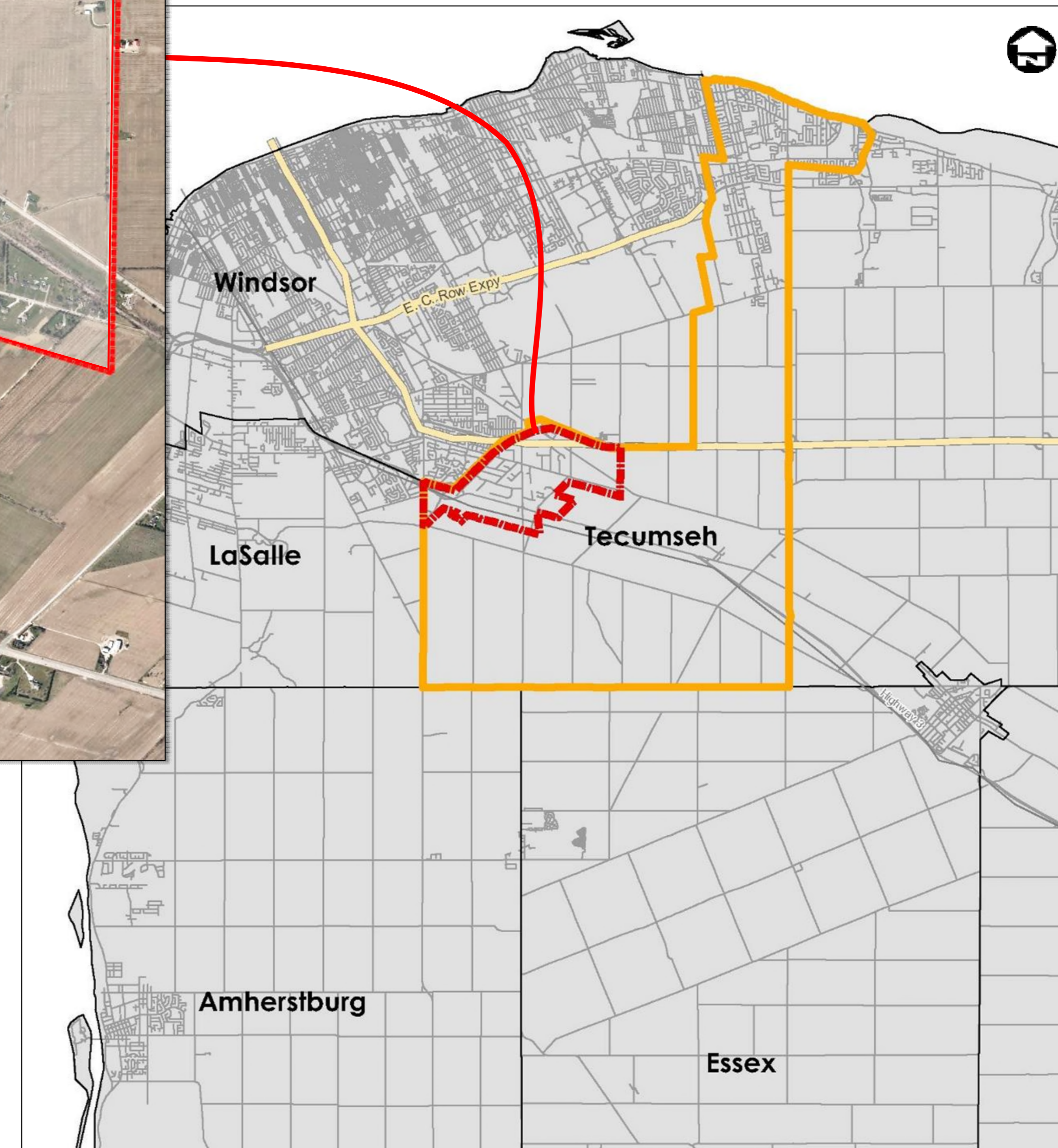
February 8, 2022

Presented by: Alain Michaud, P.Eng.
Landmark Engineers Inc.

The study area is located in the south west corner Town of Tecumseh commonly known as the Oldcastle Business Park. It is bound by Highway 401 along the north. Walker Road bisects the study area running north / south. North Talbot Road and Highway 3 area the main east / west roads.



OLDCASTLE, TECUMSEH



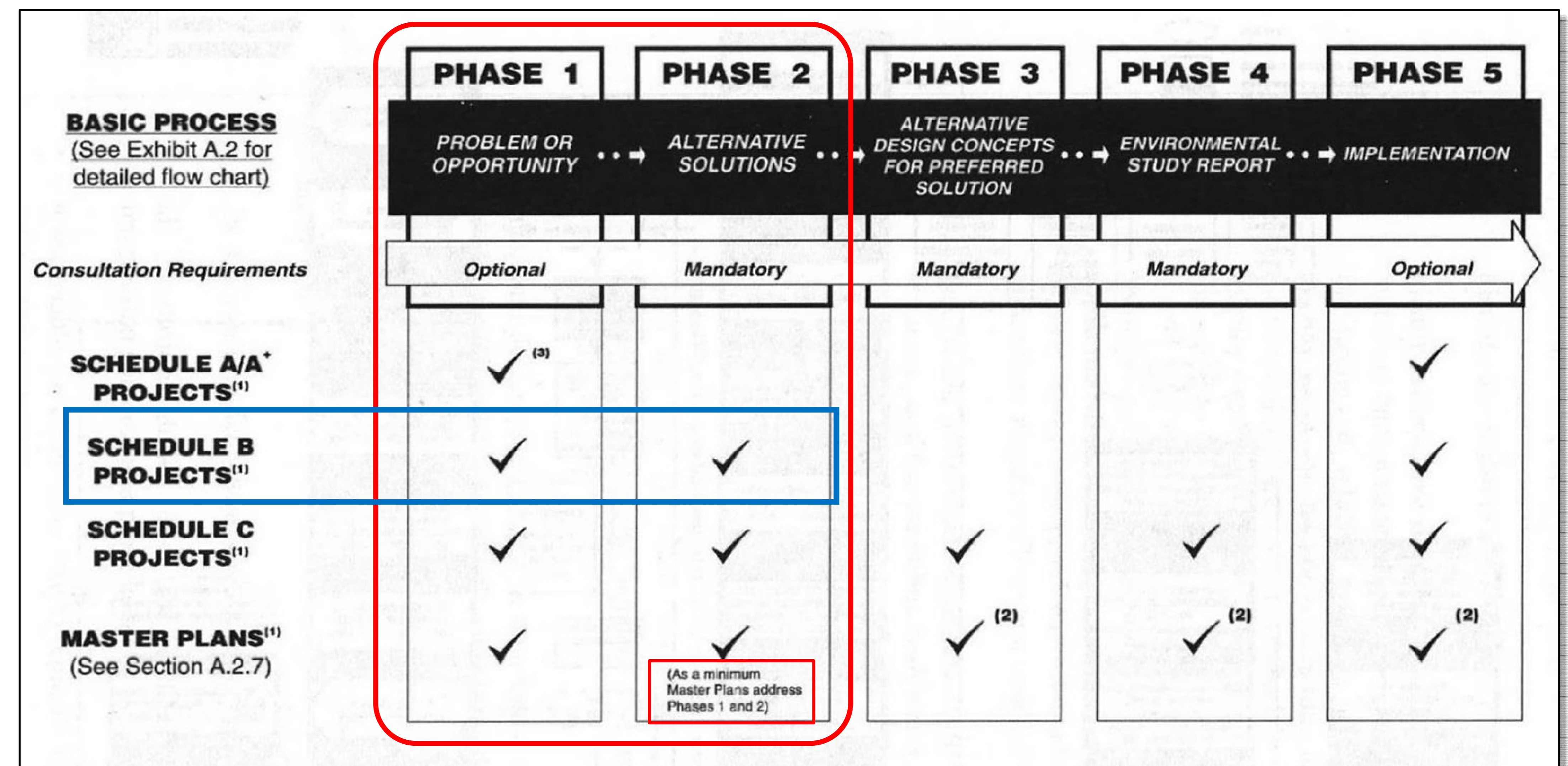
Problem / Opportunity Statement

“This study intends to evaluate the current stormwater system capacity of the Oldcastle Hamlet, identify the capacity needed for existing and projected future demands and develop a strategy to implement proposed improvements.”

Objectives

- Inventory, assess and confirm the capacity of the current stormwater system;
- Identify and define local drainage issues and areas of concern;
- Review and assess the stormwater needs of future development;
- Identify and assess potential improvements; and,
- Prepare a prioritized strategy for implementing the proposed improvements.

- This project followed the planning process set out in the Municipal Engineers Association’s *Municipal Class Environmental Assessment (Class EA)* for Master Plans (Approach #2).
- Master Plans are defined as: A long range plan which integrates infrastructure requirements for existing and future land use with environmental assessment principles. At a minimum, a Master Plan addresses Phases 1 and 2 of the Municipal Class EA process.
- Given the Master Plan will minimally cover Phases 1 and 2, all projects identified in the Master Plan that are ‘Schedule B’ will be considered complete through the EA Process and may proceed to construction. (Note: No ‘Schedule C’ projects were identified as a result of the preferred solution)
- For ‘Schedule B’ projects, only one point of Public Consultation is required. Given the nature of this project, however, the Project Team elected to increase the level of public consultation (over and above the minimum requirement), and host an extra Public Information Centre, creating a total of two Public Consultations for this project.

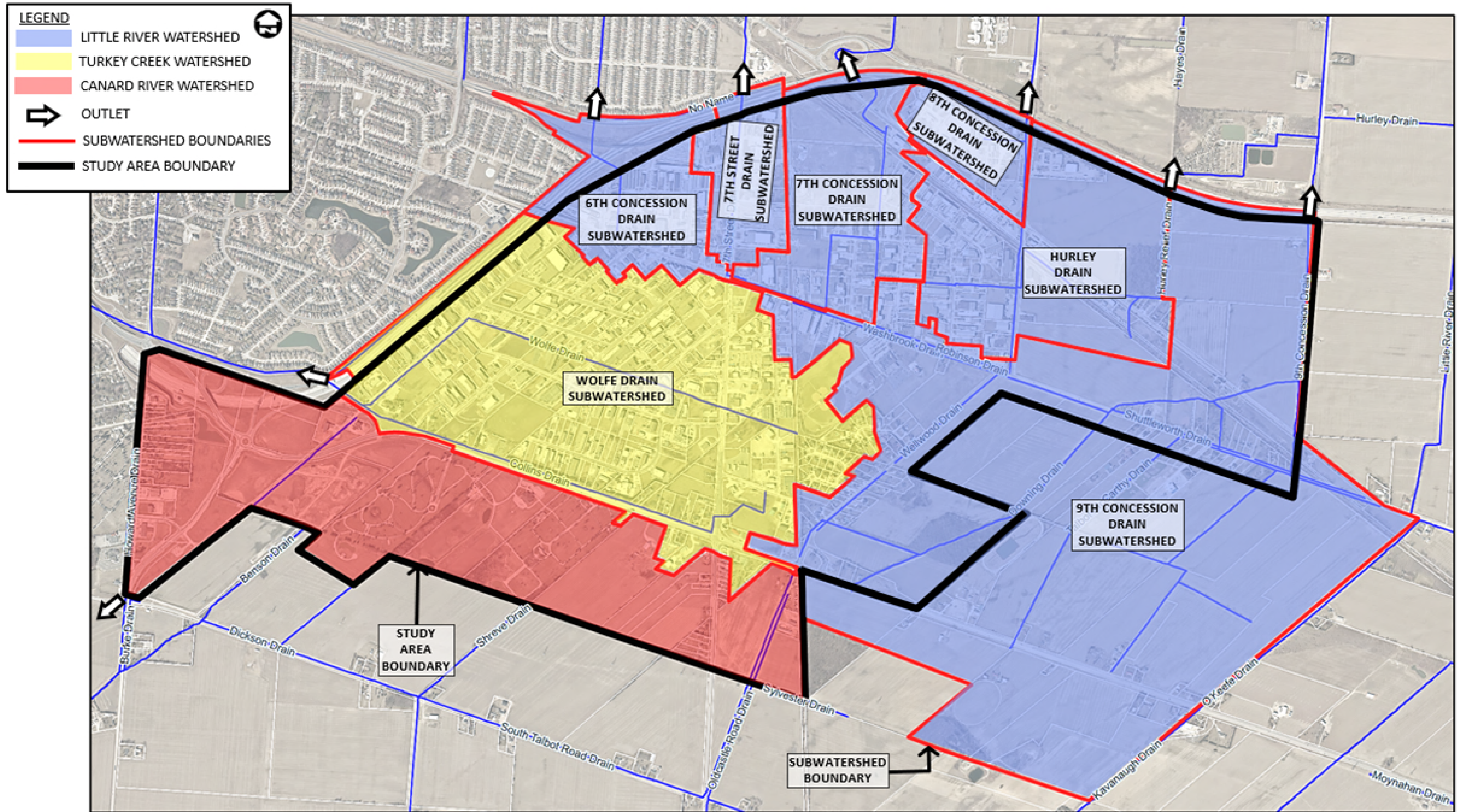


Two Public Drop In Centres (PICs) were held over the course of this Class Municipal EA:

- Drop-In Centre No. 1 – Thursday, October 17th, 2019 (2-5pm and 6-8pm)
- Drop-In Centre No. 2 – Wednesday, January 29th, 2020 (3-5pm and 6-8pm)

Notices and mail-outs were sent to key project stakeholders, the public and First Nations throughout the project to notify them of the PICs, project updates and provide opportunity for feedback.

- Notice of Intent & Invitation to Comment (PIC No. 1) – October 7, 2019;
- Information Package 1 (Sent to all First Nations to offer consultation) – November 21, 2019;
- Invitation to Comment (PIC No. 2) – January 13, 2020;
- Invitation to Comment (PIC No. 2 - First Nations) – January 13, 2020;
- Invitation to Comment (PIC No. 2) – Potentially affected property owners – January 21, 2020;
- Information Package 2 (Sent to all First Nations to offer consultation) – February 25, 2020;
- Notice regarding Wolfe Drain Improvements and Potential Property Impacts – October 27, 2021;
- Notice regarding Preferred Property Needs for Stormwater Storage Facility – October 28, 2021;
- Information Package 3 (Sent to all First Nations to offer consultation) – December 6, 2021;

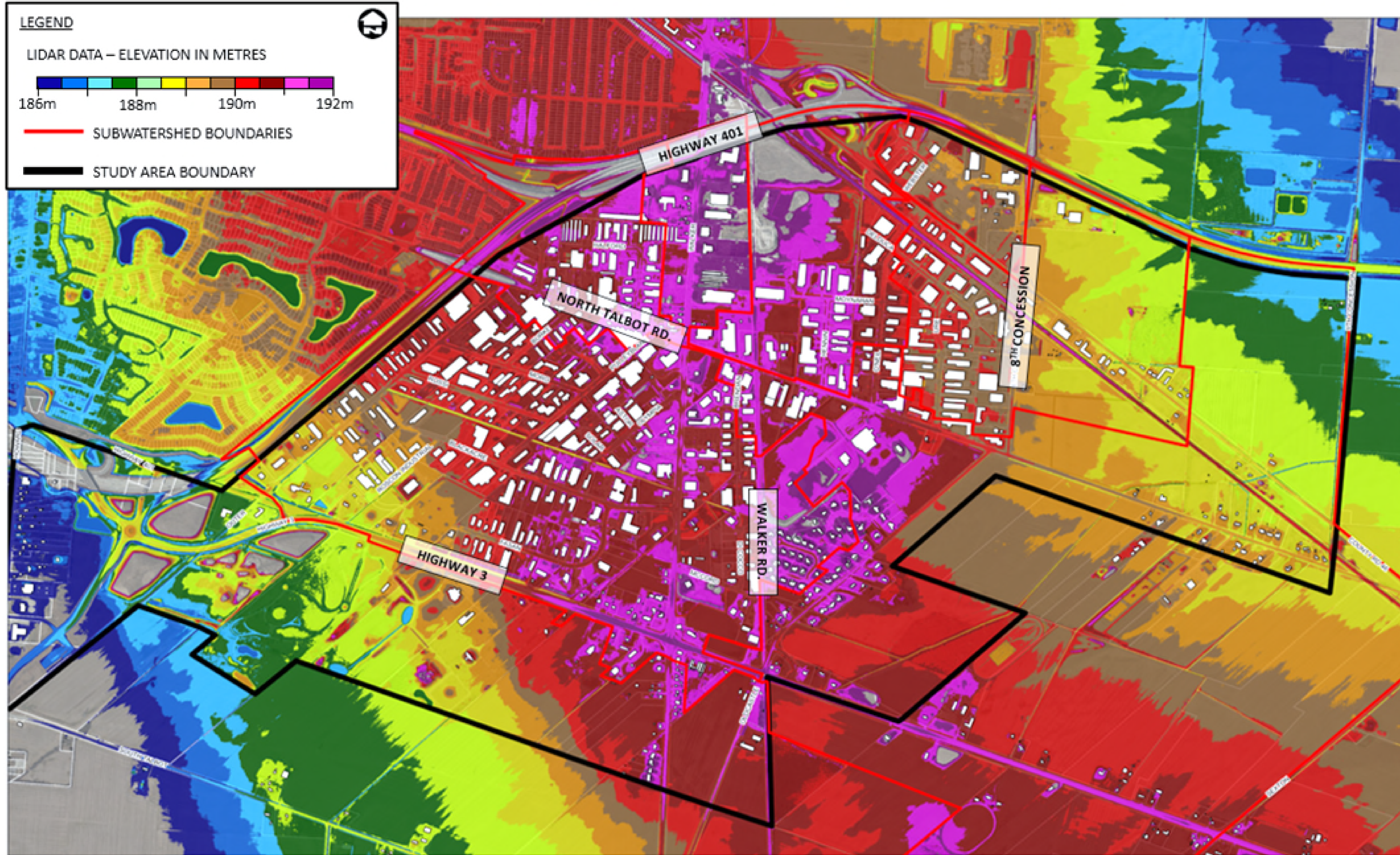


The current study area is located at the headwaters of three separate watersheds, with stormwater draining:

- westerly toward Turkey Creek;
- northerly and easterly toward Little River; and,
- southwesterly toward the Canard River.

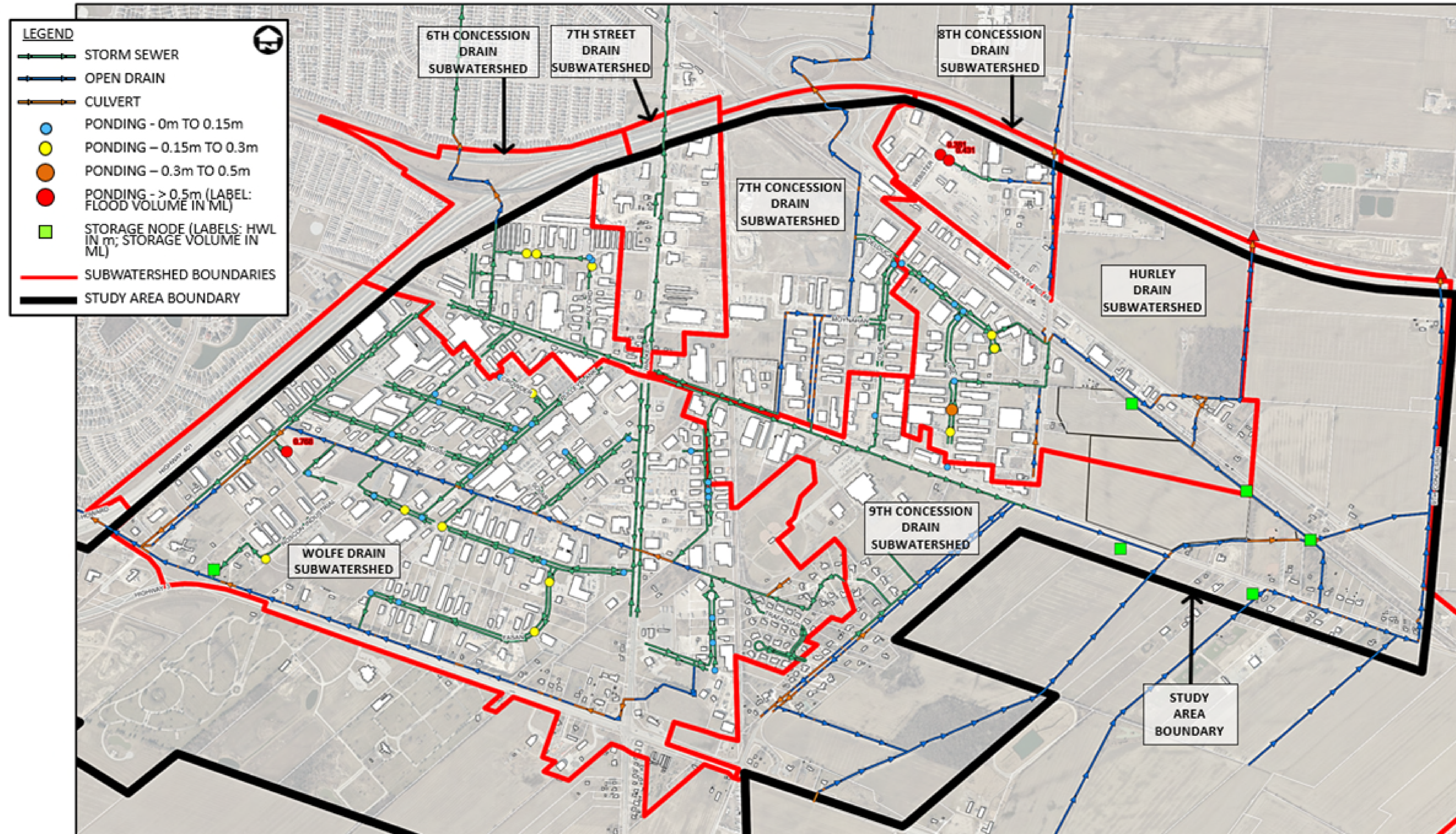
The drainage divide separating these three watersheds consists of a low ridge that generally runs along the Walker Road and Highway 3 rights-of-way.

Stormwater generated from within the study area is generally conveyed to the downstream drainage systems (located within the neighbouring municipalities of Windsor and Lasalle) via local storm sewers, roadside ditches, and open-channel drains.



In order to analyze and assess the performance of the existing (and future) drainage system, a detailed hydrologic and hydraulic model of the study area and its downstream receiving bodies using PCSWMM Professional 2D software. The model approach consisted of:

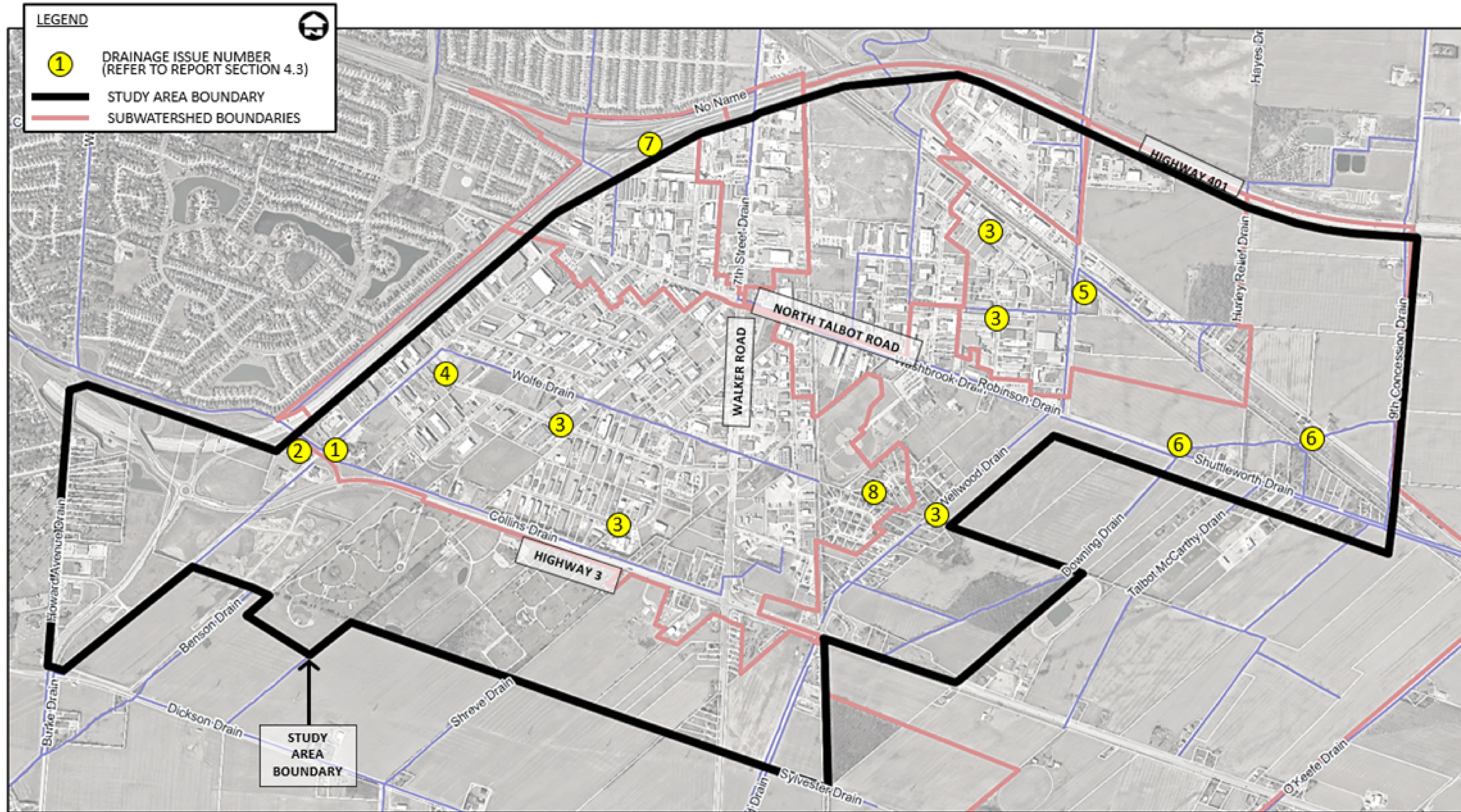
- A dual-drainage model (incorporating both the minor drainage system of sewers, drains & culverts and the major drainage system of overland surface flow routes);
- Calibration based on actual field observations from five separate flow-monitoring locations during six separate rainfall events over the course of the study - measuring both water levels and flow velocities; and,
- Assessment of performance under the standard design storms for 2-Year and 100-Year return periods.



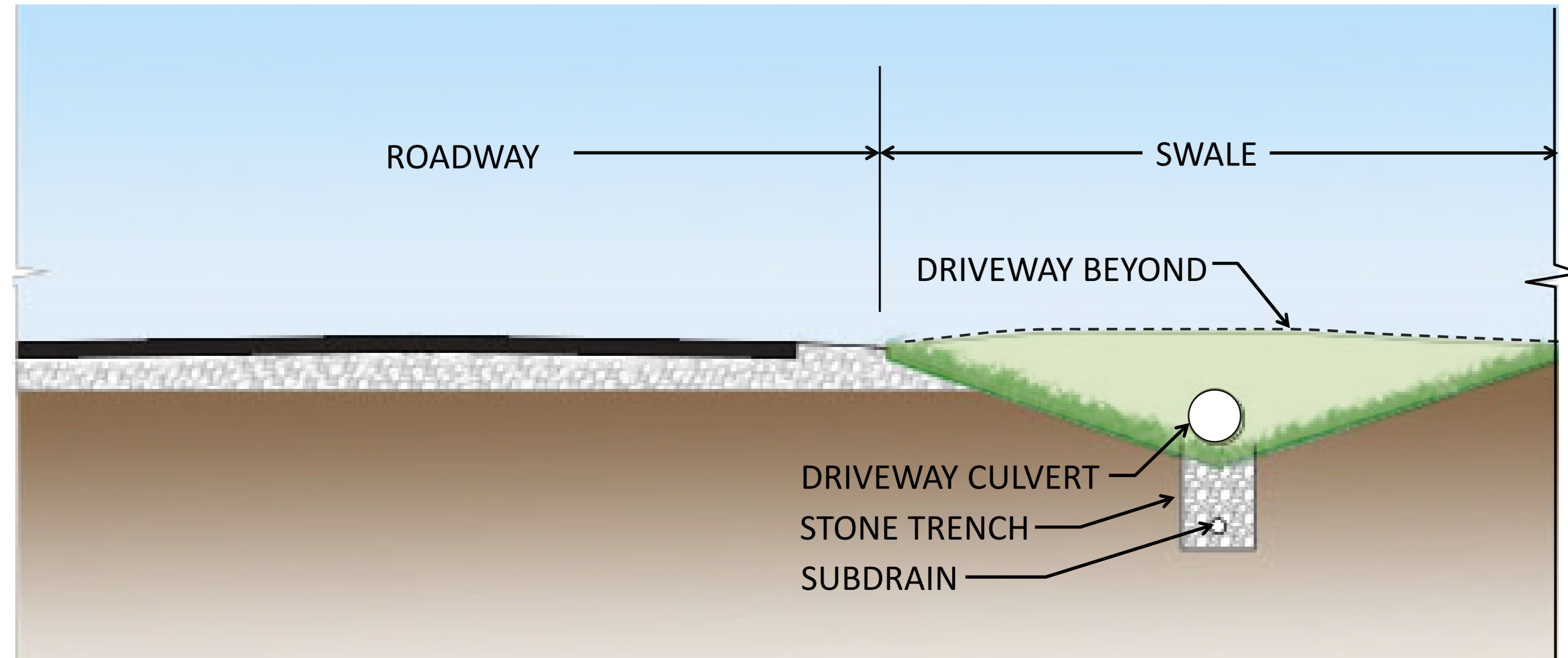
In identifying problems with the existing system, it was noted that the current drainage infrastructure within the study area was generally designed and constructed to a lesser standard than that which would be prescribed today. It is noted that:

- these systems can still provide an adequate level-of-service in conveying stormwater from most rainfall events;
- a full upgrade of the system to conform with modern standards would be highly impractical, disruptive and expensive;
- the model was first used to identify and address the parts of the existing stormwater system that are significantly undersized and have deficient drainage capacity – where frequent and prolonged nuisance ponding will typically result.

Based on our review of the drainage model, our observations in the field, and our consultations with both local residents and Town of Tecumseh maintenance staff, existing drainage problems were identified as summarized in the following slides:



- 1 Wolfe Drain culvert crossing is significantly undersized;
- 2 Wolfe Drain is experiencing notable downcutting and erosion from high flow velocities;
- 3 Local roadways, designed with subdrains, shallow ditches and culvert drainage systems, are experiencing nuisance ponding is frequent and prolonged.
- 4 Blackacre Drive has a low-lying road sag that is prone to deep ponding and restricted access as result of deficient drainage;
- 5 Hurley Relief Branch Drain along the north side of the abandoned railway is significantly plugged with sediment;
- 6 Washbrook Drain has a significant blockage (~0.5m depth) located immediately north of North Talbot Road. Heavy brush and sedimentation is evident along the drain from North Talbot Road to County Road 46;
- 7 6th Concession Drain enclosure between North Talbot Road and the Highway 401 corridor is a chronic maintenance issue with substantial sedimentation and standing water in the pipe;
- 8 Castlewood Court has been observed by residents to take a long time to drain. It is suspected that the existing enclosure from Castlewood to Wolfe Drain may be partially blocked.



SECTION - TYPICAL SWALE WITH DRIVEWAY CULVERT



SWALE WITH DRIVEWAY CULVERT (TYPICAL)

Existing Culvert Assessment

Good



Fair



Poor

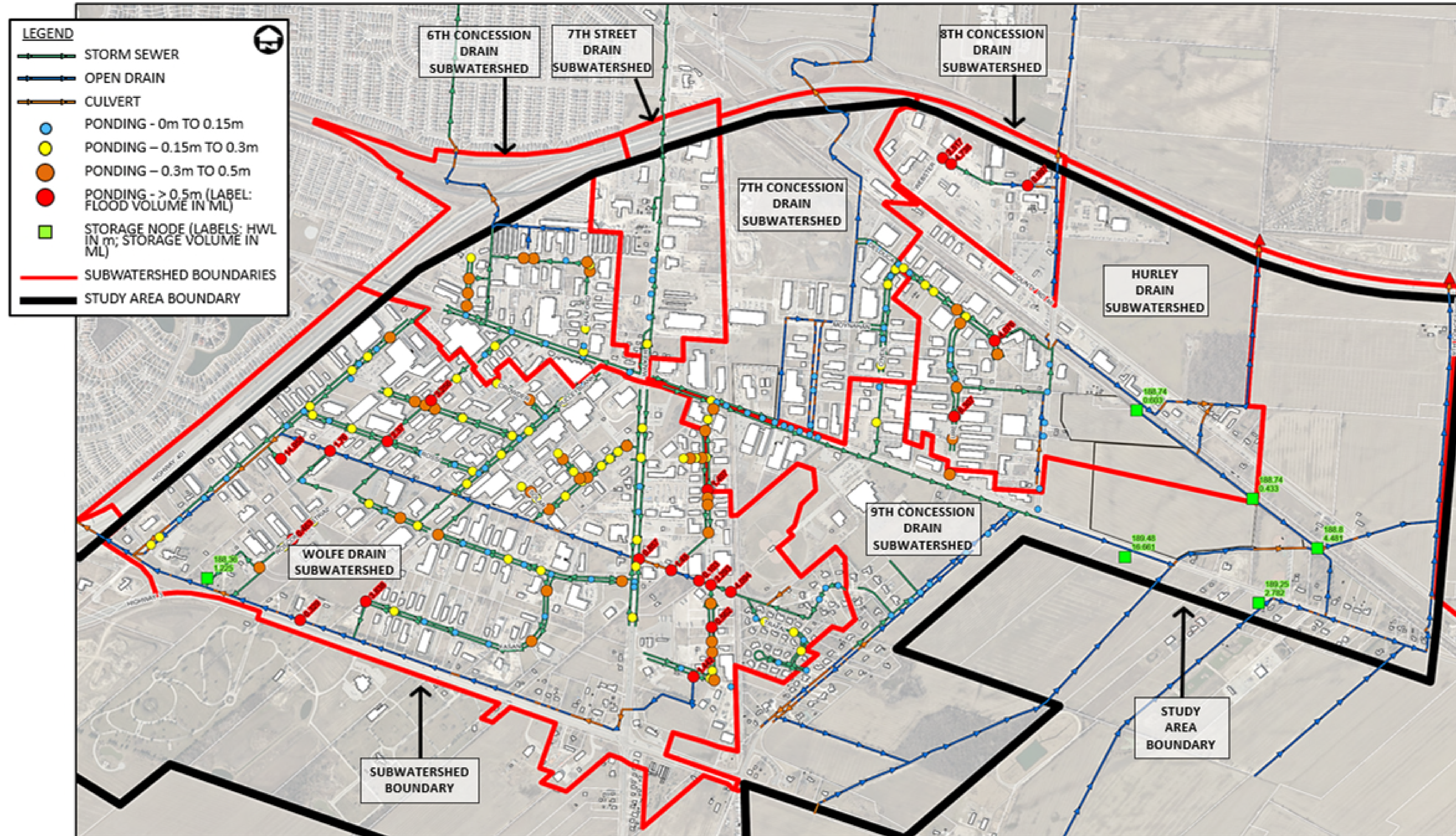


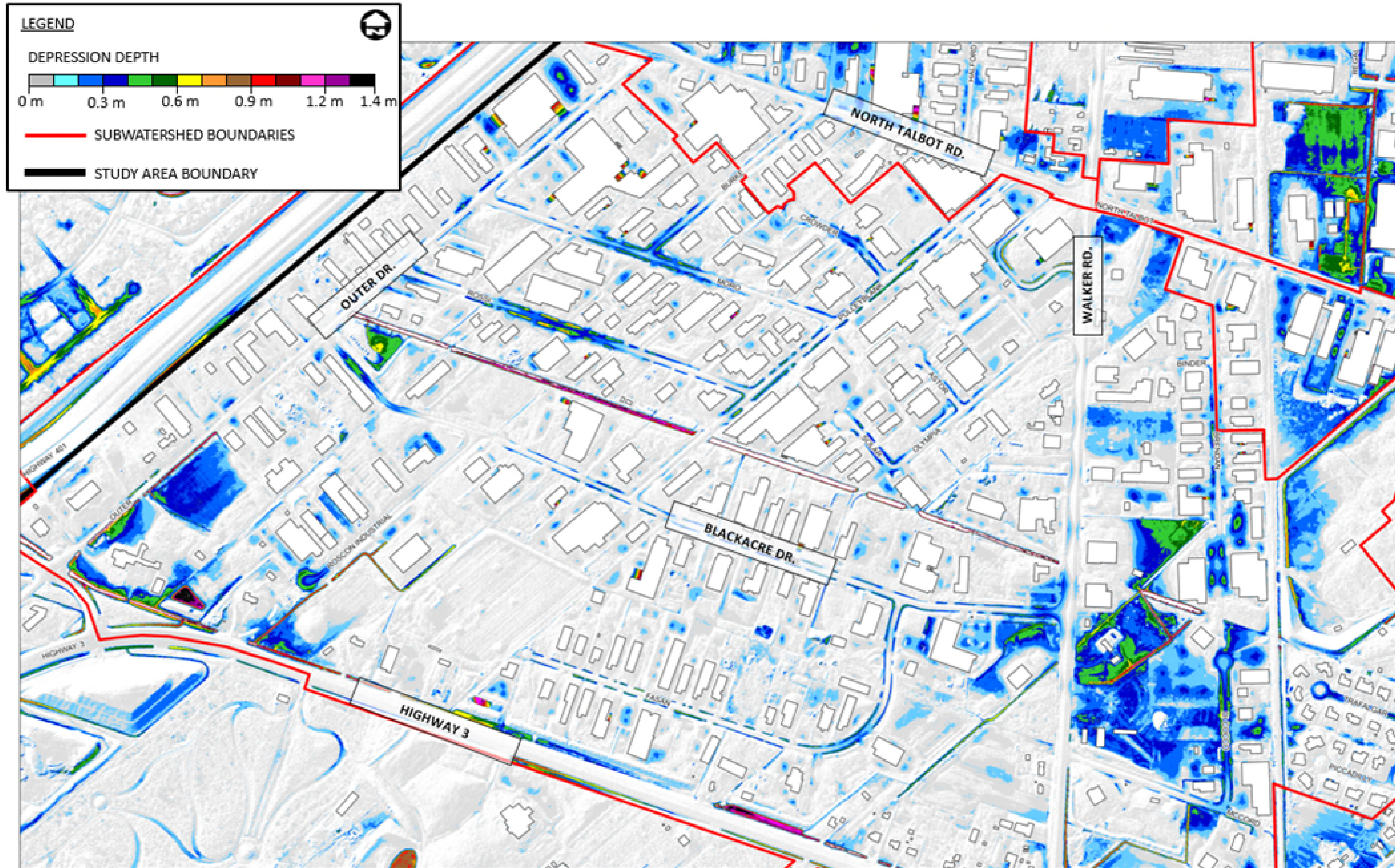
Very Poor

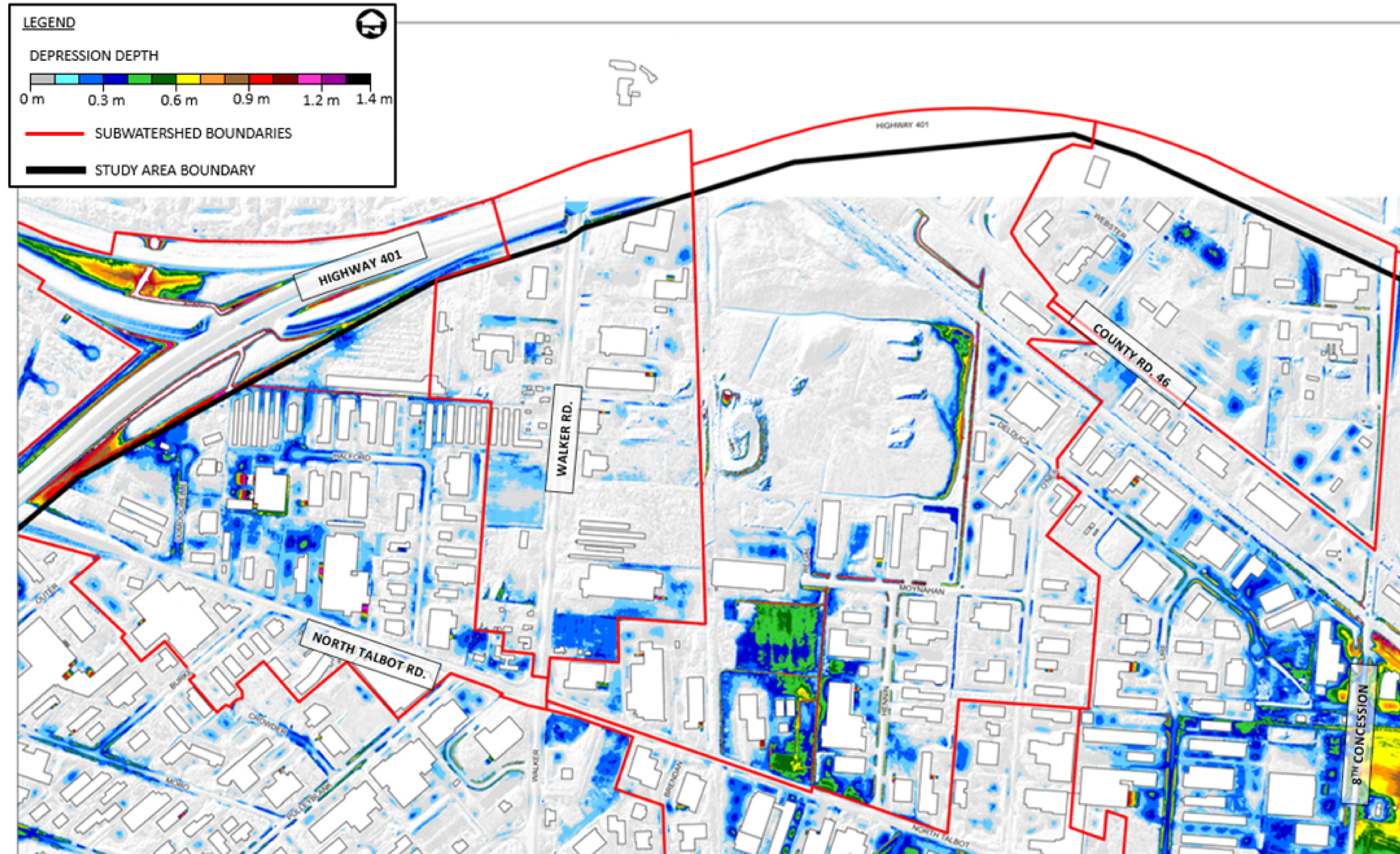


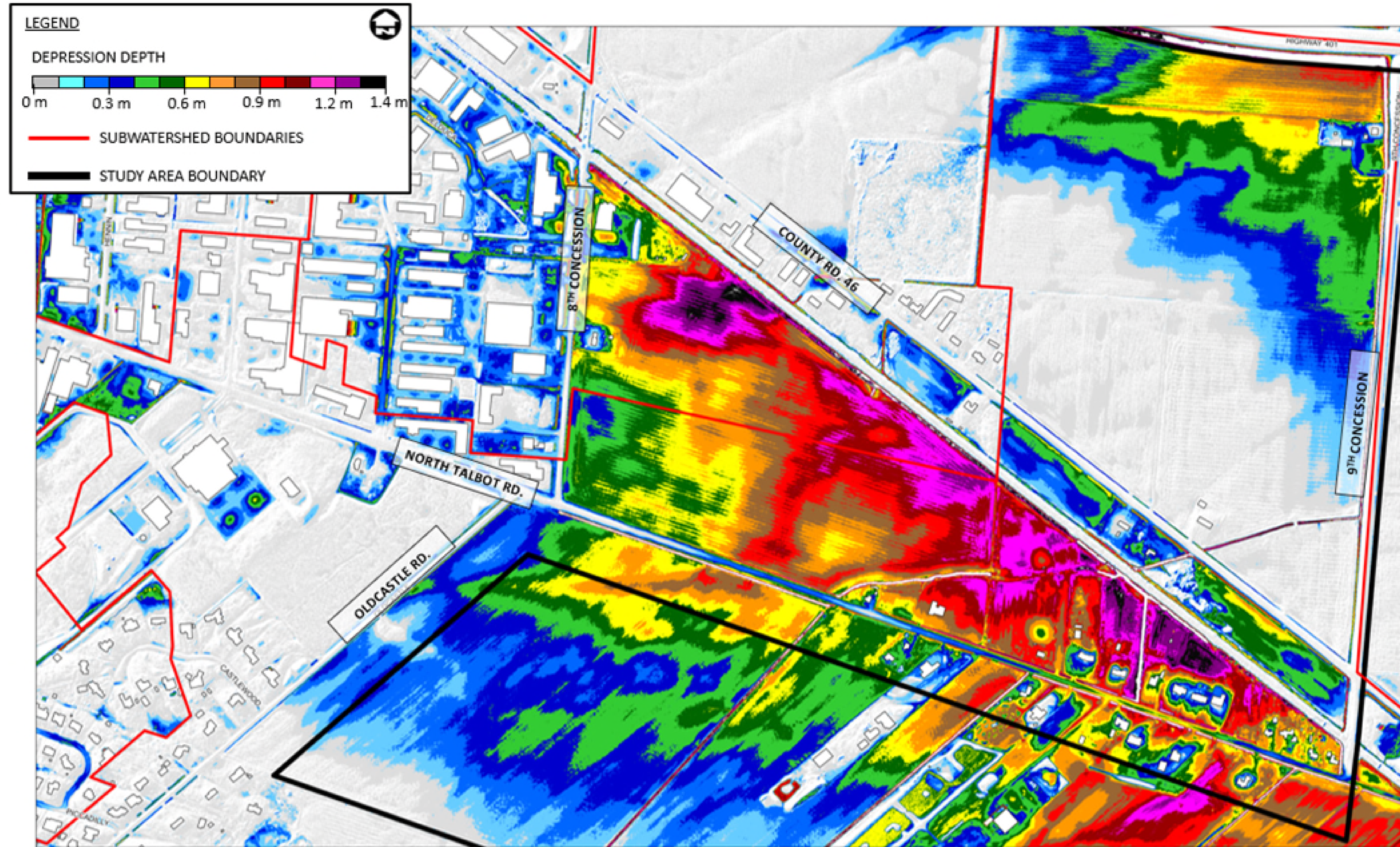
In addition, our review of the dual-drainage model for the study area revealed the following deficiencies with the major (i.e., overland) storm drainage system for conveying infrequent heavy storm events within the study area:

- Roadway sags lacking a proper overland flow outlet were identified along Fasan Drive, Blackacre Drive, Halford Drive, Webster Drive, Del Duca Drive, Ure Street, Dumouchelle Street, Moro Drive, Rossi Drive, Roscon Drive, Olympia Drive, Brendan Lane, and DiCocco Court;
- The existing Wolfe Drain along Outer Drive and east of Walker Road does not have sufficient capacity to convey stormwater from a 100-year flow event;
- The existing cross-section of the Washbrook Drain between North Talbot Road and 9th Concession Road does not have sufficient capacity to convey stormwater from a 100-year flow event; and,
- The existing roadside drain along North Talbot Road between Weston Park and 9th Concession Road does not have sufficient grade and is very slow to drain.







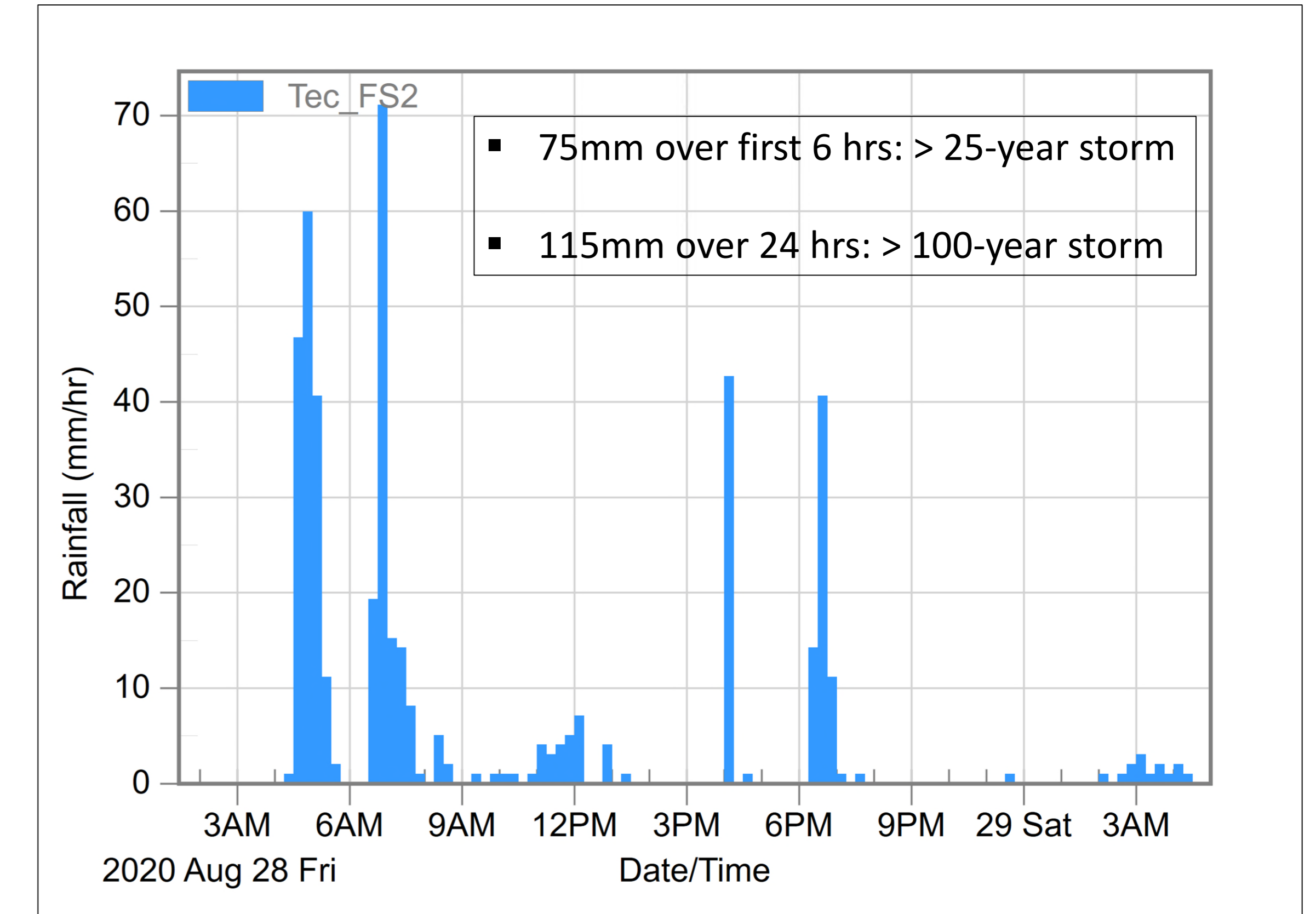




BLACKACRE DRIVE NEAR OUTER DRIVE (9:33AM)
EXCESSIVE PONDING AT ROADWAY SAG



ROSCON INDUSTRIAL DRIVE CUL-DE-SAC (9:56AM)
ROADSIDE PONDING – RECOMMEND OVERLAND RELIEF



OUTER DRIVE NEAR CONNECTOR ROAD (9:20AM)
WOLFE DRAIN OVERFLOW ONTO CHURCH PROPERTY



URE STREET (10:16AM)
ROADSIDE PONDING – POOR DRAINAGE

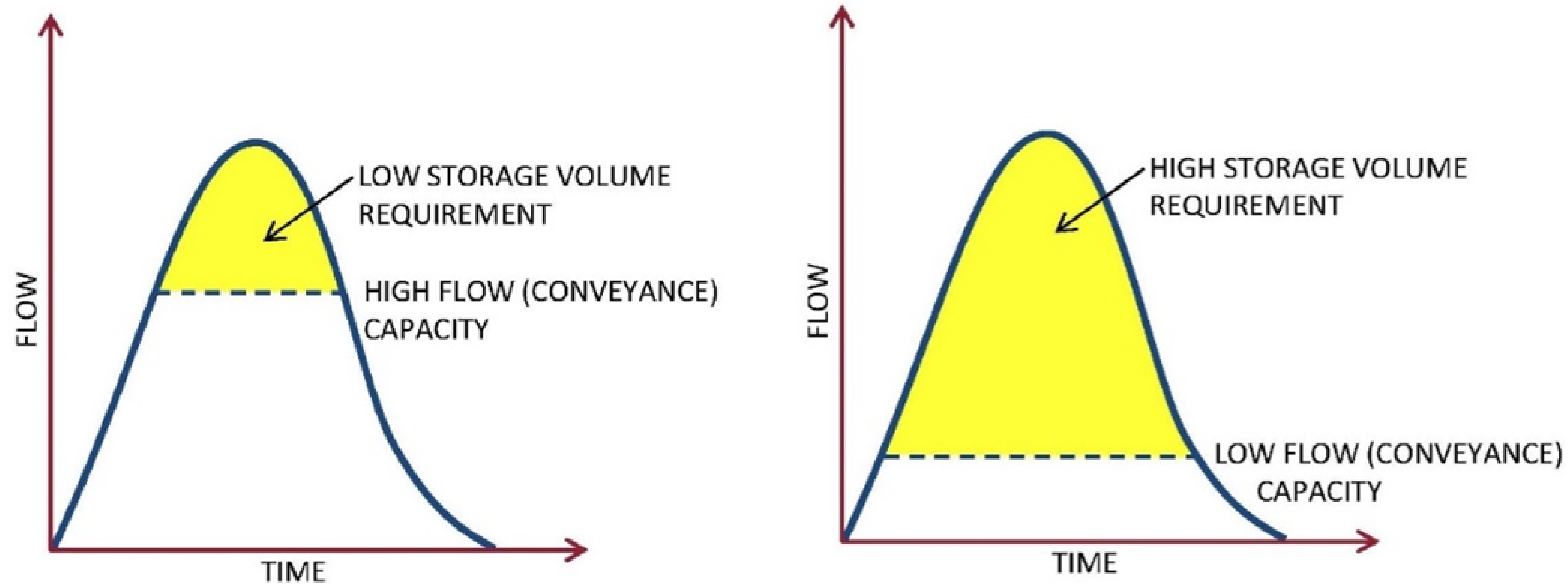


DEL DUCA DRIVE (10:18AM)
ROADSIDE PONDING – POOR DRAINAGE

There are two ways to improve the system's ability to handle stormwater:

- Increase conveyance (flow capacity); and/or,
- Increase storage

Relationship between conveyance and storage:



Constraint: The study area is limited as to how much flow it can direct to receiving drains in the neighbouring municipalities.

In order to address the known issues with the existing stormwater system, the following drainage improvements are recommended:

- New storm sewers along Fasan Drive, Blackacre Drive, Del Duca Drive, Ure Street, Castlewood Court and Oldcastle Road;
- Wolfe Drain improvements, including:
 - a new auxiliary Wolfe Drain, combined with storage via a new Blackacre Pond;
 - a 1200mm-diameter enclosure of the Wolfe Drain along Outer Drive;
 - replacement of the storm sewer immediately east of Walker Road; and,
 - remedial works along the steep segment of the Wolfe Drain between Outer Drive and Highway 401;
- Deepening of the Collins Drain from Outer Drive to the Fasan Drive storm sewer outlet, combined with storage via a new Collins Pond - including replacement of all affected culverts;
- Replace (enlarge) existing storm sewer outlets to Wolfe Drain for Moro Drive, Rossi Drive, Olympia Drive and Brendan Lane;
- Replace (enlarge) existing storm sewer outlet to 6th Concession Drain for Halford Drive;
- Replace and re-route the Hurley Relief Branch Drain enclosure to a new Hurley Pond located along the south side of the railway;

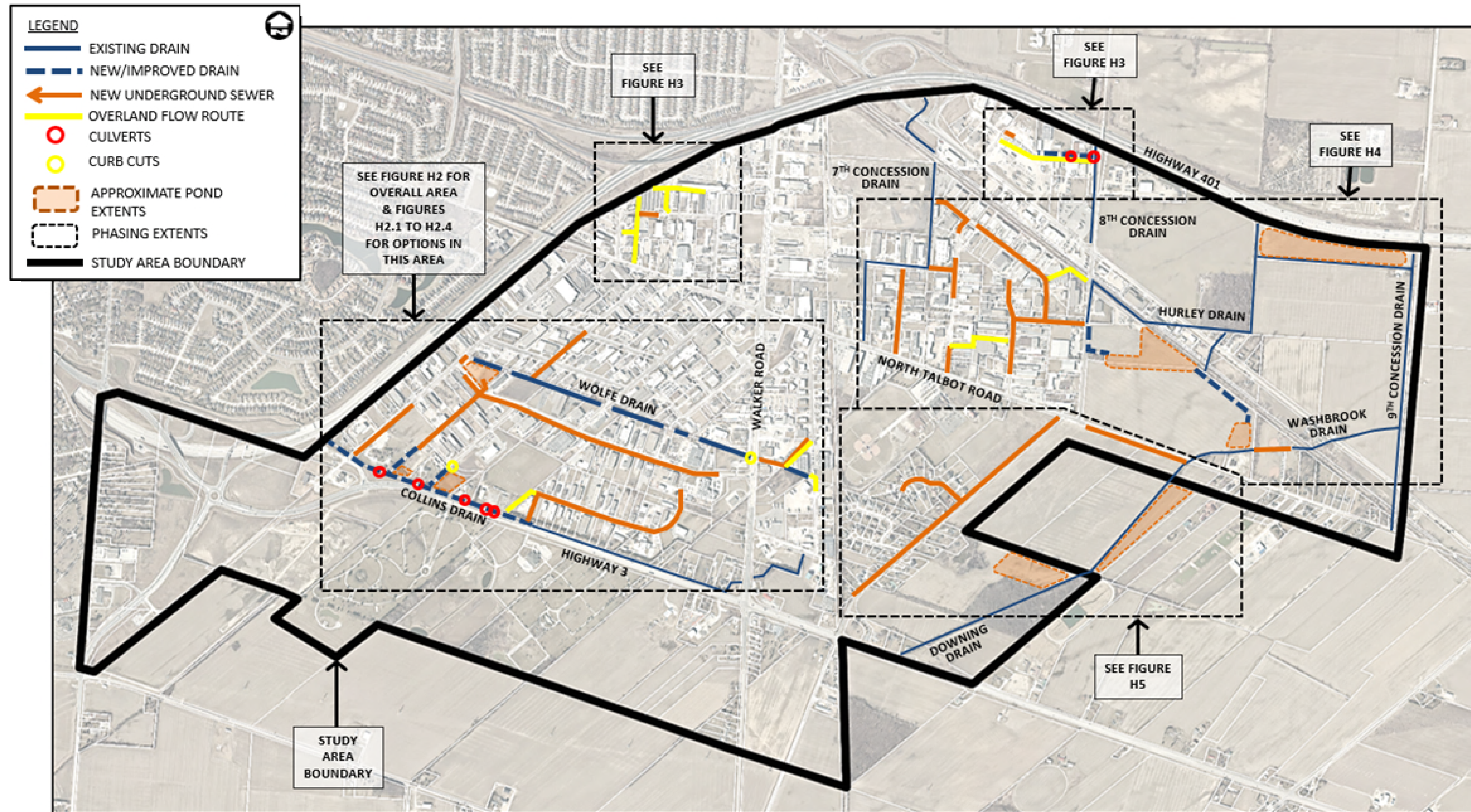
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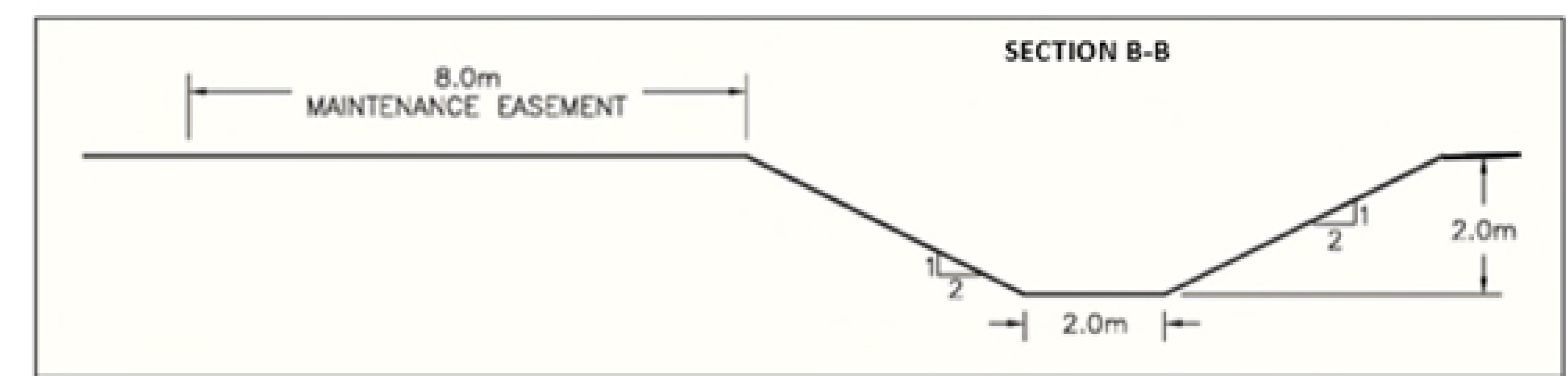
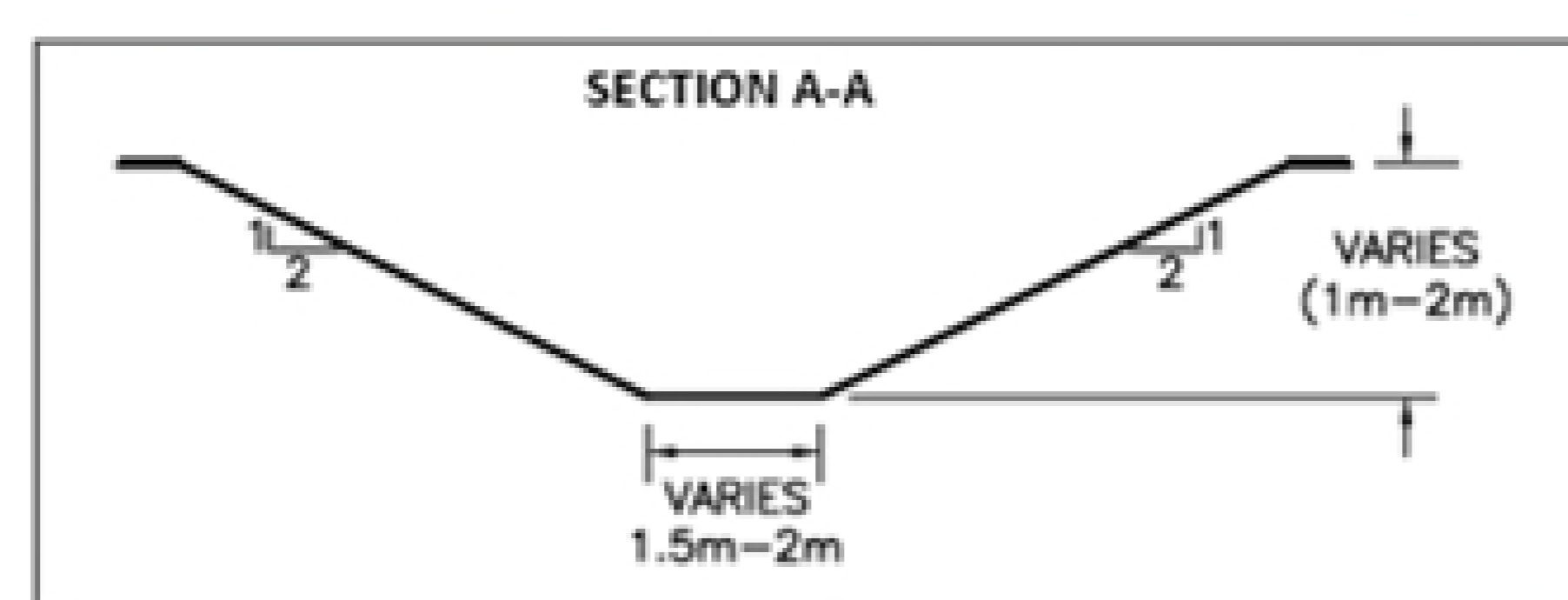
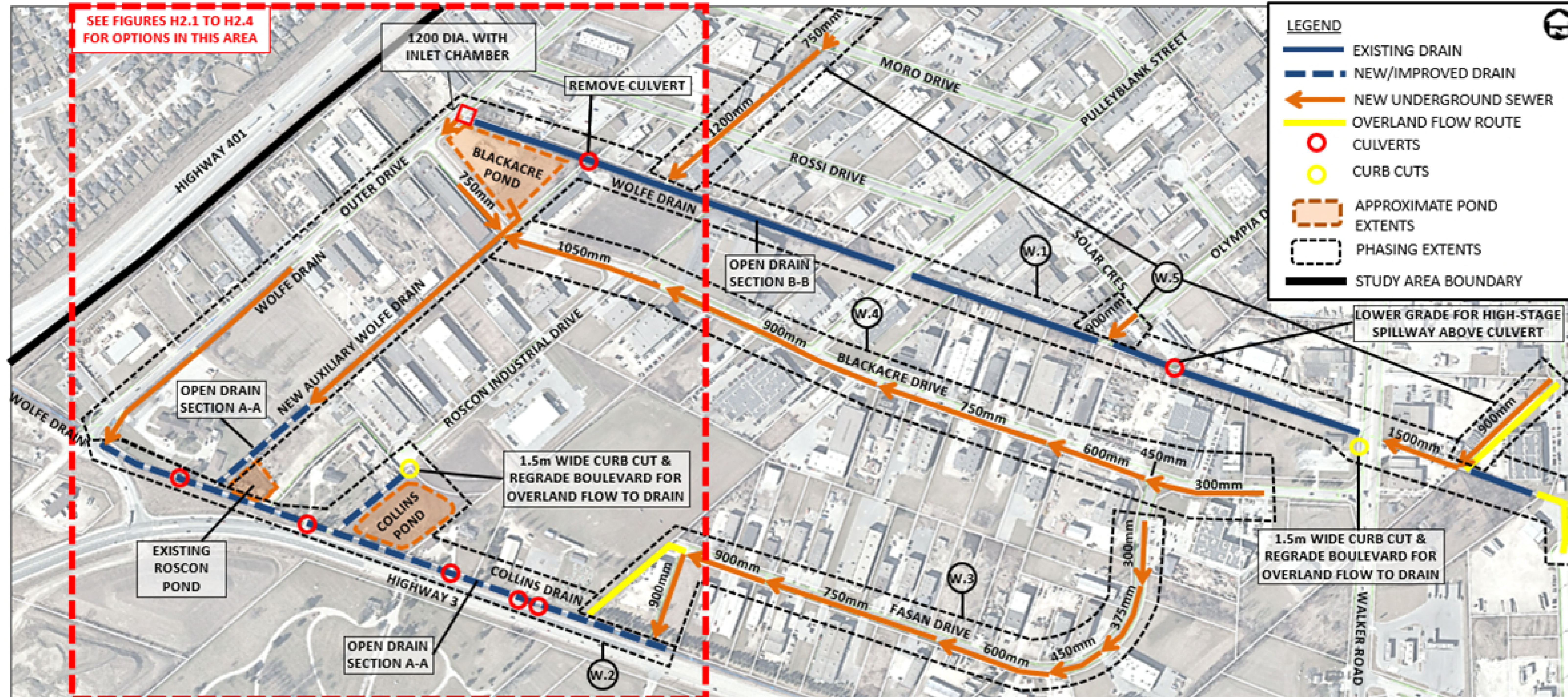
- Washbrook Drain improvements, including:
 - immediate maintenance to remove blockages; and,
 - replacement of culvert through Weston Park;

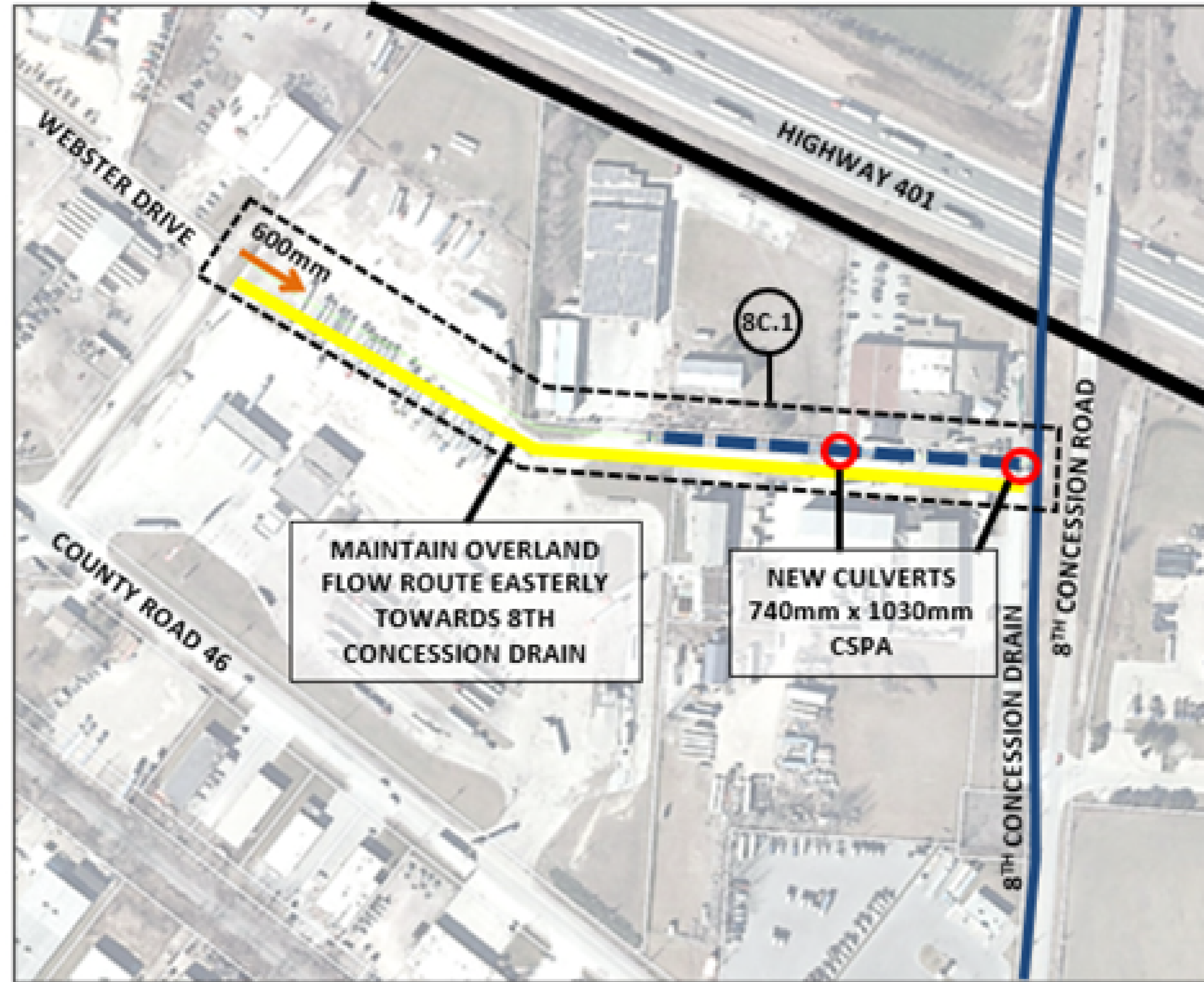
- New Washbrook-Downing Pond to attenuate flows from Washbrook Drain, immediately upstream of the North Talbot Road crossing;

- Demonte Drain improvements, including:
 - replacement of existing storm sewer and culverts;
 - cleaning of the open-channel segments of the drain, as required to provide a reasonable level of service; and,
 - the establishment of a new overland flow route toward the 8th Concession Drain;

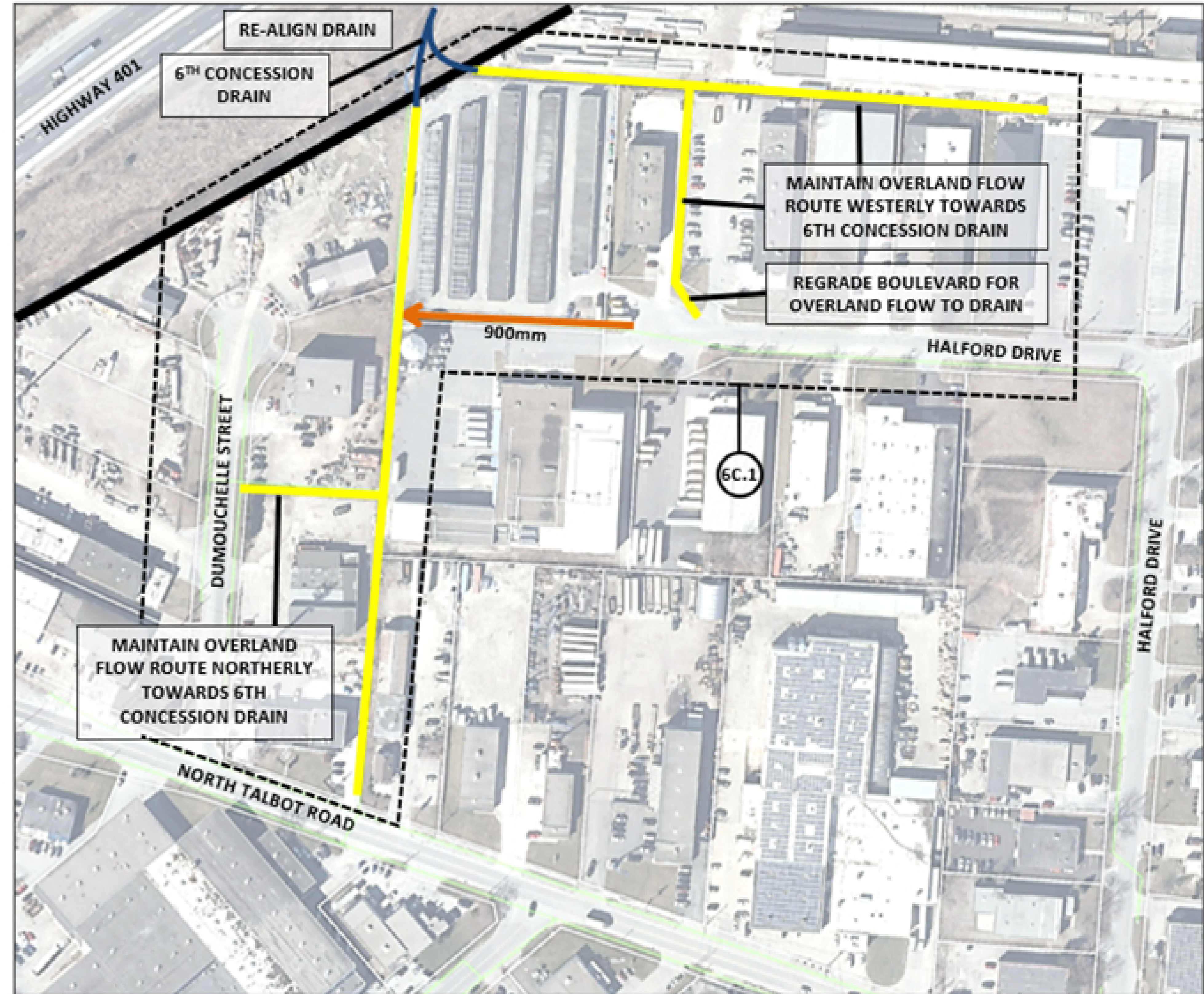
- Establish/secure/maintain overland flow routes at specific locations.







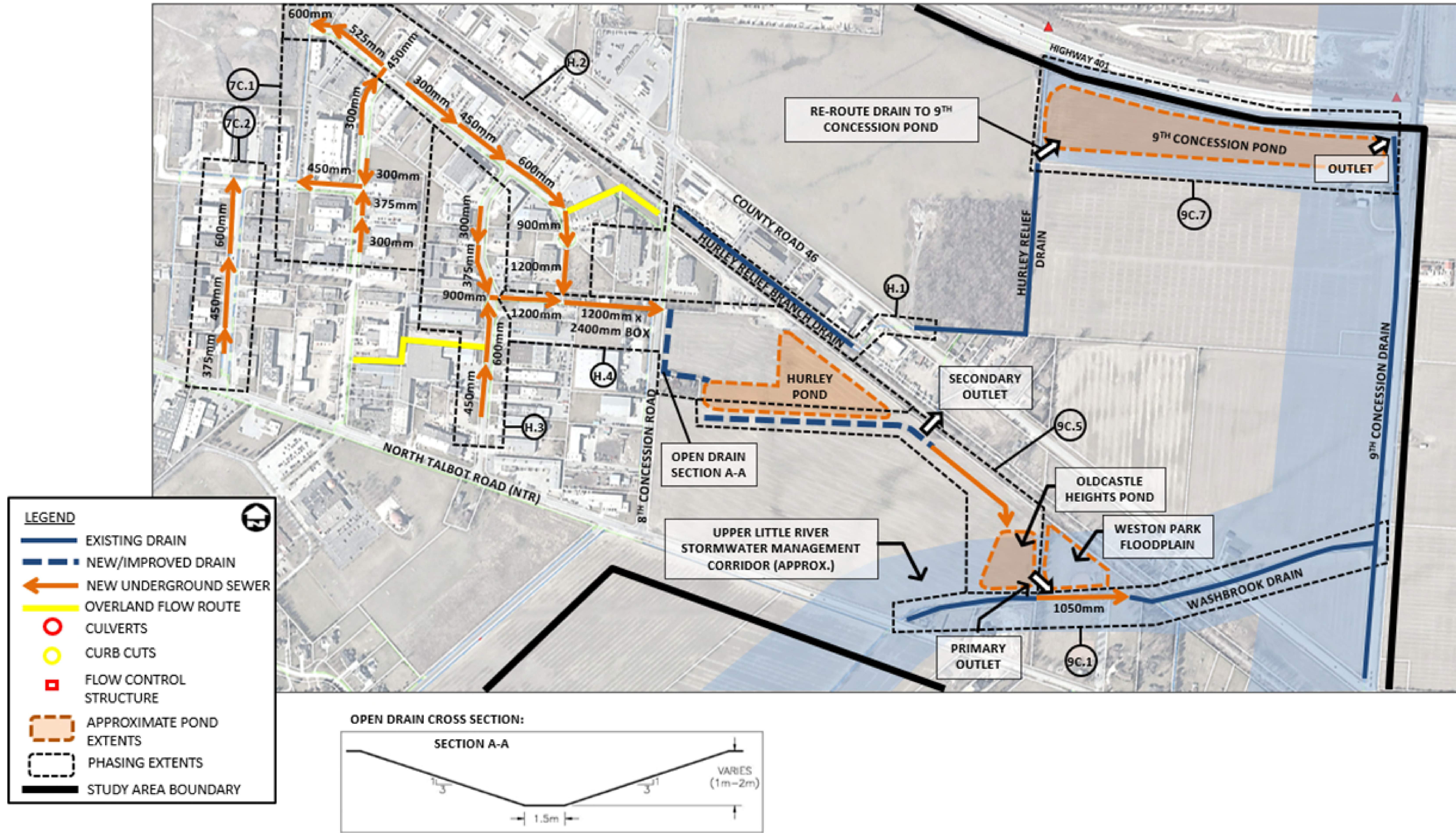
8TH CONCESSION DRAIN AREA

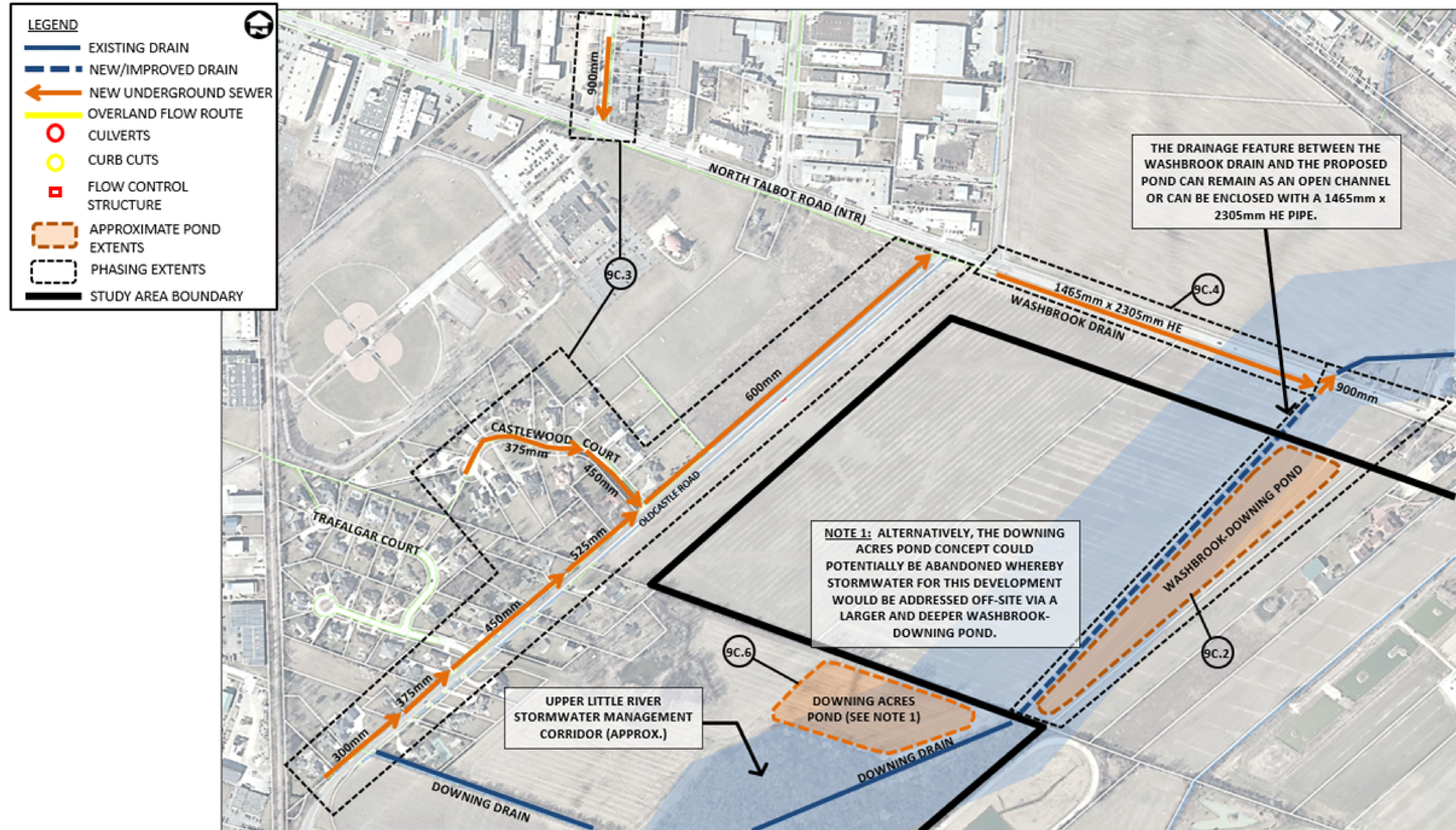


6TH CONCESSION DRAIN AREA

LEGEND

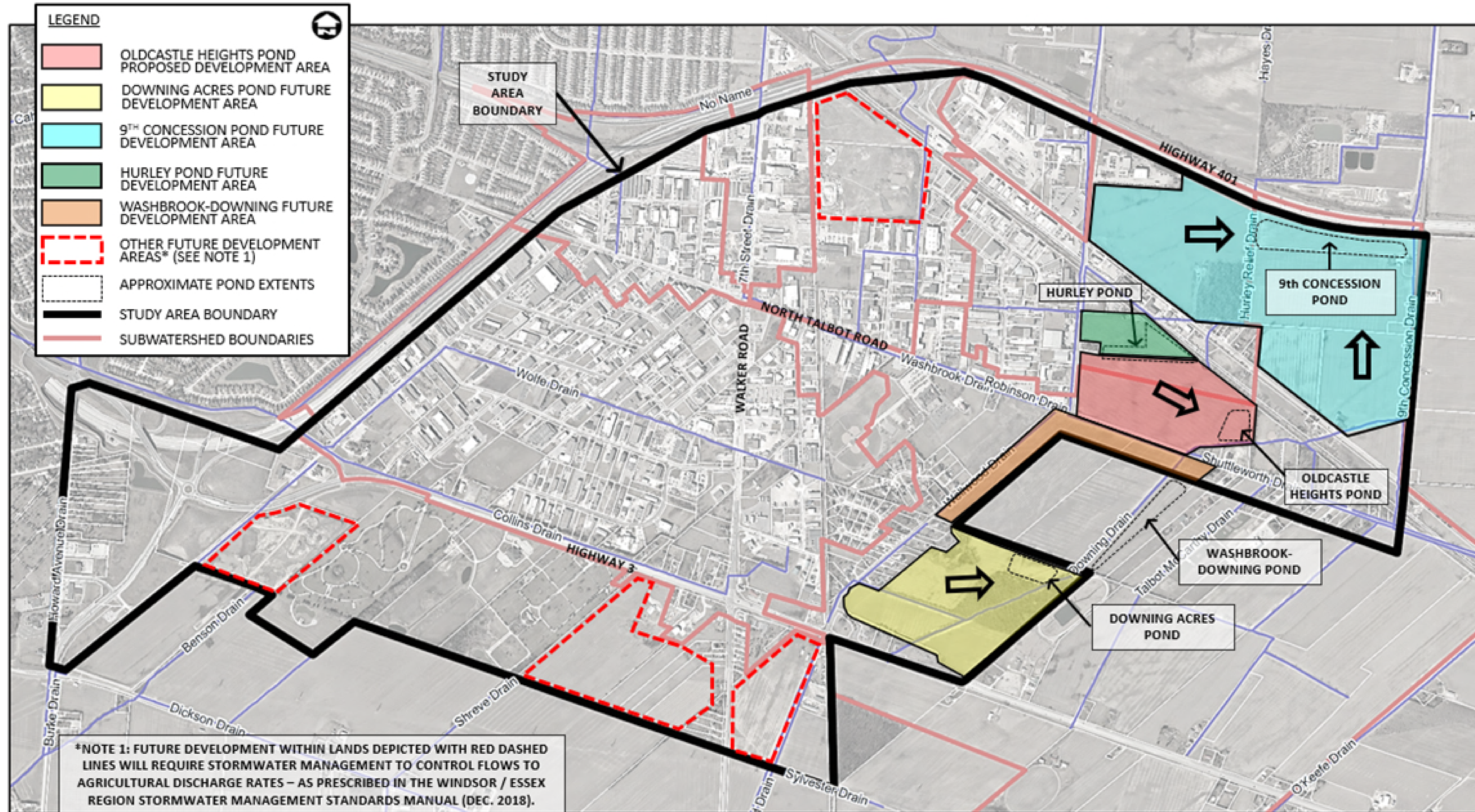
- EXISTING DRAIN
- NEW/IMPROVED DRAIN
- NEW UNDERGROUND SEWER
- OVERLAND FLOW ROUTE
- CULVERTS
- CURB CUTS
- FLOW CONTROL STRUCTURE
- APPROXIMATE POND EXTENTS
- PHASING EXTENTS
- STUDY AREA BOUNDARY





In order to address the stormwater management needs for future developments within the current study area, the stormwater ponds identified in the recommended improvements (i.e., the Oldcastle Heights Pond, the Downing Acres Pond, and the 9th Concession Pond) have all been sized to address both the stormwater quality and quantity requirements of the adjacent designated development blocks on a regional scale.

Other large undeveloped areas within the study area will require individual stormwater management plans to address these requirements as set out in the Windsor/Essex Region Stormwater Management Standards Manual (ERCA, 2018).



For new infill developments located within the existing built-up sections of the study area, a set of simplified stormwater management criteria have been established as part of the overall study. These criteria establish clear and concise storage volume and release rate requirements for 4 separate categories of infill developments (i.e., Normal; Exempt; Basic; and Enhanced), as described below:

Normal: This SWM level will generally apply as the default requirement for all infill development. To achieve this level, the following SWM criteria shall apply:

- Storage Volume Required (m^3/ha) = $3 \times (\text{Imp } \%) + 100$; per hectare of overall property area.
- Allowable Release Rate ($m^3/s/ha$) = 0.054; per hectare of overall property area.

Enhanced: This SWM level will generally apply to infill developments where the consequences of storage exceedance (and subsequent spills onto adjacent lands) would pose an unacceptable risk.

Basic: This SWM level will generally apply to infill development activities on properties with: existing imperviousness in excess of 60%; and, where a 'Normal' level of SWM is not practical (i.e., new storage cannot be reasonably accommodated via surface storage in parking lots and/or grassed depressions).

Exempt: This SWM level will generally apply to minor infill development activities such as: the paving of existing gravel parking lots; and small parking lot expansions and/or building additions of less than 5% of the total property area. In these instances, no specific SWM requirements are recommended, although the implementation of SWM measures should be encouraged to the extent that is practical.

Project ID	Project Description	Planning and Approval Process	Watershed	Subwatershed	Easement / Property Acquisitions	Timeframe ¹	Preliminary Budget Cost Estimate ²
W.1	Wolfe Drain Improvements	Drainage Act	Turkey Creek	Wolfe Drain	E8, E9, E14 and PA1	Short-Term	\$3,550,000
8C.1	Demonte Drain Improvements	Drainage Act	Little River	9th Conc. Drain	E15	Short-Term	\$100,000
H.1	Hurley Relief Branch Drain Improvements	Drainage Act	Little River	Hurley Drain	-	Short-Term	\$50,000
H.2	New Storm Sewer along Del Duca Drive	Schedule B	Little River	Hurley Drain	E16 and E17	Short-Term	\$1,000,000
H.3	New Storm Sewer along Ure Street	Schedule B	Little River	Hurley Drain	E19	Short-Term	\$450,000
9C.1	Washbrook Drain Improvements	Drainage Act	Little River	9th Conc. Drain	-	Short-Term	\$620,000
W.2	Collins Drain Improvements	Drainage Act	Turkey Creek	Wolfe Drain	E10 and PA2	Medium-Term	\$1,130,000
W.3	New Storm Sewer along Fasan Drive	Schedule B	Turkey Creek	Wolfe Drain	E11	Medium-Term	\$1,340,000
W.4	New Storm Sewer along Blackacre Drive	Schedule A	Turkey Creek	Wolfe Drain	-	Medium-Term	\$1,870,000
W.5	Replace Storm Outlets to Wolfe Drain	Schedule B	Turkey Creek	Wolfe Drain	E6, E7, E12 and E13	Medium-Term	\$1,080,000
6C.1	Replace Halford Drive Storm Outlet	Schedule B	Little River	6th Conc. Drain	E1 to E5	Medium-Term	\$60,000
7C.1	New Storm Sewers along O'Neil Dr. & Moyhanan St.	Schedule A	Little River	7th Conc. Drain	-	Medium-Term	\$230,000
H.4	Enlarge & Re-route Hurley Drain to New Hurley Pond	Schedule B	Little River	Hurley Drain	E19, E20 and PA4	Medium-Term	\$3,320,000
9C.2	New Washbrook-Downing Pond	Schedule B	Little River	9th Conc. Drain	PA3	Medium-Term	\$2,200,000
7C.2	New Storm Sewer along Hennin Street	Schedule A	Little River	7th Conc. Drain	-	Long-Term	\$370,000
9C.3	New Storm Sewer along Oldcastle Road, Castlewood Court and O'Neil Drive	Schedule A	Little River	9th Conc. Drain	-	Long-Term	\$1,880,000
9C.4	Extension of Washbrook Drain Enclosure	Drainage Act	Little River	9th Conc. Drain	-	Long-Term	\$4,170,000
9C.5	Oldcastle Heights Pond	Schedule B	Little River	9th Conc. Drain	-	-	\$1,310,000
9C.6	Downing Acres Pond	Schedule B	Little River	9th Conc. Drain	-	-	\$1,630,000
9C.7	9th Concession Pond	Schedule B	Little River	9th Conc. Drain	PA5	-	\$5,660,000

¹ Recommended Timeframe: Short-Term = 1-2 years; Medium-Term = within 10 years; Long-Term = within 20 years.

² Preliminary Budget Costs for Section W: Wolfe Drain Subwatershed Improvement Costs are based on Option 1b.

Short-Term Improvements = \$5.8 Million
Medium-Term Improvements = \$11.2 Million
Long-Term Improvements = \$6.4 Million
Development-Driven SWM = \$8.6 Million

TOTAL = \$32.0 Million

